Year 5

Conceptual narrative Science: Form and function

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

The form and function of living things are adapted to the environment where they live.

What concepts do I want my students to understand?

- Cause and effect relationships that relate to different body parts being adapted to particular environments.
- The features of living things, enable them to function in their environment.

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, (properties of matter and changes of matter) 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?

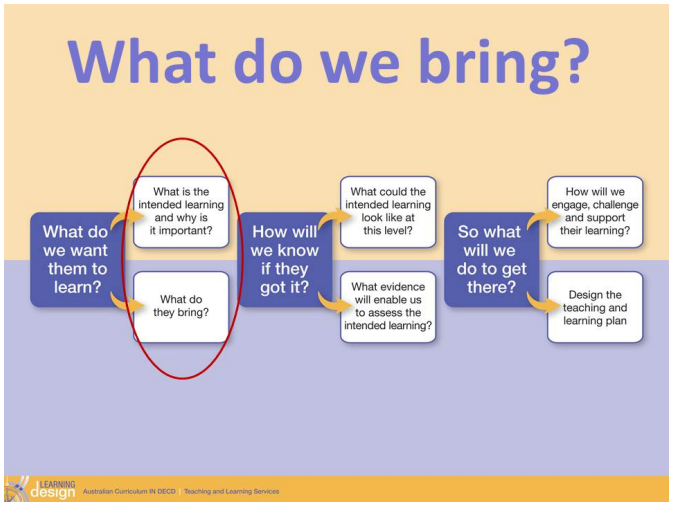
The features of living things are linked to their function.

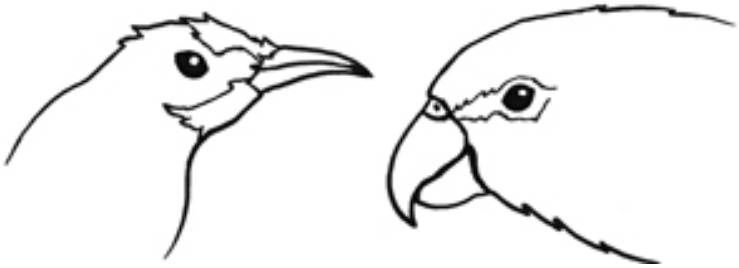
What content could I use to explore this concept?

In this concept, we want students to understand what the term adaptation means, in a biological science. We could explore both behavioural and structural adaptations which help an organism to survive, by looking at:

- native plants requiring bushfires to crack open their seeds
- animals that hibernate in winter
- birds that migrate to nesting sites
- cows in Scotland which are hairier than cows in Australia
- cactus plants which conserve and have structures to hold water to survive in the desert.

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 5, we want our students to understand how the particular features of living things help them to survive in their environment.

Year 5 example

In this example, I will ask my students to look at a range of plants and animals that use camouflage as an adaptation. I could get them to view a video on the chameleon lizard, or mistletoe, or stone plants, or katydid insects.

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 5, I want my students to make observations in order to develop their curiosity around the phenomena of camouflage. Questions I may ask my students are:

- *What do you notice about the change in colours of the plants and animals?*
- *Did you observe any other changes as the organisms were adapting to their environment?*
- *How do their body features help them to survive in their environment?*

What patterns and relationships can you see?

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 patterns and relationships can you see?*

In Year 5, I want my students to discover the relationships between a structural or behavioural adaptation.

- *Do all the animals and plants use camouflage in the same way?*
- *Were there any exceptions or unusual patterns?*

What do you predict?

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

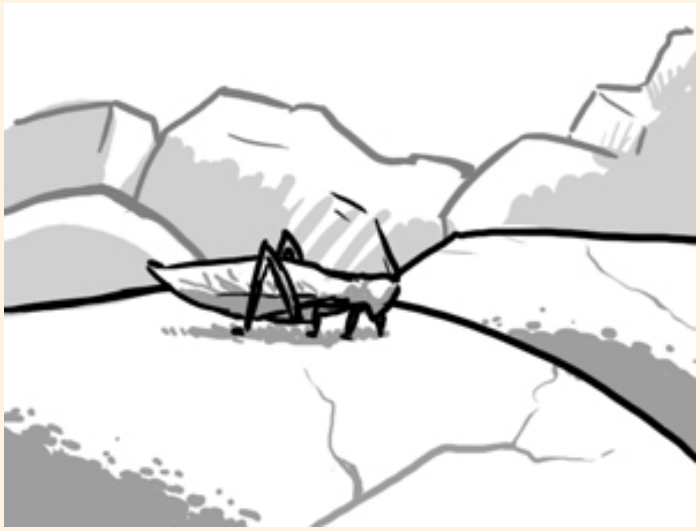
Students ask testable questions that help them to narrow the focus of the inquiry. These questions provide opportunities for students to make predictions.

Using the BitL questions, I could ask:

- *What do you predict?*

In Year 5, I want students to make predictions based on their observations.

- *What do you predict will happen as the surroundings for the chameleon or stone plant or katydid changes?*
- *What do you predict the limitations might be?*
- *What makes you think that?*
- *What do you predict the range of colours might be?*
- *What makes you think that?*



How can you test?

How might I help students investigate their questions?

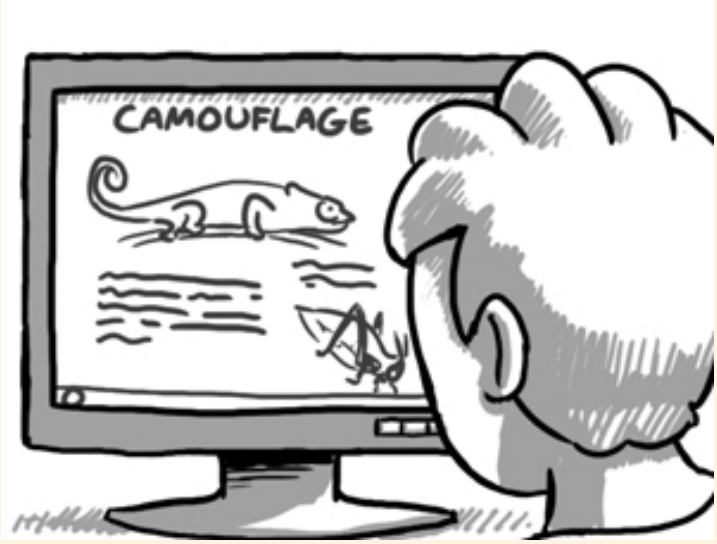
These questions support students to develop science inquiry skills and problem solve.

Using the BitL questions, I could ask:

- *How can you test?*

In Year 5, I want my students to start using secondary sources to gather data to test their ideas. Questions I may ask my students are:

- *How can we explore the camouflage effect?*
- *How might you find out about the changes that happen?*
- *What ideas have you got?*
- *What is your best idea?*
- *What safety and animal ethics, may prevent you from testing your idea?*
- *What other resources could you use to help you explore your question?*



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?*

In Year 5, I want my students to record and communicate their data and thinking. Questions I may ask my students are:

- *What do you think is the best way to represent your findings?*
- *How can you use the evidence gathered, to support the science ideas about camouflage?*
- *Did other people find something different to you?*
- *Was what you found, the same or different from what you predicted? If so, how?*
- *So what happens to animals or plants that do not adapt to their environment?*

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?*
- *Why is it important to know about the adaptations of organisms?*
- *How does understanding this, help us to understand other adaptations?*
- *Who might be interested in this information?*
- *What else about camouflage or adaptations could you investigate?*

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 have adaptations that aid their survival in their environments.

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 both concepts, (properties of matter and changes of matter) 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 form and function concept

Year 1

This starts in Year 1, when students explore the features of living things and link them with their function. They might look at familiar insects and identify that eyes are for seeing, wings are for flying and legs are for crawling.

Year 5

In Year 5, students look at how different body parts are adapted to particular environments, such as birds, which have different beaks depending on what they eat. Some, like parrots, are for cracking seeds while honeyeaters beaks are long and narrow to eat nectar from flowers. Another example is the covering of some animals which enables them to be camouflaged in their surroundings.

Year 8

The scale in Year 8, zooms in to the microscopic, where students learn about the form and function of cells as the basic unit of living things. They then zoom out, to examine how the structure of organs relates to the specialised function of the system it is part of. The students might start by looking at blood cells, and then zoom out to the heart, which is an organ that is part of the circulatory system.

Year 9

At Year 9, students start to think about form and function within systems, the focus is on how the internal systems work together to respond to changes in an organism's environment, such as the body's response to heat stress or infection.

Year 10

In Year 10, students learn about genetics, the role of genes and DNA, as a mechanism for passing on these adaptations of form and function, from one generation to the next.

So from Year 1 to Year 10, students develop their understanding from what they can see on familiar living things, to internal systems of living things, at both the macroscopic and microscopic scale. Along the way, they relate this to how they are related to functioning in their environment.