



Improving our Classroom Environment v4 July 2025

Internet of Things: CfE Science 2<sup>nd</sup> Level

Teachers' Lesson Guide



THE UNIVERSITY  
of EDINBURGH



# Improving our Classroom Environment

## Synopsis

- This topic helps learners to understand how sensors can be used to gather information about building environments, such as the level of CO<sub>2</sub> temperature, humidity and light levels.
- Learners investigate how these environmental factors can impact learning. They research and discuss how, at certain levels, environmental variables such as CO<sub>2</sub> can have a detrimental effect on the capacity to learn.
- Learners will use the PPDAC process to identify problems, plan solutions, gather and analyse data, and draw conclusions.
- Learners plan and carry out experiments to measure the impact of changes to their classroom environment, for example how the introduction of plants reduces the level of CO<sub>2</sub> and the subsequent impact that this has on their learning.
- Central to this topic is the use of sensors for gathering data about the building environment. Learners will have access to a indoor environment sensors which measure levels of CO<sub>2</sub>, temperature, humidity and light in their classroom over time.
- Learners read and analyse data gathered by the sensor to provide information about their learning environment. During this longitudinal study, learners will correlate changes in environmental variables (eg, light, CO<sub>2</sub> and temperature) with their readiness and capacity to learn.
- Learners may extend their learning about classroom environments and apply it to other contexts, such as offices and homes.
- Some classes may wish to connect with other schools carrying out similar research – details of participating schools can be provided by the Data Education in Schools Team at the University of Edinburgh.
- Through their involvement in this project, learners will develop an understanding of how sensors contribute to the Internet of Things (IoT) – the worldwide collection of internet connected things.

## Duration

This is a longitudinal study which requires ongoing gathering and analysis of classroom environmental data.

While the class may choose to determine the length of the research period, several weeks is the recommended minimum period for the investigation so that learners can gather a robust data set for analysis and evaluation. Some classes may engage in extension activities that will extend the length of the project.

Time should be set aside weekly to revisit the investigation and analysis of sensor data. Their classroom data is presented via a digital dashboard curated by the University of Edinburgh.

At the end of the investigation period, time should be available for learners to draw conclusions, discuss the impact of their findings and share their learning.

## Objectives

- ✓ To develop scientific inquiry and investigative skills.
- ✓ To introduce learners to concepts about data and its use in problem solving.
- ✓ To raise awareness of how sensors are used to gather data in the environment.
- ✓ To analyse, interpret, evaluate and present scientific findings.

## Age and stage

- CfE second level
- Coverage of CfE experiences and outcomes, science benchmarks & skills development, and IDL links are shown below.

## Curriculum areas/benchmarks

### **Second Level Science Skill**

- Selects appropriate methods to record data/information.
- Identifies relationships between the independent and dependent variables.
- Relates findings to the wider world.
- Draws basic conclusions consistent with findings.
- Identifies and discusses additional knowledge and understanding gained.

### **Second Level Topical Science (various)**

#### **Digital Learning**

- I can select and use digital technologies to access, select relevant information. TCH 02-02a

#### **Maths/Numeracy**

- I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way. MNU 2-20b
- I can display data using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology. MTH 2-21b

#### **Literacy**

- As I listen or watch, I can make notes, organise these under suitable headings and use these to understand ideas and information and create new texts LIT 2-15a

## Knowledge, Understanding and Skills

- Know that sensors can be used to gather data on environmental entities.
- Understand how sensor data could be used to solve a problem.
- Analyse, interpret and evaluate scientific/numeric findings.
- Present scientific findings.

## Resources

Resources to support this activity are highlighted in the lesson plans. This includes PowerPoint or PDF presentations, learner instructions, data observation sheets and activity templates. An indoor environment sensor is used to measure levels of CO<sub>2</sub>, temperature, humidity and light in the classroom, along with instructions for installation and operation.

## Lesson Planning

### Activity Overview

Activity 1	The Class that Kept Falling Asleep
Activity 2	Investigating environmental factors
Activity 3	Introduction to sensors and data about buildings
Activity 4	Investigating our learning environment
Activity 5	Recording 'Learning State' evaluations
Activity 6	Analysing the dashboard
Activity 7	Changing our learning environment
Activity 8	Can plants improve our learning environment?
Activity 9	Drawing conclusions from the investigation
Activity 10	Making a presentation
Activity 11	Extension work

### Learning intentions (covering the entire project)

- We are discovering how CO<sub>2</sub>, temperature, humidity and light affect our learning.
- We are learning about how sensors can capture environmental data.
- We are exploring ways of improving our learning environment so that we become more successful learners.

## **Success Criteria (covering the entire project)**

We will know if we have achieved our goal if I can:

- Identify problems caused by a poor classroom environment.
- Understand how sensors collect data about buildings.
- Analyse data arising from our investigation.
- Suggest how we can improve our learning environment using sensors to help us.
- Follow instructions and work well in a group.

## **Assessment**

- Observation of learner engagement during learning activities and understanding of background science.
- Questioning during the plenary and presentations.

## **Resources**

- PowerPoint – Activities 1 to 10
- Indoor environment sensor
- Sensor data from Cladach Primary (Activity 3)
- Templates for rating Ready to Learn?