



Yachting New Zealand

KŌKŌKAHA

POWERED BY WIND

TERM 1 2021

TEACHER GUIDE

Kia ora

Welcome to Kōkōkaha - powered by wind.

Kōkōkaha is an integrated unit of work that focuses on the science, technology, engineering and maths (STEM) associated with harnessing the wind.

Kōkōkaha's learning experiences are designed for students in years 5 through to 10 and are intended to provide them with the skills and knowledge to design their own technologies to harness the power of the wind.

Kōkōkaha learning experiences can easily be adapted for older or younger children and are available to schools and kura throughout New Zealand through the website:

www.kokokaha-yachting.nz

During Kōkōkaha learners are challenged to design a technology to harness the power of the wind.

Before launching into their designs learners participate in a range of hands on learning experiences to build their knowledge about wind.

They can also feel the power of the wind by participating in a **sailing experience** at sailing clubs or providers around Aotearoa New Zealand.

Then when they are ready learners design a technology to harness the power of the wind and upload their ideas to the **Kōkōkaha Ideas Gallery**.

This teacher's guide gives you all the information you need to get underway with Kōkōkaha in your classroom.

We hope you enjoy Kōkōkaha and look forward to seeing your students' designs later in the term.

Ngā mihi
The Kōkōkaha team

Yachting New Zealand



PROUDLY SUPPORTED BY



KŌKŌKAHA
POWERED BY WIND

www.kokokaha-yachting.nz

TEACHER GUIDE

1. TE WERO



Kōkōkaha challenges students to take action in their local community to help solve a problem that faces us all - climate change. In introducing Kōkōkaha teachers should present students with the following challenge and mission.

The world is continuing to increase its use of energy. Much of this energy is from non renewable sources. This is having an impact on our climate as more and more carbon dioxide is released into the atmosphere.

In New Zealand more than 80% of energy is generated from renewable sources, with wind being one of those sources. We need to find ways to harness even more power from the wind.

Your mission is to design a technology to harness the power of the wind.

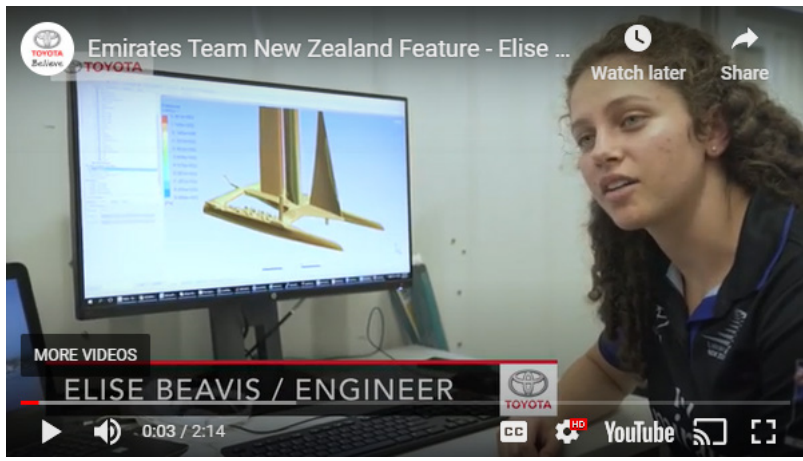
2. SETTING THE SCENE

A key outcome of Kōkōkaha is for learners to get the opportunity to develop their capability to use the technology development process.

Emirates Team New Zealand are world leaders at developing technological solutions to harness the power of the wind.

Elise Beavis is a member of the design team and spends her working days using the technological problem solving process to find ways to make the racing boats sail faster.

Kōkōkaha links to a video where Elise explains how the team designs, tests and refines new ideas. There are clues in her video that your learners will be able to use to help them with their design ideas.



3. CLASSROOM LEARNING EXPERIENCES



Kōkōkaha has 12 learning experiences which teachers can pick and choose from to help learners develop the skills and knowledge needed to design their own technology idea. The learning experiences are organised into three sets of four experiences.

SET ONE WHEN THE WIND BLOWS

Discovering wind

How can you see it? How do you know it is there? How is it recorded? What are tell-tale signs of the wind?

Which way wind

How do you know where the wind is coming from? Learners design and build a wind vane.

The need for speed

How do you measure the wind? Learners design and build an anemometer.

Wind and waves

Where do waves come from? What makes the water move? How do you measure waves?

SET TWO A FORCE TO BE RECKONED WITH

Tāwhirimātea is howling

Who is Tāwhirimātea? Where did he come from and what does he do? Learners create a dance to represent a type of wind.

Harvesting wind

How do wind turbines work? Where are wind farms in Aotearoa New Zealand? Learners design a pinwheel.

Capturing wind

Why do sailors love the wind? How do they capture it? Learners design a wind sock to capture the wind.

Power my car

How do blokarts use the wind? What is kinetic energy and friction? Learners design and test a sail car?

SET THREE HOW SAILBOATS WORK

Float your boat

What makes a boat float? Why do some boats sink? Learners design and make a clay boat and test its ability to float.

Sail away

What are the parts of a sail boat? How do they work? Learners build, test and improve a model sail boat.

Sail power

How do sails work? Learners work out how to measure the perimeter and area of a sail.

Up on the foils

How have sail boats changed over the years? How have these changes led to foils on boats? Learners design and test a simple foil.

Each of the 12 Kōkōkaha learning experiences are presented in the same way on the website.

www.kokokaha-yachting.nz/learning-experiences

WHICH WAY WIND

Learning Intention:
To understand and use familiar words about wind direction. To make and understand how a wind vane works.

Discussion:
You can often see the wind blowing, but can you tell what direction the wind is coming from?
So outside to look for indicators that tell you what direction the wind is coming from. For example flags, trees, clouds, blowing snow and grass blowing. Can you determine the wind direction from what you see outside?
There are four basic directions, north, south, east and west. Where does the sun rise? From in that direction. The sun rises in the east. Can you name a compass east direction?
The wind is named by the direction it is coming from. For example, a northerly wind blows from the north to the south.
Do you know what a wind vane or weather vane is?
It is one of the oldest tools for measuring the direction of the wind, as it points in the direction the wind blows. Wind vanes are usually used to determine air direction weather or climate. They are usually used to determine the wind direction. Although a wind vane can be used to determine the wind direction, it is not used to predict the weather.
Have you ever seen a wind vane? Where has it been? What did it look like?
Wind vanes are usually found on high and they are sometimes placed like a weather vane on the tops of buildings, such as schools, farms, churches, weather stations and on boats.
Sailboats often have wind vanes called wind indicators on top of their masts. Why do sailors need to know the wind direction?
Wind vane is used in determining how sailors are going to navigate their boats.
How do wind vanes measure wind direction?
They work when an indicator, such as a small arrow, reacts to wind gusts and points in the direction of the wind. The arrow and the vane are attached to a central point. The wind makes the arrow point in the direction of the wind. The arrow points into the wind, so you can identify the direction from which the wind is blowing.
Winds are caused by variation in air pressure and temperature. Local winds can change in minutes or hours. For example, sea breezes and land breezes are local winds that change every 12 hours.
In most regions, the wind usually comes from one primary direction, called the prevailing wind.
Do you know the prevailing wind in your local area?
Prevailing winds are often influenced by global winds. Global winds come from the north and south and do not vary much. How do you know? Polynesians and the Europeans used their knowledge of prevailing winds to navigate their way to discover New Zealand?

Activity: Design, make and test a wind vane then record wind directions.

Materials:
• Scissors
• Glue
• Paper, card and glue
• Drawing pin or nail
• Paper straw or similar
• Wooden skewer
• Card or heavy paper
• Heavy or corrugated cardboard from a box
• Hot glue gun or melting tape or sealant
• Compass

Procedure:
How many cards or pieces of three or four?
1. Write the four directions (N, S, E, W) near the edge of a paper plate. If there are four corners, they should read NE, SE, SW and NW.
2. Soak a card with a drawing pin or nail in the bottom of the soup tin. Use the scissors just big enough to poke the straw through the card.
3. To the middle section on the back and glue straw through until the glue is dry.
4. Hold the card over the top of the tin. Push the end of the straw into the hole of the plate.
5. Set aside.
6. Cut a strip of corrugated cardboard about 25cm by 1.8cm.
7. Cut a square from card approximately 7cm square. The card should be approximately quarter the size of the square.
8. Glue or tape the square and attach it to the end of the corrugated strip.
9. Place the pointy end of the skewer through the middle corrugated part of the strip and glue the arrow to the south and east of the plate.
10. Thread the skewer into the straw on the cup.
11. The skewer and arrow should be able to move freely in the wind.
12. You might like to make a design for an arrow or paint or decorate the arrow.

Testing:
Use your wind vane and compass to record wind direction.
Take the wind vane outside and hold them high in open areas, such as a playground, on a hill, or on the roof. They should use a compass to find north and get the wind vane to blow with the wind.
Record the wind direction. Remember that the side points to N, that the wind is blowing from the north (not from the south to the north).
It is possible to work out what the prevailing wind is in a location by monitoring the wind over time and determining what direction the wind is blowing from most often.
For the first two weeks, the weather should be recorded on the opposite side of the page. Do you know what the prevailing wind is in your area? Record the wind direction and the wind speed on the opposite side of the page. Do you know what the prevailing wind is in your area? Record the wind direction and the wind speed on the opposite side of the page.
Create a Wind Rose
A Wind Rose Diagram is a tool which graphically displays wind speed and wind direction at a particular location over a period of time.
Create your own Wind Rose Diagram on your collected data, using the wind rose template. For each time the wind blows in a particular direction, colour in a bar on that side of the circle. Wind rose graphs are used by meteorologists and meteorologists to show the prevailing wind direction and the other data your wind rose should show you your prevailing wind at a glance.

Glossary:
Wind direction - blowing air
Down - below
Sailboat - like a boat
Tsunami - The sea or god of weather causing the sea to rise
Weather - what the weather is like at a particular time and place
Weather station - a place where weather is measured
Downpour - someone who studies the ocean
Anemometer - an instrument for measuring wind speed
Wind vane - a device that measures the direction of the wind
Weather station - what you will see when you visit the weather
Sea level - the height of the sea
Knot - One nautical mile per hour
Compass - A tool for finding direction such as North, South, East and West
Sea Breeze and Land Breeze - The winds caused by differences in temperature between the sea and the land
Prevailing Wind - The most common wind in a location
Sea Level - The height of the sea
Wind Rose Diagram - A diagram that summarizes information about the wind at a particular place and over a period of time
Open level - How - a long piece of wire that is twisted and bent
Wind Turbine - A machine that gets energy from the wind to turn and power the energy

Each experience has a set of learning intentions.

Most of the experiences have a video that helps unpack the topic.

Each experience has a discussion section to help engage learners with the topic. The discussion section includes questions that teachers might like to ask learners to get them thinking about the topic. Brief answers to the questions are provided as well to help teachers who might not have the prior knowledge of the topic.

Many of the experiences have a gallery of images that help illustrate the topic under discussion.

Each experience has an activity section which in most cases involves learners in making and testing something. The activity section includes a list of the materials that are needed. The activities have been designed to use materials that are already in most schools and kura or are easy to source. The activity descriptions also give step by step instructions for learners to complete the task.

A gallery of photos to help illustrate the activity is included with most experiences.

In some experiences there are downloadable templates provided to help learners record and analyse data.

Each experience has a glossary of terms that relate to the topic.

4. SAILING EXPERIENCE

Yachting New Zealand

In addition to the classroom learning experiences, learners can feel the power of the wind during a sailing experience.

www.kokokaha-yachting.nz/sailing-experience

We have set up 23 Kōkōkaha providers around Aotearoa New Zealand to deliver a day long Kōkōkaha sailing experience to classes of up to 30 students. In addition there are a network of sailing clubs around the country, and a group of commercial providers, who can provide have-a-go experiences for schools and kura. The Kōkōkaha website provides registration and contact details for the two types of sailing experience.

For schools and kura registered for the Kōkōkaha sailing experience, the day typically has two parts. Generally each group of up to 30 students is split into two groups.

In the morning the first group goes sailing to experience the power of the wind. Meanwhile the second group undertake a set of hands-on challenges to introduce them to some of the technologies used in sailing. After lunch the groups swap.

The hands-on challenges are lead by the teachers from the participating school, while the sailing experience is facilitated by Kōkōkaha kaiako.

Part one: Feel the power of the wind

Learners are introduced to safer boating skills as they get out on the water and go for a sail. All the equipment including boats and life jackets are provided. The focus is on learners feeling the power of the wind.

Part two: Hands-on technology challenges

There are four challenges to introduce learners to technologies involved in sailing.

Pulley Power: How can pulleys be used to reduce the amount of effort required to lift a weight?

Knot Know How. What are some of the common knots used in sailing?

Sink & Float. What makes a boat float and what makes it sink?

Hull & Sail Materials. How have the materials used to build hulls and sails changed over the years?



KŌKŌKAHA
POWERED BY WIND

www.kokokaha-yachting.nz

TEACHER GUIDE

5. TAKE ACTION

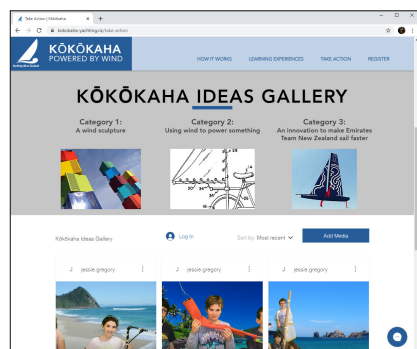
Once learners have learned all they need to know about wind their mission is to design a technology to harness the power of the wind. Designs can be presented as either an image or as a video. If a video, they need to be less than one minute in length. There are three categories of design to choose from.

1. A wind sculpture
2. Using wind to power something
3. An innovation to make Emirates Team New Zealand sail faster

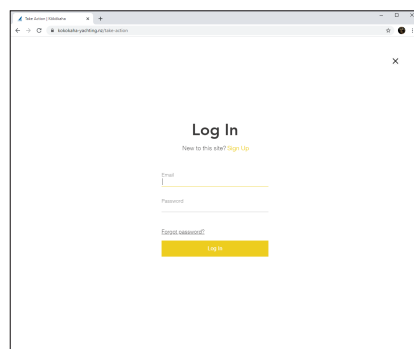
Teachers are responsible for loading the designs into the Kōkōkaha ideas gallery.

www.kokokaha-yachting.nz/take-action

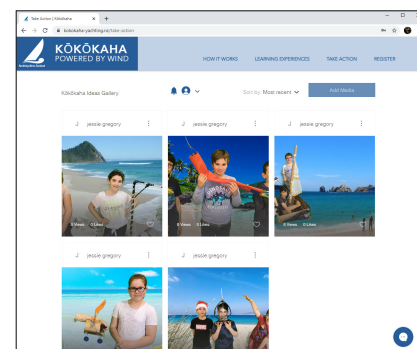
1. Click the login icon on the ideas gallery.



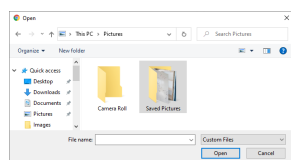
2. Enter your user name and password. If you have not got one already the gallery will prompt you to set one up.



3. Click the add media button.



4. Choose the file you want to upload to the gallery from your computer.



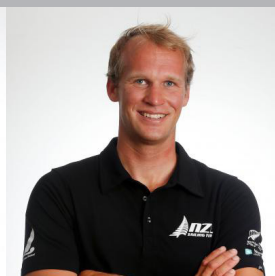
Later this year members of the NZL Sailing Team will review the designs and the top design in each category will receive a school visit from members of the New Zealand Sailing team.

Good luck!

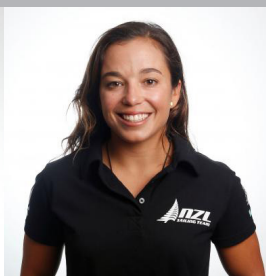
NZL SAILING TEAM KŌKŌKAHA IDEAS JUDGING PANEL



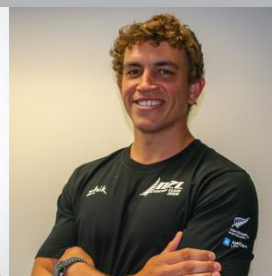
Molly Meech
Silver Medalist Rio Olympics



Josh Junior
America's Cup Champion
World Finn Champion



Alex Maloney
Silver Medalist Rio Olympics



Andy Maloney
America's Cup Champion



Erica Dawson
Olympian Tokyo



Daniel Wilcox
Olympian Rio and Tokyo