

Water Conservation with micro:bit

Programme: Water Conversation

Level: Primary 5

Theme / Challenge Statement: Environmental Science

Summary

Pupils will be programming a device which will help to raise awareness in water conservation and provide a platform for pupils to show concern for water as a limited natural resource and the need for it in their everyday lives. Students will use the micro:bit to develop a self-watering device that will water the plants when the soil is dry.

<Please insert a photo here that is representative of the lesson idea. This photo will be used as the thumbnail of the lesson idea when it is posted on the Digital Maker website.>

Prior Knowledge:	Students should already know: 1. Plants need air, food and water. 2. Water is scarce.
Learning Objectives:	By the end of the lesson, students should be able to: 1. Develop a plant self-watering system with micro:bit that waters the plant when the soil is dry

Time	Teacher Activities	Purpose	Resources Needed
Introduction/Pre-activity			
Lesson Development	Explanation about using technology in science and water conservation	To understand the requirements of technology in science and why water conservation is important	
Lesson development/Main activities			
Lesson 1 Introduction to micro:bits	Teacher will inform the group that they will be designing and constructing a plant self-watering device. It will be a group work and in groups of 3, students will design and construct a plant self-watering device and program it. Groups will be	Pupils will learn: 1. about the microcontroller hardware and the graphical block-based programming environment 2. how to give instructions using the block-based programming environment	<ul style="list-style-type: none"> ▪ micro:bit with battery pack ▪ laptop with internet access

Lesson Plan

	<p>given the opportunity to test their device</p> <p>On the final day, each team has to present their device</p>	<p>3. how the process of compiling the instructions into programs is done</p> <p>4. how to upload the program onto the microcontroller</p>	
<p>Lesson 2</p> <p>Understanding how the soil moisture sensor works</p>	<p>Teacher will explain what is a soil moisture sensor and how it detects moisture, if-else statement and how it works.</p> <p>Each group will then program the micro:bit to display the value read in by the soil moisture sensor following the teacher's instructions.</p> <p>Following the first task, groups will then try to program the micro:bit to show different messages when the soil moisture sensor is read.</p>	<p>Pupils will learn:</p> <p>1. how can a soil moisture sensor be used as a form of input</p> <p>2. how to display input values read in by a soil moisture sensor</p> <p>3. how to program a soil moisture sensor to demonstrate logical reasoning using an if-else statement to do conditional checks and then perform the necessary action</p> <p>4. how to design and write a simple program to accomplish the challenge</p>	<ul style="list-style-type: none"> ▪ micro:bit with battery pack ▪ laptop with internet access ▪ motor shield ▪ soil moisture sensor ▪ wet tissue
<p>Lesson 3</p> <p>Programming the DC motor pump</p>	<p>Teacher will explain what is a DC water pump and how it works.</p> <p>Each group will then build and program the micro:bit to activate the DC water pump using the buttons following the teacher's instructions.</p> <p>Following the first task, groups will then try to program the micro:bit to start and stop the DC water pump from working using the same butto.</p>	<p>Pupils will learn:</p> <p>1. how to give sequential instructions to program a DC motor pump</p> <p>2. how to program a sequence of rotation with repetition using functions and conditional loops</p> <p>3. how to design and write a simple program to accomplish the challenge</p>	<ul style="list-style-type: none"> ▪ micro:bit with battery pack ▪ laptop with internet access ▪ DC water pump ▪ tubing ▪ cup to hold water

Lesson Plan

<p>Lesson 4 Build and coding a plant self-watering system</p>	<p>With the teacher's help, each group will then build and program the micro:bit, as a plant self-watering system, to activate the DC water pump only when the sensor detects that the soil is dry.</p> <p>Each group will also be given time to present their own device</p>	<p>Pupils will learn:</p> <ol style="list-style-type: none"> 1. how to identify and define key characteristics and predict the behaviour of the simple program 2. how to design and build the plant self-watering system according the key characteristics 3. how to write simple program and code the plant self-watering system behaviour using simple forms of inputs and outputs 4. how to work in groups to accomplish the project goals 	<ul style="list-style-type: none"> ▪ micro:bit with battery pack ▪ laptop with internet access ▪ motor shield ▪ soil moisture sensor ▪ DC water pump ▪ tubing ▪ cup to hold water ▪ plant with soil
Closure and consolidation/Post-activity			
<p>Reflection</p>	<p>After every lesson, pupils will reflect on how pupils can save water and show care for the environment through the use of technology.</p>	<p>To understand the requirements of technology in science and why water conservation is important</p>	

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<p><u>Contributed by:</u></p> <p>Name of School: West View Primary School</p> <p>Name of Teacher (Optional):</p> <p>Date: 31st January 2018</p>
