Year 4

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 depend on each other and the environment to survive.

What concepts do I want my students to understand?

- Understand that living things depend on each other (producers, consumers, decomposers) and the environment to survive.
- Interactions between living things may be competitive (predator - prey) or mutually beneficial.

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 (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

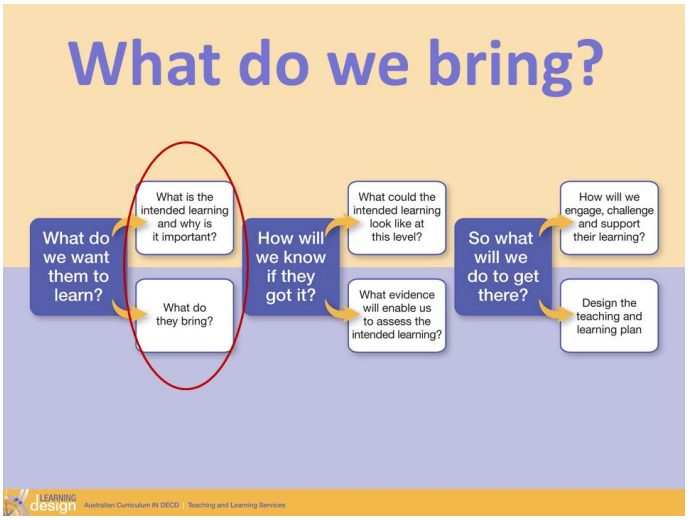
What might my students already know about this concept?

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. Plants provide food and shelter for some animals, and some animals are food for other animals.

What content could I use to explore this concept?

We could explore these concepts through one of Scootle's learning objects, or observe an ant farm, or by investigating the habitat of local plants and animals.

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).



At Year 4 level, we want our students to understand that living things depend on each other and the environment to survive.

Year 4 example

I would choose an everyday example to start with, such as a tree and the birds that use the tree, so the students can notice they depend on each other.

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 4, I want my students to make observations in order to group similar things together. I would ask my students to observe the interactions between the birds and the tree. Questions I could ask are:

- *What are birds doing on or near the tree?*
- *What is the same and what is different about how the birds get their food and water?*

What patterns and relationships can you see?

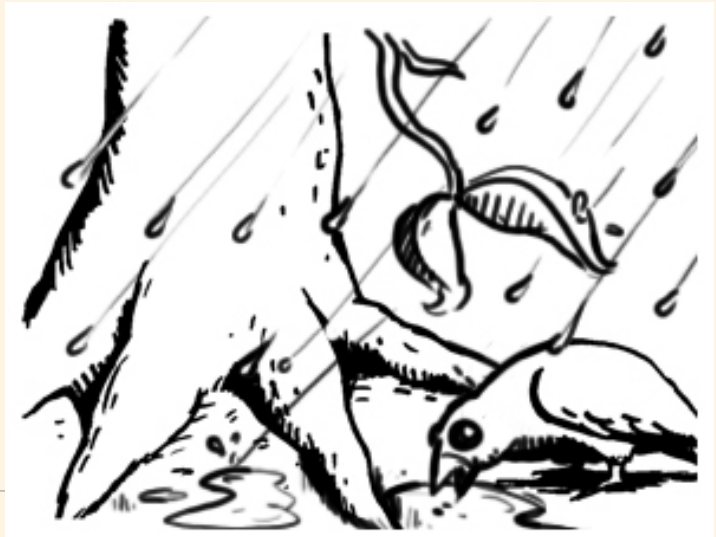
Student's curiosity leads them to ask questions. These questions help students to order their findings into a pattern to be able to make comparisons or find relationships. These questions support students to be more precise and foster analysis and classification of the observations.

Using the BitL questions, I could ask:

- *What patterns and relationships can you see?*

At Year 4, I want my students to use prior knowledge to describe the relationships between plants and animals, how they depend on each other. I could ask my students:

- *What are the similarities?*
- *What are the differences?*
- *Where does the bird get its water from?*
- *Where does it go when it rains?*
- *What does the bird get from the tree?*
- *What does the tree get from the bird?*



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...?*

In Year 4, I want my students to predict how the relationships might change within a system. For example

- *What do you think might happen if you added a cat into the tree? Or if more trees were added nearby?*
- *What do you think would happen if more insects came to the tree?*
- *How might a fire affect the birds?*
- *How might winter affect the trees and birds?*
- *How might night affect the birds?*
- *What would the birds do if the trees were cut down for a new playing field?*

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 we explore?*

At Year 4, I want my students to start planning and conducting investigations. Questions I could ask the students are:

- *How will you investigate what happens in the school when the tree is flowering?*
- *What could you try? How could you test your idea?*
- *What will you record?*
- *What safety aspects need to be considered?*
- *Will your investigation affect the birds? How?*

How can you review and communicate?

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 review and communicate?*

I would ask my students to think of the best way to show the relationships they found between animals and plants and how they depend on each other. In Year 4, I want my students to share the information they found with their classmates.

- *What tools (list, table, graph, and drawing) might you use to identify patterns and share this information?*
- *Did other people find something different to you?*
- *Was what you found the same or different from what you predicted? If so, how?*
- *How could you improve your investigation?*

So what? What next?

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?*
- *What next?*

It is important to connect the concept to their everyday life so they can see why it is important to know this. I could ask my students:

- *Who might be interested in, or need to know about the dependence relationships in the tree? Why?*
- *What else might you investigate?*
- *How would the relationships between plants and animals in the sea be the same? Different?*

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 be able to think, work and process scientifically. Students can connect science to their world and consider why they need to learn that animals and plants form relationships of dependence and interdependence

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.