Hauora

Curriculum Level 2 - Years 4 to 6

Technology - Nature of Technology - Level 2
Technology - Technological Knowledge - Level 2
Technology - Technological Practice - Level 2
Technology - Computational thinking for digital technologies - PO2
Technology - Designing and developing digital outcomes - PO1
Rauemi Pikau

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!

Concepts and context
We have pre-selected concepts and contexts in order to provide a wide range of meaningful and relevant possible learning activities.
• The Concepts we have selected are based on bicultural themes in keeping with our uniquely Aotearoa approach to learning in the Kia Takatū ā-Matihiko | National Digital Readiness programme.
• The Contexts were selected to align with the concepts. We have been mindful to select contexts that could be easily adapted to your local curriculum. Authentic and meaningful contexts support students to take action. They’ll contribute to their local community as well as having a positive impact on themselves and others such as their whānau, iwi/hapū and wider community.

Connections to the strands
Teachers should make connections to the technology strands via the achievement objectives and progress outcomes to support a coherent pathway of learning for students.

Achievement objectives support you to start considering learning intentions, planning, and explicit teaching concepts.
Progress outcomes are what you are aiming for, the desired learning performance. It’s important to understand that the progress outcomes build year by year and are used to identify learning progression.

Relationships to support learning
Our Rauemi Pikau support you to think about how you build relationships with others to enhance student learning. In particular, we’ve shown how these relationships can have an impact when supporting students to take action. This might include people in your community, local businesses, iwi/hapū, other schools etc. People, expertise and materials are required to enrich your local curriculum and create engaging learning opportunities for students. It’s important that schools draw on their existing relationships, as well as create new ones, to support their learning programmes.
Our context example
The school has decided to hold a Hauora Challenge Day where ākonga and whānau can engage in a number of activities to promote health and well being. We have been exploring the model of Te Whare Tapa Whā and the various aspects of wellbeing. Our challenges will incorporate aspects of physical (taha tinana), such as keeping active and playing sport; mental (taha hinengaro), such as puzzles and brainteasers; spiritual (taha wairua), such as meditation and yoga sessions; and whānau (taha whānau), activities such as informative presentations from students about fire safety and prevention, team building games etc.

We want to support our wider community to be healthy and safe. Our Hauora Challenge Day is an opportunity for us to share our ideas with the community to support them to be healthy in all aspects of hauora.

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.

How might we support our local medical centre to get the repairs it needs in order to continue to support our local community to be safe and well?
Technology Achievement Objectives

Students will:

Characteristics of technology
• Understand that technology both reflects and changes society and the environment and increases people’s capability.

Characteristics of technological outcomes
• Understand that technological outcomes are developed through technological practice and have related physical and functional natures.

Possible Learning Activities:
- Research how sports companies (such as Nike) are constantly creating new technological outcomes (running shoes, carbon fibre bike frames) to improve performance in physical challenges, and how the technology relates to the man-made, natural, and social world.
- Provide students with examples of technological outcomes (e.g., sports equipment), guide them to explore how these have changed over time, and identify any changes that have resulted in terms of people’s capability to do things.
- Explore how food companies use design (art, colour, typeface, packaging materials), to transmit messages about the nutritional benefits of the enclosed food.
- Look at digital devices as a source of entertainment, organisation, and communication. Explore the ways software developers have engineered an addictive element into their software. Research some ways of restoring a good balance of use and non-use, testing them to see what’s most effective, examples of positive and negative impacts on people, society and/or the environment.
- Identify how digital technologies are being used to improve physical performance (motion capture, filming technology, modeling of body movements), and identify any social and/or environmental issues that might have influenced the nature of the outcomes produced.
- Examine how professional athletes are paid or sponsored to use, test, wear, and promote products, and that those products have a functional nature as well as a less tangible/physical nature (fashion, image, being part of a group).

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:

- How does technology relate to and influence people, the environment, and itself? How does this change over time, both positively and negatively?
- What is the nature of a technological outcome? How is it different to natural objects and other things created by people? What does it look like (physical) and what does it do (functional)? What key features (attributes) relate to who might use it?
Technology Achievement Objectives

Students will:

**Technological modelling**
- Understand that functional models are used to explore, test, and evaluate design concepts for potential outcomes and that prototyping is used to test a technological outcome for fitness of purpose.

Design concepts are ideas created in response to a need. Fit-for-purpose tests test that the outcome performs as intended. Does it solve the problem or do what it was supposed to do?

**Technological products**
- Understand that there is a relationship between a material used and its performance properties in a technological product.

How does a material behave in certain environments and under certain processes? Butter is soft and melts at moderate temperatures, timber is tough and doesn’t melt. You should probably therefore make a chair out of timber, rather than butter (assuming you want to sit in it regularly).

**Technological systems**
- Understand that there are relationships between the inputs, controlled transformations, and outputs occurring within simple technological systems.

How does an input change into an output? Do you know what each of the parts are, and how they work together to make that change happen?

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:**

- **Technological modelling:** Look at examples of sport technology that students already own and identify aspects that are designed to improve performance (e.g. spikes on shoes, special handlebars on a scooter). Create some healthy edible products to sell as a fund-raiser. Test some different options and settle on one. Explore a process to make a large number of them, looking at the inputs (ingredients), controlled processes (cooking), and outputs (food to sell), to find a way of making a consistent product.

- **Technological products:** Discuss and explore simple, everyday systems, like a phone alarm. The alarm time on a phone is an input. The hidden electronics/black-box is the controlled transformation that triggers the alarm at the correct time (output). Students identify an example of some sporting equipment that they feel doesn’t work well and redesign it to be better. Test and refine it.

- **Technological systems:** Explore modern board-games and how the art and components invite players to buy and play the game, and how they also make playing the game easier (organise information, help you remember rules etc…). Design, prototype and test your dream yoga mat using appropriate materials and incorporating features to make exercise more fun. Describe changes to your prototype after testing and why they were made.
Students learn to know how

Technology Achievement Objectives

Students will:

Planning for practice

- Develop a plan that identifies the key stages and the resources required to complete an outcome.

What are the basic steps to make the outcome, and what resources (materials, equipment, people) are needed at each step?

Brief development

- Explain the outcome they are developing and describe the attributes it should have, taking account of the need or opportunity and the resources available.

Can you say why the outcome is being made? What are the key features of what is being made? Can you justify why the outcome is good for the user? Attributes should be broad descriptors of what is intended rather than measurable specifications.

Outcome development and evaluation

- Investigate a context to develop ideas for potential outcomes. Evaluate these against the identified attributes, select, and develop an outcome. Evaluate the outcome in terms of the need or opportunity.

Can you describe/give details (drawings/models/verbally) of your outcome before it is made? How does the idea square against your key features (what it will look like and what it will do)? When you’ve made your outcome a reality, evaluate it against your key features. How does it rate? Does it look as expected, and do what was needed?

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:

- Ask an expert to come and talk to the class about training for physical challenges: what’s helpful, what’s motivating, and help the students to establish some goals. Students identify barriers that stop people from wanting to train regularly and design a solution to motivate them.

- Design and test a puzzle challenge to be used at the school fair as a fundraiser, and/or the opportunity to develop/improve existing puzzles that could raise more money.

- Students present or ‘pitch’ a solution to the rest of the class (dragon’s den style), justifying why it is needed, describing its key attributes, what it will look like, what it will do, how and why it will address their needs or those of their fellow students, in order to be ‘funded’ to produce and ‘sell’ the outcome.

- Research and design a solution for somebody who is having trouble getting to sleep at night.
Computational thinking for digital technologies

Progress Outcome 2

In authentic contexts, and taking account end-users, students give, follow and debug simple algorithms in computerised and non-computerised contexts. They use these algorithms to create simple programs involving outputs and sequencing (putting instructions one after the other) in age-appropriate programming environments.

Simple tasks are broken down into sequenced steps and tested by someone else in non-computerised contexts. Instructions need to be able to be followed without input from anyone else and need to give the same result/output every time. Can students take a set of instructions and turn them into a simple computer program? Audio, text or a dancing virtual cat are all examples of outputs.

Teaching and Learning

Computational thinking for digital technologies enables students to 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:

- Set up a training routine using Fitness unplugged (kidbots).
- Use physical computing devices to measure physical activity, such as a beep test, to encourage an increase in personal fitness.
- Design and create a method for measuring the speed of a pinewood derby car. The system needs to measure accurately and display the results.
- Use physical computing (eg simple circuits, LEDs etc) to create an art mural exploring an aspect of hauora.
- Create a program that measures the time between two presses of a button and displays it.
- Create a program to interact with students, perhaps asking how their day was. Student responses could be captured and changes to the data over time could be displayed.

Click here to learn more about Computational thinking on Technology Online
Designing and developing digital outcomes

Progress Outcome 1

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

In this area, 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:

- In races, use video to determine who crossed the finish line first in those with a close finish. Discuss which app is best to use i.e. ability to rewind and fast-forward while still showing detail. Discuss whether video or still photography is the best way to capture events. When would each format be useful?
- Students use simple analog/digital testing equipment to capture simple data (speed, height, time), and use an application to graph it.
- Create a display of photos to share on the school social media feed. Discuss how people feel if their ‘fails’ are published to an audience they haven’t agreed to.
- Use an app to develop an infographic explaining the four areas of hauora (tinana/body, hinengaro/mind, wairua/spirit, whānau/family/community).
- Create short videos showing how to do a skill with follow up activities on cards.
- Use an app to develop a graphic novel or comic book page from a story that they have read, or are reading, around hauora.
- Create digital outcomes to support anti-bullying programmes, or to support students to feel calm at school (e.g. desktop pictures for school computers).
Essential resources
Available at kiatakatu.ac.nz

Pīkau 5
CTDT:PO1
First steps in programming

Pīkau 6
CTDT:PO2
Programming with Sequence and Output

Pīkau 11
DDDO:PO1
Digital outcomes - Getting started with progress outcome 1

Pīkau 12
DDDO:PO1
Challenge yourself with PO1

Pīkau 13
DDDO:PO2-3
Creating digital outcomes using digital images and digital photography

Pīkau 14
DDDO:PO2-3
Physical Computing

Video
1 hour 7 mins
Personal perspectives of teachers integrating Digital Technologies into the classroom
### Additional support resources

#### English: Reading Resources

- **Simi Helps** (TKI) Level 1 (Yellow): Simi notices fire when his family are preparing an umu. Includes audio.
- **Sports Day for Monster** (TKI) Level 1 (Yellow): Monster and his friend Jack are excited about all the events they can try at the school sports day. Includes audio.
- **Just One Wheel** (TKI) Level 2: A school caretaker in Northland has introduced unicycles to the students.
- **Square Eyes** (TKI) Level 3: Morality tale about how some digital technologies alter our experiences without us knowing.
- **Happy New Year** (TKI) Level 3: A bush fire on Great Barrier changes plans.

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

- **Emotional Robots** (TKI) Level 4: This article explores the development of artificial intelligence (AI) from a social and ethical perspective.

#### Health and Physical Education

- **Well-being/hauora** (TKI): Explanation of Māori Whare Tapawhā perspective of holistic health (website).
- **He Reo Tupu, He Reo Ora unit plan**: (TKI) (English language) Health from te ao Māori perspective (website).
- **ERO Wellbeing for Success**: Resource for schools (pdf).
- **Health Promoting Schools: Promoting hauora/wellbeing**: Canterbury DHB resource for schools (website).
- **Supporting young people with stress, anxiety and/or depression**: Ministry of Social Development guidelines (pdf).
- **Mental Health Matters**: A health education resource for junior secondary school. Mental health Foundation of New Zealand/Ministry of Health (pdf).
- **Digital Technology Safe and responsible use in schools**: Ministry of Education and netsafe (pdf).
- **Health and well-being for learning**: (TKI): Ministry of Health (website).
- **Bullying Free NZ Posters**: Free, printable posters.
- **Class Korowai**: Activity incorporating Māori culture aspects of health.
- **A Shuttle Run Counter and Timer**: A PDF explaining a project completed by two primary school students with an example on YouTube.

#### Useful online tools

- **Teaching Technological Modelling** (functional modelling): Te Kura o Otangarei example of practice at NZC Level 1 & 2.
- **ScratchJr**: Free, online programming language suitable for 5–7 years.
- **Scratch**: Free, online programming language designed for 8–16 years.
- **Code Club Aotearoa**: Coding Clubs run nationally for 9–13 year olds.
- **Hour of Code**: Hour long activities to support learning to code.
- **Poster My Wall**: Create amazing posters, videos and graphics.
- **Do ink**: Animation and drawing app.
**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.

**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.

**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.

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

Retrieved:
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.