Year 5

Conceptual narrative Science: Diversity and evolution

In the Biological Sciences 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 structural or behavioural features and adaptations that help them to survive in their environment.

What concepts do I want my students to understand?

- An adaptation is a structural or behavioural feature, that develops over time.
- Different kinds of living things differ in their structural and behavioural features. These features help them survive 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 the concepts (diversity and evolution, form and function, interdependence and ecosystems) together, because they complement each other.

Note: Not all concepts are specifically addressed in each year level.

Introduction

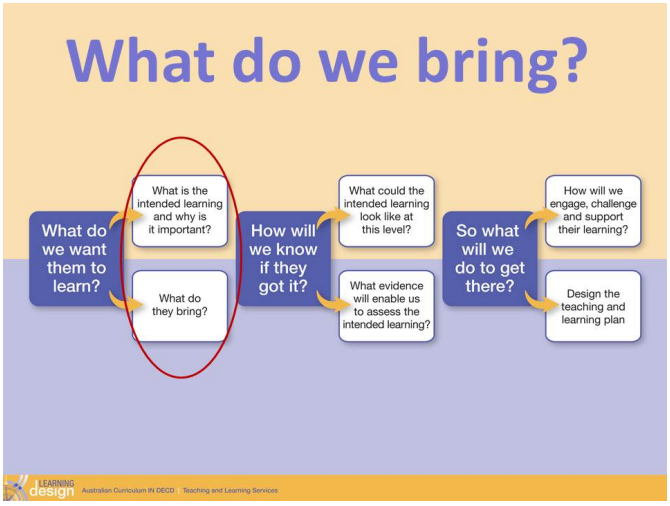
What might my students already know about this concept?

Living things have a life cycle. Living things grow, change and reproduce. We use features to classify living and non-living things.

What content could I use to explore this concept?

We could explore this concept by exploring how native and introduced plants and animals have adapted to different Australian environments, such as features and behaviours of nocturnal animals; features and adaptations of living things that help them survive in the desert, or a range of arctic animals, to see how they are adapted to suit cold conditions.

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 students to understand how plants and animals adapt their behaviour and structure to their environment.

Year 5 example

In this example, we could compare and contrast a pelican with a penguin to see how they are adapted to their environment.

What do you notice?

How can I help my students make observations?

Using the BitL questions, I could ask:

- *What do you notice?*

Questions I could ask my students are:

- *What is the weather like where the pelican lives?*
- *How does a pelican get its food?*
- *Where does the pelican find shelter?*
- *Does the pelican have any predators?*
- *Do any animals compete with the pelican for the same food?*

What patterns and relationships can you see?

How can I help students to see patterns and relationships? 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?*

I could ask:

- *What relationships do you notice, in the way that pelicans get their food, compared to other birds that live near the sea?*
- *What are the similarities?*
- *What are the differences?*
- *What behaviour shows the pelican has adapted to its environment?*

What do you predict?

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

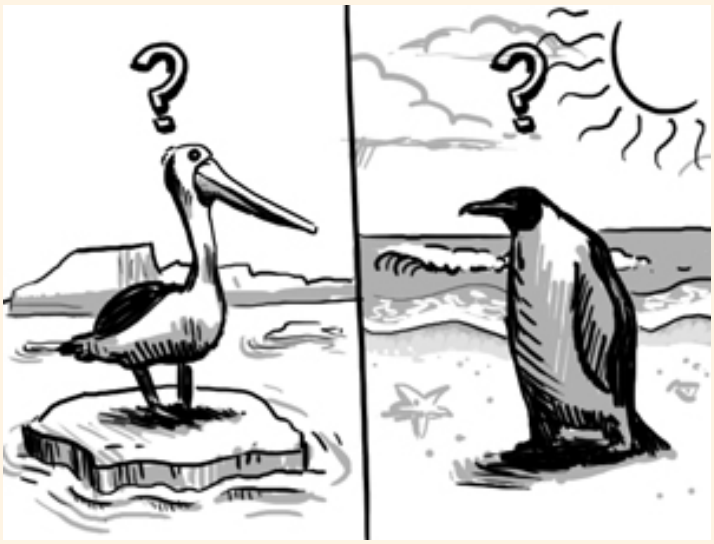
Students ask testable questions that help them to narrow the focus of the inquiry. These questions provide opportunities for students to make predictions.

Using the BitL questions, I could ask:

- *What do you predict?*

In Year 5, I want my students to use their patterns to predict findings of an investigation. Students compare a pelican to a penguin. I could ask:

- *What would happen if the animals switched where they live?*
- *What features would be useful in their new habitat?*
- *What features would not be needed?*
- *Do you think a penguin could survive in the pelican's habitat?*
- *What problems would the new habitat cause?*
- *Would you expect to see pelicans huddling like penguins? Why? Why not?*



How can you test it?

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

Using the BitL questions, I could ask:

- *How can you test it?*

In Year 5, I want my students to investigate their questions. Questions I could ask:

- *How could you investigate why penguins huddle?*
- *Or, could you investigate the different properties of penguin and pelican feathers?*
- *What could you try?*
- *How could you test your idea?*
- *What will you record?*
- *What safety aspects need to be remembered?*
- *What features do birds who live in cold places share with penguins?*
- *How could you model these features? Could you use a model to investigate how effective they are?*

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 might ask:

- *Describe in words why you think pelicans and penguins might realistically survive in different environments, and draw diagrams to illustrate how they have adapted.*
- *Why might these differences have occurred?*
- *What does that tell you about how animals adapt to their environments?*
- *How could you communicate how the different features of pelicans and penguins help them survive?*
- *What is better communicated by diagrams? Text?*
- *How else might you communicate what you have learnt?*

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:

In Year 5, I want my students to identify how scientific discoveries are used to solve problems that directly affect people's lives. Questions I may ask:

- *Who might be interested in knowing the behavioural and structural features of animals and plants that help them to survive in the environment?*
- *How does understanding adaptations help us to think about future planning of growing cities?*
- *What else might 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 how plants and animals adapt their behaviour and structure to their environment.

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 (diversity and evolution, forms 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.