

# 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

Living things have similar basic needs.

### What concepts do I want my students to understand?

- People, plants and animals both at home or in nature need food, water and shelter to survive.

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 biological 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?

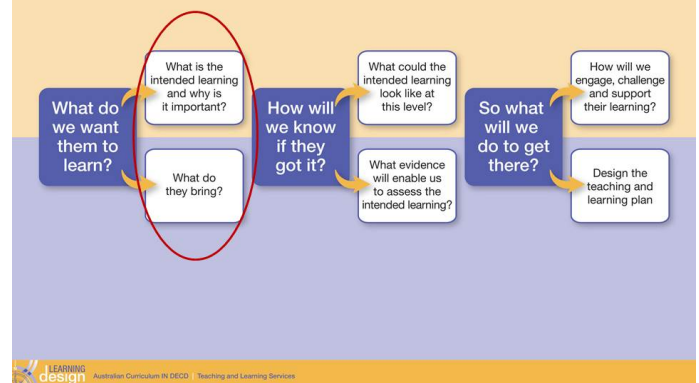
Students will be aware that they need water and shelter. Some may have experience of pets or plants.

### What content could I use to explore this concept?

There are many ways to investigate what animals and plants need to survive. We could observe snails, worms, crickets, the class pet or grow wheat seeds.

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).

## What do we bring?



At Foundation level, we want our students to understand our what living things need to survive.

## Foundation Year example

For this example, we are going to observe the class pet which is a guinea pig.

### 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. would ask my students:

- *What do you see the guinea pig doing?*
- *What do you see the guinea pig eating and drinking?*
- *How does the guinea pig get its food and drink?*



### 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?*

I want my students to use their observations to discover similarities between the guinea pig, themselves and other animals. Questions I would ask my students are:

- *What does the guinea pig need?*
- *What do we need to give the guinea pig to keep it alive?*
- *What else needs food and water*
- *How are you like a guinea pig?*
- *What do you need to stay alive?*
- *How different are you?*
- *What questions do you have about looking after a guinea pig?*



## 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 at Foundation, may be able to use these patterns to make predictions. I could ask my students:

- *What do you think might happen if we forget to feed the guinea pig?*
- *Would this be responsible?*
- *What do you think would happen if we give the guinea pig our food?*
- *How do you feel if you forget to eat? Or, if someone gave you the wrong kind of food?*
- *What do you think will happen if you forget to have a drink??*



## 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 Foundation, I want my students to start exploring their questions and predictions. Questions I might ask my students are:

- *If we offer the guinea pig three bowls of food - carrots, lettuce and apples, which do you think it will eat?*
- *How will you find out?*



## How can you share?

### How can I help students share their observations and questions?

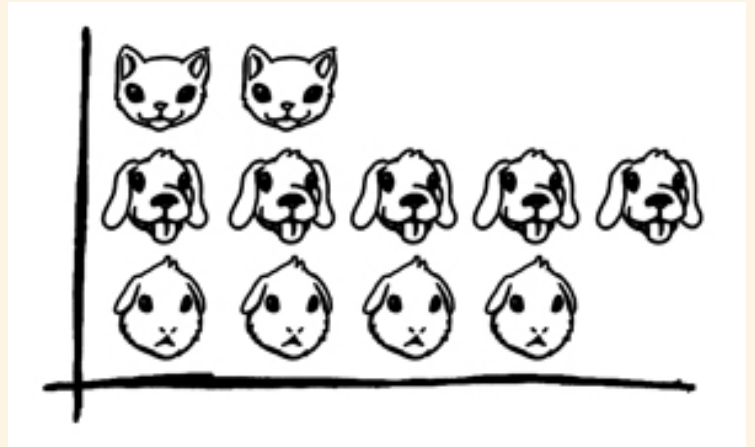
These questions stimulate students' reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can you share?*

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

- *Can you draw a diagram to show what the guinea pig ate?*
- *Can you share with the class by making a reminder chart for the guinea pig's needs?*



## 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?*
- *How does knowing this help us?*
- *Why is it important to care for the guinea pig responsibly?*
- *Why is it important to understand the needs of other living things?*
- *Who might be interested in this? Why?*
- *Do all animals need food and water?*



## 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 people have needs that help them to survive.

## 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.