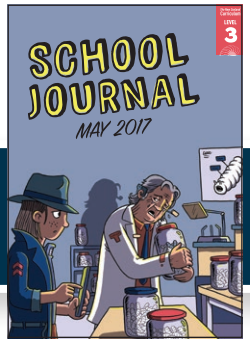
# Designed for Good

**by Philip Cleaver**

**School Journal**
**Level 3, May 2017**
**Year 5**




## Overview

This TSM contains a wide range of information and suggestions for teachers to pick and choose from, depending on the needs of their students and their purpose for using the text. The materials provide multiple opportunities for revisiting the text several times.

The New Zealand environment has been badly affected by introduced pests such as rats, stoats, and possums. "Designed for Good" follows the process of developing an effective and humane trap to reduce these pest populations. The article tells the story of the project, from the first "That's it!" moment through to the production of thousands of traps, which are now in use throughout New Zealand. We learn about the research the designers carried out, the trialling they undertook, and the eventual success of the finished product. The article also provides some background information about New Zealand's pest problem and concludes with a reference to the government's announced goal of making New Zealand pest-free by 2050.

This article:

- follows the technological process involved in designing a new product
- provides facts and information about the pest problem in New Zealand
- has photographs and diagrams to illustrate the text
- has text boxes with subheadings
- includes a glossary.

A PDF of the text is available at www.schooljournal.tki.org.nz

**Texts related by theme** **"Knee Deep"** SJ L4 Oct 2013 | **"Deer, Oh Deer"** SJ 4.1.10 | **"Remarkable Reti"** SJ L3 Oct 2015 | **"Red-hot Racers"** SJ L4 Oct 2011 | **"New Boots"** SJ L3 May 2017 | **"Up the Pipe"** SJ L3 Nov 2014

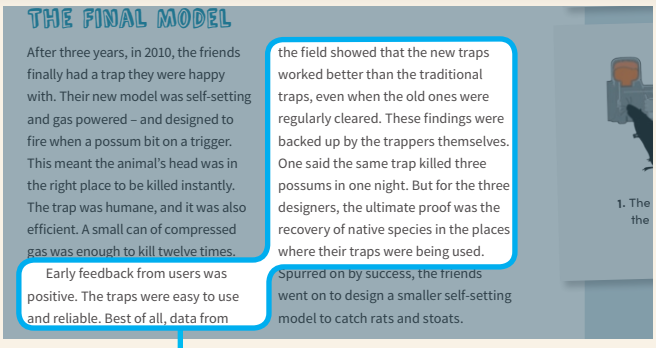
## Text characteristics from the year 5 reading standard

PEST FREE?

The resetting traps are an exciting development for pest control in New Zealand. The three friends hear amazing stories all the time. In one part of Fiordland National Park, it took only two months to reduce a large rat population to zero.

In 2016, the government announced the goal of making New Zealand pest-free by 2050. The plan is to start with our three "worst" pests: rats, stoats, and possums. Craig thinks it's unlikely that traps alone will achieve this. "Eliminating these pests – and all the others – is possible," Craig says, "although my guess is we'll need completely new technology, maybe something we can't yet imagine. But a pest-free New Zealand … it's definitely worth aiming for."

abstract ideas, in greater numbers than in texts at earlier levels, accompanied by concrete examples in the text that help support the students' understanding



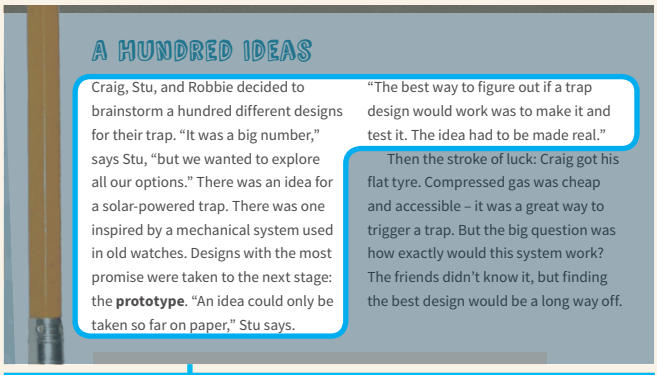
THE FINAL MODEL

After three years, in 2010, the friends finally had a trap they were happy with. Their new model was self-setting and gas powered – and designed to fire when a possum bit on a trigger. This meant the animal's head was in the right place to be killed instantly. The trap was humane, and it was also efficient. A small can of compressed gas was enough to kill twelve times.

Early feedback from users was positive. The traps were easy to use and reliable. Best of all, data from the field showed that the new traps worked better than the traditional traps, even when the old ones were regularly cleared. These findings were backed up by the trappers themselves. One said the same trap killed three possums in one night. But for the three designers, the ultimate proof was the recovery of native species in the places where their traps were being used.

Spurred on by success, the friends went on to design a smaller self-setting model to catch rats and stoats.

sentences that vary in length and in structure (for example, sentences that begin in different ways and different kinds of complex sentences with a number of subordinate clauses)



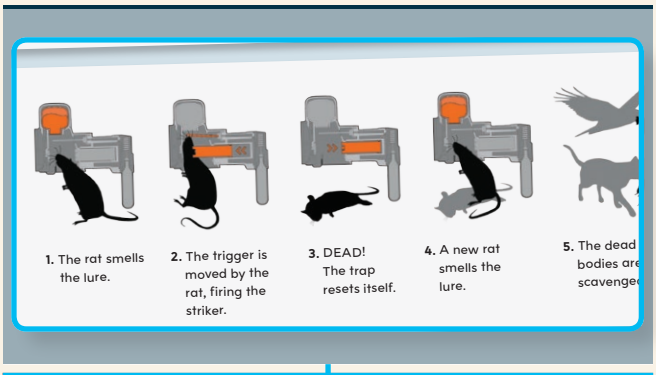
A HUNDRED IDEAS

Craig, Stu, and Robbie decided to brainstorm a hundred different designs for their trap. "It was a big number," says Stu, "but we wanted to explore all our options." There was an idea for a solar-powered trap. There was one inspired by a mechanical system used in old watches. Designs with the most promise were taken to the next stage: the **prototype**. "An idea could only be taken so far on paper," Stu says.

"The best way to figure out if a trap design would work was to make it and test it. The idea had to be made real."

Then the stroke of luck: Craig got his flat tyre. Compressed gas was cheap and accessible – it was a great way to trigger a trap. But the big question was how exactly would this system work? The friends didn't know it, but finding the best design would be a long way off.

a significant amount of vocabulary that is unfamiliar to the students (including academic and content-specific words and phrases), which is generally explained in the text by words or illustrations




illustrations, photographs, text boxes, diagrams, maps, charts, and graphs that clarify or extend the text and may require some interpretation

**Reading standard: by the end of year 5**

# Text and language challenges

(Some of the suggestions for possible supporting strategies may be more useful before reading, but they can be used at any time in response to students' needs.)

## VOCABULARY

- Possibly unfamiliar words and phrases, including "trigger", "compressed gas", "inflated", "industrial design", "rugged country", "reset", "efficient", "self-setting", "durable", "humane", "stowaways", "introduced", "species", "declined", "predators", "seedlings", "solar-powered", "mechanical system", "prototype", "accessible", "modify", "misfired", "footage", "refining", "lure", "biochemist", "ultimate", "spurred", "mink", "dispenser", "drones", "eliminating"
- Use of idiom/figurative language: "out of the blue", "high hopes", "a big leap for conservation", "stroke of luck", "room for improvement"
- Te reo Māori: "kiore", "rātā", "kāmahi"

## Possible supporting strategies

- Identify words or phrases that may be unfamiliar. Explain briefly before the students start reading: *Because this article is about technology and design, there will be some technical language. There are glossed words at the bottom of some pages, and I can help if there are other words that are unfamiliar.*
- Prompt prior knowledge of strategies to work out unknown words, such as reading and thinking about the surrounding information, putting the words into context, and using parts of the words they recognise.
- *The English Language Learning Progressions: Introduction*, pages 39–46, has useful information about learning vocabulary.
- See also ESOL Online, Vocabulary, for examples of other strategies to support students with vocabulary.
- Check that English language learners understand the terms "pest" and "conservation". Consider bringing in a speaker to demonstrate how pest traps work.
- Display posters of New Zealand pests and identify the animals. A pest poster can be downloaded from the Pest Detective website. You could use the photos on this poster to create vocabulary flashcards.
- To help students understand the design brief, ensure that they understand the meaning of the key words: "self-setting", "lightweight", "durable", "affordable", "reliable", and "humane". These words could be used in a definition-matching exercise. Give a set of words and their definitions to pairs of students to match correctly.
- There are many potentially unfamiliar words in this text. Consider having students create a "before and after" vocabulary grid. Before reading, draw up a grid of key words. The students write their own definitions for each word without using a dictionary. As they come across the word in the text, they confirm or revise their original definition. At this point, or after reading, the answers can be discussed and clarified. You could also encourage English language learners to write definitions in their first language or to add drawings.

| Word | My definition | Revised definition |
|---|---|---|
| | | |
| | | |

- Alternatively, pairs of students could create word maps by writing the focus word in the centre of a circle, brainstorming related words, and linking these to the focus word. The word maps could be:
  - words with similar meanings to the focus word
  - words from the same word family
  - words that relate to the same topic or theme.

## SPECIFIC KNOWLEDGE REQUIRED

Some understanding of:

- native bush
- the concept of conservation of natural resources
- the difference between native and introduced species
- the concept of innovation
- the process of technological development
- the government's goal of being pest-free by 2050

## Possible supporting strategies

- Prompt students to discuss, with a partner, what they know about the New Zealand bush.
- Explain why it is important that we conserve our environment.
- Ask questions to clarify the ideas. *When the writer says "difficult to use in rugged country", what does he mean by rugged?*
- Explain the idiom used. *"Has the answer to a problem ever hit you out of the blue?" When we say "out of the blue", it's a way of saying that something is totally unexpected.*
- Challenge students' thinking with questions. *Why do we work to protect some species and kill others? (for example, we protect the kiwi and kill the possum). What's the difference between a native animal and an animal that has been introduced?*
- Make connections to what students may have done in technology to solve a problem.

## TEXT FEATURES AND STRUCTURE

- A non-fiction article
- Photographs of the designers and the trap
- Text boxes and headings
- A labelled photograph of the trap and a step-by-step diagram showing how it works
- A glossary
- Use of a flashback as an introduction
- Steps that go back in time before moving chronologically through the design process
- Changes in tense
- Use of direct quotes from the designers

## Possible supporting strategies

- Before reading, prompt the students to recall what they are likely to find in an article. Ask students to talk with a partner to remind each other of the features of information texts.
- Direct students to features of the article, such as the photographs or the headings, to support discussion.
- Question students to support understanding of layout features. *What is the impact of putting a text box on top of a photograph?*
- Have the students identify references to time and then to construct a timeline of the events in the article (rats came to New Zealand "around 1300", The friends had a trap they were happy with "After three years", and so on).
- Discuss why the article changes from past to present tense on page 13. *Why is the sidebar about the trap in the present tense?*
- Have the students identify the direct quotes and ask them to suggest why the writer has included these.

# Possible curriculum contexts

### ENGLISH (Reading)

Level 3 – Ideas: Show a developing understanding of ideas within, across, and beyond texts.

### ENGLISH (Writing)

Level 3 – Language features: Use language features appropriately, showing a developing understanding of their effects.

### SCIENCE (Living World)

Level 3 – Ecology: Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.

### TECHNOLOGY (Nature of Technology)

Level 3 – Characteristics of technology: Understand how society and environments impact on and are influenced by technology.

### Possible first reading purpose

- To learn more about a new device for trapping pests

### Possible subsequent reading purposes

- To find out what drove the designers to invent a special trap for killing pests in our native bush
- To understand the impact of human actions on the environment
- To understand the concept of innovation

### Possible writing purposes

- To persuade others to the view that "We need to get rid of animal pests from New Zealand"
- To explain how possums thrive in the New Zealand bush OR how the self-setting trap works
- To describe the steps in a process

**The New Zealand Curriculum**

# Instructional focus – Reading

**English** Level 3 – Ideas: Show a developing understanding of ideas within, across, and beyond texts.

**Science (Living World)** Level 3 – Ecology: Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.

**Technology (Nature of Technology)** Level 3 – Characteristics of technology: Understand how society and environments impact on and are influenced by technology.

## First reading

- Set the purpose for reading.
- Support awareness of a global perspective on problem solving and caring for our planet. *Today, with technology, we can find out what's going on anywhere in the world. We can also use technology to help solve problems.* Direct the students to read the introduction on page 8.
- Ask them to read page 9, then talk to a partner. *Have a chat about what we have found out. Do we know who is involved? Do we know why these guys want to design a better trap? What are the main requirements for an efficient trap? Why does it need to be self-setting?*
- Direct students to the headings: "A Hundred Ideas", "Design and Redesign", and "The Final Model".
- Skim the text together to gather information from the diagrams and headings.
- Prompt the students' critical thinking. *Were all the designs helpful? Why did they develop so many prototypes?*
- Model identifying the main ideas and recording them.

### If the students struggle with this text

- Clarify what "design" means and prompt connections for students. *What would your job involve if you were a designer?*
- Clarify the concept "pest trap", then use questions to support students' predictions. *We are going to find out why Craig Bond was so keen to design a better pest trap. Why do you think we would need pest traps?*
- Make connections to controlling pests in our homes. *Has anyone ever used fly spray or nit shampoo? Does pest control always involve killing animals?*
- DIGITAL TOOLS Create a Google doc and ask students to add their questions and answers to it. Then project the document and discuss it as a class.
- Model how to use the headings to predict what will be in each section. *Design and Redesign – "re" is a prefix that tells us a thing happened again, so "re" tells me they designed it more than once. I think this section will be about the process they used and how they tried out different ideas.*
- Have the students ask questions before reading and use a question-answer framework to record the main ideas.

## Subsequent readings

How you approach subsequent readings will depend on your reading purpose.

### The teacher

Prompt prior knowledge about the New Zealand environment.

- *What sorts of animals do we have in New Zealand? What do we mean by the native bush? Is it important to look after the bush? If so, whose responsibility is it?*

Provide opportunities for students to discuss, in small groups, the relevance of the native bush for all of us, including people who live in the city. Ask questions that encourage students to reread "The Pest Problem" on page 10.

- *Which animal species were introduced to New Zealand? Why were they brought here? When did the damage begin? Why are stoats especially dangerous?*

If appropriate, take students outside to observe native bush, invite a visiting speaker to talk about pest control, or access Department of Conservation resources, for example, http://www.doc.govt.nz/get-involved/conservation-education/resources/possum-picnic/

- Ask questions to prompt critical thinking: *Do we value some animals more than others? If so, why is that?*

### The students:

- think critically about what it means to look after native bush, come to their own conclusions about the importance of doing so, and decide where the responsibility lies
- find and integrate information across the text about the various animal species that have been introduced to New Zealand and their impact on the environment
- evaluate information in the text to make inferences and answer questions about why animals regarded as pests were brought to New Zealand in the first place
- think critically and discuss the idea "Are kiwis more important than possums?"

DIGITAL TOOLS The students could highlight relevant sections of text using the PDF of the article and a PDF annotator such as Kami Google Chrome App – you can then project this for the class to discuss

### The teacher

Invite the students to consider what "innovation" means. Direct them to work in pairs or small groups to identify the qualities of an "innovative designer".

- *Using your own knowledge, and what we have read in the article, make a list of the things you think are important for innovation.*
- *How innovative were Craig, Stu, and Robbie?*
- *Can we solve all problems with innovation?*

Provide a challenge for students where they need to use problem solving and innovation.

- *This egg needs protection. What would be the best material to use?*

### The students:

- share their ideas on innovation and design, using their prior knowledge
- evaluate what they have read to decide how innovative Craig, Stu, and Robbie are
- make links to problem solving and adaptation, for example, they consider the commercial egg carton and bird nests and come up with other innovative alternatives for egg carriers.

**GIVE FEEDBACK**

- *I noticed you drew on several pieces of information in the text to come up with your own ideas about how to identify and manage the animals that threaten the environment. You have become an expert at finding evidence in the text to support your own opinions!*

**METACOGNITION**

- *What was it that prompted you to challenge the idea of killing all pests?*
- *What questions do you still have about the way we care for our environment?*
- *What process do you use when you are trying to solve a problem?*

**Reading standard: by the end of year 5**

**The Literacy Learning Progressions**

**Assessment Resource Banks**

# Instructional focus – Writing

**English** Level 3 – Language features: Use language features appropriately, showing a developing understanding of their effects.

| Text excerpts from "Designed for Good" | Examples of text characteristics | Teacher (possible deliberate acts of teaching) |
|---|---|---|
| Page 8<br><br>"That's it!" Has the answer to a problem ever hit you out of the blue? It once happened to designer Craig Bond. He'd been thinking about ways to trigger a new pest trap and was stuck. One day, he was out biking and got a flat tyre. A stranger offered to pump up the tyre using a small can of compressed gas. Within seconds, the tyre was inflated – and Craig had his idea. | **EXAMPLES OF TEXT CHARACTERISTICS**<br>**ENGAGING THE AUDIENCE**<br>*Writers are aware of their audience when they choose specific words and phrases to include. The words and phrases must have an impact on the reader and add interest.* | Lead discussion about the way students responded to the introduction.<br>▪ *How does the opening sentence affect you as a reader?*<br>▪ *Why does the writer ask a question in the second sentence?*<br>▪ *The writer doesn't tell you what Craig's idea was, but he gives a clue. How does he do that?*<br>▪ *What is the effect of giving a clue like this in the opening paragraph? Does it make you want to find out more?*<br><br>Direct students to share ideas with a partner about ways a writer can engage their audience.<br>▪ *If we want to tell a story, how do we make sure the reader wants to keep on reading?*<br><br>Provide opportunities for students to share prior knowledge.<br><br>Have the students write an opening paragraph to an article about whether we should try to eradicate all pests from New Zealand by 2050, then share it with a partner.<br><br>DIGITAL TOOLS Partners could write their paragraph on a shared Google doc, then add feedback comments to each other's paragraph.<br>▪ *Does it make you want to read on?*<br>▪ *How could you improve it?* |
| Page 12<br><br>**Design and Redesign**<br><br>Designing a self-setting trap that used gas became the team's focus. There were a lot of false starts. "At first we took a traditional trap for smaller pests and tried to modify it," Stu remembers. "These trigger when a rat or stoat steps on a steel plate." There were problems with this design. The trap sometimes misfired, and it didn't kill quickly enough. "We decided to try again with a possum trap," says Stu. …<br><br>After three years, in 2010, the friends finally had a trap they were happy with. | **CHOOSING WHICH DETAILS TO INCLUDE**<br>*Writers choose details that are important to the idea they are trying to convey and omit others that they think are not important. They also condense time by writing a general comment that can summarise a lot of activity.* | Discuss the phrases that show how much time was involved in developing the trap.<br>▪ *How many years are covered in the section "Design and Redesign"? (Read on to the next section for the answer.)*<br>▪ *What words help convey the sense that it took a long time to develop the trap?*<br>▪ *Why doesn't the writer tell us more about all the false starts?*<br><br>Ask the students to write about something that took place over a long period.<br><br>DIGITAL TOOLS They could complete this using a Google doc, which would allow for giving and receiving feedback by other students and by you.<br>▪ *Choose which details are important to include.*<br>▪ *What parts can you condense? Where can you miss out details?*<br>▪ *How will you show the passing of time?*<br><br>For English language learners, create and display a list of words and phrases that can be used to show the passage of time. (For example, a few years ago, one day, within seconds, ten years later, at first, now, then, next, afterwards, at the same time, before that, in the end, finally, soon, after a while, at this point, meanwhile, at this moment, later, previously, earlier, until then, and so on.) Add to this list as your students discover more terms.<br><br>Make links between the information in the written text and the visual text.<br>▪ *Can you understand how the trap works without looking at the diagram?*<br>▪ *Does the diagram help to make the explanation clearer?*<br>▪ *Is there anything else you would include in the diagram?* |

| Text excerpts from "Designed for Good" | Examples of text characteristics | Teacher (possible deliberate acts of teaching) |
|---|---|---|

Page 12

Their new model was self-setting and gas powered – and designed to fire when a possum bit on a trigger. This meant the animal's head was in the right place to be killed instantly. The trap was humane, and it was also efficient. A small can of compressed gas was enough to kill twelve times.


**EXPLANATIONS AND DIAGRAMS**

*Explanations usually describe how something works or why something happens. Sometimes texts include diagrams to make the explanation clearer.*

Have the students find a place where a diagram would enhance their ideas and create one to support their explanation.

DIGITAL TOOLS Students could create their diagram digitally using Google Drawings, or draw it by hand and then insert a photo of it into their Google doc.

- *Did your partner understand what you meant or did they need to ask questions to clarify?*
- *Did the diagram help? What did you need to label?*
- *Does using a diagram mean that you need less written text?*

**METACOGNITION**

- *Tell me how the discussion in small groups helps your understanding. Do you find that you sometimes change your mind? Do you feel able to use someone else's ideas in your own writing?*

**GIVE FEEDBACK**

- *When you were writing to explain how the possum thrives in the bush, you wrote "Possums have lots of stuff to eat." Will the readers know what "stuff" is? How can you be more precise?*

**Reading standard: by the end of year 5**

**The Literacy Learning Progressions**

MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA
New Zealand Government

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