Year 2

Conceptual narrative Science: Diversity and evolution

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 grow, change and reproduce.

What concepts do I want my students to understand?

- Animals and plants change from birth to maturity.
- There are predictable patterns in the growth and change of living things.
- Living things have offspring similar to themselves.

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 the 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

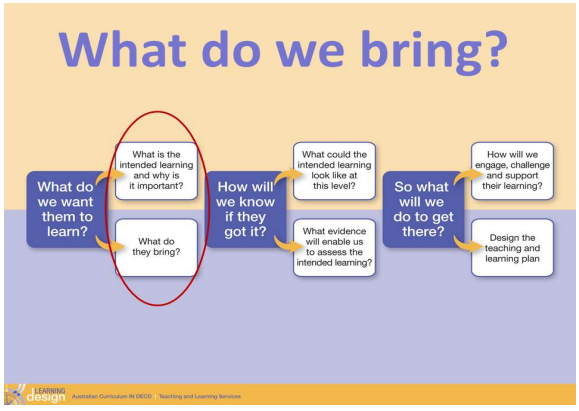
What might my students already know about this concept?

The features of plants and animals have specific functions.

What content could I use to explore this concept?

Students might follow the changes as chicken eggs hatch, or as seeds grow into vegetable plants, or represent their own growth and changes from birth until now.

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 2, we want students to understand that living things grow, change an reproduce.

Year 2 example

In this example, students explore the different life stages of a butterfly, from egg, to caterpillar, to butterfly.

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 2, I want my students to observe patterns of change in the life cycle of a butterfly. Questions I could ask my students are:

- *What shape are the eggs?*
- *What colour are they?*
- *What is happening to the eggs? Are they changing?*
- *What is interesting about the eggs?*
- *Can you see inside the egg?*

What do you think?

How can I help students to see patterns and relationships? What questions might my students ask?

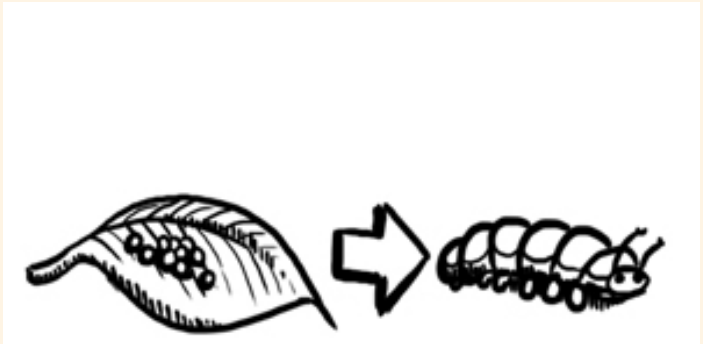
Students' curiosity leads them to ask questions. These questions help students to order their findings into a pattern, to be able to make comparisons or find relationships. They also support students to be more precise and foster analysis and classification of the observations.

Using the BitL questions, I could ask:

- *What do you think?*

In Year 2, I want my students to ask questions and look for relationships between the stages of the life cycle. I may prompt them with:

- *How are the caterpillars similar and different to their eggs?*
- *How does the egg change into a caterpillar?*
- *What do you think the caterpillar will turn into?*
- *What questions do you have about the caterpillars?*
- *What else are caterpillars like?*
- *How is a caterpillar like a baby chicken? How is it different?*



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.

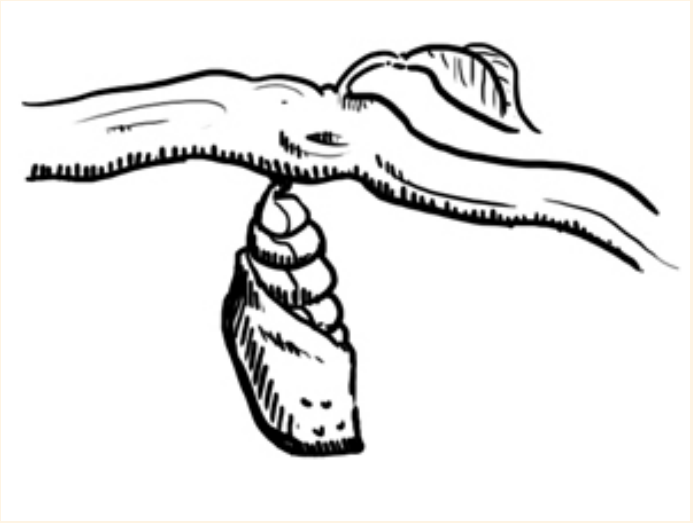
Using the BitL questions, I could ask:

- *What do you think if...?*

In Year 2, I want my students to start making predictions about stages in the life cycle. I might ask:

- *What do you think might happen to the caterpillars when they have grown big?*
- *What do you think will emerge out of the chrysalis?*
- *How might it get out of the chrysalis?*
- *Do you think that all the caterpillars will develop at the same time?*
- *Will they all look the same when they emerge?*

How might I help students investigate their questions?



How can you explore?

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

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

Using the BitL questions, I could ask:

- *How can you explore?*

At Year 2, I want my students to compare their observations to their predictions of the life cycle of the butterfly.

- *What do we need to do to observe the life cycle of a butterfly as it grows?*
- *How will you record the changes?*
- *When will we know it is an adult?*
- *What do you need to think about to care for the butterflies?*

How can you share?

How can I help students share their observations and questions?

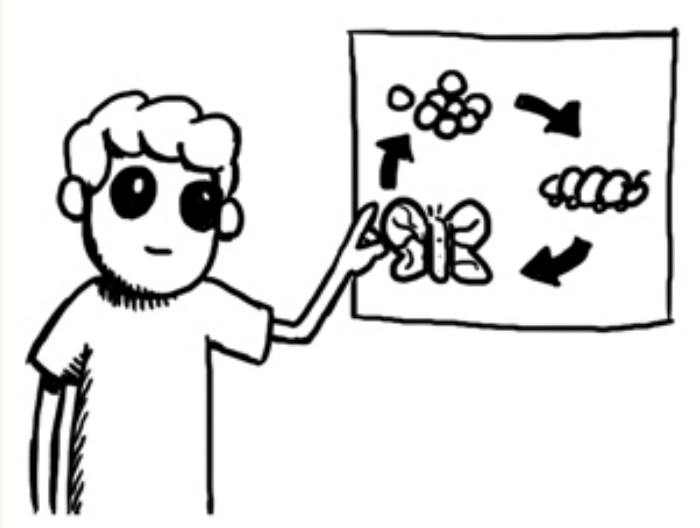
These questions stimulate student's reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can you share?*

At Year 2 I want my students to represent and communicate how butterflies change. Questions I could ask my students are:

- *Can you draw a diagram to show the place where you found butterfly eggs?*
- *Can you draw a diagram to show what happened?*
- *Did others find the same as you?*
- *What is the same about butterflies and caterpillars?*
- *How do they differ?*



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?*

I want my students to see this science in their everyday life.

- *Why is it important to understand how animals and plants grow?*
- *Why is it useful to know how living things change?*
- *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 animals and plants grow, change and have offspring similar to themselves.

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 the concepts of 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 diversity and evolution concept

Year 2

This concept starts in Year 2 with familiar examples of how living things grow, change and reproduce Students might look at changes from birth to maturity of different animals and plants, such as chicken eggs or sunflower seeds, comparing the adult with the offspring.

Year 3

In Year 3, the focus is on what distinguishes living things from nonliving things so students might explain why they would classify a range of items from the school environment (e.g. stones, sticks, feathers, insects, and parts of plants) as living or nonliving. Students notice that living things have a variety of external features which can help to group them.

Year 4

In Year 4, the idea that living things grow and reproduce is continued by looking at life cycles, such as when the plant grows, flowers and produces seeds, or the tadpoles change as they mature and become adult frogs.

Year 5

In Year 5, students learn that adaptations help an organism survive in its environment. For example, students might consider how arctic animals have adapted to survive in extreme cold.

Year 7

In Year 7, students discover that there are differences within and between groups of organisms, and use classification further, to enable them to organise and communicate about this diversity. For example. sorting and classifying different species of birds from the local environment.

Year 10

In Year 10, the theory of evolution combines these ideas with the role of genes and DNA, in passing on features or heritable characteristics from one generation to the next. This explains the past and present diversity of life on earth and offers a means to predict possible futures. Students at Year 10 level, are increasingly taking on a global perspective and so consider the relationship of biodiversity, natural selection and evolution.

So, from Year 2 to Year 10, students develop their understanding of evolution and diversity, by building on from their thinking about life cycles, to consider adaptation and survival of familiar objects, and then understand how this supports the theory of evolution by natural selection.