



Programming (Selection in physical computing)



Key Question/What will I learn by the end?

L1- Connecting Crumbles
L2- Combining output components
L3- Controlling with conditions
L4- Starting with selection
L5- Drawing designs
L6- Writing and testing algorithms

Visual Representations



Prior Knowledge

Rec - *Programming (Beebots)*

YR1 - *Programming and debugging (Beebots)*

YR2 - *Coding and programming (Beebots & Espresso)*

YR3 - *Programming, coding and control (Espresso)*

YR4 - *Coding (Introduction to Scratch)*

Sticky Learning

New Knowledge

Know that complex algorithms can have multiple errors that need debugging
To know how to read a complex program
To know how a particular algorithm works
To know how to detect (using logical reasoning) a bug and debug that problem in a program
To know a range of inputs and outputs that control or simulates control of a physical system.

New Skills

To be able to combine sequences of instructions and procedures to turn devices on or off.
To understand input and output.
To be able to use an ICT program to control an external device that is electrical and/or mechanical.
To use ICT to measure sound or light or temperature using sensors.

Vocabulary (incl. equipment)

New

levels of abstraction - four levels that can help describe a project
Task - this is what is needed
Design - this is what it should do
Build - this is how it is done
Running the code - this is what it does
Infinite loop - a loop that commands the instruction/set of instructions to repeat forever
Count-controlled loop - a set of commands are carried out a specific number of times
Condition-controlled loop - a set of commands stop being carried out when a condition is met.

Cross-curricular Links

Science – Electricity (Year 4)

- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches, and buzzers

Design and Technology (Key stage 2)

- Generate, develop, model, and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces, and computer-aided design
- Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining, and finishing], accurately
- Select from and use a wider range of materials and components, including construction materials, textiles, and ingredients, according to their functional properties and aesthetic qualities
- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers, and motors]
- Apply their understanding of computing to program, monitor, and control their products



Connection

- **Bluetooth Connection:** Bluetooth enables a secure way to connect and exchange information between devices such as mobile phones, telephones, laptops, personal computers, printers, digital cameras, tablets, voice controlled devices and video game consoles. This connection is needed to exchange information from the App to the Lego model.

Trialing and Debugging

- Programmers do not put their computer programs straight to work. They trial them first to find any errors:

- Sequence errors: An instruction in the sequence is wrong or in the wrong place.

- Keying errors: Typing in the wrong code.

- Logical errors: Mistakes in plan/thinking.

- If your algorithm does not work correctly the first time, remember to debug it.

Sequencing and Algorithms

- A sequence is a pattern or process in which one thing follows another.

- We design algorithms (sets of instructions for performing a task) to help us program the sequence that we require to achieve our desired outcomes.



- Programming is the process of keying in the code recognized by the computer (using your algorithm).

Selection in Physical Computing

- Programming is when we make and input a set of instructions for computers to follow.

- Lego WeDo 2.0 is an App which enables Lego models to be programmed in order to create movements using robotics.

- We use algorithms (a set of instructions to perform a task) which we can plan, model and test, in order to create accurate and imaginative robotic actions.

- Input - The data which is entered into a computer or device.

Output Device - The device which receives data from a computer or device.

-Output: Motor Blocks:



Motor This Way Block

Sets the motor to turn the axle in the direction shown.



Motor That Way Block

Sets the motor to turn the axle in the direction shown.



Motor Power Block

Sets the motor power to the desired speed and starts the motor.



Motor On For Block

Starts the motor for a chosen amount of time.

-Flow Blocks:



Start Block

Must be used at the beginning of a program string. Press on it to make the program start.



Wait for

Use this to tell the program to wait for something to happen.



Repeat Block

Use this block to repeat actions. Blocks

- Input Blocks:



Any Distance Change

Inputs the Motion Sensor mode "Any Distance Change"



Number Input

Inputs a numeric value to a block.

