

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

Features of living things are linked to their function.

What concepts do I want my students to understand?

- The features of plants and animals have specific functions.
- Similar features often service similar functions on different animals and plants. For example eyes for seeing, legs for movement.

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

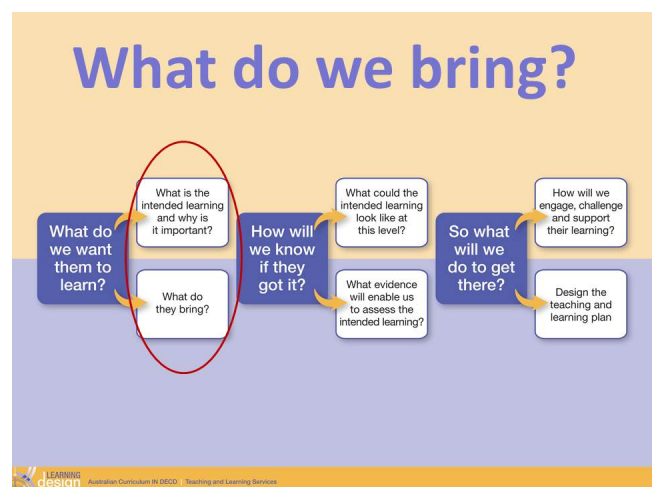
What might my students already know about this concept?

Students may have some experience of common features of plants and animals.

What content could I use to explore this concept?

We could explore ants in an ant farm, spiders in resin, or butterflies in a butterfly house to observe and understand the features of living things. We want our students to understand that different body parts have different functions.

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 the features of living things and what they do.

Year 1 example

In this example, I want my students to explore the animals and plants on the nature table. This might include flowers, pot plants in soil, worms, snails, frog, fish and budgies.

What do you notice?

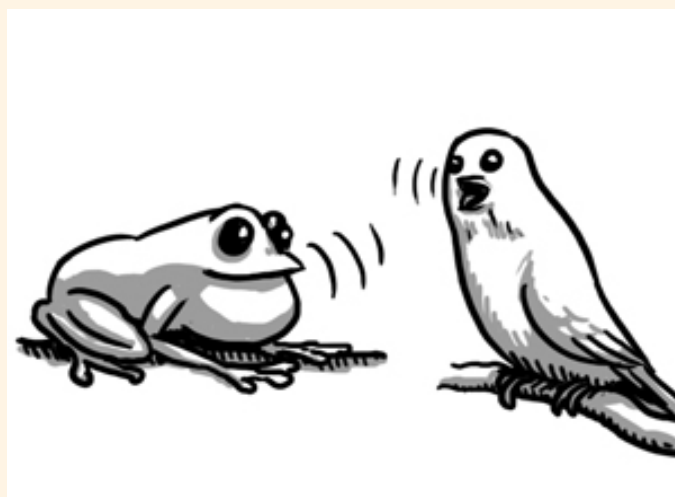
How can I help my students make observations?

Using the BitL questions, I could ask:

- *What do you notice?*

In Year 1, I want my students to make observations about the features of living things using their senses.

- *What can you hear?*
- *Do all the animals make the same sound?*
- *What can you see?*
- *What do they feel like?*
- *How are they moving? What other living things do you know?*
- *What features do they have? How could you find out?*



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 look for relationships between the features of living things and what they are for? I could ask my students:

- *How do birds talk to each other?*
- *How do they eat?*
- *How do they move?*
- *Can the budgie hear our sounds? How do you know?*
- *What about the other living things?*
- *What living things have the same features?*
- *Why do some have different features?*
- *Does a frog move like a bird? DELETE THIS QU?*
- *How does a frog move differently to a bird? Why does it do this?*



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 find answers to their questions. To develop the students' ability to think scientifically, I could ask:

- *What might happen if you touch a snail's eye?*
- *Do you think that a worm has eyes? Why? Why not?*
- *Do you think all animals have eyes?*
- *Which animals might not need eyes?*
- *How might they find food?*



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 we explore?*
- *How will you find out if snails, worms and spiders have eyes?*
- *What are your ideas?*
- *What might we need to help us look and count the number of eyes?*
- *How else might we find out?*
- *How could you record?*



How can you share?

How can I help students share their observations and questions?

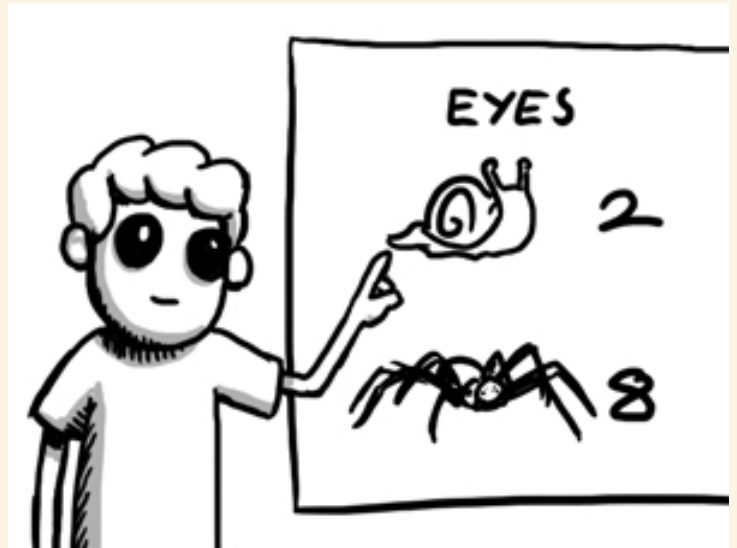
These questions stimulate student's reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can we share?*

In Year 1, I want my students to share their findings through drawings.

- *Can you draw a diagram to show the number, and kind of eyes on a spider and a snail?*
- *How can you show how the eyes are the same or different?*



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?*

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:

- *How does knowing this help us?*
- *Why is it important to think about what body parts might be used for?*
- *Who might be interested in 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 different body parts have different functions.

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.