

Giving the Ocean a Voice

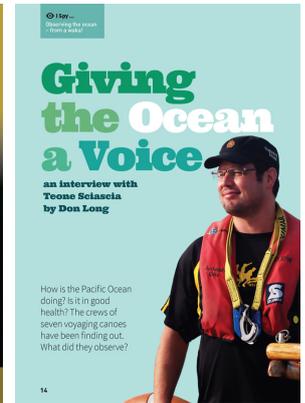
an interview with Teone Sciascia

Overview

In this interview, students read about the evidence of environmental issues noticed by waka voyagers in our oceans.

Links to technology are made by the images of the ocean-going waka.

A Google Slides version of this article is available at www.connected.tki.org.nz.



Science capability

Students need to develop a set of **capabilities** that support them to ask informed questions if they are to participate as “critical, informed, responsible citizens in a society in which science plays a significant role”. The capabilities enable students to meet the achievement objectives in a way that supports the purpose of science in *The New Zealand Curriculum* and the development of the key competencies. These capabilities include being ready, willing, and able to **gather and interpret data**. Students need to understand what counts as evidence in science, the importance of observation, and the difference between observation and inference.

Text characteristics

- Abstract ideas, accompanied by concrete examples in the text that help support the students’ understanding
- Maps, photographs with captions, diagrams, illustrations, subheadings, and a glossary to support the text
- A significant amount of vocabulary that will be unfamiliar to some students (including context-specific words and phrases), which is generally explained in the text by words or illustrations
- Figurative language, such as personification.

Curriculum context

SCIENCE

NATURE OF SCIENCE: Participating and contributing

Achievement objective(s)

L2: Students will explore and act on issues and questions that link their science learning to their daily living.

NATURE OF SCIENCE: Investigating in science

Achievement objective(s)

L2: Students will extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

Key Nature of Science ideas

- Science knowledge is based on direct, or indirect, observations of the natural physical world.
- Scientists gather data using their senses to make observations.
- Making careful observation often involves measuring something.
- Observations are influenced by what you already know.
- Asking questions and raising awareness about issues leads to research to find solutions.

Key science idea

The quality of water affects all animal and plant life.

ENGLISH

READING

Ideas

L2: Students will show some understanding of ideas within, across, and beyond texts.

INDICATORS

- Uses their personal experience and world and literacy knowledge to make meaning from texts.
- Makes meaning of increasingly complex texts by identifying main ideas.
- Makes and supports inferences from texts with some independence.

THE LITERACY LEARNING PROGRESSIONS

The literacy knowledge and skills that students need to draw on by the end of year 4 are described in *The Literacy Learning Progressions*.

TECHNOLOGY

TECHNOLOGICAL KNOWLEDGE: Technological modelling

Achievement objective(s)

L2: Students will understand that functional models are used to explore, test, and evaluate design concepts for potential outcomes and that prototyping is used to test a technological outcome for fitness and purpose.

TECHNOLOGICAL KNOWLEDGE: Technological products

Achievement objective(s)

L2: Students will understand that there is a relationship between a material used and its performance properties in a technological product.

Key technology ideas

- Technological outcomes are made from materials.
- The technologist considers the performance properties of each material when selecting materials for a technological outcome.
- Technological modelling is an essential part of the process when developing a new technological outcome.

Scientific investigation

A science investigation where you change or try something and observe what happens is called an experiment. Not all scientific investigations are experiments; there are many ways of investigating in science. *The New Zealand Curriculum* science achievement aims indicate that students should experience a range of approaches to scientific investigation including classifying and identifying, pattern seeking, exploring, investigating models, fair testing, making things, and developing systems. Many scientific investigations involve systematic observation over time of an object, an event, a living thing, or a place.

Some important things to remember when you do a scientific investigation are: to be systematic and fair; to make sure that only one thing is changed at a time if you are doing an experiment or fair test so you are sure which changes result in which outcome; to observe and record what happens very carefully; and to be open minded so you notice things you are not expecting.

Sound data is obtained when you are able to get similar outcomes each time you do the same thing, or when data has been collected in the same way and in a systematic manner. No investigation or experiment results in a “wrong” outcome. You may have done something differently from others or the conditions may be slightly different so you don’t get the same result as others do, but it is not “wrong”.

Thinking about and developing explanations about why things happen the way they do, based on evidence, is an important aspect of science. Another important aspect is critically evaluating methods and ideas. Part of a scientist’s work is critiquing and evaluating the methods and ideas of other scientists. They expect their work to be subject to critique. If they are going to be able to make informed decisions about scientific issues as responsible citizens, students first need to experience a range of approaches to scientific investigation and to practise critique and evaluation of scientific methods and ideas – both their own and those of others – just like scientists do!

Meeting the literacy challenges

The following strategies will support students to understand, respond to, and think critically about the information and ideas in the text. After reading the text, support students to explore the key science and technology ideas outlined in the following pages.

TEXT CHARACTERISTICS

- Abstract ideas, accompanied by concrete examples in the text that help support the students' understanding
- Maps, photographs with captions, diagrams, illustrations, subheadings, and a glossary to support the text
- A significant amount of vocabulary that will be unfamiliar to some students (including context-specific words and phrases), which is generally explained in the text by words or illustrations
- Figurative language, such as personification.

INSTRUCTIONAL STRATEGIES

FINDING THE MAIN IDEAS

ASK QUESTIONS to orient the reader to the ideas that this article is about the health of the ocean, that the ocean's health is important to us all, and that by changing our behaviour we can improve the health of the ocean.

- *What might the title mean?*
- *What questions do you have about the title?*
- *Can the ocean really have a voice?*
- *Why did the author use this tool? [personification]*

IDENTIFY aspects of the structure, such as title, headings, sections, and photographs that will help your students to navigate the article and locate the main ideas. Point out the interview style, with the alternating dialogue. Support the students to make predictions about the key ideas and information from **SKIMMING** through the text.

Have the students read to the bottom of page 16 before **DISCUSSING** the meaning of the word "kaupapa".

- *What does Teone feel about the ocean?*
- *What has he noticed to make him feel this way?*

PROMPT the students to list Teone's observations as they read the text. Ask the students to **IDENTIFY** the important scientific concept on page 19 [systematic]. With this concept in mind, ask them to **REVIEW** the observations Teone made and **DISCUSS** whether he is right to claim that this information signals the need to change.

ASK QUESTIONS to encourage the students to draw their own conclusions about Teone's message.

- *What are the changes Teone is looking for? Do you think he is right?*

TEACHER SUPPORT

Want to know more about instructional strategies? Go to:

<http://literacyonline.tki.org.nz/Literacy-Online/Teacher-needs/Pedagogy/Reading#Years1-4>

<http://literacyonline.tki.org.nz/Literacy-Online/Teacher-needs/Pedagogy/Reading#Years5-8>

<http://literacyonline.tki.org.nz/Literacy-Online/Student-needs/National-Standards-Reading-and-Writing>

<http://www.literacyprogressions.tki.org.nz/>

"Working with Comprehension Strategies" (Chapter 5) from *Teaching Reading Comprehension* (Davis, 2007) gives comprehensive guidance for explicit strategy instruction in years 4–8.

Teaching Reading Comprehension Strategies: A Practical Classroom Guide (Cameron, 2009) provides information, resources, and tools for comprehension strategy instruction.

USING THE MAP AND PHOTOGRAPHS TO CLARIFY THE TEXT

MODEL by thinking aloud how the images can provide visual support for the text.

- *I don't know much about waka, but looking at the photographs on pages 16 and 19, I can see what is meant by a double "hull". I can see the size of the waka and the two tira with their rā.*

ASK QUESTIONS to support the students to draw information from the maps.

- *How far do you think Teone sailed? What can you tell about the size of the ocean? What does this suggest about the performance of the waka?*

DEALING WITH UNFAMILIAR VOCABULARY

PROMPT the students to refer to the glossary on page 19 for support with some of the vocabulary, and have them refer to the captioned photographs on pages 15 and 18 to explore the concepts about coral bleaching, plastic, and shark fins.

PROMPT the students to read on for a sentence or two when they find an unfamiliar word or phrase.

- *From the information in the text, what do you think the phrase "criss-crossing the Pacific Ocean" means?*
- *You may not know that word "pristine", but read on for a sentence or two until you find information you can use to infer what it means.*

Te Hauora

Don: *What did you observe?*

Teone: When we were a long way from land, the ocean looked **pristine**. As soon as we got close to land, we started to see rubbish. When we saw plastic rubbish and bits of sawn wood floating past us, we knew we were getting close to an island.

Don: *Did the crew take samples of the rubbish?*

Teone: It is hard to **manoeuvre** (say *man-oo-ver*) a waka, so it is hard to take samples. We took photographs of what we observed instead. The Fijian waka in the fleet found a marine turtle tangled in plastic rubbish. The waka managed to stop, and the crew freed the turtle. This was videoed.

Don: *What do you think these observations tell us?*

Teone: People don't understand that the ocean's health affects us all. For example, think about the fish we eat. And we saw dead sharks floating in the sea. Fishermen had caught them, cut off their fins, and dumped their bodies. This is so wasteful.



↑ Plastic can kill.



↑ Shark fins for sale – they are used to make soup.

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Students explore issues and questions that link science learning to daily living.

There are multiple ways to observe and gather data.

Water quality affects all animal and plant life.

What's the proof?

Don: *Were your observations systematic?*

Teone: Systematic observations are very expensive. You need satellites and research ships crewed by scientists. We have shown that there is a problem. Something is happening out there. Something is wrong and we are pointing this out.

Don: *So, in your experience, what is the value of people sailing into remote parts of the Pacific to see what's going on?*

Teone: When we report what we have observed, it gives Te Moananui-a-Kiwa a voice. We give talks and describe what we have seen on websites. We show people our photographs from the voyage. These photographs are a wake-up call. We have discovered that things need to change within ourselves, within our communities, and within our countries too. Hopefully, our observations will lead to further research and some good changes.



Glossary

bleaching – when coral loses all its colour and turns white

fleet – a group of ships

kaupapa – purpose

manoeuvre – move around

pristine – clean

systematic – in a well-organised and fair way, making sure all the parts are treated the same

Technologists consider the properties of different materials when selecting materials for building.

Telling others, sharing data, communicating in science

Asking questions and raising awareness about issues leads to research to find solutions.

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Exploring the science

Some activities focus directly on the science capability of “gathering and interpreting data” and the Nature of Science strand. Other activities extend student content knowledge. You are encouraged to adapt these activities to make the focus on Nature of Science explicit and to support students to develop the capability to collect and interpret data.

LEARNING FOCUS

Students make observations, gather data, and interpret and discuss outcomes based on their observations.

KEY SCIENCE IDEAS

Key Nature of Science ideas

- Science knowledge is based on direct, or indirect, observations of the natural physical world.
- Scientists gather data using their senses to make observations.
- Making careful observation often involves measuring something.
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Key science idea

- The quality of water affects all animal and plant life.

LEARNING ACTIVITIES

Activity 1: Following up the research

Have the students imagine they are a team of marine scientists following up on the work the team on *Haunui* did monitoring the amount and type of rubbish in the Pacific Ocean.

Ask the students to pretend their playground is the Pacific. Get them to look at the map of the Pacific and use it to draw the major islands in chalk. They can then devise a monitoring plan that provides evidence of the amount and type of rubbish in particular regions of the pretend Pacific. Support them through their investigation by asking:

- *How often and where will you sample?*
- *How large an area will you need to count rubbish in for each sample?*
- *What things will need to be the same to compare samples from different regions?*
- *How would you keep track of your results?*
- *What categories of rubbish will you have?*
- *Try out and evaluate your data-gathering plan over several days. Do some areas attract more rubbish of certain types than others? Why might this be?*
- *What difference does the wind make?*
- *Do you think rubbish would behave in the same way or differently in the real ocean? Why?*
- *What have you learnt about rubbish in your playground? What can you do about it?*

Activity 2: Exploring our own environment

Have the students design ways of gathering data that provide detailed accurate indications of the amount and types of rubbish in a waterway, such as a river, stream, lake, or beach close to your school. Students are to collect and present data, develop ways to use this evidence to build awareness of the need to protect the area, and devise plans to reduce and monitor the amount of rubbish there.

One approach to data gathering, interpretation, and presentation might be for the students to photograph the rubbish they see and to present their findings in a PowerPoint presentation. Guide them through their investigations with questions such as:

- *How representative is the evidence the photographs present?*
- *What other data would give an accurate representation of the amount of rubbish in the area?*
- *Where is the rubbish coming from?*
- *Who needs to know about this?*

Activity 3: More about coral bleaching

The students could further investigate the ocean and how human waste and rubbish could affect it, for example, by finding out more about coral and how and why it is bleaching. To do this, conduct a shared reading of the *School Journal* article, “The Great Barrier Reef: See It While You Can”.

Prompt the students’ prior knowledge by asking:

- *What do you know about the Great Barrier Reef?*
- *Why do you think the title has the tag line of “See It While You Can”?*

Divide the students into three jigsaw groups. Each group is to read and interpret the information on one of the following pages: 44, 45, or 46–7. They can then share their knowledge with others.

Activity 4: Estuary health check

Another way of finding out more about the impact of humans on the ocean would be to conduct a shared reading of the *School Journal* article, “Estuary Health Check”. The article explains that cockle numbers in Pāuatahanui Inlet decreased by more than half between 1976 and 1992. The cockles have been surveyed every three years since as a measure of the estuary’s health.

- The text recounts the 2007 survey of cockles from a young person’s perspective. The survey procedure supports discussion of the principles behind the scientific process. It explains the importance of estuaries, the place of cockles within them, some causes of the cockles’ decline, and steps taken to protect them. Underlying all this is the concept of the delicate balance within ecosystems and that ecosystems are fairly resilient to disturbance, though they may end up in a different state than they began. With a grasp of these concepts, your students will be able to make connections to environmental issues in your local area.

Activity 5: “Tiakina a Tangaroa – Protect our Seas”

This *School Journal* article, about a class science investigation, recounts how the students compare the sea life of a “protected” marine reserve with that at an “unprotected” beach. They discover clear differences and identify the harm people do to the environment by littering. The students raise community awareness of the issue by organising a sponsored parade.

The accompanying teacher support material can be used to support reading of the text and to support students to use what they have learnt as the basis for persuasive writing.

The Department of Conservation has “marine-themed” teaching resources, many of which focus on marine reserves. These could be used in preparation for a field trip.

Activity 6: Speaking out for the ocean

On the basis of what they have learnt about the impact humans are having on the ocean, have the students respond to the questions:

- *If the ocean really did have a voice, what might it say to us?*
- *What can you do about this?*

They could explore their responses using the drama technique of “hot seating”, with one student taking on the role of the ocean while others ask questions. Alternatively, they could present their responses in posters, again taking the ocean’s point of view.

Activity 7: The 5 Rs and scam!

A level 2 resource in the Figure It Out series focuses on sustainability. It offers well-supported science and mathematics activities and investigations about reducing, recycling, and reusing, including the following games:

- **The 5Rs**
A card game that introduces ways of recycling household items or reducing our use of resources.
- **Scram!**
A game that helps students to understand words about the environment and resources.

Activity 8: Cultural values

A set of activities in a resource package developed by the Sir Peter Blake Trust provides the opportunity for students to learn about Māori fishing practices and about rāhui, mātaītai, and marine reserves. Suggested activities include inviting local kaumātua to talk about customary fishing practices and the reasons for them.

Activity 9: What’s on in our place?

There are many opportunities for students to extend their learning within the local environment. These include programmes and activities developed by local authorities.

“Take Action for Water” is a term-long programme of work developed by the Greater Wellington Regional Council. You can use it to lead classroom inquiries into the health of water catchments and ecosystems in your local area. The programme investigates the relationships between the living parts of the ecosystem and the impact humans have on it. It shows how we can act to reduce our negative impacts and help to restore the processes and functions of ecosystems.

“Waterways and Wetlands” is a learning resource developed by the Christchurch City Council to be used along with a visit to Travis Wetland, Christchurch’s largest freshwater wetland and an important habitat for native wetland plants. The Council has also supported Environment Canterbury to develop a water education programme called “Waitaha Wai: Waterways of Christchurch”.

Google Slides version of “Giving the Ocean a Voice” www.connected.tki.org.nz

RESOURCE LINKS

Science Online <http://scienceonline.tki.org.nz/>

Learnz: Investigating Water Quality and Biodiversity around Lake Taupō <http://www2.learnz.org.nz/core-fieldtrips.php>

Learnz <http://www.learnz.org.nz>

Figure It Out (Levels 2–3) – *Sustainability: Mathematics in Science Contexts*
http://www.nzmaths.co.nz/figure-it-out-carousel-interface?parent_node=#c=13;p=0

Take Action for Water <http://www.gw.govt.nz/take-action-for-water>

Christchurch City Council: *Waterways and Wetlands*
<http://www.ccc.govt.nz/learning/educationforsustainability/learningthroughaction/waterwayswetlands/index.aspx>

Waitaha Wai: Waterways of Christchurch
<http://ecan.govt.nz/advice/your-school/lesson-resources/pages/water.aspx>

Te Papa: *Matariki Education Resource*
<http://www.tepapa.govt.nz/Education/OnlineResources/Matariki/Pages/MatarikiTeacherResource.aspx>

Department of Conservation
<http://www.doc.govt.nz/getting-involved/for-teachers/themes/marine/>

Sir Peter Blake Trust, *Years 4–8 Care for Our Coast Teacher Resource Package*
<http://www.sirpeterblaketrust.org/get-involved/care-for-our-coast>

Environment Southland, water quality monitoring and graph generator
<http://www.es.govt.nz/for-schools/educational-resources/stream-studies/>

Saving our Streams http://projecttwinstreams.com/?page_id=457

“The Great Barrier Reef: See It While You Can” SJ L4, May 2013

“Estuary Health Check” SJ 4.3.08

“Tiakina a Tangaroa – Protect Our Seas” SJ L2, October 2011 + TSM and audio

Link to technology

The following activities and suggestions are designed as a guide for supporting students to explore and develop understandings about technological modelling and technological products.

You are encouraged to adapt the activities to suit the specific needs of your students.

LEARNING FOCUS

- Students gather data and problem solve as they investigate, plan, create, evaluate, and discuss technological outcomes based on the products they construct.

KEY TECHNOLOGY IDEAS

Key technology ideas

- Technological outcomes are made from materials.
- The technologist considers the performance properties of each material when selecting materials for a technological outcome.
- Technological modelling is an essential part of the process when developing a new technological outcome.

LEARNING ACTIVITIES

Activity 1: Is a waka (or “waka”) a technological outcome?

Work with the students (through discussion) to reach a shared definition of a technological outcome. Record this definition. One way to do this is to record it as a checklist. For example, a technological outcome is something that:

- is designed and made by people
- meets a need or an opportunity, or solves a problem
- is not natural
- has physical attributes (a car is large, heavy, hard to the touch)
- has functional attributes (a car moves, its doors open and close, its boot stores things).

Prompt the students to list all the technological outcomes they can see in the classroom. Use the class definition to identify an item as a technological outcome before adding it to the list.

Reread “Giving the Ocean a Voice” and discuss whether a waka is a technological outcome, and why.

Activity 2: Exploring the materials technology involved in the construction of waka

Explore the materials technology involved in the construction of waka and the appropriateness of natural and man-made materials. Use this as an opportunity to make links to Māori and Pasifika technological knowledge and skills.

Prompt the students to consider the technology of ocean-going voyaging waka, building with questions, such as:

- *What sort of wood do you think is used? Why?*
- *What do the designers have to think about in creating the masts?*
- *Why do ocean-going waka have double hulls?*
- *How wide do the hulls have to be with masts in the middle?*

Ask the students if they have any questions of their own.

In the course of this discussion, introduce terms such as “wind power” and “buoyancy”.

Use the image of a waka on page 11 (of this TSM) to complete a chart identifying the parts of a waka, the purpose of each part, and the materials from which it is made. Note whether the materials are natural or man-made. The resources on voyaging canoe navigation provide information on the challenges Polynesian navigators face and the solutions that meet those challenges.

Activity 3: Identifying the need for technological solutions

Use video links (see, for example, Vaka Motu “Okeanos”) to identify the issue of the need for sustainable transport in the Pacific and the technological solutions that have been explored in the past. List the challenges that were faced and the criteria that a waka needed to meet in order to be suitable for the conditions.

Activity 4: Developing a technological product

Have the students work in groups to use modelling materials to create a model of a functional ocean-going waka. Have them begin by researching, then drawing, and finally making a working model that they can test for stability on the water. The diagram on page 11 (of this TSM) is a useful guide.

The students will need support to understand how functional modelling is used to evaluate design ideas. They need to understand that design concepts refer to design ideas for parts of an outcome, as well as the conceptual design for the outcome as a whole. The prompts in Activity 2 could be used to prompt their thinking about different aspects of the design.

When the students test their waka, encourage them to observe closely to see what happens and to draw conclusions about why their design has or has not achieved its purpose.

Have students evaluate their model waka as “fit for purpose” against the attributes of design that were established in Activity 2 prior to designing their model.

Google Slides version of “Giving the Ocean a Voice” www.connected.tki.org.nz

RESOURCE LINKS

Technology Online <http://technology.tki.org.nz/>

Rāwiri Taonui. “Canoe Navigation – Waka – Canoes”, *Te Ara – The Encyclopedia of New Zealand*, updated 22 September 2012 <http://www.TeAra.govt.nz/en/canoe-navigation/page-1>

Science Learning Hub: Rediscovering Traditional Māori Navigation <http://www.sciencelearn.org.nz/Science-Stories/Tsunamis-and-Surf/Rediscovering-traditional-Maori-navigation>

Waka building video <https://www.youtube.com/watch?v=WWqATz38uuq>

History of voyaging canoes <http://www.herbkanehawaii.com/>

Pacific voyagers videos <https://www.youtube.com/user/pacificvoyagers/videos>

