



The Valley Primary School
Class 1 Computing MTP Spring 2 2023-2024.
Programming Toys.

Unit Overview:

In this unit about programming toys, children will be introduced to the principles of programming through unplugged tasks and the use of Bee-Bots (or similar programmable toys). They will be introduced to algorithms as a set of step-by-step instructions given to a device, will learn how to debug simple algorithms and how to use logical reasoning to predict how a program will behave.

Assessment:**...all children should be able to:**

- create step-by-step instructions using pictures;
- write and follow detailed step-by-step instructions;
- direct a Bee-Bot (or similar programmable toy) to a toy;
- program a Bee-Bot (or similar programmable toy), one instruction at a time, using the arrow buttons

.... most children will be able to:










- say what an algorithm is;
- say why it is important to be precise when writing an algorithm;
- check their work for mistakes (debug);
- program a Bee-Bot (or similar programmable toy) using the arrow buttons;
- start their programming sequence again if they need to;
- check their work for mistakes to debug a program;
- plan and check an algorithm

.... some children will be able to:


















- see how a product changes when they change the instructions;
- evaluate and improve their sequence (debug).

Learning Sequence & Objectives	Activities
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To create instructions using pictures.














Learning Sequence		
	What Is an Algorithm? Use the Lesson Presentation to define an algorithm. Ask the children to think about an algorithm for getting dressed in the morning, e.g. "What if you put on your coat before your jumper?" Click the link on the Lesson Presentation to show the children a video from BBC Bitesize. Highlight that when you write an algorithm, the order of the instructions is very important.	
	What Is an Algorithm? Using the Lesson Presentation , invite children to help you give picture instructions to a robot in order to brush his teeth. Point out that if you try to wet your brush before you turn the tap on, the robot will fail.	
	Build and Snap: Build a simple model using 5 building blocks and show the children how to take pictures of each stage, one block at a time. Show them examples of clear photographs using the Lesson Presentation . <i>Can children identify what makes a good picture instruction step?</i>	
	Get Building! The children should build a simple model using 5 blocks (you may choose to add or remove blocks to suit your children), taking a single photograph at each stage. <i>Can children take a clear photograph for someone else to follow?</i> They should then pull apart all their bricks and give their tablet, with the photos open, to another pair. Children must then see if they can follow the pictorial instructions given to them to recreate the model. <i>Are the children able to follow instructions in order?</i>	
	Did You Do a Good Job? Children show their model to the pair who took the pictures. Evaluate their success using the Lesson Presentation . <i>Have the children built the final model correctly?</i>	

To say why it is important to be precise when writing an algorithm.

Learning Sequence					
	Build an Animal: Invite two children up to the front and give them a small set of building bricks each. Using the Lesson Presentation , give the children 1 minute to "build an animal". When finished, compare similarities and differences using the Lesson Presentation . Remind the children that instructions for completing a task need to be clear, detailed and in the right order. <i>Can children identify how the teacher could have added more detail to the instruction?</i>				
	Potato Man Building: Using the Lesson Presentation , introduce the children to the parts of a potato man toy. Use the Lesson Presentation to choose an instruction and click it, allowing the lack of detail to mean that the product will turn out wrong. Use the following slides to choose better instructions so that the potato man turns out correctly. <i>Can children offer detailed instructions? Can the children say which parts must be added in a certain order (eyes before glasses)?</i>				
	Children use the Differentiated Potato Man Picture Cards and Potato Man Instructions Activity Sheet , writing the instructions for how to build the pictured potato man. <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 33%; text-align: center; vertical-align: middle;"> Children need to write detailed instructions in each box, including which numbered holes to use.</td> <td style="width: 33%; text-align: center; vertical-align: middle;"> Children need to write detailed instructions, including which numbered holes to use, and are given more options for pieces.</td> <td style="width: 33%; text-align: center; vertical-align: middle;"> Children need to write detailed instructions, including which numbered holes to use, and are given more options for pieces. They will need to add the eyes before the glasses.</td> </tr> </table>	 Children need to write detailed instructions in each box, including which numbered holes to use.	 Children need to write detailed instructions, including which numbered holes to use, and are given more options for pieces.	 Children need to write detailed instructions, including which numbered holes to use, and are given more options for pieces. They will need to add the eyes before the glasses.	
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	Did It Work? Once the children have written their instructions, give them to a partner and see if their partner can build the potato man using the Build a Potato Man Activity Sheet . Evaluate success using the Lesson Presentation .				












To write instructions to program a person like a computer.

Learning Sequence

	<p>Help Me Put My Shoes On: Show the children a pair of your shoes. Ask them to tell their partner instructions for how you should put them on. Ask some children to say their instructions out loud. Some children will correctly identify that you will need to take off the shoes you are already wearing first. Explain to them using the Lesson Presentation what this lesson will be about.</p>	
	<p>Program the Teacher: Allow the children in pairs to program you. Tell them that you really need to reach something on the other side of the room and bring it back to the front. In pairs, children should think of instructions for you to follow and then ask one of them to say their instructions out loud. Follow their instructions, showing the need for detail, e.g. make it clear that 'walk forward' needs to be followed by 'x number of steps', and that 'turn around' will need a direction and possibly either a 'quarter' or 'half' instruction. <i>Can children give precise instructions that someone else can follow?</i></p>	
	<p>Debugging: Explain to the class that if they notice something has gone wrong, they must go back and change the algorithm. Show the next slide on the Lesson Presentation and ask the children to identify where the instructions need fixing. Repeat for the following slides. <i>Can children work out the mistakes? Can children correct a mistake?</i></p>	
	<p>Program Your Friend! Get the children into pairs of similar ability and tell them that they will take it in turns to be a toy robot! Each pair has a set of Program a Person Activity Cards which they must work through. One child should pick a card and attempt to instruct their partner, step by step, to complete the task. Ensure that as children are working, they make a written record of at least one set of instructions that was successful. You may wish to take photographs or videos of the children working together. <i>Can children give precise instructions that someone else can follow?</i></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div data-bbox="931 657 1249 753" style="text-align: center;">  <p>Children follow instructions involving moving around the room to fetch objects.</p> </div> <div data-bbox="1258 657 1608 753" style="text-align: center;">  <p>Children follow instructions asking them to move in more precise ways and use simple objects.</p> </div> <div data-bbox="1617 657 1935 801" style="text-align: center;">  <p>Children follow instructions including moving and using objects which may have more than one way of interacting with them.</p> </div> </div>	
	<p>Algorithms Without Words: Ask the children how you could write an algorithm without words. Show them the symbols on the Lesson Presentation and ask them to draw which symbols they would have to draw to get you, the teacher, to a different part of the room. Tell them that they will also need to tell you how many steps or turns to take, using a number of arrows. <i>Can children use simple symbols to represent a single action?</i></p>	












To program a Bee-Bot (or similar programmable toy) to move.

Learning Sequence

	<p>Symbols: Use the Lesson Presentation to introduce the children to a Bee-Bot (or similar programmable toy) and discuss what the different buttons do (and why these symbols have been chosen). Use the following slides to practise choosing the correct buttons to achieve a movement. You may also wish to use a real Bee-Bot (or similar programmable toy) in the classroom and ask children to help you to replicate the movements on the Lesson Presentation. If needed, continue to practise as a class, predicting the movement of the Bee-Bot (or similar programmable toy). <i>Can children direct the Bee-Bot (or similar programmable toy) correctly?</i></p>	
	<p>Programmable Toy at the Toy Shop: Show children the Toy Cupboard Programmable Toy Mat. Show them how one square on the mat is equal to one press of the forward arrow on the Bee-Bot (or similar programmable toy). Complete the practice task on the Lesson Presentation.</p>	
	<p>Toy Shop Task: In pairs or groups, children direct their Bee-Bot (or similar programmable toy) to a toy on the mat. Children pick their own starting challenge level from the Lesson Presentation and move through the tasks when they are ready. Take photographs for evidence, if needed. <i>Can children program a Bee-Bot (or similar programmable toy) using the arrow buttons?</i></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div data-bbox="936 537 1254 608">  <p>Children get to chosen toy, pressing and moving one instruction at a time.</p> </div> <div data-bbox="1267 537 1559 655">  <p>Children program more than one step at once, with the goal of programming all instructions in one go.</p> </div> <div data-bbox="1572 537 1926 681">  <p>Children direct the Bee-Bot (or similar programmable toy) to the toy while avoiding obstacles placed on the mat.</p> </div> </div>	
	<p>How Did You Do? Discuss and evaluate the children's success using the Lesson Presentation.</p>	













To debug a Bee-Bot (or similar programmable toy).

Learning Sequence

	<p>Draw a Shape: Give the children a Bee-Bot (or similar programmable toy) per group and complete the task on the Lesson Presentation. Check that they all remember how to program using the arrow buttons, and ensure that all children understand how to program more than one step at once.</p>	
	<p>What Went Wrong? Give children time to answer the question on the Lesson Presentation. Show the line the Bee-Bot (or similar programmable toy) will take if it follows the instructions given. <i>Can the children identify where the instructions went wrong?</i> Ask the class for ideas on how to fix it. <i>Can the children draw the correct sequence?</i></p>	
	<p>Debugging: Using the Debug My Programmable Toy Activity Sheets and Toy Cupboard Mats, each pair should rewrite the incorrect sequences. The pairs use the Bee-Bot (or similar programmable toy) to check that their sequence is the correct one before moving on.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div data-bbox="947 1131 1265 1233">  <p>Children draw arrows and then words to correct the sequences, aiming for one toy. 'Clear' is given.</p> </div> <div data-bbox="1279 1131 1597 1256">  <p>Children use arrows and then words to correct the sequences, aiming for 1-2 toys. They are reminded to write 'Clear'.</p> </div> <div data-bbox="1610 1131 1928 1329">  <p>Children use words to correct the sequences, aiming for 1-2 toys and using the backwards button. They should remember to write 'Clear' and 'Go'. There may be more than one mistake.</p> </div> </div>	
	<p>Half Turns: Ask the more confident members of the class to explain how to make a half turn. Demonstrate a half turn on the Bee-Bot (or similar programmable toy) by pressing the left or right button twice, and by pressing the backwards button.</p>	

To program a sequence to make a Bee-Bot (or similar programmable toy) move.

Learning Sequence

	<p>Toy Shop: Use the Lesson Presentation to help the children to plan an algorithm on their whiteboards. Remind them to press 'Clear' and 'Go'. <i>Can the children plan an algorithm before pressing 'Go'?</i></p>	
	<p>Shopping List: Sit the class in a circle. Use the list on the Lesson Presentation and ask children to help you program the route around the toys. Children should use whiteboards to practise drawing a route around the Toy Shop grid, then amend their algorithm to get the Bee-Bot (or similar programmable toy) back to the start.</p>	
	<p>Go Shopping: Children to write an arrow algorithm which would direct the Bee-Bot (or similar programmable toy) through the list on their Differentiated Shopping List Activity Sheet.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="936 435 1261 531">  <p>Children direct the Bee-Bot (or similar programmable toy) around the mat to collect the 4 toys pictured.</p> </div> <div data-bbox="1272 435 1574 611">  <p>Children direct the Bee-Bot (or similar programmable toy) around the mat to collect 5 toys, including reversing to pick up the rubber duck.</p> </div> <div data-bbox="1608 435 1933 627">  <p>Children direct the Bee-Bot (or similar programmable toy) around the mat to collect 5 toys, avoiding obstacles. They then use the backwards button where possible to shorten the sequence.</p> </div> </div>	
	<p>Try It Out: Once they have completed their algorithm, in pairs, children should program the Bee-Bot (or similar programmable toy) to see if it works. <i>If it hasn't worked, can the pairs identify why and debug the sequence?</i></p>	
	<p>What Did I Buy? Show the children the algorithm on the Lesson Presentation. Can they work out what your Bee-Bot (or similar programmable toy) picked up at the shop?</p>	