



Overview

In this article, students learn about the development of the underwater bait setter. This device is designed to reduce the number of seabirds harmed through long-line fishing.

Curriculum context

TECHNOLOGY

NATURE OF TECHNOLOGY

Characteristics of Technology

Achievement objective(s)

L3: Students will understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function.

L4: Students will understand how technological development expands human possibilities and how technology draws on knowledge from a wide range of disciplines.

Key ideas

- Societal and/or environmental issues can influence what people decide to make and how they plan, make, and test technological outcomes.
- Technological outcomes change and develop over time.
- Technological knowledge is knowledge that technologists agree is useful in ensuring a successful outcome.
- Technologists use knowledge and skills from other disciplines when developing a technological outcome (for example, science, mathematics, history, psychology).

ENGLISH

READING

Ideas

Achievement objective(s)

L4: Students will show an increasing understanding of ideas within, across, and beyond texts.

Indicators

- Makes meaning of increasingly complex texts by identifying and understanding main and subsidiary ideas and the links between them.
- Makes connections by thinking about underlying ideas within and between texts from a range of contexts.
- Makes and supports inferences from texts with increasing independence.

The Literacy Learning Progressions

The literacy knowledge, skills, and attitudes that students need to draw on by the end of year 8 are described in *The Literacy Learning Progressions*.

Meeting the literacy challenges

The following strategies will support students as they engage with the information and ideas in the text. Once they understand what the article is about (“the story”), they will be able to explore the key technology ideas outlined in the following pages.

The *Connected* series includes a range of texts that provide opportunities for students to locate, evaluate, integrate, and synthesise information and ideas.

It is expected that students will read across the range of texts in this *Connected* to develop their literacy skills and their understanding of the topic.

Text characteristics

- Short explanatory text
- A diagram that requires interpretation
- Some technical vocabulary and the use of puns in the title and heading.

1. FINDING THE MAIN IDEAS

“Taking the Bait” describes the development of a device designed to reduce the number of seabirds harmed through longline fishing. The text has a straightforward structure.

ASK QUESTIONS to **PROMPT** the students to identify the issue that Dave Kellian wanted to resolve.

Why did Dave Kellian want to invent a new system for releasing long-line bait?

After reading the text, the students can **SCAN** through it to identify the stages of technological development. For example:

- Kellian started with an idea.
- He developed a functional model.
- After much testing, he worked with others to develop a prototype.
- The prototype was trialled.
- Dr Graham Robertson (an ecologist) decided to get involved.
- The device is now in use and can help to resolve the problem.

2. USING THE DIAGRAM TO CLARIFY THE TEXT

EXPLAIN that diagrams help to clarify the meaning of the text.

THINK ALOUD about how the diagram on page 25 supports the text.

On the right of the diagram, I can see how the device is attached to the boat. I have to check the text to remind myself what the red object is called.

ASK QUESTIONS to support students to use the diagram and integrate information as they are reading.

What do the arrows on the right-hand side indicate?

What's inside the capsule?

Why does the lower box have an arrow that points to the underwater capsule?

3. DEALING WITH TECHNICAL VOCABULARY

Have the students **IDENTIFY** and **LIST** the technical vocabulary.

Examples include: “technique”, “system”, “electronics”, “functional model”, “prototype”, “device”, “capsule”, “hydraulic”, “version”, and “trialled”.

Have students **SORT** this vocabulary according to how they worked out the meanings of the words. Categories could include:

- I know this word from another context.
- I found a clue to the meaning in the text.
- I predicted this meaning from reading the text.
- We use this word in technology.
- I can see the meaning from the illustration.
- I found the word in the dictionary.

4. RECOGNISING IDIOMATIC EXPRESSIONS

In this article, the writer has used puns in the title and in the heading on page 25.

Many students will be unfamiliar with these expressions. **IDENTIFY** the puns and discuss how puns are a play on words.

PROMPT the students to discover the usual meanings of these expressions and how they have been given another literal meaning in this text.

Can you find another title in this book that is a pun on a common expression? (“Catch My Drift”)

Exploring the technology

The following activities and suggestions are designed to support students to develop understandings about the nature of technology as a human endeavour.

Key ideas

- Societal and/or environmental issues can influence what people decide to make and how they plan, make, and test technological outcomes.
- Technological outcomes change and develop over time.

We are reading this article to find out the knowledge people need when they design and create technological outcomes. Write down any questions you think of while reading the article.

Activity 1: Creating the capsule

Explain to the students that large-scale fisheries target certain types of fish, but they inevitably catch other types as well. This is known as by-catch. By-catch also includes marine animals such as birds, turtles, and dolphins that are caught by accident. Some species are under threat as a result.

Dave Kellian played a key role in developing the Underwater Bait Setter, which has reduced the number of seabirds caught by long-line fisheries.

Show a film clip about the Underwater Bait Setter: <http://thefoundationforantarcticresearch.org/index.php/projects-2/dr-graham-robertson/>

Southern Seabird Solutions (www.southernseabirds.org) provides useful information on several initiatives that migrate by-catch, including the Underwater Bait Setter. Direct students to the site's "mitigation pathway". Have them read about and record the steps involved in turning an idea into a product, for example, identifying a need related to seabirds, investigating the factors that lead to the birds, being killed, seeking expert advice.

Have students read additional information about Dave Kellian's capsule. (They can click on the "capsule" link on the Develop Your Idea page of the mitigation pathway.)

Ask students to match stages in the development of the bait setter with the steps they identified from the mitigation pathway. Students may be surprised by the amount of time – and money – that has gone into developing the capsule.

Ask students to research the seabird characteristics that influenced the design of the bait setter. (They can click on the "seabird characteristics" link on the Getting Started page of the mitigation pathway.)

What evidence is there in the design of the Underwater Bait Setter that these characteristics have been considered?

Activity 2: Seabird by-catch

The Underwater Bait Setter is just one of a number of by-catch mitigation measures. Birdlife (www.birdlife.org) provides fact sheets about by-catch. Each fact sheet explains the mitigation technique or device and provides information on its effectiveness. See: www.birdlife.org/seabirds/bycatch/albatross.html

Have students work in groups to research different mitigation measures. Each group reports back to the class on the effectiveness of the technology they have researched.

Activity 3: Design a device

Birds are not the only marine creatures caught as by-catch. The Consortium for Wildlife Bycatch Reduction (www.bycatch.org) has a database with a range of by-catch mitigation technologies. Have students research a by-catch reduction technique or a by-catch species. Encourage students to look for links between the characteristics of a species and a reduction technique. For example, visual cues are important in sea turtle foraging behaviour. Turtles are afraid of sharks. Placing shark shapes on gill nets has reduced the number of turtles caught in gill nets.

- Technological knowledge is knowledge that technologists agree is useful in ensuring a successful outcome.
- Technologists use knowledge and skills from other disciplines when developing a technological outcome (for example, science, mathematics, history, psychology).

Ask students to use what they discover to design a technological outcome that could help to reduce by-catch. Tell students to include:

- an explanation of the specific by-catch issue they are trying to address
- characteristics of the animal
- how they have considered these characteristics in their design
- a drawing of their technological outcome, with labelled parts.

Activity 4: Sea lion excluder devices

Sea lions in the sub-Antarctic are sometimes caught by commercial squid fisheries. The government requires all trawl boats to use a "sea lion exclusion device" (SLED), which is meant to enable sea lions caught in the trawl net to escape. However, there are questions about whether the seals that get out of the nets are escaping without injury.

Have students research the SLED and the environmental issue that it is trying to address. What characteristics of sea lions make them vulnerable to being caught? How does the SLED work? What do different groups say about its effectiveness?

MINISTRY OF EDUCATION RESOURCES

- www.techlink.org.nz/curriculum-support/Strategies/nt-Characteristics/level4.htm

FURTHER RESOURCES

- www.southernseabirds.org