



Overview

This TSM contains 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.

“Talking to the River” tells the story of a farmer and a group of engineering and computing students from Victoria University of Wellington who collaborate to gather data about river pollution and publicise it. River pollution is a topical issue, and “Talking to the River” provides an example of people dedicated to making a difference. The article explains the impact cows can have on rivers and the importance of being able to accurately measure levels of river pollution. The university students overcome several challenges to create a prototype monitoring device that is fit for purpose. The reach of the project is extended exponentially by creating an app that tracks river improvements and allows users to upload photos to a website.

This article:

- provides facts and information about the impact of dairy farming on rivers
- describes the process of designing and developing a water-monitoring device
- shows how digital technologies can be used to solve problems and engage members of the public with contemporary issues
- has diagrams to illustrate the text
- has non-continuous text with subheadings
- includes technical information, some of which is supported by a glossary
- aligns with the Digital Technologies Hangarau Matihiko curriculum by providing an example of how to design and produce quality, fit-for-purpose digital solutions.

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

Texts related by theme

“Designed for Good” SJ L3 May 2017 | “Testing the Water” Mahi Tahi Connected L3 2017 | “Water Worries” SJ L3 April 2012

Text characteristics from the year 6 reading standard

We have retained the links to the National Standards while a new assessment and reporting system is being developed. For more information on assessing and reporting in the post-National Standards era, see: <http://assessment.tki.org.nz/Assessment-and-reporting-guide>

Where to now?

The RiverWatch monitor and app are a brilliant example of technology making information widely available. And the team's just getting started. The prototype was finalised in 2016, and the following year Grant met another milestone: raising \$50,000 on a crowd-funding website (in just five weeks!). The money will pay for ten new monitors that will be tested in rivers around the country. Soon, Grant hopes to be selling RiverWatch monitors to the public. In the meantime, work is continuing on the monitor's design. For instance, Grant is interested in measuring the presence of harmful bacteria by using sound waves.

some information that is irrelevant to the identified purpose for reading (that is, some competing information), which students need to identify and reject as they integrate pieces of information in order to answer questions

COWS AND RIVERS

Cows and rivers are a bad mix. Cows produce a lot of manure, and this contains phosphorus and nitrogen, the same nutrients that are found in fertiliser. In fresh water, high levels of nutrients cause problems. Algae can start to grow very fast (called an algal bloom) and use up too much oxygen. This can harm fish and river insects. Cow manure also contains bacteria that sometimes cause serious illness in people. High levels of harmful bacteria is the main reason many of our rivers are now unswimmable. Finally, as Grant saw, wandering cows damage riverbanks. This usually means that more sediment is washed into the water, reducing the amount of light that can reach the riverbed (see page 22).

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

THE DATA, WHAT AND WHY?

The pH sensor measures the acidity or alkalinity of water. It is designed to measure the concentration of hydrogen ions in the water.

Temperature sensor: Temperature is a key environmental factor. High temperatures can cause a significant change in temperature, which can affect the amount of oxygen dissolved in the water. The sensor is designed to measure the temperature of the water.

Turbidity sensor: Turbidity is a measure of the cloudiness or haziness of a fluid caused by suspended particles. High turbidity can affect the amount of light that reaches the riverbed.

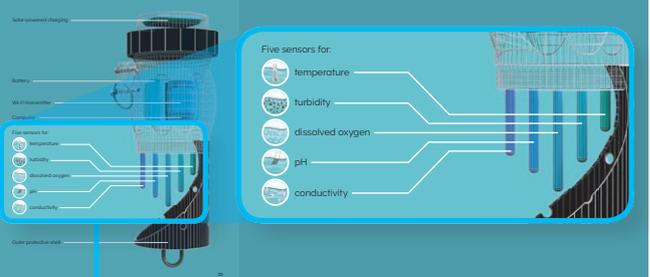
Dissolved oxygen sensor: Dissolved oxygen is a measure of the amount of oxygen that is dissolved in the water. Low levels of dissolved oxygen can be harmful to aquatic life.

Conductivity sensor: Conductivity is a measure of the ability of water to conduct electricity. High conductivity can be a sign of high levels of dissolved salts.

pH: This is a way to measure acidity or alkalinity, a scale that ranges from 1 to 14 (under 7 is acidic, over 7 is alkaline). River water with a very low or very high pH can become toxic for aquatic life. River plants and animals need water that has a pH between 6.5 and 9.

mixed text types (for example, a complex explanation may be included as part of a report)

The RiverWatch monitor: what's inside



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



VOCABULARY

- Possibly unfamiliar words and phrases, including “rural”, “district”, “teeming”, “algae”, “foamed”, “grazed”, “vegetation”, “eroding”, “manure”, “generations”, “monitoring”, “fertiliser”, “device”, “water quality”, “toxic”, “outer protective shell”, “milestone”, “crowd-funding”, “unique”, “at stake”, “animation”, “crucial”, “refining”
- Place names: “Pahaoa River”, “Hinakura”, “Wairarapa”
- Organisations: “local regional council”
- A whakatauki: “Kaua e kōrero mō te awa, kōrero ki te awa”
- Scientific language: “proof”, “phosphorus”, “nitrogen”, “nutrients”, “algae”, “bacteria”, “sediment”, “data”, “degrees Celsius”, “turbidity”, “dissolved oxygen”, “aquatic life”, “ecosystem”, “pH”, “acidity”, “alkalinity”, “scale”, “ranges”, “conductivity”, “conduct”
- Technological language: “prototype”, “app”, “sensor”, “solar-powered charging”, “outer protective shell”, “user-friendly”, “uploaded”, “computer code”, “drag-and-drop software”, “Java”, “programming language”, “refining”, “accessed”

Possible supporting strategies

- Preview the text to identify subject-specific terms you may need to pre-teach. Select a small number of words to focus on, for example, words related to science, such as “acidity”, “alkalinity”, and “conductivity”. Note that some of the words are explained in text boxes in the article. Remind students of strategies such as reading back, using the context, using word knowledge, and reading on to check or clarify.
- Use Before and After vocabulary grids like the one below to help students become independent in learning unfamiliar words. Before reading the story, create a grid of key words that you want the students to focus on, for example, the technological or scientific language. Ask the students to write their own definition for each word without using a dictionary. As they come across the word in their reading, they can confirm or revise their original definition. Once revised, their answers can be shared and clarified together as a whole group/class. Students may write their definitions in their first language.

Word	My definition	Revised definition

- Develop the students' prior knowledge of river systems and develop vocabulary lists or word webs associated with river health and the life cycle of plants and algae in particular. Include the impact of erosion on rivers and the ways nitrogen and phosphorus get into the water.
-  The students could create their word webs using an online mind mapping tool such as Mindmup.
-  The Newshub special report “How Polluted Are New Zealand’s Rivers?” has some useful visuals you could use to pre-teach about sediment, nitrogen, and algae.
- *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.

SPECIFIC KNOWLEDGE REQUIRED

- Some understanding of the life processes and needs of plants, for example, the need for light, oxygen, and nutrients
- Some understanding of rural life, for example, issues related to cows and rivers
- Some understanding of scientific concepts, such as acidity and pH levels
- Some understanding of technological processes, for example, what a prototype is
- Some understanding of digital technologies, for example, apps, coding, and software

Possible supporting strategies

- Discuss the concept of an ecosystem and the ways organisms interact with each other and the environment. Before reading the article, use online resources and infographics to explore what causes an algal bloom.
- Prompt students to discuss what they know about healthy rivers and about the impact cows can have on rivers.
- Remind students to make connections with their prior knowledge as they read. Depending on their understanding of ecosystems, science, and technology (including digital technologies), you may need to support them with subject-specific vocabulary.
- Explore examples of prototypes and ways that digital technologies are used to solve problems. Remind students of a typical technological design process and summarise the process in a diagram.
-  Explore the 3D model of the RiverWatch monitor on the RiverWatch website and identify external components of the monitor, for example, the solar panels. Make connections with the diagram on page 23.

- A non-fiction article that includes several breakouts, an info-graphic, and a diagram
 - Competing information: the impact of cows on rivers; the importance of gathering data to create change; the design process; the purpose and process of developing an app
 - Generally straightforward sentences
 - Repetition of key terms and ideas
 - A glossary
 - Mixed text types, including explanatory text that has an introduction to a scientific (or technological) classification followed by a sequence of points, for example, page 22
 - A variety of text connectives in the explanatory text: clarifying, indicating time, sequencing ideas, showing cause/result, adding information
 - The use of present tense, action verbs.
- Before reading, prompt the students to recall what they are likely to find in an article about solving a challenging problem. Have them talk with a partner to remind one another of the features of information texts.
 - Preview the text by looking at the headings, illustrations, diagrams, table, text boxes, and glossary. Skim and scan the text to support understanding of its purpose and features.
 - Break the text up into different sections, returning to the article several times. Ensure that students are clear about the purpose for reading each time.
 - Photocopy pages 22 and 23 and have the students use the table on page 22 to discuss and explain the components (shown in the diagram on page 23) and their functions.
 - Text reconstruction activities will help the students to notice the text connectives. Copy a piece of text, cut it up into separate paragraphs or sentences, and muddle them up. The students try to recreate the text, in the correct sequence. In doing so, they notice the text connectives used across sentences or paragraphs. Once the students have decided on the order, they should discuss it with a partner.
 - Assist English language learners to notice the verbs used in explanatory texts. You could use a cloze activity in which you delete all the verbs from a piece of the text and the students then complete it by adding a suitable verb in each gap. Alternatively, the students could identify and highlight all the verbs in a section of text and discuss their findings.



Possible curriculum contexts

ENGLISH (Reading)

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

ENGLISH (Writing)

Level 3 – Structure: Organise texts, using an appropriate range of structures.

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 (TECHNOLOGICAL KNOWLEDGE)

Level 3 – Technological modelling: Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development.

Possible first reading purpose

- To find out how a farmer and a group of university students collaborated to try to solve an environmental problem
- To learn about the steps involved in designing a prototype.

Possible subsequent reading purposes

- To learn about the impact of dairy farming on rivers
- To learn about indicators of river health
- To learn about ways that digital technologies are used to solve problems and to increase public engagement with contemporary issues.

Possible writing purposes

- To write a report on a local environmental issue or an article about someone who is working to protect the environment
- To write an article about the way a technological design addresses a need or opportunity
- To write a piece of persuasive writing about the importance of protecting our rivers and our native fish
- To describe the steps in a technological process.



Instructional focus – Reading

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

First reading

- Provide a brief overview of the article.
- Share the purpose for reading with the students.
- Skim and scan the article together, prompting students to identify:
 - the structure of the story and its purpose
 - the text boxes that provide additional support for understanding scientific and/or technical information
 - the technical diagrams and illustrations
 - the glossary.
- Have students identify the immediate challenge or problem that Grant is trying to address (the need to prove that the river is dying) and the related sub-challenges (the challenges the university students faced when designing the prototype).
- Have students identify what Grant’s ultimate goal is and the ways the text refers back to this goal.
- Have the students pose questions before reading and look for specific information to answer their questions as they read.

If the students require more scaffolding

- Remind students of strategies they can use when they encounter unfamiliar words, for example:
 - reading on to see whether the word is explained somewhere else in the paragraph or in another section (for example, the list of indicators of river health on page 22)
 - inferring meaning from the context
 - breaking the word into chunks or syllables and/or looking for a familiar word root, for example: eroding and erosion
 - using diagrams or illustrations to help interpret the text.
- Create a graphic organiser that shows the overarching challenge and related challenges.
- Refer students back to the knowledge-building activities they did before reading the text.
- Have students create illustrations of each river-health indicator and the impact of each factor on river plants and animals. Use some of their drawings to create information-transfer tasks. The students, working in pairs, are given the same labelled drawing with different information missing. They complete their graphic by taking turns to ask their partner for the missing information and add it to their diagram. It’s important that they can’t see each other’s diagram.

Subsequent readings How you approach subsequent readings will depend on your reading purpose. Where possible, have the students work in pairs to discuss the questions and prompts in this section.

The teacher

Have students make connections between the design solutions outlined on page 21 and the components of the RiverWatch monitor illustrated and explained on pages 22 and 23.

- *The students needed to protect the sensors. How do the diagram and text show you how they solved this problem?*
- *Did you notice how the writer reassures us that we’ll find more information about subject-specific terms, such as turbidity, later on in the text? Why do you think she did this?*

The teacher

Direct students to the fourth challenge on page 21 and the purpose of engaging the public in the process.

Discuss how the text reminds the reader of the big-picture challenge: stopping all river pollution. Discuss why it’s important to involve lots of people in the monitoring process.

Give students a paper copy of pages 26 and 27 and get them to identify each stage of the design process using the labels at the bottom of each page (concept, visual design, programming, user testing).

- *How do the illustrations at the bottom of the page show what is involved in each stage?*
- *How does the process the students used compare with the technological process we’ve used in class?*
- *How does the development of the app relate to the challenge Grant is trying to address?*

The students:

- explore, discuss, and explain the diagram on page 23 using the accompanying table of information on page 22
- identify the physical attributes of the monitoring device that align with each challenge
- make connections between the challenges, the information in the text box, and the diagram
- can explain the purpose of each sensor, using reference to the river-health indicators.

The students:

- identify the stages in the design process
- describe the links between the illustrations and each design stage
- make connections to the big picture challenge of stopping all river pollution and the use of an app to involve the wider public in the process
- integrate information across the text to evaluate the effectiveness of Grant and the students’ solutions to the problem.

GIVE FEEDBACK

- *You have done a good job of integrating information across the text. When I asked you how you understood what turbidity is, you showed me the text box on page 22. Like you, I found it helpful to have turbidity described as cloudiness.*

METACOGNITION

- *Why is identifying a problem a good starting point for a scientific or technical article?*
- *What helped you to understand the diagram?*



Reading standard: by the end of year 6

The Literacy Learning Progressions

Assessment Resource Banks

Instructional focus – Writing

English Level 3 – Structure: Organise texts, using an appropriate range of structures.

Text excerpts from “Talking to the River”

Page 22

Turbidity: The turbidity (cloudiness) of a river is caused by sediment. Too much sediment reduces the amount of light that can reach the riverbed, and plants and algae need light to grow.

Examples of text characteristics

SUBJECT-SPECIFIC VOCABULARY

Writers understand that readers have different levels of familiarity with technical or subject-specific vocabulary. Text boxes, glossaries, and diagrams are some of the ways writers support readers to understand subject-specific language.

Teacher (possible deliberate acts of teaching)

Explain that scientific or technological texts often use subject-specific vocabulary and that it's important to keep a range of readers in mind when you write.

- One way to identify subject-specific or challenging words in your writing is to ask someone with different interests to read it and give you feedback on words they were unsure about.
- Think about ways that you can support your readers to understand challenging words, for example, by explaining the word in brackets, using a glossary, or choosing an easier term.

Page 25

Sadly, Grant believes these trends aren't unique. "It's not only the Pahaoa that's changing," he says. "River pollution is a problem all over the country."

FACTS AND OPINIONS

A non-fiction article often has lots of factual information, but personal opinions can sometimes be included, too. Providing a human touch makes an article more engaging for readers and helps them to feel a personal connection to what they are reading. However, it's important for readers to be able to distinguish between fact and opinion.

Discuss why it can be useful to include opinions or responses in a non-fiction article.

- What are some techniques you can use to show whether something is fact or opinion? Why is it important to distinguish between the two?
- How do you decide which facts are important to include in an article and which ones you can leave out?
- What is more powerful when it comes to persuading people – facts or opinions?
- Think about how you will show your reader the difference between facts and opinions in your article.

Page 19

The problem

Before it could help, the council wanted to know how much pollution was in the river and where it was coming from. Grant could see for himself that the Pahaoa was dying, but he needed to prove it. Getting that proof wouldn't be easy. Nobody was monitoring the river, and the equipment that could do this job was expensive. Most people would have given up, but not Grant.

HEADINGS

Headings help readers to make sense of the text. They identify what each section will be about and help readers to find information quickly in a long text

Discuss the importance of being able to scan an article or webpage to find the information you want. Discuss the advantages and disadvantages of using straightforward headings such as "The problem" and more figurative headings such as "Talking to the River".

- Writers need to keep the needs of their readers in mind. If a text has lots of challenging ideas and information, simple, straightforward headings are more important than they are in easier texts.
- It's important that your headings and the text that follows them line up, otherwise you will confuse your readers. Headings are a useful way to keep your own writing on track too.
- Review the headings in your article and share with a partner why you chose them.
- Do they help the reader or add more confusion? How might you need to change them?

METACOGNITION

- How did you decide which facts to include and which to leave out in your article? What techniques did you use to help your reader make sense of your ideas? Why did you choose these techniques and not others?

GIVE FEEDBACK

- You've written a strong opinion piece about our local river. I wonder if you could find some more facts that can make it even stronger.



Writing standard: by the end of year 6



The Literacy Learning Progressions