Ashwood School Yr 10: Digitech/Math Lesson Sequence

Ashwood School is a specialist school for students aged between 5 and 18 with mild intellectual disabilities offering a diverse range of programs aimed at building individual capabilities in all learning areas, independence, self-esteem, and confidence.
Students in this class are working in Level D and Foundation in the Victorian Curriculum

Overview of teaching and learning activities: In this sequence of lessons, students are learning how to write an algorithm, use coding and write a program with Bee-Bots and Cozmo. Each lesson is 45 minutes in the classroom with the furniture moved to the edges to allow for students to work easily in the room.

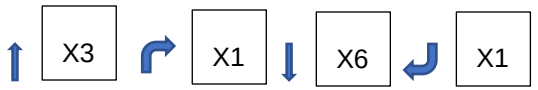
Foundation - Level Description (relevant to the unit)

In Level D Maths, students explore measurement attributes in practical situations and identify and describe the basic characteristics of a range of objects. Students show an understanding of 'location' and spatial concepts by responding to instructions to position items.
In Foundation Level Maths, students play with objects and draw pictures to develop links between their immediate environment, everyday language and mathematical activity. They create and continue simple patterns. They use simple statements and gestures to describe location.
In Level D Digital Technologies, students use a sequence of steps and decision-making processes to solve a simple problem.
In Foundation to Level 2 Digital Technologies, students begin to develop their design thinking skills by conceptualising algorithms as a sequence of steps for carrying out instructions, such as identifying steps in a process or controlling robotic devices. Across the band, students will have had the opportunity to create a range of digital solutions through guided play and integrated learning, such as using robotic toys to navigate a map or recording science data with software applications.

Content Descriptions (relevant to the unit)

Level D Maths Location & Transformation: Follow simple directional words to locate or move an object 'on', 'in' or 'under' (VCMMG065) **Level D Digital Technologies** Creating Digital Solutions: Follow and represent a sequence of steps and decisions (algorithms) needed to solve simple problems (VCDTCD012)	**Foundation Maths** Geometry and Measurement: Describe position and movement (VCMMG082) **F-2 Digital Technologies** Creating Digital Solutions: Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems (VCDTCD017)

Resources:
- one Bee-Bot for 2-4 students
- Bee-Bot mats https://www.bee-bot.us/bee-bot/Bee-Bot-mats.html
- One Cozmo per 2-4 students
- Videos demonstrating Cozmo https://www.anki.com/en-us/cozmo/cozmo-videos
- Stickers for hands to remind those students of left and right
- Large wooden blocks to make a maze to enable a Bee-Bot to move through.
- Laminated pictures of toys etc. from a shopping catalogue to use as *treasure* for the BeeBots to carry.
- Worksheets with headings: estimate code & real code (could be used as an estimate)

NB: Reasonable adjustments for Level C and D students:
- Student only moves the Bee-Bot forward/back to arrive at the destination to pick up the object and return.
- Students are given a written list of instructions to move their Bee-Bot e.g. Input this code: ↑ x 4 ↓ x3 ↑x5 or 

- Laminated forward, backward 15cm arrows, and turn arrows as visual guides to place next to the Bee-Bot mat squares & later for the maze

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Learning Intent & Success Criteria	Lesson Activities	Assessment
Session 1: Introduce the Bee-Bot **Learning Intention:** I can write an algorithm **Success Criteria:** • I can listen and respond to others'. • I can code the Bee-Bot to move to &/or from a position on the grid map.	**Whole Group introduction:** 1. Review last terms language of location and position and how to direct a person from one area to another using the correct language. Introduce the vocabulary *algorithm* as a well-designed set of steps used to solve a problem. Complete a shared writing of an algorithm to *send* a student to pick up an object in the classroom using directional language and number of steps to take. Test the algorithm. 2. Demonstrate the Bee-Bot – how to turn on and off, how to program to move forwards and back and how to reset. Students have a turn to estimate how many *steps forward/back* to reach a destination prior to testing their code. **Activity:** In groups of 2-4, students estimate the number of steps to move from one Bee-Bot square to their choice of square, writing down their estimate. Students test and write down the actual number. Students rotate through all the mats using estimate and test on each mat. **Adjustment:** A 15cm arrow is placed on the mat as a visual of the direction the Bee-Bot is to take. **Whole group conclusion**: Did you get better at guessing the actual number of steps it would take? Why do you think? What do you know about the Bee-Bot? **Teacher**: Ask the students how would we find out how big each Bee-Bot square is? Using a ruler measure the length and width of the Bee-Bot square. Will knowing this help with future programming of the Bee-Bot? **NB:** move forward or backward in 15 cm intervals, or to turn at a 90 degree angle to the left or right.	Observe how well students can estimate the correct steps in any direction and trouble-shoot to change the instruction.
Session 2 - 4: **Learning Intention:** I can code the Bee-Bot to move on a grid using the language of forward/back/turn right &/or left **Success Criteria:** • I will listen and respond to others'. • I will make the Bee-Bot move to a position on the grid map.	**Whole Group introduction:** Introduce the vocabulary *coding* – Coding is the sequence of instructions or commands for a computer or other digital device to follow. Teacher invites students to demonstrate a code on the Bee-Bot from previous week's lesson. From this week a roster of students will be invited to demonstrate coding with the Bee-Bot. During these sessions students will take turns using the Bee-Bots on the Bee-Bot maps at the beginning of each lesson. **Activity:** Students design a *treasure hunt* in groups of 2-4 to test out other student's ability to use the Bee Bots. Student A *writes/draws* their code and Student B tests to see if they were correct. E.g. one student places a *treasure* on what part of the Bee-Bot mat. The other student must pick up that object with the Bee-Bot and return to the initial place using different and interesting codes to arrive at the *treasure.* Students have a turn on each Bee-Bot mat rotating approximately at 10-minute intervals. **Adjustment:** place a L & R sticker on student's hands to remind them of left and right. **Whole group conclusion**: What was a challenge today? Why was it a challenge? How did you solve it?	Assessment: anecdotal notes based on the students who do a demonstration at the beginning of the class noting their ability to set a task &/or carry out the task.

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Session 5-6: Navigating a maze with the Bee-Bot **Learning Intention:** I can build a maze with blocks and program the Bee-Bot to navigate the maze in a team. **Success Criteria:** • I will build a maze using blocks of different lengths to enable the Bee-Bot to move easily through it. • I will program a Bee-Bot to move through another groups maze.	**Whole group introduction:** Teacher introduces the word *algorithm. program.* A (computer) program is an algorithm – or set of algorithms – that a computer can execute to perform behaviour that has been pre-determined by the programmer to solve a solution or meet some other need. It has been coded into something that can be understood by a computer. Teacher demonstrates how to build a maze using large wooden blocks. Students are invited to program the Bee-Bot to move through the teacher-built maze. Were you able to accurately move the Bee-Bot? Remind the students of how far each Bee-Bot *step* is and what that means for the building of the maze? Invite a student to use a ruler to measure the 15cm on wooden blocks of different sizes. Ask them how they will solve the issue of the length of each section of their maze. **Activity:** Students are in groups of 2 or 3 to work together to build their maze and program the Bee-Bot. Once students have tested their maze they swap to a maze built by another group and program the Bee-Bot in their maze. **Whole group conclusion:** Is it easier to program a Bee-Bot to navigate a Bee-Bot map or student-made maze? Did you have challenges in building the maze to allow the Bee-Bot to move easily? How did you solve them? E.g. change the length of each section by using different-sized blocks. Additional challenges from https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/buzzing-with-bee-bots (accessed 12/5/2018)	Observation & anecdotal notes – how well do they work in a team? Are they able to build a maze? How do they problem solve when the Bee-Bot program doesn't work.
Session 7: Introduce Cozmo **Learning Intention:** I can play a game with Cozmo I can do a trick with Cozmo **Success Criteria:** • I will use Playmode to explore games • I will explore *tricks* and use cubes	**Whole group introduction:** Introduce the robot Cozmo to the students. Watch some of the videos demonstrating Cozmo https://www.anki.com/en-us/cozmo/cozmo-videos. Discuss some safety rules for working with Cozmo. Show them what Cozmo can do highlighting the connection procedure. Use the Interactive White Board (IWB) to demonstrate the Feed and Tune-Up modes. Demonstrate how to locate the sleep mode and return the robot to the charger. Invite students to have-a-go with Cozmo. **Activity:** students work in groups of 2-4 exploring Playmode games &/or tricks depending on their level. **Whole group conclusion:** Name some differences between Bee-Bots and Cozmo? Which is easier to use? What do you like to do with Cozmo?	Observation of student's in their interaction with the robot and their capacity to experiment.

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Session 8: More with Cozmo **Learning Intention:** I can teach Cozmo to say my name. **Success Criteria:** I will record and save my name and face with Cozmo.	**Whole group introduction:** Review the safety rules generated by the class last week. Invite students to demonstrate to the class how to connect and wake Cozmo. Ask a student to demonstrate a game or trick they experimented with last week. Watch some of the other videos demonstrating Cozmo https://www.anki.com/en-us/cozmo/cozmo-videos. Demonstrate Meet Cozmo enabling Cozmo to scan a face and register the face to the name. **Activity:** students work in groups of 2-4 recording and scanning their name and face with Cozmo (these are recorded on the iPad). Once complete students can continue their explorations from last week. **Whole group conclusion:** Why do you think it is useful to have your face and name recorded on Cozmo? Do you think you could trick Cozmo using your face and a different name?	Monitor the capacity of each student to record and scan their name. Monitor the capacity of each student to experiment and explore.
Session 9: What else can Cozmo do? **Learning Intention:** I will teach Cozmo how to say my name & other short phrases. **Success Criteria:** Cozmo can tell my peers my name.	**Whole group introduction:** Discuss what the students know about Cozmo. What can he do, how does he work? Remind students about the Feed and Tune-Up modes using the IWB. Students are invited to have a turn to demonstrate what they can do with Cozmo to the class. Demonstrate the Discover mode in Cozmo enabling students to type in phrases and/or sentences for Cozmo to say. NB: teacher has some pre-set ask/answer phrases for students to use &/or have joke books available. **Activity:** Students practise in groups of 2-3. **Whole group conclusion:** Students demonstrate their Cozmo phrases to their peers.	Use a checklist to determine students capacity to be innovative with their phrases/sentences. E.g. work as a group to develop phrases; copy only from book; experiment with different ideas
Session 10: Programming tools. **Learning Intention:** I will use some of the programming tools in Cozmo **Success Criteria:** I can use the programming tools in Cozmo and demonstrate to my peers.	**Whole group introduction:** Revisit all the things we can do with Cozmo so far with students taking turns to demonstrate their favourite. Discuss the word *programming*. A program is a set of instructions or a code that you enter in to the computer to make it move or do something. Watch https://www.dkfindout.com/us/computer-coding/what-is-coding/what-is-computer-program/ (accessed 8/12/2018). Demonstrate Discover Mode & Sandbox for Cozmo. N.B: blue = drive options; purple = actions; pink = animations; yellow = events; orange is control. Start the program with a green flag. **Activity:** Students practise in groups of 2-3 selecting two to three programming options. **Whole group conclusion:** Students demonstrate their peers.	Use a checklist to determine students capacity to experiment with Cozmo programming

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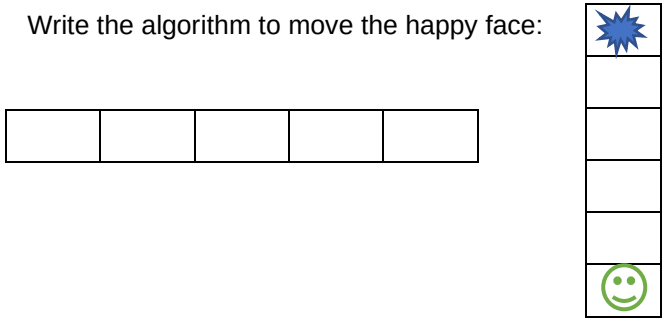
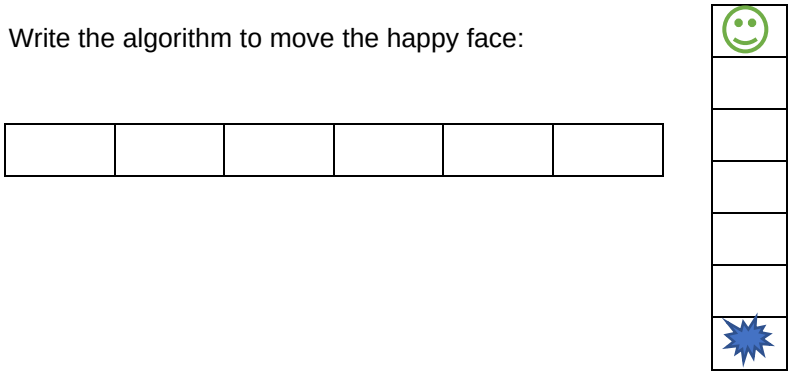
Session 11: Understanding what a *loop* is in programming? **Learning Intention:** I will create a loop block in Cozmo. **Success Criteria:** I can demonstrate using loop block to my peers.	**Whole group introduction:** review previous week selecting students to demonstrate with Cozmo. Introduce the term *loop* used in programming. A **loop** is a sequence of instructions that is continually repeated until a certain condition is reached. Demonstrate how to find the loop coding block in Sandbox (in the Discover mode) in Cozmo on the IWB. **Activity:** In groups of 2-3 students take turns to select two to three programming options and add the loop. Students begin the coding challenges. **Whole group conclusion:** Students demonstrate to the whole class. What is interesting about using the loop? Why would it be a useful tool in programming?	Observe the students attempting the loop coding. Are they confident? Do they understand what they are doing, why they are doing it.

Assessment Examples

Write the algorithm to move the happy face:



Write the algorithm to move the happy face:



Follow the path from start to end and write the algorithm:

Start				End