Kaitiakitanga
Kia Takatū ā-Matihiko are pleased to share with you our Rauemi Pikau | Resource Toolkits. Rauemi Pikau are intended to be a comprehensive exemplar or model of how you might integrate Digital Technologies (DT), and Hangarau Matihiko (HM), into your local curriculum in relevant and authentic contexts.

Please note:
- Rauemi Pikau are not an integrated unit plan and should not be directly taught from.
- Rauemi Pikau have included all of the Technology achievement objectives, as well as progress outcomes, for the year levels for which they were developed however there is much more here than you need. Teachers should collaborate with colleagues across multiple year levels in order to develop a broad learning programme that covers all of the Technology strands over time. This is preferable to trying to incorporate learning from all the achievement objectives, as well as all the progress outcomes, at once.
- We have suggested possible curriculum levels and year groups that Rauemi Pikau might be appropriate for however we encourage teachers of students in higher or lower year levels to adapt these resources as they wish to best meet the needs of their students.

How to use this resource
We suggest you might use this resource in the following way.
- Read through the Rauemi Pikau to support your own understanding.
- Download your own copy of our blank template.
- Work alongside your colleagues to explore ways in which you might integrate DT and HM into your local curriculum, using your own authentic and meaningful concepts and contexts.
- Pick aspects of our Rauemi Pikau and personalise the learning to your context by considering how you might adapt them to meet your needs and the ages and stages of your students.
- Share your learning to support the learning of others by sharing your integrated plan with others in Nga Kiriahi!
Concept
Kaitiakitanga encompasses a Māori world view of guardianship, protection and sustainability. The concept of kaitiakitanga supports developing rich opportunities for learning for all ākonga (students). It provides a basis for ākonga to actively engage as part of their wider community and to apply their learning in an authentic context.

Find out more about kaitiakitanga

“Kei te ora te wai, kei te ora te whenua, kei te ora te tangata.”
If the water is healthy, the land and the people are nourished.

“Young people: They care. They know that this is the world that they’re going to grow up in, that they’re going to spend the rest of their lives in. But, I think it’s more idealistic than that. They actually believe that humanity, human species, has no right to destroy and despoil regardless.”
- David Attenborough

Context
As part of developing your local curriculum, select a context that supports you to engage with your ākonga and the wider community to identify authentic questions, issues and opportunities that matter to them. Consider the impact that ākonga may be able to have on the wider community by engaging with your chosen context.

Our context example
There is a small awa (stream) that runs through the back of our school. Our kaumātua (person with traditional knowledge) tells us it used to be abundant with tuna (eel) and ika (freshwater fish). In our role as kaitiaki (guardian) of our local area, we are wondering:

How might we improve the health of our awa in order to encourage eel and freshwater fish to come back?
Technology Achievement Objectives
At this level teachers will be leading the learning of students to:

Characteristics of technology
- Understand that technology is purposeful intervention through design.

Identify that people designing and making things to solve problems, creates the ‘made world’. Understand that people follow a process to do this.

Characteristics of technological outcomes
- Understand that technological outcomes are products or systems developed by people and have a physical nature and a functional nature.

Distinguish between people-made outcomes and natural outcomes. Identify who uses outcomes, understand an outcome’s nature by its look (physical) and how it works (functional).

Teaching and Learning
Students come to understand technology as an intervening force in the world and learn that technological developments are inevitably influenced by (and influence) historical, social, and cultural events.

There are two components in this strand: characteristics of technology and characteristics of technological outcomes:

Possible Learning Activities:
- Discussions about what people have designed in and around the awa and how these have impacted (both positive and negative) on it. Outside expertise could be brought in to lead discussion (local iwi/hapū, Department of Conservation, local council environmental department).
- Explore the nature of some technological outcomes (eg. plastic water bottles). Discuss their physical nature, how they look—their design, shape and why they were designed this way. Examine the properties of what they are made from (clear, flexible plastic materials) and how they have impacted the people who use them and the environment they have been found in.
- Research and discuss the history of the area to find out if there are any interesting aspects of past use or stories.
- Take samples of water (a bucket full). Compare the awa sample with a tap water sample ie clarity, wildlife, rubbish.
- Discussion about what could be done to improve the awa for the wildlife in and around it.

Don’t understand a term?
Click a word with dotted underline to see the definition
Technology Achievement Objectives

At this level teachers will be leading the learning of students to:

**Technological modelling**
- Understand that functional models are used to represent reality and test design concepts and that prototypes are used to test technological outcomes.

  Modelling/models test your thinking of what could be real (e.g. playdough/card test the look, shape, size) and prototypes test if they work (e.g. Lego with moving parts).

**Technological products**
- Understand that technological products are made from materials that have performance properties.

  Identify what things are made from, how they react to their environment in different ways, and how they can be manipulated.

**Technological systems**
- Understand that technological systems have inputs, controlled transformations, and outputs.

  Understand that parts work together to make a system do its job. This Achievement Objective focuses on knowing about a system.

Teaching and Learning

Students come to understand key concepts that underpin all technological development and the resulting technological outcomes.

There are three components in this strand: technological modelling, technological products, and technological systems:

**Possible Learning Activities:**

- **Science**
  - Guide students to explore the environment directly around the awa to determine potential reasons for a reduction in fish population.

- **Mathematics and Statistics**
  - Discuss how a tablet has physical parts - case, screen, buttons, electronics inside, speakers, microphone, and a battery. The touch-screen, microphone, and buttons are examples of inputs. The inputs are processed by the electronics inside, and the results are shown on the screen (an output), or sent to the speakers as output.

  - Use digital video capture to measure the numbers of fish at regular intervals.

  - Designing and developing digital outcomes

- **Mathematics and Statistics**
  - Students use their data to create a simple wall display, using technological modelling and products, of their findings from the research. Modelling the wall display from materials such as paper and card supports students to understand how they perform eg. card will stay rigid, paper may not. Confirmation of hunch/inquiry is supported or challenged.

  - Count wildlife as it moves over a white board placed in the stream, or explore wildlife found in a bucket of water from the stream. Teacher leads use of a tally chart to record findings.
Technology Achievement Objectives
At this level teachers will be leading the learning of students to:

Planning for practice
• Outline a general plan to support the development of an outcome, identifying appropriate steps and resources.

Identify what to do next. Identify what resources are needed (materials, components/software).

Brief development
• Describe the outcome they are developing and identify the attributes it should have, taking account of the need or opportunity and the resources available.

Communicate what will be created. Say what the key features/attributes are (size, job/what it does, how it is safe etc.)

Outcome development and evaluation
• Investigate a context to communicate potential outcomes. Evaluate these against attributes; select and develop an outcome in keeping with the identified attributes.

Create representations (of their ideas) through models, drawings, verbally. Communicate how these ideas include the required attributes, then select and produce the outcome.

Teaching and Learning
Students are given opportunities to engage in their own technological practice and to reflect on the practice of others.

There are three components in this strand: Planning for practice, Brief development, and Outcome development and evaluation:

Possible Learning Activities:
Identify the pathway of the river. Guide students to look for potential causes of pollution at the source, down stream, and identify any pollution coming from their school.
Science

Teacher leads students to consider what makes a sustainable and healthy awa (Science) and then evaluate the awa against their chosen attributes.
Technology

Invite kaumātua, people who have lived in the area for a long time, local iwi/hapū, local council environmental department, Department of Conservation, or community members, to share about the history and use of the awa by the iwi/hapū, and the importance of the awa to the community, past and present.
Social Sciences Place-based learning
## Computational thinking for digital technologies

### Progress Outcome 1
At this level teachers will be leading the learning of students to:

In authentic contexts and taking account of end-users, students use their decomposition skills to break down simple non-computerised tasks into precise, unambiguous, step-by-step instructions (algorithmic thinking). They give these instructions, identify any errors in them as they are followed, and correct them (simple debugging).

Step-by-step instructions (algorithms) need to give the same outcome every time they are followed. Instructions need to be able to be followed by anyone without any input from others ie precise and unambiguous. When errors (bugs), are corrected in the instructions it is called 'debugging'.

### Teaching and Learning

Students express problems and formulate solutions in ways that means a computer (an information processing agent) can be used to solve them.

In this area, students develop algorithmic thinking skills and an understanding of the computer science principles that underpin all digital technologies. They become aware of what is and isn't possible with computing, allowing them to make judgments and informed decisions as citizens of the digital world.

### Possible Learning Activities:

#### Sorting Network Activity
Lifecycle of fish or the history of the area, what the impact has been.
- [CS Unplugged](#)

#### Decomposition Activity
The crime could be who polluted the river.
- [BBC](#)

#### Debugging Activity
Being eels navigating the river.
- [Code.org](#)

#### Rescue Mission Activity
Create a map on a grid of the awa. Teacher leads students to write instructions for tuna (eels) to navigate the awa from the creek to the Tongan trench (simple algorithm).
- [CS Unplugged](#)

[Click here to learn more about Computational thinking on Technology Online](#)
Designing and developing digital outcomes

**Progress Outcome 1**
At this level teachers will be leading the learning of students to:

In authentic contexts and taking account of end-users, students participate in teacher-led activities to develop, manipulate, store, retrieve, and share digital content in order to meet technological challenges. In doing so, they identify digital devices and their purposes and understand that humans make them. They know how to use some applications, they can identify the inputs and outputs of a system, and they understand that digital devices store content, which can be retrieved later.

A digital outcome needs to be designed to meet a real need, for real people. Do students understand what each digital device does, and how it will help them meet their desired outcome? Where and how do they store/use the files they create? Do they understand the difference between what people feed into a system, versus what comes out? Students can use different applications to complete a task and understand that choosing the right application can make the task easier.

**Teaching and Learning**
Students understand that digital applications and systems are created for humans by humans. They develop increasingly sophisticated understandings and skills for designing and producing quality, fit-for-purpose, digital outcomes. They develop their understanding of the technologies people need in order to locate, analyse, evaluate and present digital information efficiently, effectively and ethically.

**Possible Learning Activities:**

- **Image photography, capturing the story**
  Körero about digital photos as files which are copied and stored. Discussion about how digital photos, videos and text are different types of information and they are all digital outcomes. Discussion about digital outcomes (such as photos) having been created by people, and should be treated appropriately e.g. attributions, permission.

- **Develop a functional model** of their animation or movie by drawing, storyboarding, creating models or verbally.

- **Create a stop motion animation or Youtube drama** teaching other students about the human threats to the awa and how to avoid them.

- **Combine place based learning and social mapping** to create a 3D story on how to look after the awa resource using a digital map app.

- **Create a stop motion animation or Youtube drama** teaching other students about the human threats to the awa and how to avoid them.

- **Teacher leads an activity** to use simple analogue/digital testing equipment to capture simple data, (e.g. temperature) and being able to graph it for use in a digital format such as a slideshow or portfolio.
# Essential resources

Available at [kiatakutu.ac.nz](https://kiatakutu.ac.nz)

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Additional support resources

**Science / Social Sciences**

- **Teamwork makes the stream work** – Central Hawke's Bay students are restoring the local river and making their school a better place to be.
- **Te Wairepo/York Stream** – Nelson City Council share key actions that improved a local awa in conjunction with Victory Primary School.
- **Ways to generate Kaitiakitanga in your school** – A list of creative ideas to care for your local environment.

**Mathematics and Statistics**

- **Mathematics Rich Problem Solving task** (Level 1) – The Garden: Adapt this task to include living things from your own context
- **Mathematics General Interaction Ideas** – Measurement (ECE) Hands on, practical ideas to support learners exploring an environment
- **Tour Builder** – Google digital mapping app

**English: Reading Resources**

- **Under the Sea** (Gold) Information report on seaweed with audio included.

**Higher reading level, but could be used as a discussion starter with class**

- **The plastic free challenge** – A School Journal article (reading level 2) about a school protecting the ocean from plastic. Models kaitiakitanga and provides an example of students having an impact through taking action.
- **Tiakina a Tangaroa** – A School Journal article (reading level 2) that shows students acting on questions and issues in regards to their local beach
- **Talking to the river** – A School Journal article about monitoring pollution in a river.
- **Mahinga Kai Crusaders** – A School Journal article about looking after the places where kai is gathered.
- **The River** – A School Journal article about a river polluted upstream by a factory and a student acting on this.

**The Arts**

- **Nature scrapbook** – Collect items from your local area to create a class scrapbook
- **Fun things to make** from the Department of Conservation.
- **The sounds of the sea** – A dance unit for Level 1 which could be adapted to other local environments.

**Technology**

- **ScratchJr**: Free, online coding tool suitable for ākonga aged 5 – 7 years
- **Teaching Technological modelling to junior students** – Technology Online resource
- **Tuna: Trash or Taonga**: A 6 minute video about the importance and value of eels in our rivers.
Algorithm:
Step-by-step instructions (algorithm) need to give the same outcome every time they are followed. Instructions need to be able to be followed by anyone without any input from others ie precise and unambiguous.

Attributes:
Broad descriptors of what is intended (safe, work well etc), not measurable like specifications.

Concepts:
Ideas created that solve a defined problem. Can be drawn, 3d modelled, discussed.

Context:
Where you are working, the physical and social place/environment. Every solution has a context, which is the place, situation, users, and environment that the outcome is developed for. The context for a garden chair, for example, could be ‘outside on the lawn, used by family members aged from 3–65 years.’

Controlled transformations:
What happens, and what changes in the middle of a system, as a result of an external action. When you set an alarm to wake you on your phone, you change settings in the software, but it is the controlled electronic ‘black-box’ (unknown/unseen) systems inside the phone circuits, that enable it to be changed.

Debugging:
When errors (bugs), are corrected in the instructions it is called ‘debugging’. Debugging is as much an ‘attitude’ as a process. It is a natural part of the process of programming, and success comes with finding and fixing bugs, not generating error-free instructions on your first attempt.

Design concepts:
Ideas created in response to a need.

Develop:
The process used to produce an outcome.

Digital outcome/content:
Something that can be stored or manipulated in a digital format. If it can be captured in a digital file (stored on a digital device), it is a digital outcome.

End-user:
An end-user is whomever will be using, or will be affected by, the completed outcome. The end-user should be able to use the completed outcome independent of the creator.

Fit-for purpose:
Ongoing development and refinement attempts to ensure the outcome performs as intended, it does what it is supposed to do.

Functional modelling:
Functional modelling is used to evaluate design ideas and interim steps.

Input (computational thinking):
Any way that a human can communicate with a computer (e.g. clicking the mouse, pushing a button). Information fed into a set of instructions (e.g. the temperature from a sensor).

Input (design & developing digital outcomes):
What the creator brings to the final outcome. Examples include images, choice of typeface, image manipulation etc.

Intervention by design:
How humans create outcomes to solve problems (improve or damage our world) e.g. Cars are faster/easier than walking, a glass holds water to drink from that can be cleaned and reused.

Key stages:
Significant steps taken that are required to have a completed/fit for purpose outcome.

Model/modelling:
A physical representation of a technological solution that enables a solution’s feasibility to be tested/predicted, usually made in substitute materials like card, paper etc.

The natural world:
That which exists from nature, has not had human intervention.

Need:
Requirement of person, group or place/environment. There are many potential outcomes that could be made to solve the identified issue/problem. What is needed and why is it needed?

Opportunity:
A new situation or a place where a technology could be useful and successful.

Output (computational thinking):
Any way that a computer can communicate with a human (e.g. words on a screen or a sound), or something that happens as a result of a set of instructions being run (e.g. the heater turns on).

Output (design & developing digital outcomes):
The digital outcome created e.g. a photo or sound file.
Glossary

Simplifying the terms

**Performance:**
What materials do in certain situations.

**Performance properties:**
How a material behaves in certain environments and under certain processes determines how it is used (e.g. butter melts in moderate temperatures, timber doesn’t). You can easily cut through butter with a blunt knife and you need a saw and more effort to cut timber. You can therefore make a chair out of timber, you couldn’t make a chair out of butter.

**Planning:**
Why we keep records to manage resources, progress, reflect on decision making. Records explain decisions, suggest new directions, can answer outside questions.

**Planning tools:**
Visual and organisational, flow charts, lists etc.

**Potential outcomes:**
Design concepts aim to describe the nature of potential outcomes.

**Product:**
A human made product is one you can hold/touch/see.

**Properties:**
Why materials behave the way they do.

**Prototype:**
Literally, “creating the first of a kind”:
A physical representation, made in the actual materials to test function and feasibility. Prototyping is used to evaluate the fitness for purpose of systems and products that have been developed.

**Retrieve:**
Accessing stored information.

**Reuse:**
There are opportunities to find a new use for something. The outside part of an old pen has the opportunity to be used as a straw or to support a pot-plant to grow straight. An old ipad can be used as a digital photo display.

**The social world:**
Involving human relationships.

**System (designing & developing digital outcomes):**
Anything that can take an input and manipulate it to produce an output.

**System (general technology):**
The way something works, like communication, transport, collaboration.

**Technological challenge:**
A problem that can be solved by designing and developing technology.

**Technological change:**
How outcomes change over time, and how those changes affect human behaviour.

**Technological impact:**
The positive and negative effects of technology on society and/or the environment, and of society and/or the environment on technology.

**Technological outcome:**
What the student creates, either a product or a system. Technological outcomes can be categorised as products and systems but distinguishing between the two is not always straightforward. It depends on how you look at the outcome concerned.

For example, you could describe a cell phone as a technological system, comprising interconnected components that work together to achieve a purpose. But you could also describe the same phone as a technological product, focusing on the materials used in its manufacture and not on the many interconnected components inside it.