5/6 - Learning environments

Learning focus

This sequence of lessons explores how conditions in the environment can impact on learning. Through investigating the environmental influences on our classroom, and learning environments such as light, noise and temperature, students collect data and identify the optimal learning environment.

Curriculum links

Links with Digital Technologies Curriculum Area

Strand	**Content Description**
Processes and Production Skills	Acquire, store and validate different types of data, and use a range of software to interpret and visualise data to create information (ACTDIP016)

Links with the Science Curriculum Area

Strand	**Content Description**
Science as a Human Endeavour	Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083)

Links with the Mathematics Curriculum Area

Strand	**Content Description**
Data Representation and Interpretation	Pose questions and collect categorical or numerical data by observation or survey (ACMSP118)

DIGITAL TECHNOLOGIES HUB

Learning hook

Introduce the students to the question ‘How do we learn best?’ Ask them to consider what type of environment they learn best in and the different factors of the environment that impact on their learning.

Students use a Y chart to record some of their initial thoughts about how they learn best and the environment in which they learn best. In the middle of the Y chart, students write the big question they will be exploring: ‘How do I learn best?’ They can then use the three sections of the Y to draw pictures or use words to describe how learning sounds, looks and feels to them.

Have a discussion about students’ preferred learning environments, including the similarities and differences in their preferences. Make a list of the different elements of the environment that the students suggest. These may include comfort of chairs, noise level, light, temperature and number of people in the classroom.

Learning map and outcomes

Explain to students that they are going to investigate the different factors that influence their learning environment to create the optimal learning environment. They will collect data from across the school to identify the optimal learning environments across the school. They can then design a digital system to alert them when conditions are not ideal.

Understandings

- Different peripheral devices can collect different data.
- Some peripheral devices are better suited for collecting certain types of data.
- There is a difference between numerical, text and visual data.
- We can use data to interpret trends.
- Digital systems use data.

Learning input

What is data?

Explain to students that data is the information they collect. They can use data to help them make decisions or to better understand something. They are going to collect data across the school to learn more about the factors that impact their learning environments, such as noise, light and temperature.

Data can be collected in many different ways (eg taking photos, recording video, recording the number of times an event occurs or observing people). For this task, students will collect data by measuring light, noise and temperature.

Begin discussing temperature as students will have prior knowledge in this area. Ask them how to measure temperature, what tools they can use and the unit of measurement used for measuring temperature.

Look at the Bureau of Meteorology website and search for weather observations of a particular area's temperature (eg Melbourne weather observations). This is an example of an organisation that collects data on the weather.

Ask the following questions:

- Why do you think the Bureau of Meteorology collects this data?
- How do they collect and organise their data?
- What times of day do they collect data?
- What tools do you think they use?
- Why have they collected the data on more than one occasion?
- What unit of measurement do they use?
- Have they used the same unit of measurement each time?

What can students learn from this to help them collect data across the school? Model to students how they can use a map of the school and pinpoint different areas to collect the data. Ask them to think about the different places across the school they can collect the temperatures (eg different rooms, corridors and outside). Discuss the times of day that data could be collected (eg morning, midday and afternoon). Over a week, they will see patterns in the data.

You may like to return students' attention to the data collected by the Bureau of Meteorology and use this example to create a chart to display the data.

Students can use the same process to collect data for the noise and light in the school. For this part they will need different tools. They can use their peripheral devices (iPad or Android tablets) to measure the light (lux) and noise (decibels). They will need to choose the right tool to measure the factors and use this consistently as they collect data.

Choose an app to measure light and noise and give students time to become familiar with it. There are a number of apps available, including:

- Light Meter (Android) (scale reading required)
- Lux Meter (Android)
- Galactica Luxmeter (iOS)
- Decibel Meter (iOS).

Learning construction

Prior to collecting data across the school ask students what they think the results will show. What will be the noisiest time of the day or place in the school? Where will have the most or least light? What will be the warmest part of the school?

Students will now collect data across the school. You can decide how long you would like the students to collect data and how often. Data collection can be completed in:

- small groups that collect all data types together
- groups of six in which pairs are responsible for collection of a data type (eg light, noise or temperature) and bring all the data back to the group.

Students will need a map of the school to establish where they will collect the data. As students collect their data they can add this to a spreadsheet. Model to student how to set up a spreadsheet to present their data. Students then use this data to create a graph to show how the data changes depending on the area or the time of day.

When the data has been collected, students can analyse their data and look for trends or patterns. Use the following questions to have a discussion about the data collected.

- Which areas of the school were the hottest or coldest?
- Did the level of noise change depending on the time of day?
- Which time of the day had the most light?
- What patterns did you notice?

Look at the following charts about ideal temperatures, light and noise in learning environments:

- Noise
- Light
- Temperature (for environmental savings)

Learning demo

Noise

Noise can be harmful when we are exposed every day to unwanted and harmful sounds such as loud cars and motorcycles, leaf blowers, barking dogs, noisy neighbours, parties, car alarms, and police and firefighter sirens. It is common for us

to complain about noise when we are doing activities such as rest, sleep, study, entertainment, relaxation and conversation. In a noisy classroom, students may not be able hear the teacher and may become upset or fall behind in learning as a consequence.

Light

The outdoor light level is approximately 10,000 lux on a clear day. Much of what we do in schools is visual and therefore we need enough light to help us interpret what we are seeing. The classroom is a place for many activities, such as reading and writing, student or teacher presentations, acting, playing and tests. Some of these things require different levels of light.

Temperature

When we are concerned about it being too hot or too cold our brains are busy trying to get us warmer or cooler. This can make it difficult to focus on learning. There is also the environment to consider and how much electricity is being used to heat or cool an area. Making it too hot or too cold can waste our natural resources.

Ideal learning environment

To create the ideal learning environment we need to know when we are in ideal conditions and when they change. We can use digital systems to notify us when conditions are not ideal.

Ask students to consider what the algorithm for this will look like using language such as ‘if this, then that’. When considering the temperature alert students will also need to consider if it is summer or winter.

Examples

- **If** lux is below 250 **then** the light will flash
- **If** the date is between 1 December and 28 February and the temperature is below 18 degrees **then** the light will flash.
- **If** the date is between 1 December and 28 February and the temperature is above 28 degrees **then** the light will flash.
- **If** the noise level is above X decibels **then** a light will flash.

Students can make an alert systems using the following instructions and littleBits.

- Light sensor
- Sound trigger
- Temperature sensor

Example
Using littleBits, students will need a power connection, sound trigger and an output to show that the sound has got to a certain level (eg buzzer or light).

The sensitivity of the sound trigger can be changed. Students can use trial and error to adjust the sensitivity with a small screwdriver. Ask students to make adjustments while testing sounds with a noise meter app. They can then find the loudest noise level that will allow them to learn. They can create a bar graph to show the level of noise.

The sound trigger can be changed to a light sensor or temperature sensor to create the light and temperature alerts.

Learning reflection

Give each group an opportunity to share the data they collected in a presentation to the class. Throughout the presentation students should show how they organised their data, what their graphs show about the light, noise and temperature across the school and what their priority areas are for alerting students to the conditions of their environment based on the data collected. If students made an alert, they can show how it works, using the 'if … then' statements in their explanations.

Assessment

Throughout the learning sequence and the reflection, look for the following understandings.

- Different peripheral devices are used to collect data.
- Data can be represented visually and using numbers.
- Acquired data can identify patterns and trends.
- Data can be used to set values in digital systems.
- Conditions can be managed using data.
- Digital systems rely on data to make them work effectively.

Example of this include:

- Do students use the equipment accurately to collect data?
- Can students use the number data collected to create a graph?
- Can they identify the coldest or warmest places in the school and prioritise these areas for the use of an alert system?
- Can they create a digital alert system, using the apps to enter data, by changing the sensitivity?
- Can they explain how changing the sensitivity is actually entering data into the device?