



## Overview

In “Robot Challenge”, the students describe how they designed and made robots for a competition. The article will interest many students and could inspire some to enter the competition themselves. The team comprises boys and girls from a range of ethnicities, providing a good role model for students who may think of technology and robots as the domain of Pākehā boys.

The school setting and the ages of the students are familiar, and the text is well-supported with photos that show the process of building and using the robots. Aspects of the technology will

be challenging to some students, but most should have enough interest and prior knowledge (for example, of programming, the use of remote control toys, and sci-fi creations) to work through these challenges.

The article has a strong theme of co-operation – the students work together to achieve a goal, solving problems together as they arise.

Texts related by theme “Red-hot Racers” SJ L4 Oct 2011 | “Taking the Bait” Connected L4 2012 | “Patu Mania” SJ 4.2.08

## 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

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

4 June

The next step in the process is to choose our music. It's not easy. "When building the robots, we work as a team. If we can't decide on something, then we take a vote," says Sean.

However, the boys want one song and the girls want another – it's a tie. We can't decide. Then somebody suggests a song from a science fiction movie.

"We all like that idea, so that's the song we choose," says Ria.

12 June

The music helps to give us a theme for the dance – we decide that our robots will be two aliens. Now we have to make costumes for them. We also make props, including a spaceship, to be used during the performance.

21 June

Today we begin to choreograph the robot dance. We have to calculate how far the robots need to move each time they change position. Because this is a dance, they also need to stay in time with the music as they move.

Ms Chartrand asks us if we think it's better to use seconds, wheel rotations, or degrees as our unit of measure. We try them all and discover we're more likely to make our robots travel the right distance if we use seconds.

We can adjust the power levels to change how quickly the robots move. We test how far the robots can move in one second on full power compared with one second on half power. We have to try a lot of different settings to find the right one for each movement.

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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

some ideas and information that are conveyed indirectly and require students to infer by drawing on several related pieces of information in the text

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

# Possible curriculum contexts

## TECHNOLOGY

Level 3 – Technological practice and technical knowledge

## ENGLISH (Reading)

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

## ENGLISH (Writing)

Level 3 – Ideas: Select, form, and communicate ideas on a range of topics.

## Possible reading purposes


- To learn how a group of students took part in a technology challenge
- To compare the practice of the students with our own technology work
- To learn about making a dancing robot.

See Instructional focus – Reading for illustrations of some of these reading purposes.

## Possible writing purposes

- To record and describe a similar technological practice of our own
- To explain how one or more of the technology ideas or processes in the text works.

See Instructional focus – Writing for illustrations of some of these writing purposes.

 The New Zealand Curriculum

# Text and language challenges

## VOCABULARY:

- The technical terms connected with robotics and performance, including “robotics”, “application”, “interlocking”, “stable”, “choreograph”, “calculate”, “seconds”, “wheel rotations”, “degrees”, “unit of measure”, “dress rehearsal”
- Possible unfamiliar words and phrases, including “droops”, “encourage”, “sequence”, “transfer”, “adjust”, “tie”, “theme”, “interviewed”, “entertainment value”
- The name, “RoboCup” which is a play on the title of the popular sci-fi character “RoboCop”
- The use of “programme” as a verb
- The expressions: “take the stage”, “run through”, “paid off”, “were rapt”.

## Possible supporting strategies

Identify the vocabulary that your students will need support with. Use strategies to preview the vocabulary, such as having the students view the photographs then discuss the terms they illustrate. Give pairs of students the subheadings “Robotics” and “Performance” and ask them to write some ideas under each heading, using the vocabulary and concepts you’ve discussed. Have each pair share their ideas with another pair, and encourage them to make links with technology texts and projects they know. Tell them to compare the text with their ideas as they read. Give the students opportunities to encounter the specialist words that are relevant to this and other technology topics before, during, and after reading.

After reading, you may wish to explore some words in more depth, for example, the way “programme” can act as a verb and a noun. Some of the students may need support to understand the idiomatic use of some expressions. List and explain these, asking the students to suggest similar expressions in other languages they know. *The English Language Learning Progressions: Introduction*, pages 39–46, has useful information about learning vocabulary.

## SPECIFIC KNOWLEDGE REQUIRED:

- Knowledge of the processes involved in a technology project
- Experience of planning, developing, and evaluating something
- Experience of working as part of a team
- Familiarity with robots and how they can be used
- Experience of entering a competition
- Knowledge of how computers can be used for programming.

## Possible supporting strategies

Review the process involved in planning, developing, and evaluating a project for a technology outcome. Ask the students to name and explain the stages of the process, including working as a team. Write these stages on a chart.

Have the students work in pairs to skim the text, identifying the part of the process that each photograph relates to. Each pair could take one stage and explain what the team is doing. Ask the students to add brief details or questions alongside each stage. You could also use the photos as prompts after reading to help students retell the process. To do this, some students may need the support of single word or phrase prompts, while others may need speaking frames to provide more support. See ESOL Online for more information about speaking frames: <http://esolonline.tki.org.nz/ESOL-Online/Teacher-needs/Pedagogy/ESOL-teaching-strategies/Oral-language/Speaking-frames>

## TEXT FEATURES AND STRUCTURE:

- Introduction that poses a question for the reader, and then sets the scene
- Short, dated chronological diary entries
- Photographs that illustrate the process from design to final performance
- The sections, which describe parts of the process
- The use of phrases to clarify the sequence: “We start”, “Then”, “It’s time to”, “The next step”, “we decide”, “Today we begin”
- Long sentences that describe difficult or multiple processes
- Text boxes that provide extra information.

## Possible supporting strategies

Skim-read the text with the students as they identify the diary format, the text boxes, and the way the photographs are used. Check that they understand the use of dates and the present tense verbs, implying the diary records actions “as they happen”.

Unpack complex sentences and ideas during reading: see the example on page 3 of these notes. If the students require greater support, you may need to rewrite a difficult sentence into short sentences with one idea. Then explore the relationships between the ideas. Note that English language learners may not find complex oral explanations useful. These students may also need diagrams and examples to support their understanding.

*Supporting English Language Learning in Primary Schools: A Guide for Teachers of Years 5 and 6* (Explaining, pages 42–49) provides some useful information on explaining. For more information about this resource and PDFs of the booklets, see ESOL Online at <http://esolonline.tki.org.nz/ESOL-Online/Teacher-needs/Reviewed-resources/Supporting-English-Language-Learning-in-Primary-School-SELLIPS>



Sounds and Words

# Instructional focus – Reading

Technology (Level 3 – Technological practice and technical knowledge)

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

## Text excerpts from “Robot Challenge”

## Students (what they might do)

## Teacher (possible deliberate acts of teaching)

### 4 May

Our teacher, Ms Chartrand, introduces us to robotics – the branch of technology that deals with the design, construction, operation, and application of robots.

*The students **make connections** between “our” in this sentence and the named students in the introductory paragraph (page 30) to **infer** that the entry is written on behalf of the group. They combine their knowledge of sentence structure and of aspects of technology to unpack and understand the topic. The students **integrate** information from the title, the introduction, and this sentence to understand that the class will use the aspects of robotics Ms Chartrand has named to make their own robots.*

**MODEL** how to unpack the sentence.

- When I see a long sentence like this with a lot of punctuation, I slow down and read each part carefully. First, I link “Our teacher” and the name: that’s easy. Next I look for a main verb – what does Ms Chartrand do or say?
- The verb is right there: “introduces”. I ask myself, “What does she introduce?” and the answer is obvious: “robotics”. I’m not sure what robotics means, but the dash tells me I’m going to find out. The next part tells me robotics is “a branch of technology”. I know there are many different branches or kinds of technology, so robotics is one of them.
- The verb phrase “that deals with” tells me to look for a “what”, and I see a long list of words separated by commas. Each word in the list describes an aspect of robotics. Putting it all together, I now understand what the class is going to study. I make connections between the title, the introduction, and this sentence to understand how the class will do this.

### 21 May

It’s time to program our robots. We do this on a laptop. ... Then we decide on the sequence of movements. We transfer this information from the laptop to the robots’ computers using cables. When we start the program, we find that some things work but others don’t. We’ll have to adjust our robots or the program, and try again.

*The students **make connections** between their own experiences with programming and the text to **visualise** and understand what the text is describing. They **ask questions** and search for answers to support their understanding.*

**DIRECT** the students to work in two or more small groups.

- In your group, read this section aloud.
- Take turns to explain each part to the group, discussing the meanings of the words and concepts until you all understand what the students are doing.
- If you have questions, write them down.

Be aware that in the descriptions of what the students did, there are often multiple relationships, including multiple subject and object relations, for example: “The computer programme we are using lets us make the robots go forwards, backwards, and rotate.” English language learners may need support with identifying these multiple relationships. Now bring the groups together, and ask each group to share their explanation.

- What was easy to understand?
- What was difficult?
- How did you resolve any problems?
- What questions do you still have about what they did?

Ms Chartrand asks us if we think it’s better to use seconds, wheel rotations, or degrees as our unit of measure. We try them all and discover we’re more likely to make our robots travel the right distance if we use seconds.

*The students **make connections** between their knowledge of technology and the text to understand the teacher’s question. They draw on their technical vocabulary knowledge to identify the differences between the units and **infer** the reasons for seconds being the best option. The students **integrate** information from the text and their own experiences to understand the problem-solving process.*

**ASK QUESTIONS** to help the students understand the technical terms and their application in this context.

- What are “units of measure”? Name some units we use every day.
- What do units of measure all have in common?
- What do the three units measure? How do we decide which unit to use?
- Why do you think seconds was the best one? How did they decide this? When have you made a decision in this way?

You may need to support some students to unpack the relationships between clauses and phrases in the second sentence (in particular the condition and consequence relationships) and to understand the meaning of the language expressing probability (“we’re more likely to”). You may wish to start a list of units, asking students to make notes alongside each unit, saying what it can be used for. For example, metres are used to measure lengths. Prompt the students to be more specific if possible, for example, “When would you use millimetres instead of centimetres or metres? When would kilometres be the best unit to use?”

**GIVE FEEDBACK**

- You’ve had to think hard to work out what was happening in some parts of this text. You were able to use experience of using a remote-controlled truck to visualise some parts of the process.

## METACOGNITION

- Show me a place where you had to reread or use other strategies to understand. Which strategy was most helpful?
- How could you help someone with no background knowledge to understand this text? What strategies would you use?
- How did you work out what “entertainment value” meant? What clues or knowledge helped you?

 Reading standard: by the end of year 6

 The Literacy Learning Progressions

 Assessment Resource Banks

# Instructional focus – Writing

Technology (Level 3—Technological practice and technical knowledge)

English (Level 3 – Ideas: Select, form, and communicate ideas on a range of topics.)

## Text excerpts from “Robot Challenge”

Does the idea of making your own robot sound like something from the future? Join year 5 and 6 students Caitlin, Niket, Ria, and Sean from ACG Sunderland school in Auckland as they make their own robots and enter them in a competition.

We use interlocking plastic blocks to build arms. Then we make structures from wood and sticky tape to support the robot’s head. However, the wood and tape are not strong enough, and the head droops to one side.

We come together as a team and discuss ideas. Perhaps we should use the interlocking blocks for this part of the robot as well. We think they might be more stable than wood – and we’re right. The blocks work!

We program the robot to do a turn at one point in the song, but when we test it, the robot trips over some of its own wires and falls over. To solve this problem, we tie up the wires – and anything else on the robot that might get in its way.

## Examples of text characteristics

### INTRODUCING THE TOPIC

*A technology project can be a response to a problem or a challenge. Telling the reader what this is and how it came about sets the purpose for both the writer and the reader.*

### ACTION VERBS

*A process is a series of actions. Writers use action verbs to indicate each step in a process.*

- *We use*
- *we make*

### PRESENT TENSE

*When recording a process in a diary or journal, the present tense shows actions as they happened.*

### EXPRESSING PROBLEMS AND SOLUTIONS

*Signal words like “however” or “but” can indicate a problem in a process. An author shows readers what the problem is, why it happened, the possible solutions, and the result of making changes.*

## Teacher

(possible deliberate acts of teaching)

**ASK QUESTIONS** to help the students form their intentions for writing.

- What is the challenge or problem that your technology demonstrates or solves?
- What kind of audience will find this interesting?
- How will you introduce or describe your topic?
- What is the context for the topic?

**PROMPT** the students to notice the way text uses action verbs to show what was done.

- What actions are involved in the process?
- What kinds of verbs tell the reader what the students did?
- How does the author show the order of the actions?
- Will you write “as it happens”, using the present tense, or “what happened”, using the past tense? What are the reasons for your choice?

**DIRECT** the students to consider how to explain problems and solutions.

- Look at the way these two problems are described. What was the reason for each problem?
- How are the solutions described?
- In your own writing, make sure readers can follow the sequence of the actions as well as the thinking behind them.

If students need support for writing about all or part of a process, provide a template. For example, you could use these headings, and model how to use the template:

*The process:*

*The steps I took:*

*1. First, ...*

*2. Next, ...*

*A problem I met:*

*Reason for the problem:*

*Possible solutions:*

*The solution that worked:*

Some students may benefit from using a writing frame. For a description of writing frames and examples, see ESOL Online at <http://esolonline.tki.org.nz/ESOL-Online/Teacher-needs/Pedagogy/ESOL-teaching-strategies/Writing/Writing-frames-or-text-frames>

### GIVE FEEDBACK

- You’ve started with a clear description to show your readers what the topic is and why you chose it. Then you go on to describe the process you used.
- I can follow the process easily because you’ve used words to show the sequence.
- You’ve replaced some of the verbs with more precise words that show me exactly what you did.

### METACOGNITION

- What problem or challenge does the technology you’ve described solve or demonstrate? Ask a partner to read your writing to check that readers will understand it. Partners, what kind of feedback will be most useful to the writer?
- Why did you choose this topic? How did you show your readers what to expect?
- Will your readers understand the technical language? If not, how can you help them?



Writing standard: by the end of year 6



The Literacy Learning Progressions