

Conceptual narrative Science: Interdependence and ecosystems

In the biological sciences sub-strand, there are three main conceptual threads being developed from Foundation through to Year 10. They are the concepts of diversity and evolution, form and function and interdependence and ecosystems.

Big ideas

Plants and animals live where their needs are met.

What concepts do I want my students to understand?

- Plants live where there is enough light, water, soil and shelter.
- Animals live where there is enough food, water and shelter.
- This may vary for different plants and animals.

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 all concepts, (diversity and evolution, form and function and interdependence and ecosystems) 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 may understand what living things need to survive, such as food and water.

What content could I use to explore this concept?

We want our students to consider where plants and animals shelter and get their water and food to survive. We could explore the school yard or local park or bring in animals from the Nature Education Centre, like hopping mice, in an aquarium set up with its natural habitat.

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 Year 1, we want our students to understand that plants and animals live in places where their needs are met.

Year 1 example

In this example, I will take my students out to the schoolyard to focus on exploring places where things live and then investigate if plants need soil to survive.

What do you notice?

How can I help my students make observations?

Using the BitL questions, I could ask:

- *What do you notice?*

In Year 1, I want my students to make observations using their senses to find plants and animals in the school yard. Questions I could ask my students are:

- *What plants and animals can you see or hear in the school yard?*
- *What does it look like, where they are living?*
- *Can you describe what it smells like and feels like?*
- *What else do you notice about where the plants and animals are?*



What do you think?

Students' 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 Year 1, I want my students to ask questions and look for relationships between where animals and plants live. I may prompt them with:

- *Where else might you look for plants and animals?*
- *What does the plant or animal need to stay alive?*
- *Where do they get it from in each place?*
- *Do plants need soil to survive?*



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 Year 1, may start to make predictions about possible changes, or answers to their questions. To develop the student's ability to think scientifically, I could ask:

- *What do you think might happen if the animals or plants were moved from their 'place'?*
- *What do you think would happen to the animal or plant if the place they lived changed?*
- *What would happen to the frogs if the pond dried out?*
- *What do you think would happen if you ran through a spider web and broke it?*



How can you explore?

These questions support students to develop science inquiry skills and problem solve.

Using the BitL questions, I could ask:

- *How can you explore?*

In Year 1, I want my students to start exploring their questions and predictions. Questions I might ask my students are:

- *How can we find out if plants need soil to survive?*
- *What ideas have you got?*
- *If you are not going to grow plants in soil, then what will you grow them in? Sand? Rock? Gel? Water bowl?*
- *Why did you choose that material?*
- *How is that material like soil? Different?*
- *How often will you water and measure your plants?*
- *How could you record?*



How can you share?

How can I help students share their observations and questions?

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

Using the BitL questions, I could ask:

- *How can you share?*

At Year 1, I want my students to share the information about where plants and animals live with their classmates.

Questions I could ask my students are:

- *Can you draw a diagram to show others where your plant was grown?*



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?*
- *Why is it important to know about where plants and animals live?*
- *How does understanding where plants and animals live help us to think about what they need?*
- *How does understanding what plants and animals live help us to protect and care for them?*
- *Who might need to know about this? Why?*



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 that animals and plants live where their needs are met.

Appendix 1

Appendix 1 shows how the Science as a Human Endeavour strand develops in sophistication and complexity across Foundation to Year 10.

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 all concepts, (diversity and evolution, form and function and interdependence and ecosystems) together, because they complement each other.

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

Biological sciences

In the biological sciences sub-strand, there are three main conceptual threads being developed from Foundation to Year 10. They are the concepts of diversity and evolution, form and function and interdependence and ecosystems.

Let's look at the interdependence and ecosystems concept

Foundation

This starts in the Foundation year where students look at what people and other living things need to survive. For example, the class guinea pig needs food, water and shelter to survive.

Year 1

Year 1 goes a bit wider and students' focus on the idea that plants and animals live where their needs are met. This may vary for different plants and animals. For example, some spiders live under the bark of trees, whereas others like the trap door spider, live under the ground.

Year 4

In Year 4, students understand how living things depend on each other and the environment to survive. Insects and a spider living on a tree demonstrate this. The spider gets shelter and protection from the tree, and the tree gets protection from the spider because the spider eats the insects that could damage the tree.

Year 6

At Year 6, the growth and survival of living things are affected by the physical conditions of their environment. For example, a tree could be affected by extended lengths of darkness. If there is a thick smoke in the atmosphere and the sunlight isn't able to get through, a tree is unable to make its food because it needs sunlight, and so without the sun's light, it will slowly die.

Year 7

In Year 7, students study the interactions between living things which we call organisms and the impact of humans on these interactions. For example, humans introduced the cane toad in Queensland as an attempt to control the native cane beetle, however this impacted on other food chains and food webs.

Year 9

By Year 9, the focus broadens to include how energy and matter flow through whole ecosystems and the effect of both living (biotic) and non-living (abiotic) factors on them. An example of this is the regeneration of a local area that occurs after a bushfire or drought.

So, from Foundation to Year 10, students develop their understanding of interdependence in ecosystems from basic needs of familiar living things to abstract ideas about how energy and matter flows in ecosystems.