Building a Wharenui

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CONNECTED 2
SCIENCE • TECHNOLOGY • MATHEMATICS

Overview

This article outlines the process of building a traditional wharenui, including a description of the materials and building techniques used and an explanation of the symbolism and spiritual significance of the wharenui. It also explains how and why processes and materials used to construct wharenui are changing.

Curriculum context

TECHNOLOGY

NATURE OF TECHNOLOGY

Characteristics of technological outcomes

Achievement objective

L1: Students will understand that technological outcomes are products or systems developed by people and have a physical and a functional nature.

Key ideas

- Technology involves people designing and making products or systems to meet a need or opportunity.
- These products or systems are called technological outcomes.

Learning goal (to be shared with your students)

In this activity, we are learning:

- to identify a technological outcome.

TECHNOLOGICAL KNOWLEDGE

Technological products

Achievement objective

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

Key ideas

- Technological outcomes are made from materials.
- Materials have performance properties.
- When selecting materials for a technological outcome, the technologist considers the performance properties of each material.
- When a technological outcome is created, materials are manipulated (for example, shaped, cut, sanded).

Learning goal (to be shared with your students)

In this activity, we are learning:

- to identify that technological outcomes are made of materials.

MATHEMATICS AND STATISTICS

GEOMETRY AND MEASUREMENT

Transformation

Achievement objectives

L3: Students will describe the transformations (reflection, rotation, translation, or enlargement) that have mapped one object onto another.

Key ideas

- Symmetry is an important feature of many buildings.
- Transformations such as reflection, rotation, and translation can be found in many designs.

Learning goals (to be shared with your students)

In this activity, we are learning:

- to recognise symmetry in structures and decorations
- to use the language of transformation to describe patterns.

ENGLISH

READING

Processes and strategies

Achievement objective

L3: Students will integrate sources of information, processes, and strategies with developing confidence to identify, form, and express ideas.

Indicator

- Integrates sources of information and prior knowledge with developing confidence to make sense of increasingly varied and complex texts.

Ideas

Achievement objective

L3: Students will show a developing understanding of ideas within, across, and beyond texts.

Indicator

- Starts to make connections by thinking about underlying ideas in and between texts.

The Literacy Learning Progressions

The relevant knowledge, skills, and attitudes for students at this level are described in the The Literacy Learning Progressions.

Suggestions for providing literacy support for the key ideas

The following strategies will support students to engage with the ideas and information as they use the text for particular curriculum purposes.

The *Connected* series includes a range of texts that provide opportunities for students to locate, evaluate, integrate, and synthesise information and ideas.

It is expected that students will read across the range of texts in this *Connected* to develop their literacy skills and their understanding of the topic.

Text characteristics

- Abstract ideas, accompanied by concrete examples in the text that help support the students' understanding
- 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
- Sentences that vary in length and in structure
- Photographs and diagrams that clarify or extend the text and may require some interpretation.

1. FINDING THE MAIN IDEAS

This article introduces readers to the purpose and symbolism of a wharenui; explains how these large buildings were constructed using traditional methods and tools; and goes on to describe how changes in society and in technology have impacted on traditional construction methods.

The main ideas in the article include:

- The structure of a wharenui usually symbolises the structure of the human body.
- Before 1900, wharenui were generally built using traditional construction techniques and traditional art forms.
- In more recent times, the construction and decoration of wharenui have adapted to changes in technology.

ASK QUESTIONS to orient the reader to the context, when traditional methods were used.

Why didn't they use nails?

Why use stone tools?

Why was it useful that tōtara has a natural preservative?

MODEL the use of clues that help you locate key information.

This subheading on page 18 is leading me to think that the text is now moving from traditional times to more recent times. Yes, the first sentence indicates this too.

PROMPT the students to look for other clues from the headings and visual information.

What does the heading Putting Up The Structure and the diagram of the meeting house help us to predict about the main ideas on page 14?

Remind students that looking for clues in this way is a useful strategy when reading non-fiction texts.

2. USING THE DIAGRAM TO CLARIFY THE TEXT

TELL the students that diagrams often help to clarify the meaning of detailed text.

MODEL by thinking aloud about how the diagram on pages 14 and 15 provides visual support for the text.

I'm finding it easier to understand how the structure works by reading each paragraph and then finding the parts mentioned in the paragraph by looking on the diagram. When I've worked out their place in the diagram, I then move on and read the next paragraph.

ASK QUESTIONS to support the students to use the diagram and integrate information as they are reading.

How can you identify the wall posts in the diagram?

The bargeboards and bargeboard supports aren't labelled on the diagram, but can you see where they are drawn in?

In this diagram, does the wharenui have eaves?

There are four labels on this diagram. Can you add two more labels?

3. DEALING WITH UNFAMILIAR VOCABULARY

PROMPT students to refer to the glossary on page 19 for support with some of the Māori vocabulary, and have them refer to the captioned photograph on the lower half of page 11 and the two diagrams on pages 14 and 15 for the construction vocabulary.

IDENTIFY materials in the local environment to demonstrate the meanings of nouns or verbs unfamiliar to the students. The school building may have eaves, classroom equipment may be made of customwood, and woven flax can be tested for its strength.

Exploring the technology

The following activities and suggestions are designed as a guide for supporting students to develop understandings about the importance of performance properties when materials are selected for a technological outcome.

Key ideas

- Technology involves people designing and making products or systems to meet a need or opportunity.
- These products or systems are called technological outcomes.
- Technological outcomes are made from materials.
- Materials have performance properties.
- When selecting materials for a technological outcome, the technologist considers the performance properties of each material.
- When a technological outcome is created, materials are manipulated (for example, shaped, cut, sanded).

Activity 1: *Is a wharenui 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 people designed
- that people made
- that meets a need or an opportunity or solves a problem
- that is not natural
- that has physical attributes (a car is large, heavy, hard to the touch)
- that 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 "Building a Wharenui". Discuss why a wharenui is a technological outcome.

Activity 2: *Recognising materials*

Group the students in pairs and give each pair an everyday technological outcome that is familiar to them (for example, a pencil case, a pair of shorts, a spiral-bound notebook). Choose technological outcomes that are made from more than one material. Encourage the students to observe and explore their technological outcome and then to identify the materials it is made from, including those materials they might not be able to see (for example, elastic inside the seam of a garment).

Record the technological outcomes and their materials on a class list. For example:

Technological outcome	Materials used
pair of shorts	fabric, thread, metal zip, plastic buttons
cellphone	metal, plastic, wire, rubber

The students can then reread "Building a Wharenui", pausing to list all the materials mentioned in the article that were or are used to build wharenui.

Activity 3: *Recognising the properties of materials*

The students can return to the technological outcome they worked with for Activity 2. Individually they can record why they think the materials used in their technological outcome were chosen.

For example: "*This jersey is made of wool because it's warm, and the buttons are made of plastic because that's firm and holds its shape.*"

Make a class list of the properties of materials that the students recorded. This list will include words such as "hard", "durable", "flexible", "able to be gripped", "cold", "easy to clean".

Return now to the list of materials used in building wharenui. Discuss why each material might have been chosen. This is the clue to the performance properties of the material. During this activity, prompt the students to refer to the text, which gives lists to a range of performance properties and provides opportunities for a rich class discussion. Ask questions to further the students' thinking.

Are some types of wood better than others?

Are some types always better or only better for specific purposes?

Is the wool in the jersey the same sort of wool as the wool in that carpet?

Is cost a performance property?

Do we always want technological outcomes to last as long as possible?

Would fibreboard be an OK material for wharenui that are built outdoors?

Activity 4: *Manipulating materials*

Ask the students to focus again on the technological outcome they started the lesson with. They have now identified the materials and their performance properties. With their partners, they can now work out how the materials have been manipulated and complete the information on the class list that relates to their technological outcome. For example:

Technological outcome	Materials used	Performance properties of the materials	How the materials have been manipulated
pair of shorts	fabric, thread, metal zip, plastic buttons	All the materials are washable, the cotton fabric is cool, the plastic buttons hold their shape, the cotton thread is strong.	The fabric has been cut and sewn. It has been dyed blue. The zip and the buttons have been coloured and moulded.
cellphone	metal, plastic, wire, rubber	The metal is strong and it conducts. The plastic is strong and it can be coloured. The rubber can be pressed, and it bounces back into shape. The wire is flexible.	The metal, plastic, and rubber have been coloured, cut, and moulded. The wires have been bent and twisted.

Return to the list of materials and performance properties identified in the article. Discuss ways in which each material may have been manipulated.

More challenging questions you could pose include:

Is the wood manipulated the same way today as it was in traditional times?

What sorts of manipulation haven't changed over time?

Why do you think many traditional forms of manipulation changed?

What forms of manipulation are you good at (for example, cutting, plaiting, weaving, sewing, sawing, glueing)?

MINISTRY OF EDUCATION RESOURCES

- *School Journal*, Part 1 Number 1, 2011, "Te Taonga nui a Tāne"
- *School Journal*, Part 2 Number 1, 2001, "Te Papa Tongarewa"
- *School Journal*, Part 1 Number 2, 2001, "Not Just a House"
- www.techlink.org.nz/teaching-snapshot/Resource-Reviews/bitesize.htm
- www.techlink.org.nz/teaching-snapshot/Resource-Reviews/technologystudent-website.htm

FURTHER RESOURCES

- www.technologystudent.com/designpro/matintro1.htm

Exploring the mathematics

This article provides the opportunity to explore mathematical ideas associated with the structural and aesthetic use of geometric shapes in the design and construction of buildings. Symmetry is evident in many cultural motifs and in architectural design. Symmetry creates a sense of harmony and balance. Students can identify examples of symmetry in the design and decoration of the wharenui in the article.

Key ideas

- Symmetry is an important feature of many buildings
- Transformations such as reflection, rotation, and translation can be found in many designs.

FOCUS QUESTIONS

- Is symmetry only found in objects made by humans?
- What language can be used to describe patterns?

Activity 1: *Exploring Symmetry*

Discuss reflectional symmetry and how symmetry creates balance. Ask the students to imagine sitting on a chair with legs that are asymmetrical. Encourage them to identify objects in the classroom or the school grounds with at least one line of symmetry.

We tend to find designs that are symmetrical visually appealing. This could be because the symmetry creates a sense of strength and harmony.

Explore reflectional symmetry in the structure of the wharenui. Then ask students to find elements of the wharenui that are asymmetrical, for example, the decoration on the wall of Te Noho Kotahitanga Marae.

Discuss whether symmetry is found only in objects made by people. Then challenge students to find examples of symmetry that occur naturally.

Ask the students to find other buildings or structures of cultural significance that provide striking examples of symmetry, for example, the Taj Mahal in India, Angkor Wat in Cambodia, or Tower Bridge in London. Use an Internet search engine to find images of "symmetry in architecture".

Ask the students to find examples of famous buildings that do not have obvious symmetry, for example, the Sydney Opera House. In the absence of symmetry, how has the architect achieved a pleasing design?

Activity 2: *Exploring Transformations*

The human brain is constantly presented with new and often complex information. As a result, our minds look for patterns that can help us make sense of this information. Also, people find visual patterns appealing. This may explain why transformations such as reflection, rotation, and translation are found in decorative motifs throughout the world.

Have the students find and describe transformations in the photographs of whakairo, tukutuku panels, and kōwhaiwhai. To describe reflection, they should try to identify the line of reflection (mirror line); to describe translation, the direction and distance of the movement; and to describe rotation, the centre and amount of turn (most often, a half-turn).

See South Pacific Journey at: www.nzmaths.co.nz for a related Figure It Out level 3 geometry activity.