



Overview

Did you know that when the Christchurch Cathedral lost its spire in 2011, it was the fourth time it had been toppled by an earthquake? *Quake, Rattle, and Roll* explains why we have earthquakes and how they are measured; it provides comparisons of quakes in New Zealand by placing them on a Richter Scale chart and on a timeline.

The report contains a wealth of information in eight chapters, giving students many opportunities to make connections within, across, and beyond the text.

Texts related by theme

"Earthquake" SJ L3 Nov 2011 | "One City – Two Earthquakes" SJ L3 Nov 2011

Text characteristics from the year 6 reading standard

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

figurative and/or ambiguous language that the context helps the students to understand

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

Recording Earthquakes

Geologists use **seismographs** to record and measure earthquakes. The word "seismic" comes from a Greek word that means to shake. GeoNet is an organisation that looks after hundreds of seismographs in New Zealand. The geologists at GeoNet record the size, depth, and location of earthquakes.

If you look on the GeoNet website, you will see three facts about each earthquake: where it was centred, how big it was, and how deep it was. Shallow earthquakes cause more powerful shaking than deeper ones.

1931: Napier, magnitude 7.8 (depth 20 km)
From their boats in the harbour, sailors saw the city buildings crumble. They were the first people to provide help. Broken gas pipes caused fires. Broken water pipes made the fires very hard to put out. Two hundred and fifty-six people died.

1942: Wairarapa, magnitude 7.2 (depth 12 km)
The worst damage was in Masterton's main street. Rebuilding took a long time because many men were away fighting in the Second World War.

1968: Inangahua, magnitude 7.1 (depth 12 km)
A huge landslide dammed the Buller River and raised its level by 30 metres. Because the river could **have flooded** nearby towns, everyone in Inangahua was **evacuated**.

1987: Edgecumbe, magnitude 6.5 (depth 10 km)
A huge crack, 7 kilometres long and up to 4 metres wide, appeared along the fault nearby. No one was killed in the earthquake, but many people suffered serious injuries.

2010: Darfield, magnitude 7.1 (depth 10 km)
This shallow quake caused the **strongest shaking ever recorded in New Zealand**. In a process called **liquefaction**, layers of wet sand and silt underground were turned into a muddy liquid that bubbled up and covered many roads and gardens.

2011: Christchurch, magnitude 6.3 (depth 5 km)
The city was extensively damaged. One hundred and eighty-five people were killed and several thousand were injured. This was the fourth time the spire of Christchurch Cathedral had been badly damaged in an earthquake.

Seismograph in South Westland

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)

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

Possible curriculum contexts

SCIENCE

Level 3 – Understanding about science: Appreciate that science is a way of explaining the world and that science knowledge changes over time.

ENGLISH (Reading)

Level 3 – Language features: Show a developing understanding of how language features are used for effect within and across texts.

Possible reading purposes

- To learn what causes earthquakes and how they are measured
- To learn about New Zealand's earthquake history
- To gain an understanding of how personal experience can make information more interesting.

Page 4 has suggestions for writing instruction.

For more support and suggestions for accelerating students' writing, see Teaching Writing in Years 4–6 on the Writing Hub.



The Writing Hub

Text and language challenges

VOCABULARY:

- Possibly unfamiliar words and phrases, including “bronze”, “dangling”, “experiences”, “heaving”, “slip”, “hurtling”, “overtook”, “perched”, “poplars”, “chestnut tree”, “destroyed”, “colossal”, “fled”, “homeward”, “scootering”, “competition”, “destruction”, “shattered”, “smashed”, “fridge”, “resist”, “pressure”, “strike”, “fault lines”, “created”, “Legends”, “Atua”, “Rūamoko”, “stamps”, “collapsed”, “rebuilt”, “New ground”, “landslides”, “crumble”, “Rebuilding”, “dammed”, “evacuated”, “suffered”, “silt”, “extensively”, “Geologists”, “organisation”, “centred”, “Shallow”, “waves of energy”, “primary”, “seismic station”, “secondary”, “jolt”, “intervals”, “Experiment”, “gradually”, “gradual”, “Research”, “horizontal movement”, “related”, “observe”, “predict”, “Engineers”, “particularly”, “architects”, “cushion”, “Parliament Buildings”, “temporary”, “brand new”, “art deco style”
- The glossary of technical terms
- Comparative terms: “great”, “major”, “strong”, “moderate”, “small”, “minor”, “not felt”
- Idiomatic expressions: “History tells us”, “came to”, “like mad”
- The similes: “like a boat on huge waves”, “like massive jigsaw pieces”
- The metaphors: “it was a ghost school”, “fault lines run”.

Possible supporting strategies

Identify vocabulary, including idiomatic and figurative language, that may be challenging for students. Use strategies to support them to understand these, such as:

- providing opportunities to meet words through oral language before reading (e.g., while activating prior knowledge about earthquakes)
- reviewing how to use a glossary
- working in groups or pairs to construct word maps of earthquake-related words (see ESOL Online at <http://esolonline.tki.org.nz/ESOL-Online/Teacher-needs/Pedagogy/ESOL-teaching-strategies/Vocabulary/Word-clusters-Maps-and-mind-mapping>)
- selecting some words students need to know and building word families to reinforce their meanings, for example, “build/rebuild”, “gradual/ gradually”, “volcano/volcanoes/volcanic”, “strong/strengthen”
- extending understanding of words beyond the context of the text.

The English Language Learning Progressions: Introduction, pages 39–46, has some useful information about learning vocabulary.

SPECIFIC KNOWLEDGE REQUIRED:

- Experience of feeling an earthquake
- Knowledge of earthquakes, recent and in the past
- Knowledge about the Earth's crust and how earthquakes and volcanoes form
- Knowledge of other people's earthquake experiences
- Knowledge of the way science can help us understand natural events.

Possible supporting strategies

Students will have a range of earthquake experiences, and some may be sensitive. Invite students to share personal experiences only if they wish. Review what the students already know about earthquakes in general and about the effects of earthquakes in particular. Discuss the map on page 6 to allow students who have knowledge or experience of earthquakes in other parts of the world to share this with the group. Review what students know about the work of scientists that helps us understand and deal with natural events such as earthquakes and volcanoes.

Students who have a first language other than English may benefit from exploring some of the content in their language before reading.

TEXT FEATURES AND STRUCTURE:

- The title, which is a play on “Shake, Rattle, and Roll”
- A report that contains explanations, recounts
- Graphic features, including a chart, a timeline, maps, and photos
- The table of contents
- The use of direct quotes in the recounts
- A glossary
- The use of figurative language
- The linking of ideas, for example, for contrast, “Both ... Both ... But ...”
- Use of passive constructions, such as “This damage ... was reported”.

Possible supporting strategies

Skim the text with the students, asking them to point out the structural features, including the contents page, the headings, and the different graphic features. Review these features to help students make links with other texts they have read that have similar features. Discuss the ways that they can use the text structure to help predict what each section will be about.

Before and/or after reading, focus on some of the language features, such as the use of figurative language. Explore one feature at a time, asking students to provide further examples to ensure that they understand what the feature is and how it's used.

Provide explicit instruction if necessary to support recognition and understanding of sentence structures, including those with passive verb constructions.



Sounds and Words

Instructional focus – Reading

Science (Level 3 – Understandings about science: Appreciate that science is a way of explaining the world and that science knowledge changes over time.)

English (Level 3 – Language features: Show a developing understanding of how language features are used for effect within and across texts.)

Text excerpts from *Quake, Rattle, and Roll*

Earthquake damage is nothing new. More than 15 000 quakes are recorded in New Zealand every year. Only about one hundred of these are strong enough to be felt.

DEMANDS OF THE TEXT

Students need to:

- make connections with prior knowledge
- identify a shortened word form
- make a connection within the text to understand a comparison.

Students (what to prompt, support, and look for as the students are reading)

The students use their vocabulary knowledge to identify “quakes” as the short form of “earthquakes”. They make connections between the text and what they know about earthquakes to confirm that earthquake damage is well known (“nothing new”) in New Zealand.

The students make a connection within the text to identify what the word “these” refers to. They cross-check with the diagram and infer from these sources that the vast majority of earthquakes are not felt because they are too small.

Teacher (possible deliberate acts of teaching)

ASK QUESTIONS to support the students to follow the meaning.

- What are “these” in the third sentence?
- How did you work that out?

EXPLAIN the way a word (“these”) can replace one or more specific words (“More than 15 000 quakes”) that appeared earlier.

This is called pronoun reference: the writer expects us to understand what the pronoun stands for. Using a general word saves repeating several words and makes the text flow better. Using pronouns helps a writer to make links in the text – creating cohesion.

DIRECT the students to identify the subject in some examples if they need consolidate their learning. For example:

- **Six hundred young people** attended the concert. Some of **them** stood up to dance.
- **Many fossils** are found in cliffs. **These** were found at the coast.
- **Mary** had to rush home. **She** was late for dinner.
- We’ve learnt **some new songs**. **They** sound really good.

PROMPT the students to cross-check information.

- How do the words in this extract relate to the Richter Scale diagram?
- Which magnitude bands might the hundred earthquakes be in?

EXPLAIN that rereading the body text along with the information in a graphic feature is a good way to check and deepen understanding.

GIVE FEEDBACK

- I noticed you stopped to work out what “these” meant. You noticed you were confused and reread to work it out.
- You’ve cross-checked with the chart to confirm what you thought. That’s a good way to make sure you’ve understood the words you’ve read.

MONITORING THE IMPACT OF TEACHING

- Notice the students’ use of cohesive devices in their writing. If they are not using pronouns to improve the flow, spend time working through examples from their reading and oral language, provide scaffolded practice in using pronouns (for example, cloze/gap-fill paragraphs), then support students to use these constructions in their writing.
- Provide additional support to students who struggle with interpreting graphic features. Help them to “talk through” the graphic, expressing in words what it shows in images.

Text excerpts from *Quake, Rattle, and Roll*

Students
(what to prompt, support, and look for as the students are reading)

Teacher
(possible deliberate acts of teaching)

Napier

Tuesday, 3 February 1931, 10.47 a.m.
(depth 20 km)

The magnitude 7.8 Napier earthquake struck on Ray Copland's first day at high school.

"When I came to, I was lying in the playground. Blood poured from above my right ear, and my ear was deaf. I was all alone. There were no boys, no teachers, no sounds. It was a ghost school. I turned and saw that the assembly hall was completely destroyed. Only a pile of bricks remained. I realised that there must have been a colossal earthquake and that everybody had fled homeward."

DEMANDS OF THE TEXT

Students need to:

- identify the text structure
- understand the place of recount and how it can personalise a text
- make connections within the text
- understand colloquial language
- understand figurative language
- use connections to infer meanings.

*The students identify the context for the recount through the structure of this chapter. They identify the time and place details and **integrate** these with other information in the text to **infer** the recount is from a survivor of the very destructive Napier quake.*

*The students use their vocabulary knowledge to understand the colloquial expression "came to". They combine this with other information in the text to **infer** that Ray was knocked unconscious.*

*The students **make connections** between details of the recount and their knowledge of schools and earthquakes to make several **inferences**: that it was a boys-only school, that Ray had been outside already, and that no one looked for him or helped him. They **ask questions** about why Ray was alone and where the other students had gone.*

*The students use knowledge of metaphor and **make connections** between their own knowledge of "ghosts" to **infer** that "ghost school" means everyone had deserted the school (or died), leaving it an empty, spooky place.*

*The students refer back to this extract later in their reading to **make connections** between the damage Ray reported and the information (on pages 14 and 15) about dangerous buildings and the damage in Napier. They **infer** that the high death toll in Napier was due to the building materials used prior to 1931.*

EXPLAIN that understanding the structure of a text can help readers.

- Writers want you to understand what they are saying. They can use recounting to explain or elaborate. They use structures such as headings and formats to help you follow what is happening or being described.

ASK QUESTIONS to prompt careful reading.

- Go back to page 4 and reread the heading and subheading. What do they mean?
- The metaphor "quaking in their boots" is a play on the more well-known phrase "shaking in their boots", which describes someone who is very scared. Why did the writer use this as a subheading?
- What did you expect to find in the chapter? What clue did you use?
- In this extract, what information helps you make connections to other parts of the text? What did you think this recount would tell you?

ASK QUESTIONS to support the students to make inferences.

- What does Ray imply here? For example, why does he say it was a "ghost school"? Think about ghosts. What does this imply?
- I'm wondering why he was alone and why no one had come to help him.
- Why did "only a pile of bricks remain"? What can you infer about how the building was made and why it collapsed?
- As you read on, find other information about the Napier earthquake and try to make further inferences about its impact.

GIVE FEEDBACK

- You've integrated information from other parts of the text to infer that.

MONITORING THE IMPACT OF TEACHING

Model making an inference (if necessary).

- I know that "came to" means he woke up and regained consciousness. He's on the ground, and the text is about an earthquake. He says that all that was left of the assembly hall was a pile of bricks. So I put all this together to infer that he was knocked unconscious by a falling brick and that's how he hurt his head. I also infer that he must have been unconscious for quite a while because it is silent when he comes to. I wonder if we can find out more about what happened online?

Text excerpts from *Quake, Rattle, and Roll*

He built a 50-metre-long wall across the Alpine Fault near Lewis Pass. If the ground moved, the wall would shift, twist, or break.

Almost fifty years later, the wall stands in the same place – unbroken. This tells us that the fault moves in big jumps, not by gradual creeping.

DEMANDS OF THE TEXT

Students need to:

- visualise
- understand the cause-and-effect relationships
- follow the logic of the experiment.

Students (what to prompt, support, and look for as the students are reading)

*The students use the words and the photo to **visualise** how the wall might look if the ground moved. They follow the cause-and-effect relationship signalled by “if” (describing a possibility) to **infer** that even small, gradual movements would have an effect on the wall. They make connections between the first and the second paragraph and understand the pronoun reference in “This tells us that” to identify the conclusion and the reasons for it.*

*The students **make connections** between the text and science experiments they have done to **infer** whether Evison’s experiment was a good one.*

*The students **integrate** information from here and elsewhere in the text to **infer** that science knowledge and methods change over time.*

Teacher (possible deliberate acts of teaching)

PROMPT the students to visualise the experiment.

- Look at the photo – can you imagine that wall moving?
- What would it look like if the ground moved little by little?
- What would it look like if the ground moved suddenly and dramatically?

PROMPT the students to make connections as they consider the value of the experiment.

- How does this compare with a science experiment you have done? Share with a partner what was similar and what was different.
- What is your opinion of the experiment? Was it worthwhile or not? Why?

GIVE FEEDBACK

- Forming a picture in your head is a good way to understand a description of an action or an event.
- Your connection with growing mould in different places was useful. It helped you to see that this was a simple, straightforward way to test for an effect.

MONITORING THE IMPACT OF TEACHING

If students are not able to understand the possible cause-and-effect relationships, make a diagram and go through the possible events and results. Add the heading Does the Earth Change Gradually or in Big Jumps?

- If the Earth changes gradually, the wall will shift, twist, or break.
- If the Earth changes in a big jump (an earthquake), the wall will shift, twist, or break.
- The wall did not shift, twist, or break.
- There has not been an earthquake on the Alpine Fault.
- The Earth has not moved on this part of the fault. It has not changed gradually.

Text excerpts from *Quake, Rattle, and Roll*

Engineers have a saying: “Earthquakes don’t kill people – buildings do.” Unsafe buildings are the cause of almost all deaths from earthquakes. Brick and stone buildings are particularly dangerous.

Every time there is a big quake, experts study the damage. They teach architects, engineers, and builders how to design and build stronger buildings. They also work out how to strengthen older buildings.

DEMANDS OF THE TEXT

Students need to:

- understand the saying, which includes understanding the words that are left out – buildings do (kill people)
- identify the main idea
- make inferences about the dangers of some materials in an earthquake
- cross-check and integrate information across the text about building construction.

METACOGNITION

- How did the chapter headings help you? Give me an example.
- What reading strategy was most useful as you read? Explain how it helped you.
- What experiences or knowledge of your own helped you understand the ideas in this book?
- What words have you chosen to put in your vocabulary notebook? Why?

Students
(what to prompt, support, and look for as the students are reading)

The students integrate information from across the text to identify the main idea that buildings need to be designed and made well to prevent deaths in an earthquake.

The students integrate ideas and information across the text and their own prior knowledge to make inferences about the reasons some building materials are safer than others.

The students cross-check with earlier information to confirm that earthquakes that resulted in deaths were in towns with older buildings of brick and stone. They make connections between this information and what they know about their own school or area to make inferences about their safety.

Teacher
(possible deliberate acts of teaching)

ASK QUESTIONS to support the students as they integrate information across the text.

- What is the main idea in this section?
- What have you learnt about why people might die in an earthquake?
- Did the earthquakes themselves cause these deaths?
- What connections can you make with your own school or area? Do you know if older buildings have been made stronger?
- What was the most interesting idea for you in this book?
- What new information have you learnt?

GIVE FEEDBACK

- You’ve remembered the saying about cars – “it’s drivers, not cars that kill people”. That’s a good connection to make. It helped us to understand the saying.
- Jamie told us about the work being done to make his house stronger. This connection helps bring the text to life and make it easier to understand.

MONITORING THE IMPACT OF TEACHING

If students are not making connections, spend time asking questions, reminding them of any events, places, or people who may provide connections, then drawing out details. For some students, you may need to provide additional resources, such as newspaper reports, magazine articles, and video clips, to prompt discussion about the topic.

Suggestions for writing instruction

Students often need support to find an idea to write about. Help them to identify ways they could use this text to form intentions for their writing.

- What questions occurred to you as you read this book? Take one of your questions, research the answer, and then write it up for others to read. Think about your audience – who would be interested in reading this?
- What experiences of your own did this book remind you of? Take one of your experiences and write it up for others to read. Do you have photos, quotes from other people, or newspaper reports you could add?
- What kind of structure and language will you use in your writing? Why?
- What photos, maps, diagrams, or illustrations would help you to get your ideas across?

Continue to support the students as they plan their writing, showing them strategies they could use, such as mind maps, flowcharts, and graphic organisers. If students want to carry out interviews for their work, help them to make arrangements and to form questions that will elicit the information they need.

Students will probably need support to move from the plan to the first draft and to revise their writing.

Spend time looking at the language features they are using, suggesting some alternatives and showing them how to use other texts as models, if appropriate. Share work-in-progress (with permission) with one or two students: ask them to explain their writing choices and their audience to provide constructive feedback and ideas.

Scaffold the students to build on their writing strengths, tailoring your support as they take control of strategies for themselves.

Some students will benefit from carefully staged and scaffolded explorations of writing. See ESOL Online: <http://esolonline.tki.org.nz/ESOL-Online/Teacher-needs/Pedagogy/ESOL-teaching-strategies/Writing/Guided-writing>