ADST – Robot basics

Early Years Digital Technology

Session 1

Learning intention and success indicator for students
• *I can correctly identify and use the language of forward, backward, left, right and go.*

Activity

- Display the 'I can' statements around the classroom and make students aware of them (refer to Appendix 2).
- Begin with explicit instruction of directional language and have students physically move themselves left, right, forwards and backwards, in preparation for programming the robot.
- Have students provide directional instructions to their peers and practise the following movements: forwards, backwards, turn left, turn right, and go.
- Introduce the term 'algorithm' and explain the concept as a sequence of steps of decisions required to solve a problem. Explore different uses for algorithms in real life, such as operating a computer to write an email, or following a series of steps in the method of a recipe.
- Provide explicit teaching of how to give directional instructions, by using the laminated *Programming command cards* to show the command/s to students and giving verbal instructions at the same time. This will assist students with connecting the physical movement with the action of the card. For example, ask students to:
    - Take one step forward, turn right (using one Forward command card and one Turn right command card)
    - Turn left and go two steps forward (using one Turn left command card and two Forward command cards)
- Following guided instruction from the teacher, pair students together and ask students to select a series of commands, and give the instructions/commands to their partner to complete the physical movements.

Session 2

Learning intention and success indicator for students
• *I can design a simple sequence of steps (algorithm) to solve the problem of getting the bee to the flower.*

- After students have experimented with creating different commands, introduce the problem to be solved – 'How can you get the bee to the flower?' Refer to *Bee to flower* student worksheet (Appendix 1).
- Ask students to cut out the Programming command cards and place relevant Programming command cards on the *Bee to flower* student worksheet to design a solution of commands to program the robot to travel from the start to the end point so the bee can get to the flower. Discuss the importance of using patterns to create an algorithm with the students. Do not get the students to stick the Programming command cards on the worksheet at this stage.
- Use the masking tape to create a grid map (15 cm x 15 cm squares) on the classroom floor or create a grid map chart. Get students to use the Blue-Bot fake bot cards to trial and debug their sequence of steps (algorithm) according to their *Bee to flower* student worksheet. If the sequence of steps does not work, have students repeat the process and manipulate the Programming command cards on the worksheet and then try again with the Blue-Bot fake bot and the grid map.
- After students have successfully trialled their sequence of steps, ask them to stick their selected Programming command cards onto the *Bee to flower* student worksheet.
- Ask the students to use the grid (either on the classroom floor or on their worksheet) to identify patterns in their algorithms.
- Get students to complete a peer review on directional language (refer to Appendix 3).
- Teacher could also ask students to reflect on testing to debug by asking the following questions:
    - What errors did you have to fix?
    - How did you fix the errors?
    - Who was responsible for fixing the errors? You or your partner?

Session 3

Learning intention and success indicators for students
• *I can test and debug program a robot to successfully travel from the bee to the flower*.

- Ask students to use the robot and the grid map on the classroom floor to test and evaluate their chosen programming commands to determine if they have solved the problem of getting the bee to the flower.
- If students encounter errors, direct them back to checking their sequence of steps (algorithms) according to their *Bee to flower* student worksheet.
- Compare the different algorithms created by students, discussing the different ways students solved the problem. Discuss ways that the problem was solved using the:
    - least amount of commands
    - most amount of commands
    - shortest path
    - longest path
- Ask students to write up a self-reflection which will give evidence for assessment. Guiding question could include:
    - How many steps did it take to move the bee to the flower? Could you have done this differently?
    - Did you use a pattern when the robot travelled from the bee to the flower?
    - Did you use all the directional language? i.e. left, right, forward, backward and go?
    - Can you think when you might need to move ‘backwards’?
    - Why did you have to use the instruction ‘go’ when programming the robot?
    - Why was instruction ‘stop’ not used when programming the robot?

Appendix 2

'I can' statements to display around classroom

- I can correctly identify and use the language of forward, backward, left, and right.
- I can design a simple sequence of steps (algorithm) to solve the problem of getting the bee to the flower.
- I can test to debug a program so the robot can successfully travel from the bee to the flower

Appendix 3

Peer review: Directional language

How well could your partner do the following tasks?

Complete the table below by ticking the number of smiley faces that you think best describes how your partner did each task.

Tasks	☺	☺☺	☺☺☺
Move forwards and backwards			
Move left and right			
Provide good instructions when testing the algorithm			
Debug a program so the Blue-Bot fake bot could travel from the bee to the flower			
Identify a pattern in their algorithm			

Appendix 4

Rubric for teacher: *Robot basics* learning sequence

Elements from achievement standards	Indicators		☺	☺☺	☺☺☺	☺☺☺☺
Demonstrates skill in investigating a problem/challenge to move the bee to the flower	Uses an algorithm to program a robot to move the bee to the flower	Insufficient evidence	identifies directional language of left and right	demonstrates the directional language of left, right, forward and backward to create an algorithm to program a robot	experiments with the use the language of left, right, forward and backward to create an algorithm to move the bee to the flower	applies the use the language of left, right, forward and backward to create an algorithm to move the bee to the flower
		Insufficient evidence	identifies directional language of, forward and backward			
	Tests to debug an algorithm for a robot to travel from the bee to the flower	Insufficient evidence	tests to identify a way to debug an algorithm	tests to illustrate a way to debug an algorithm	experiments with testing to debug an algorithm for a robot to travel from the bee to the flower	demonstrates how to test to debug an algorithm for a robot to travel from the bee to the flower
	Uses a pattern when creating an algorithm to follow directions	Insufficient evidence	identifies a pattern when creating an algorithm to follow directions	illustrates a pattern when creating an algorithm to follow directions	experiments with using a pattern when creating an algorithm to follow directions	applies a pattern when creating an algorithm to follow directions