Input / Output

Ages: 7-11
Length: 1 hour
Equipment: PDF print out

Introduction

This lesson introduces the relevant words; ***control, input, process*** and ***output*** through activities that link to student's lives to help them relate to the concepts introduced. This lesson will build upon prior learning relating to algorithms.

Curriculum Alignment	• UK National Curriculum Computing Key Stage 2
Learning Objective	• To identify the input and output within a computing system • To demonstrate how input, process, output can be used in a robotic system
Keywords	• Control • Input • Process • Output
Resources	• Paper and pens
Lesson Sections	• Setting the Scene • Activity 1 – Identifying the input and output within a computer system • Activity 2 – MiRo simulator • Summary

Setting the Scene

How do we control the systems we create?

We create programs to control computer systems by inputs and outputs.

Concept	How it is used
A computer system is any device that receives an input, processes it and outputs it. *Can you think of a computer system you use that has an input and output?*	When you write code, you need to think about how the program will start; the input. What the program needs to do; the process. What the final program will produce; the output.

Testing any program you create is essential to ensure it works correctly. Through testing on a physical device, if applicable, can help develop the program to create the desired output.

First let us look at how computing systems use ***input, process, output***.

Activity 1

Activity 1 is focused on getting students to think about what a ***control*** system is and relate this to their everyday tasks.

Scenario 1	Scenario 2
You turn on the TV and your favourite program is on and you sit down to watch it. • The **input**; how did you turn the TV on? • The **process**; how did the TV get the programme to watch? • The **output**; what do you see the programme on?	You have been asked to put the washing on? • The **input**; how do you set the washing cycle? • The **process**; how does the washing machine know the cycle to run? • The **output**; what does the washing machine do?

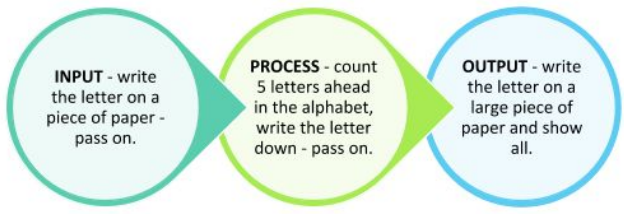
Where else have you see this process?

Whole Class Activity

Explain to the group that they are going to be working in teams of 3 to solve a problem. A way to hide a message when it is sent to another is to encrypt it. To encrypt means to change the letter to a new letter so that it cannot be read without knowing how to decrypt it (find the true letter).

One person will be the input, one the process and one the output.

- The ***'input'*** person will write the letter given on a piece of paper – they will deliver this to the 'process' person.
- The ***'process'*** person will look at the letter and count 5 letters ahead in the alphabet, write this new letter on a piece of paper and deliver to the 'output' person.
- The ***'output'*** person will write this letter on a large piece of paper or whiteboard for all to see.



Explain that this will reveal a hidden word as the letters input are encrypted and the process is to work out the real letter to be passed to the output.

Encrypted letters to input	Add 5 letters to the right to find the true letter	Output letters as solution
xkjpnkh		control

Small Group Activity

Split the students into small groups and give them a blank piece of paper.

In your group, I want you to mind map all the computer systems around you. Now select a few to highlight what the input and output is and then consider what happens within the process between.

Encourage discussion within the group, ask them to add as many computing systems that they have around them; home, school, real world etc and select a few to highlight the input, process and output.

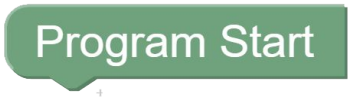
In the world today we rely heavily on computing systems and without thinking you will interact with numerous ones throughout your day.

Differentiation

- If pupils need extra support, ask them to focus on the input and output of the computer system and select simpler options like a TV to show how does it turn on and what do you see it on.
- For higher ability pupils ask them to think of a computer system that has more than one input or more than one output.

Activity 2

What are the blocks available for starting the computing system 'MiRo'?



The block shows the start of the program, but it is **you** pressing the play button that is the true **input** in this computing system.

There are also other inputs available on MiRo, the sensors and hearing a 'clap' sound. It is good practice when creating any computer program, that it is checked at regular intervals. Using a simulator like MiRo can help build a successful program and check each output works as expected.

Part 1

Simulate MiRo to output a sequence of **sounds** when the input **'clap'** is heard.

Part 2

Simulate MiRo to output a sequence of **sounds** and **light** when the input **'clap'** is heard.

This program builds on the previous activities program so pupils need to keep their program on their screen to build on.

(see Step-by-Step Worksheet)

Why should you test your computer program?

It is good practice when creating any computer program, that it is checked at regular intervals. Using a simulator like MiRo can help build a successful program and check each output works as expected.

How can we get MiRo to move towards the cans and knock them down?

We are going to create a program that will control the movement of MiRo.

How are we going to control how long the movement continues?
How can we get the program right?

Algorithm planning
1. Move forward 2. Turn left 3. Move forward

Using the algorithm as your plan, can you create the program in the MiRo simulator?

Remember there is no fail in computing only debugging, fixing and learning!

Summary

Have a discussion with the class about what they have learnt in the lesson. Discuss the new words learnt ***control, input, output*** and ***process*** and talk through any difficulties they had.

Ask students to complete the self-assessment and can be done by thumbs up, down and centre or using the images; on the following 3 questions.

Questions
Can you identify the input and output within a computing system?
Can you describe the input, process, output model within a computing system?
Can you create a program to control the output from MiRo?