

Conceptual narrative Science: The Earth's surface

In the Earth and space sciences sub-strand, there are two main conceptual threads being developed from Foundation through to Year 10, Earth in space and the Earth's surface.

Big ideas

Changes in the surface of the Earth affect living things.

What concepts do I want my students to understand?

- Weather includes temperature, rain, wind and cloud cover.
- Living things include people, plants and animals.
- Weather affects living things.

Appendix 1 shows how the three interwoven strands, Science Understanding, Science as a Human Endeavour and Science Inquiry Skills, work together to build the sophistication and complexity of the science concepts from Foundation to Year 10.

This conceptual narrative illustrates one of the nine science concepts from the Australian Curriculum: Science Content structure. It tells the story of the concept in isolation of the eight others. However, there are situations when it is advisable to teach both concepts (Earth in space and the Earth's surface) together, because they complement each other.

Note: Not all concepts are specifically addressed in each year level.

Introduction

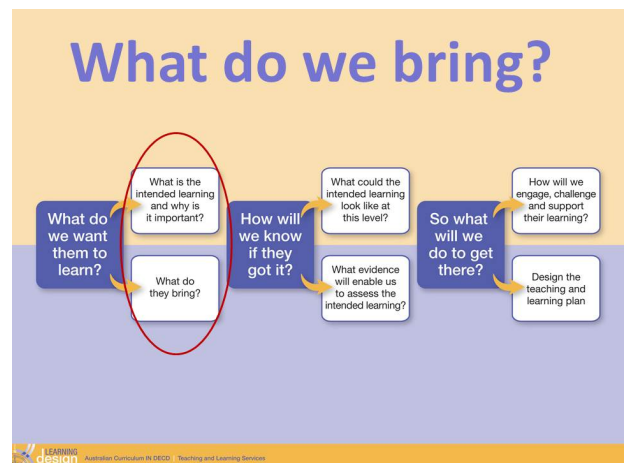
What might my students already know about this concept?

Students will have some experience of weather affecting aspects of their daily lives.

What content could I use to explore this concept?

This concept could be explored through picture books depicting the weather affecting living things, by keeping a daily weather log or by looking at images of people taken at different times of the year.

Now to bring the essence of scientific understanding to life, let's think about this concept through the six questions from the Bringing it to Life tool (BitL).



In Foundation, we want our students to think about how the weather affects them and other living things in their surroundings.

Foundation

In this example, I will look at keeping a daily weather record. It's best to do this in a season when weather is more variable.

What do you notice?

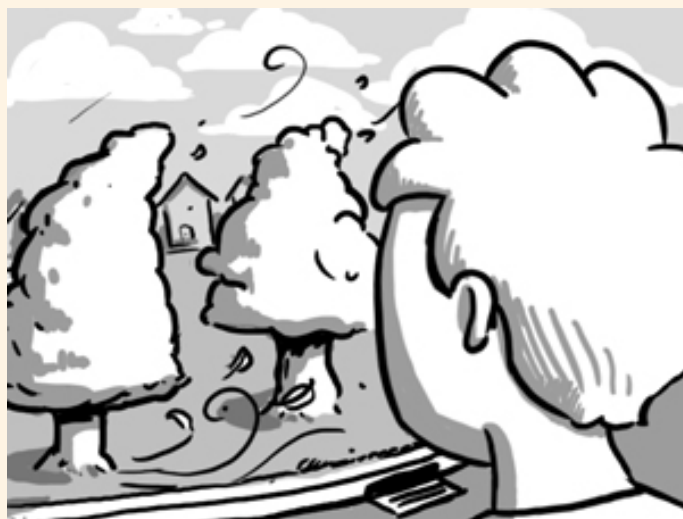
How can I help my students make observations?

Using the BitL questions, I could ask:

- *What do you notice?*

In Foundation, I want my students to make observations using their senses. I want my students to notice wind, rain, cloud cover and sun and how they feel. Some questions I would ask the students:

- *What do you notice about the weather?*
- *What do you see, hear, smell, taste, and feel when we are outside?*
- *What is happening in the sky? On the ground?*
- *What is interesting?*



What do you think?

How can I help students to see patterns and relationships? What questions might my students ask?

Student's curiosity leads them to ask questions. These questions help students to order their findings into a pattern to be able to make comparisons or find relationships. These questions support students to be more precise and foster analysis and classification of the observations.

Using the BitL questions, I could ask:

- *What do you think?*

In Foundation, I want my students to think about patterns in their observations. Questions I might ask are:

- *What do you notice about the clouds when it is raining? How is it different on sunny days?*
- *What clothes do you wear when the sun is out?*
- *Can there be wind on both sunny and cloudy days?*
- *How does the rain change what you do at recess?*
- *Does it always rain when there are clouds in the sky?*
- *Does it rain at night?*
- *What questions do you have about weather?*



What do you think if?

How can I help students to identify and formulate investigable questions?

Students ask testable questions that help them to narrow the focus of the inquiry. These questions provide opportunities for students to make predictions.

Using the BitL questions, I could ask:

- *What do you think if...?*

Some students in Foundation may be able to use patterns to make predictions. I could ask my students:

- *What do you think would happen if it rained on sports day? Why?*
- *What might happen to the plants if it didn't rain?*
- *What do you think it would be like if you wore your jacket on a hot day?*



How can you explore?

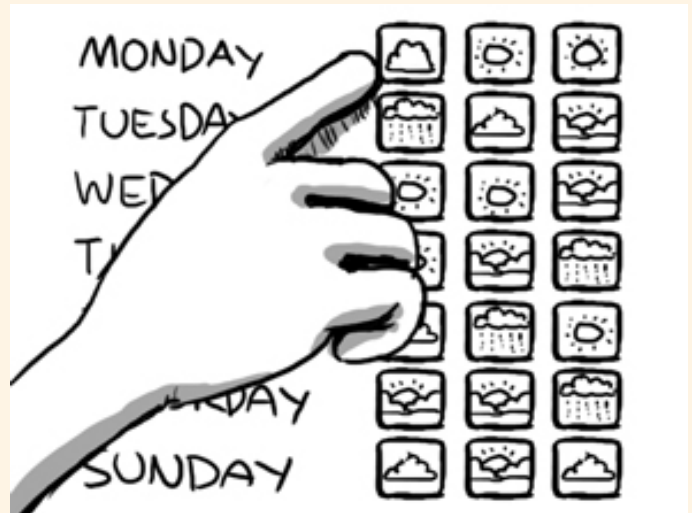
How might I help students investigate their questions? These questions support students to develop science inquiry skills and problem solve.

Using the BitL questions, I could ask:

- *How can you explore?*

In Foundation, I want my students to start exploring their questions and predictions.

- *How does our weather record help us find answers to these questions?*
- *If we wanted to find out more about the weather and plants, what else could we do?*
- *How could you find out if it is warmer in the morning or the night time?*



How can you share?

How can I help students share their observations and questions?

These questions stimulate student's reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can you share?*

In Foundation, I want my students to represent their observations and findings through discussions, drawings and role plays. I could ask my students:

- *Can you draw a diagram of what you found out about the weather?*
- *How does the diagram show what happened to living things?*
- *What labels will help explain your diagram?*



So what?

How can I help students apply the concepts in a range of authentic contexts?

These questions support student's reasoning, to expand or change their ideas from their experience and evidence and generalise to new contexts.

Using the BitL questions, I could ask:

- *So what?*
- *Who needs to know about the weather?*
- *Why is it important to know about the weather and how it affects us?*
- *How do you decide what clothes to wear?*



Concluding comments

What concepts might students develop through working with the BitL questions in this way?

By exploring this science understanding through these questions, we can help our students to think, work and process scientifically. Students can connect science to their world and consider why they need to learn how the weather affects living things.

Appendix 1

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This conceptual narrative illustrates one of the nine science concepts from the Australian Curriculum: Science Content structure. These concepts develop in depth and breadth of understanding from Foundation to Year 10. This conceptual narrative tells the story of the concept in isolation of the eight others. However, there are situations when it is advisable to teach both concepts (Earth in space and the Earth's surface) together, because they complement each other.

Note: Not all concepts are specifically addressed in each year level.

Earth and space sciences

In the Earth and space sciences sub-strand, there are two main conceptual threads being developed from Foundation through to Year 10. They are the concepts Earth in space and the Earth's surface. Let's look at the concept the Earth's surface.

Foundation

This begins in the Foundation year with students linking the weather to the effects it has on their daily life, for example how the weather can determine what clothing they wear.

Year 1

In Year 1, students observe changes in the landscape, such as water evaporating from a puddle or a sand castle washing away after the tide comes in.

Year 2

In Year 2, students focus on how we use resources from the Earth, including water. We want students to understand how they use water so they can identify ways to conserve water.

Year 4

At Year 4, students look at a range of changes to the surface of the Earth over time. Students group these changes as those caused by natural agents such as erosion or by human activity such as deforestation.

Year 6

In Year 6, students learn that sudden geological changes like earthquakes and volcanoes, and extreme weather conditions like hurricanes can affect the Earth's surface.

Year 7

In Year 7, students group the Earth's resources as renewable or non-renewable. For example, students can compare fossil fuels which take millions of years to form with wood that grows in

decades and biofuel that grows in months. They also learn about the water cycle and that water is as an important resource.

Year 8

In Year 8, students develop an understanding of the rock cycle. They consider the timescale of the processes and formation of igneous, sedimentary and metamorphic rocks. Students also learn that rocks are made up of minerals.

Year 9

When students are in Year 9, they use the theory of plate tectonics to explain how major continental plate movement predicts areas prone to earthquakes and volcanic activity. Students identify global patterns of geological activity, such as considering the role of heat energy and convection currents in the movement of tectonic plates, and relating the extreme age and stability of a large part of the Australian continent to its plate tectonic history.

Year 10

In Year 10, students understand the connections between the different systems that make up the surface of the Earth. They appreciate how cycles of carbon and other materials involve interactions in the hydrosphere, lithosphere, atmosphere and biosphere. Students learn the role of carbon in the greenhouse effect and its effects on biodiversity.

So from Foundation to Year 10, students broaden and deepen their understanding by building on from their thinking about changes in their immediate surroundings, to consider those in the wider world, and then use models and theories to describe, explain, predict and generalise.