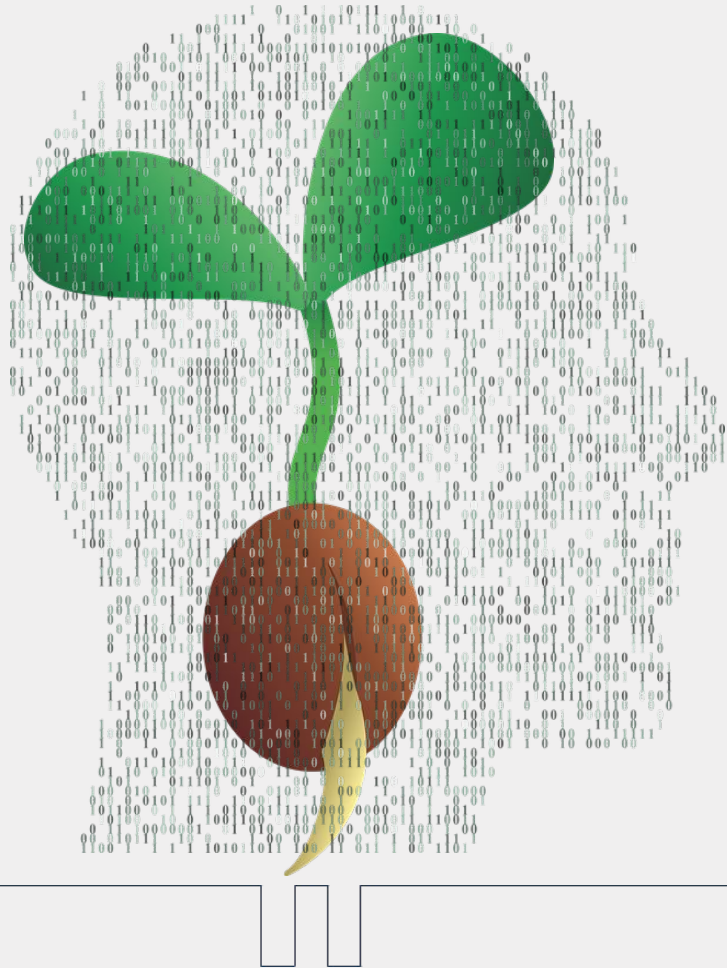




VR in Education: From using VR to creating for VR

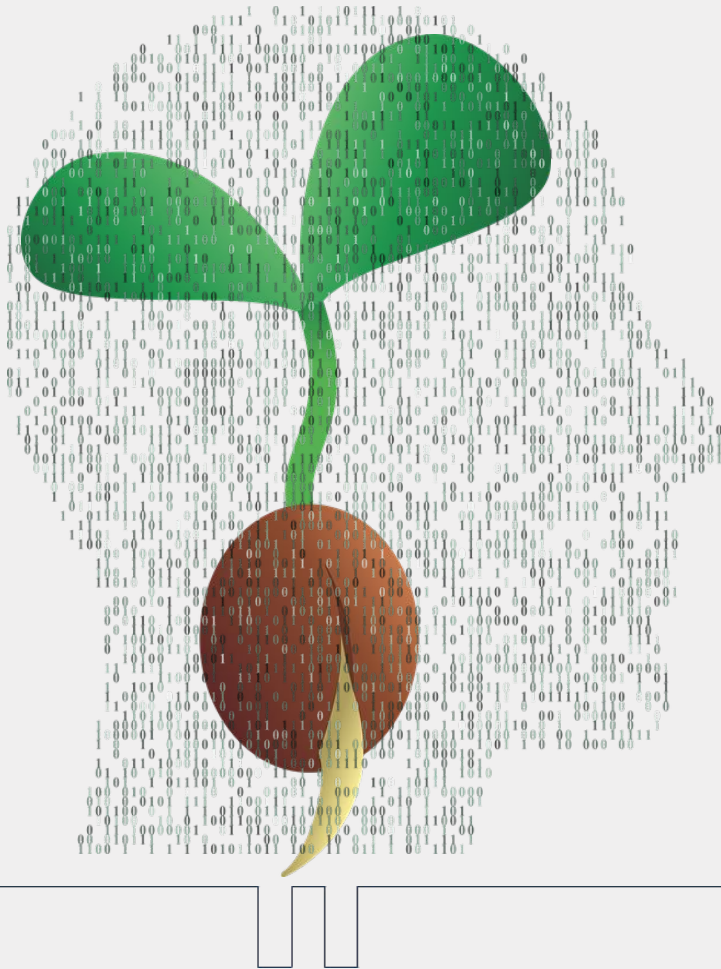
Techweek 2021

ao mariko *Virtual Reality*



Poipoia te kākano kia puāwai

Nurture the seed and it will blossom



E rere tēnei mihi i a mātou

Manaakitia mātou

Arahina mātou

I a mātou mahi

I tēnei kaupapa

I tēnei ra

This greeting comes to all here

Bless us together

Help us through

*The work and our practices
today*

Presenters & Outcomes

Aim

To learn how can the VR Voom team support you?

Presenter 1: **Kerry Lee**

Technology Lecturer, TENZ Chair, VR VOOM Advisor

01

02

Presenter 2: **Sarah Washbrooke**

Technology teacher, VR VOOM Product development lead

Presenter 3: **Nasser Giacaman**

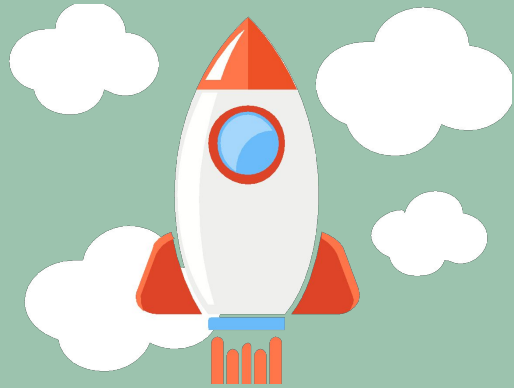
Software Engineering Lecturer, VR VOOM Science Leader

03

04

Presenter 4: **Thomas Male**

VR VOOM Programmer & Educator



Presenter 1: Dr Kerry Lee

NZ Technology Curriculum in a nutshell

NZ Technology Curriculum in a nutshell



Pepeha

*Ko Aorangi toku maunga
Ko Rangitata toku awa
Ko Ionic toku waka
Ko Kerry Lee taku ingoa
Kei Browns Bay ahau e noho ana*

**Kia ora, Kia orana, Mālō e lelei, Fakaalofa lahi atu, Bula Vinaka, Nǐ hǎo, As-salamu alaykum, Namaste
Tēnā koutou, Tēnā koutou, Tēnā koutou, katoa
and warm Pacific greetings to you all**



New Zealand

What does schooling look like today?

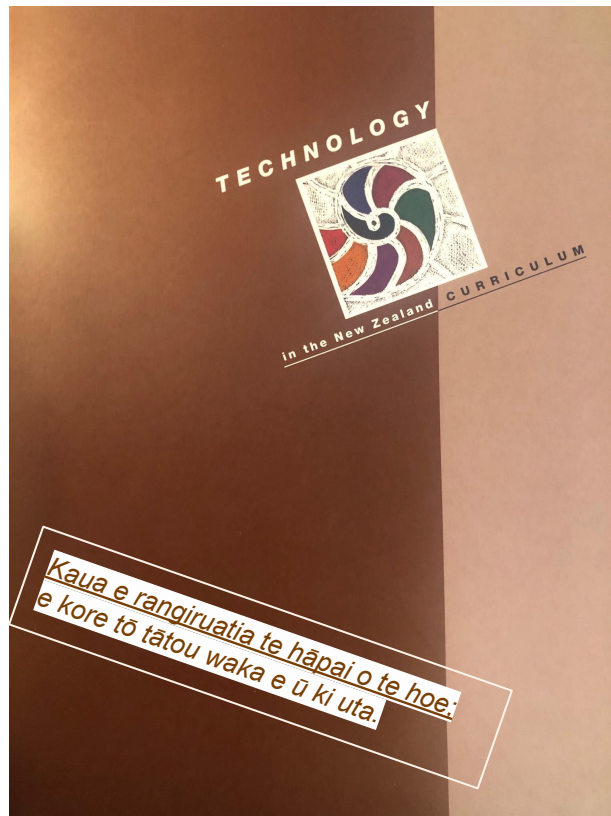
What should our schooling look like?

How can we adequately prepare are children for their future?

- In 1877 it became compulsory for children aged between 7-13 to attend primary school
- In 1901 3% of 12 - 18 year olds attended public secondary schools
- In 1939 25 % of 12 - 18 year olds attended public secondary schools

- **Confidently use ICT to access and communicate with others**
- **Problem solvers**
- **Actively seeking, using and creating knowledge**
- **Work effectively together**
- **Have a 'can-do' attitude**
- **Be resourceful, reliable and resilient**
- **Set goals, make plans, manage projects and set high standards**
- **Challenge assumptions and perceptions**
- **Participate and contribute in communities**





1995

3 strands (Knowledge, Capability, Society)
7 technological areas (p.12)

**8 curriculum books
 (each 50-100 pages)**



2007

3 strands (Knowledge, Practice, Nature)
5 technological areas (p.32)
8 components

**Reduced to 1 book
 (44 pages + flip sections)**



Te Marautanga o Aotearoa



Rauemi tautoko



Te Reo Māori



Pāngarau



Hauora



Tikanga ā-lwi



Ngā Toi



Pūtaiao



Hangarau



Te Reo Pākehā



Ngā Reo

Hangarau

HANGARAU

Ko te iho o te hangarau kei te wāwā e whai ake nei. Mā i te whakahaere o te hangarau o te ao hurihuri, i whakatakoitia e ētahi o tōu rūpuna he huarahi hei whāinga mā tōu.

*Tikina atu i tuwhakarere
I te ao kōhātu
Ngā mōhiotanga o rātou mā
Hei kawe i a tōu i roto i te ao tūroa
Kua takoto kē te whānui i rārangahia e rātou
Wānangahia, tuākina kia tau
Rangahaua kia mau mahara
Manakohia kia whiwhi ai
Te mātauranga Māori motuhake*

Kia tūpā ake te kōkano hangarau ki a tōu ākonga, me whakawhiti kōrero, me raweke, me whakamātau kia mau tonu.

Te Whaitake o te Ako i te Hangarau

Me whaitake ngā kaupapa hangarau kia kore ai e whāia mō te kore noa iho.

Mā te hangarau ka tū rangatira ngā ākonga. Hei whakahaere i ngā mōhiotanga hangarau, ka tūmā i te ao Māori me tōna hāngai ki te ao hurihuri. Me aro anō ki ngā uara, ngā pūkenga, me ngā mōhiotanga hangarau o te ao e tūnga ana ia.

Te Hanga o tēnei Wāhanga Ako

E rua ngā whenu, ko Ngā Ahuotanga Māori o te Hangarau me Te Whakahaere Hangarau. Kōwhiri ka taka mai ki ngā aho hangarau e rima. Ko te Hangarau Kai, ko te Hangarau Kōkoro, ko Ngā Hanga me ngā Pūhanga Manawa, ko Te Hangarau Matihiko, ko Te Tāhiko me te Hangarau Whakamātau.

E tika ana kia tūhuraia ngā ahuaotanga o ngā momo mātā kei te kaupapa hangarau. A, he wāhi anō mō te ao whakamātau ki te taha hōropi me te taha whakamātau. Kei roto aua wāhanga i te mahere hoahoa a te ākonga.

He rerekē ngā mōhiotanga kei te whenu. Me hono ngā whenu e rua ki ngā aho kōwhiriāia hei rūpapa mō te mahi hangarau.

Mā i te kaupapa whānui ka taka iho ngā aho hei āwhina. Tērā pea e rua, e toru rānei ngā aho e hāngai ana.

Me hāngai te aromatawai ki ngā whāinga kei ngā whenu.

Ngā Ahuotanga o te Hangarau
• ngā hangarau me te rūpapa Ahuotanga Māori
• ngā ahuaotanga me te huarahi whānui o te ao whakamātau



Te Whakahaere Hangarau
• te ahuaotanga o ngā mōhiotanga
• ngā pūkenga e pākeia ai te aho



Kāinga

Rauemi tautoko

- Pāngarau
- Tikanga ā-Iwi
- Ngā Toi
- Pūtaiao
- Te Reo Pākehā
- Ngā Reo
- Hauora
- Hangarau

> Ākonga te Tau: Hine Raumati

Kāinga > Rauemi tautoko > Hangarau

Tāngia

Tirohia mā te reo: Māori | Ingarihi

Hangarau

Kei konei ngā whakamārama mō ngā rauemi tuihono, putanga ā-tā hoki hei tautoko i ngā kaiako. Ko ētahi o ngā rauemi e hāngai ana ki te tauaki marautanga o mua, arā, ko *Hangarau i Roto i te Marautanga o Aotearoa*. Ka honoa ngā taitara o ngā rauemi tuihono ki ngā paetukutuku whai pānga.

Hei tono i ngā rauemi ā-tā pērā me ngā pukapuka, ngā kōpae whakarongo, me ngā kōpae ataata, haere ki te paetukutuku *Down the Back of the Chair*.

Ngā rauemi tuihono

Hangarau Matihiko

Hangarau Matihiko

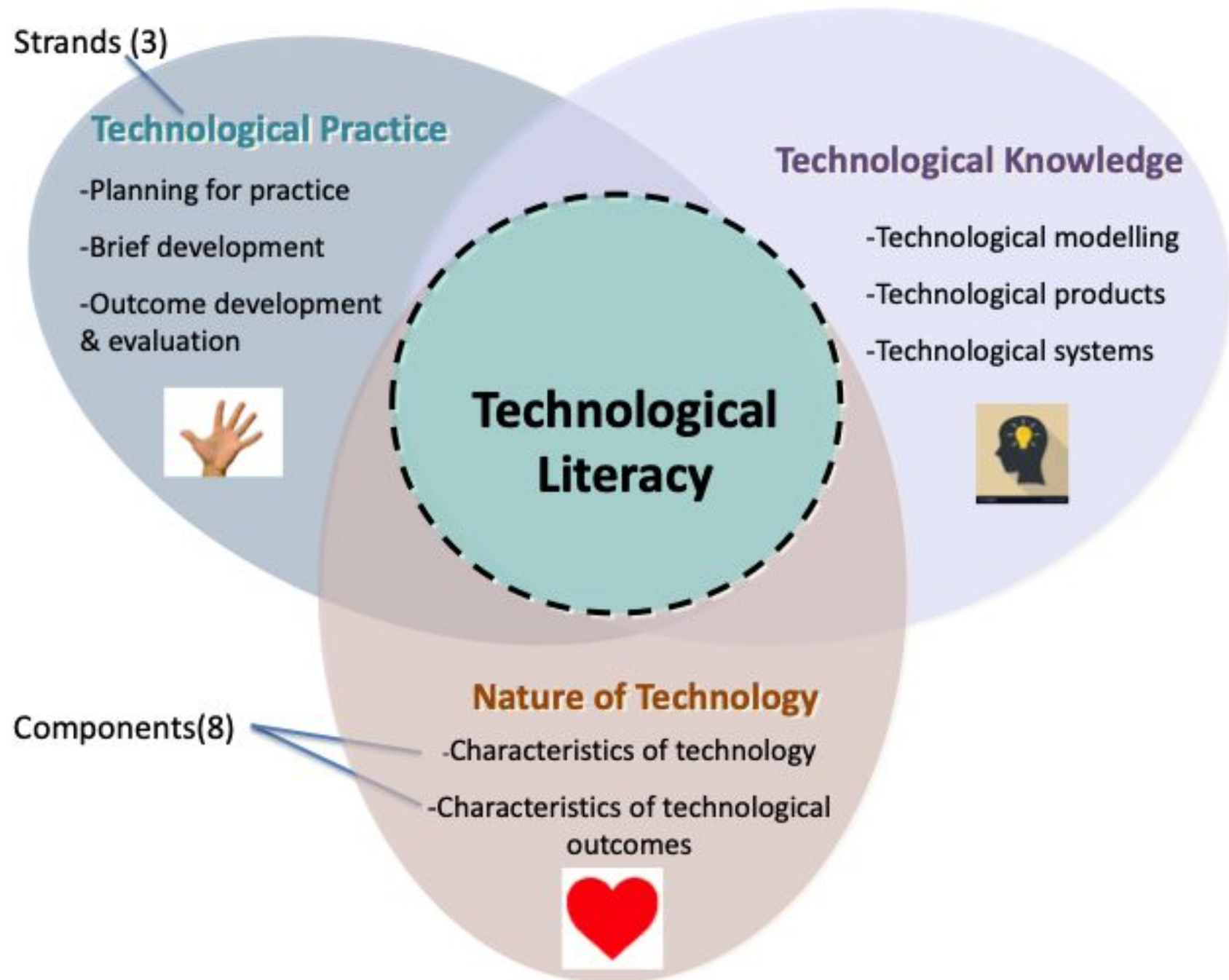
Kua whakahoutia te marautanga Hangarau. Kei tēnei pae tukutuku ētahi rauemi hei āwhina i ngā kaiako ki te

Ngā hononga whai pānga

Te Marautanga o Aotearoa - Hangarau

He Kohinga Rauemi ā-Ipurangi

Mā te Pouako



ALL strands and components at one level

Indicators of progression and teacher guidance



INDICATORS OF PROGRESSION: LEVEL 3

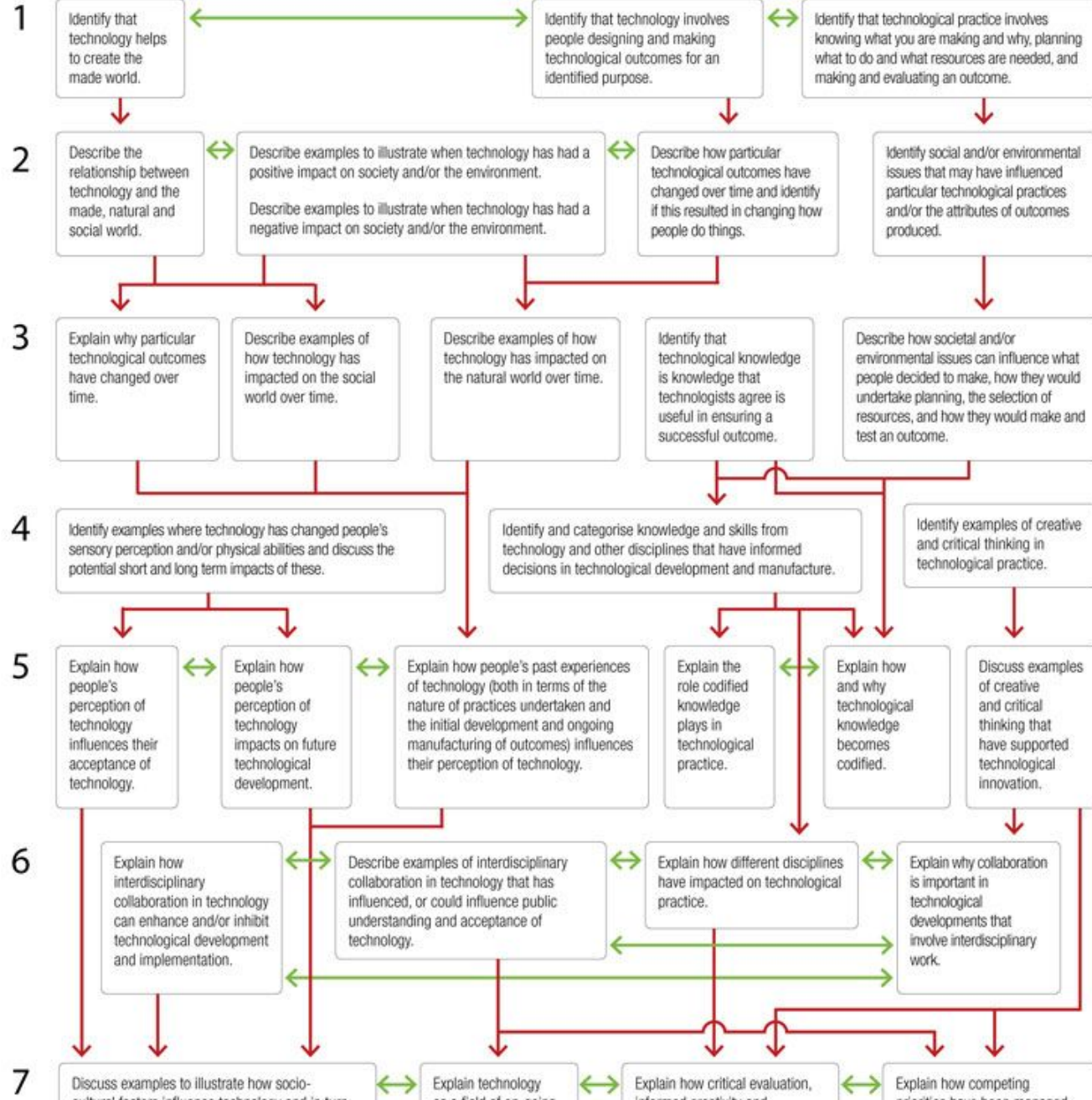
TECHNOLOGICAL PRACTICE			NATURE OF TECHNOLOGY	
Teachers should establish if students have developed robust level two competencies and are ready to begin working towards level three achievement objectives for the technological practice components, and plan learning experiences to progress these as guided by the level three indicators below.			Teachers should establish if students have developed robust level two understandings and are ready to begin working towards level three achievement objectives for the nature of technology and plan learning experiences to progress these as guided by the level three indicators below.	
Brief Development	Planning for Practice	Outcome Development & Evaluation	Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Students will: Describe the nature of an intended outcome, explaining how it addresses the need or opportunity. Describe the key attributes that enable development and evaluation of an outcome.	ACHIEVEMENT OBJECTIVE Students will: Undertake planning to identify the key stages and resources required to develop an outcome. Revisit planning to identify reviews of progress and identify implications for subsequent decision making.	ACHIEVEMENT OBJECTIVE Students will: Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity.	ACHIEVEMENT OBJECTIVE Students will: Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function.	ACHIEVEMENT OBJECTIVE Students will: Understand that technological outcomes are a fit for purpose by the relationship between functional natures.
TEACHER GUIDANCE To support students to undertake brief development at level three teachers could: • provide the need or opportunity and develop the conceptual statement in negotiation with the students • guide students to describe the physical and functional nature of an outcome (eg. what it looks like and what it can do) taking into account the need or opportunity, conceptual statements and resources available • guide students to identify the key attributes an appropriate outcome should have. Key attributes reflect those that are deemed essential for the successful function of the outcome.	TEACHER GUIDANCE To support students to undertake planning for practice at level three teachers could: • ensure that there is a brief against which planning to develop an outcome can occur • provide students with an overview of what they will need to do during their technological practice and guide students to identify key stages and place these on a timeline of some sort • provide resources including a range of appropriate materials, components, software, hardware, equipment, and/or tools for students to select from and guide students to select those that will be suitable for their outcome • guide students to reflect on progress to make informed decisions regarding next steps.	TEACHER GUIDANCE To support students to undertake outcome development and evaluation at level three teachers could: • ensure that there is a brief with attributes against which a developed outcome can be evaluated • establish an environment that encourages and supports student innovation when generating design ideas • provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and using manipulative media such as plasticine, wire, card etc • provide opportunity to develop knowledge and skills related to the performance properties of the materials/components students could use • support students to evaluate their outcome against the brief.	TEACHER GUIDANCE To support students to develop understanding of characteristics of technology at level 3, teachers could: • provide students with examples of different technologies and guide them to identify how social and environmental issues could have influenced their decision making about what should be made and why, how planning should be done and what resources should be used, how materials could be manipulated and tested, how outcomes should be evaluated, and manufacturing considerations • provide students with the opportunity to explore a range of technologies and guide them to determine why they have changed over time. Reasons for changes include such things as: changing needs, fashions, attitudes, ethical and environmental stances etc, or the development of new materials, skills and knowledge • guide students to determine the impacts different technologies have had on society and/or the environment over time • provide students with opportunities to discuss technological knowledge as knowledge that technologists agree is important for the development of a successful outcome and that if this knowledge is useful for a number of situations it can be codified for quick reference. For example, material tolerances, ratios, dosage.	TEACHER GUIDANCE To support students to develop understanding of characteristics of technological outcomes could: • provide students with a range of technological outcomes with unknown functions to explore and inform suggestions regarding how they might be made and why, how planning should be done and what resources should be used, how materials could be manipulated and tested, how outcomes should be evaluated, and manufacturing considerations • provide students with the opportunity to explore a range of technologies and guide them to determine why they have changed over time. Reasons for changes include such things as: changing needs, fashions, attitudes, ethical and environmental stances etc, or the development of new materials, skills and knowledge • guide students to determine the impacts different technologies have had on society and/or the environment over time • provide students with opportunities to discuss technological knowledge as knowledge that technologists agree is important for the development of a successful outcome and that if this knowledge is useful for a number of situations it can be codified for quick reference. For example, material tolerances, ratios, dosage.
INDICATORS Students can: • describe the physical and functional nature of the outcome they are going to produce and explain how the outcome will have the ability to address the need or opportunity • describe attributes for the outcome and identify those which are key for the development and evaluation of an outcome.	INDICATORS Students can: • identify key stages, and resources required, and record when each stage will need to be completed to make sure an outcome is completed • explain progress to date in terms of meeting key stages and use of resources, and discuss implications for what they need to do next.	INDICATORS Students can: • describe design ideas (either through drawing, models and/or verbally) for potential outcomes • evaluate design ideas in terms of key attributes to develop a conceptual design for the outcome • select materials/components, based on their performance properties, for use in the production of the outcome • produce an outcome that addresses the brief • evaluate the final outcome against the key attributes to determine how well it met the need or opportunity.	INDICATORS Students can: • describe how societal and/or environmental issues can influence what people decide to make, how they would undertake planning, the selection of resources, and how they would make and test an outcome • explain why particular technological outcomes have changed over time • describe examples of how technology has impacted on the social world over time • describe examples of how technology has impacted on the natural world over time • identify that technological knowledge is knowledge that technologists agree is useful in ensuring a successful outcome.	INDICATORS Students can: • describe possible users and functions of outcome based on cues provided by its context and issue • describe examples of technological outcomes that have similar functions • describe examples of technological outcomes that have similar physical natures (all have flexible bristles which they are used to determine their as to whether they function to clean, spread a substance, or to separate some) • guide students to understand the relationship between physical and functional nature required of their outcome, and how the key attributes relate to this • guide students to consider the key stakeholders and the environment where the outcome will be located.

Listed by Strand and its components

TECHNOLOGICAL PRACTICE: INDICATORS OF PROGRESSION								
LEVEL FOUR			LEVEL FIVE			LEVEL SIX		
Teachers should establish if students have developed robust level three competencies and are ready to begin working towards level four achievement objectives for the technological practice components, and plan learning experiences to progress these as guided by the level four indicators below.			Teachers should establish if students have developed robust level four competencies and are ready to begin working towards level five achievement objectives for the technological practice components, and plan learning experiences to progress these as guided by the level five indicators below.			Teachers should establish if students have developed robust level five competencies and are ready to begin working towards level six achievement objectives for the technological practice components, and plan learning experiences to progress these as guided by the level six indicators below.		
Brief Development	Planning for Practice	Outcome Development & Evaluation	Brief Development	Planning for Practice	Outcome Development & Evaluation	Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Students will: Justify the nature of an intended outcome in relation to the need or opportunity. Describe the key attributes that enable development and evaluation of an outcome and its evaluation.	ACHIEVEMENT OBJECTIVE Students will: Undertake planning that includes reviewing the effectiveness of past actions and resourcing, exploring implications for future actions and assessing of resources, and consideration of stakeholder feedback, to enable the development of an outcome.	ACHIEVEMENT OBJECTIVE Students will: Investigate a context to develop ideas for potential outcomes. Undertake functional modelling that takes account of stakeholder feedback, in order to select and develop the outcome that best addresses the key attributes. Incorporating stakeholder feedback, evaluate the outcome's fitness for purpose in terms of how well it addresses the need or opportunity.	ACHIEVEMENT OBJECTIVE Students will: Justify the nature of an intended outcome in relation to the need or opportunity. Describe specifications that reflect key stakeholder feedback and that will inform the development of an outcome and its evaluation.	ACHIEVEMENT OBJECTIVE Students will: Analyse their own and others' planning practices to inform the selection and use of planning tools. Use these to support and justify planning decisions (including those relating to the management of resources) that will see the development of an outcome through to completion.	ACHIEVEMENT OBJECTIVE Students will: Analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing functional modelling and evaluation that takes account of key stakeholder feedback and trailing in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief.	ACHIEVEMENT OBJECTIVE Students will: Justify the nature of an intended outcome in relation to the need or opportunity and justify specifications in terms of key stakeholder feedback and wider community considerations.	ACHIEVEMENT OBJECTIVE Students will: Critically analyse their own and others' past and current planning practices in order to make informed selection and effective use of planning tools. Use these to support and justify ongoing planning that will see the development of an outcome through to completion.	ACHIEVEMENT OBJECTIVE Students will: Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trailing in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation using feedback from stakeholders.
TEACHER GUIDANCE To support students to undertake brief development at level four teachers could: • provide an appropriate context and issue that allows students to access resources (including key stakeholders) • guide students to identify a need or opportunity and develop a conceptual statement • support students to understand the physical and functional nature required of their outcome, and how the key attributes relate to this • guide students to consider the key stakeholders and the environment where the outcome will be located.	TEACHER GUIDANCE To support students to undertake planning for practice at level four teachers could: • ensure that there is a brief against which planning to develop an outcome can occur • provide resources including a range of appropriate stakeholders, materials, components, software, hardware, equipment, and/or tools for students to select from and support students to select those that will be suitable for their outcome • provide planning tools and support students to use these to record key stages and resources needed, including when they will need to access stakeholder feedback, and to (Please note, records only need to capture what students plan to do and what they need to do to guide their progress and allow them to review this regularly) • support students to identify regular review points and to review their progress at these points • guide students to manage time and organise their selected resources based on regular reviews of progress	TEACHER GUIDANCE To support students to undertake outcome development and evaluation at level four teachers could: • ensure that there is a brief with attributes against which a developed outcome can be evaluated • establish an environment that encourages and supports student innovation when generating design ideas • provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling • provide a range of materials/components and support students to develop the necessary knowledge and skills to test and use them • guide students to evaluate outcomes in situ against key attributes.	TEACHER GUIDANCE To support students to undertake brief development at level five teachers could: • provide an appropriate context and issue that allows students to access resources (including key stakeholders) • guide students to identify a need or opportunity and develop a conceptual statement • support students to understand the physical and functional nature required of their outcome, and how the key attributes relate to this • guide students to consider the key stakeholders and the environment where the outcome will be located.	TEACHER GUIDANCE To support students to undertake planning for practice at level five teachers could: • ensure that there is a brief against which planning to develop an outcome can occur • provide a range of planning tools and support students to analyse these to inform selection of the tools they will use to manage and efficiently record their planning ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling • provide a range of materials/components and support students to develop the necessary knowledge and skills to evaluate and use them • guide students to evaluate outcomes in situ against brief specifications.	TEACHER GUIDANCE To support students to undertake outcome development and evaluation at level five teachers could: • ensure that there is a brief with clear specifications against which a developed outcome can be evaluated • establish an environment that supports student innovation and encourages analysis of existing outcomes • provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling • provide a range of materials/components and support students to develop the necessary knowledge and skills to evaluate and use them • guide students to evaluate outcomes in situ against brief specifications.	TEACHER GUIDANCE To support students to undertake brief development at level six teachers could: • provide an appropriate context and issue that allows students to access resources (including key stakeholders) and guide them to take into account wider community considerations • support students to identify a need or opportunity relevant to the given issue and context • support students to understand the physical and functional nature required of their outcome • support students to develop specifications and justify them based on key and wider community stakeholder considerations.	TEACHER GUIDANCE To support students to undertake planning for practice at level six teachers could: • ensure that there is a brief against which planning to develop an outcome can occur • provide students to critically analyse a range of planning tools that have been used in past practice • support students to select planning tools that will provide appropriate support for their practice and efficient recording of why key planning decisions were made • support students to ensure appropriate resources are available (stakeholders, materials, components, software, equipment, tools and/or hardware) suitable for their outcome • support students to use selected tools to manage resources to ensure completion of an outcome.	TEACHER GUIDANCE To support students to undertake outcome development and evaluation at level six teachers could: • ensure that there is a brief with clear specifications against which a developed outcome can be evaluated • establish an environment that supports student innovation and encourages critical analysis of existing outcomes • support students to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling • support students to explore a range of materials/components and to develop the necessary knowledge and skills to evaluate and use them • support students to undertake prototyping to evaluate the outcome's fitness for purpose and identify any further development requirements • support students to gain targeted stakeholder feedback.
INDICATORS Students can: • identify a need or opportunity from the given context and issue • establish a conceptual statement that communicates the nature of the outcome and why such an outcome should be developed • establish the key attributes for an outcome informed by stakeholder considerations • communicate key attributes that allow an outcome to be evaluated as fit for purpose.	INDICATORS Students can: • use planning tools to manage time, identify and record key stages, and resources needed, and actions to be undertaken, with progress review points clearly indicated • review progress at set review points, and revise time management as appropriate to ensure completion of an outcome.	INDICATORS Students can: • describe design ideas (either through drawing, models and/or verbally) for potential outcomes • undertake functional modelling to develop design ideas into a conceptual design that addresses the key attributes • test the key performance properties of materials/components to select those appropriate for use in the production of a feasible outcome • produce and trial a prototype of the outcome • evaluate the fitness for purpose of the final outcome against the key attributes.	INDICATORS Students can: • identify a need or opportunity from the given context and issue • establish a conceptual statement that justifies the nature of the outcome and why such an outcome should be developed • establish the specifications for an outcome based on the nature of the outcome required to address the need or opportunity, and informed by key stakeholder considerations • communicate specifications that allow an outcome to be evaluated as fit for purpose.	INDICATORS Students can: • analyse own and others' use of planning tools to inform the selection of the tools best suited for their use to plan and monitor progress and record key decisions • use planning tools to identify and record key stages, and manage time and resources (including stakeholder interactions) to ensure completion of an outcome • use planning tools to record key planning decisions regarding the management of time, resources and stakeholder interactions.	INDICATORS Students can: • generate design ideas that are informed by research and analysis of existing outcomes • undertake functional modelling to develop design ideas into a conceptual design that addresses the specifications • evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome • produce and trial a prototype of the outcome • evaluate the fitness for purpose of the final outcome against the specifications.	INDICATORS Students can: • identify a need or opportunity from the given context and issue • establish a conceptual statement that justifies the nature of the outcome and why such an outcome should be developed • establish the specifications for an outcome based on the nature of the outcome required to address the need or opportunity, and informed by key stakeholder considerations • communicate specifications that allow an outcome to be evaluated as fit for purpose.	INDICATORS Students can: • critically analyse own and others' use of planning tools to inform the selection of the tools best suited for their use to plan and monitor progress and record reasons for planning decisions • use planning tools to establish and manage all resources, and to determine and guide actions to ensure completion of an outcome • use planning tools to record initial plans and ongoing revisions in ways which provide reasons for planning decisions made.	INDICATORS Students can: • generate design ideas that are informed by research and the critical analysis of existing outcomes • undertake functional modelling to refine design ideas and enhance their ability to address the specifications • evaluate design ideas in terms of their ability to support the development of a conceptual design for a feasible outcome • evaluate the conceptual design against the specifications to determine the proposed outcomes potential fitness for purpose • evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome • produce and trial a prototype of the outcome to evaluate its fitness for purpose and identify any changes that would enhance the outcome • use stakeholder feedback to support and justify key design decisions and evaluations of fitness for purpose.

Characteristics of Technology

LEVEL



Progression diagrams



Quickly identify

- All indicators of progression for each component
- Links between indicators
- Prior indicators
- Next indicator

<https://technology.tki.org.nz/Technology-in-the-NZC/Technology-indicators>

2017 revised technology curriculum (16 pages online)

- 5 new technological areas



Technology in the New Zealand Curriculum

We've revised the Technology learning area to strengthen the positioning of digital technologies in the New Zealand Curriculum. The goal of this change is to ensure that all learners have the opportunity to become digitally capable individuals. This change signals the need for greater focus on our students building their skills so they can be innovative creators of digital solutions, moving beyond solely being users and consumers of digital technologies.

Schools will be expected to fully integrate the revised learning area into their curriculum by the start of the 2020 school year.

What is technology about?

*Kāua e ranginuiatia te hapa o te hoe;
e kore to tatou waka e ti ki uta.*

Technology is intervention by design. It uses intellectual and practical resources to create technological outcomes, which expand human possibilities by addressing needs and realising opportunities.

Design is characterised by innovation and adaptation and is at the heart of technological practice. It is informed by critical and creative thinking and specific design processes. Effective and ethical design respects the unique relationship that New Zealanders have with their physical environment and embraces the significance of Māori culture and world views in its practice and innovation.

Technology makes enterprising use of knowledge, skills and practices for exploration and communication, some specific to areas within technology and some from other disciplines. These include digitally-aided design, programming, software development, various forms of technological modelling, and visual literacy – the ability to make sense of images and the ability to make images that make sense.

Why study technology?

With its focus on design thinking, technology education supports students to be innovative, reflective and critical in designing new models, products, software, systems and tools to benefit people while taking account of their impact on cultural, ethical, environmental and economic conditions.

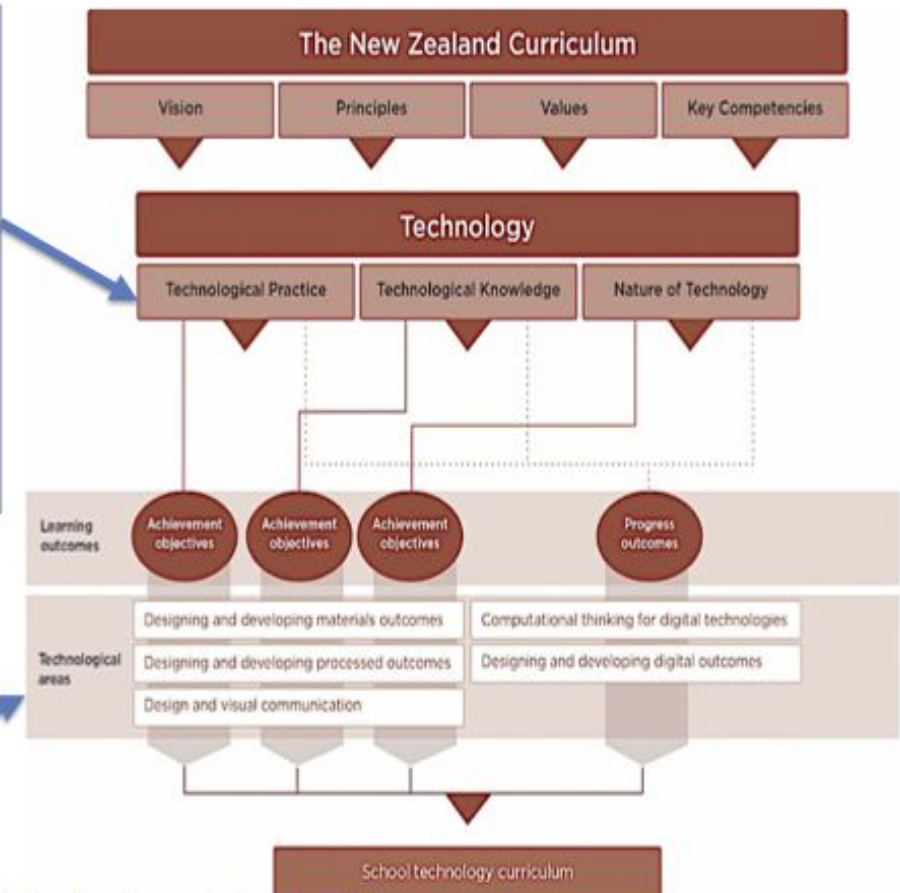
The aim is for students to develop broad technological knowledge, practices and dispositions that will equip them to participate in society as informed citizens and provide a platform for technology-related careers. Students learn that technology is the result of human activity by exploring stories and experiences from their heritage, from Aotearoa New Zealand's rich cultural environment, and from contemporary examples of technology. As they learn in technology, students draw on and further develop the key competencies.

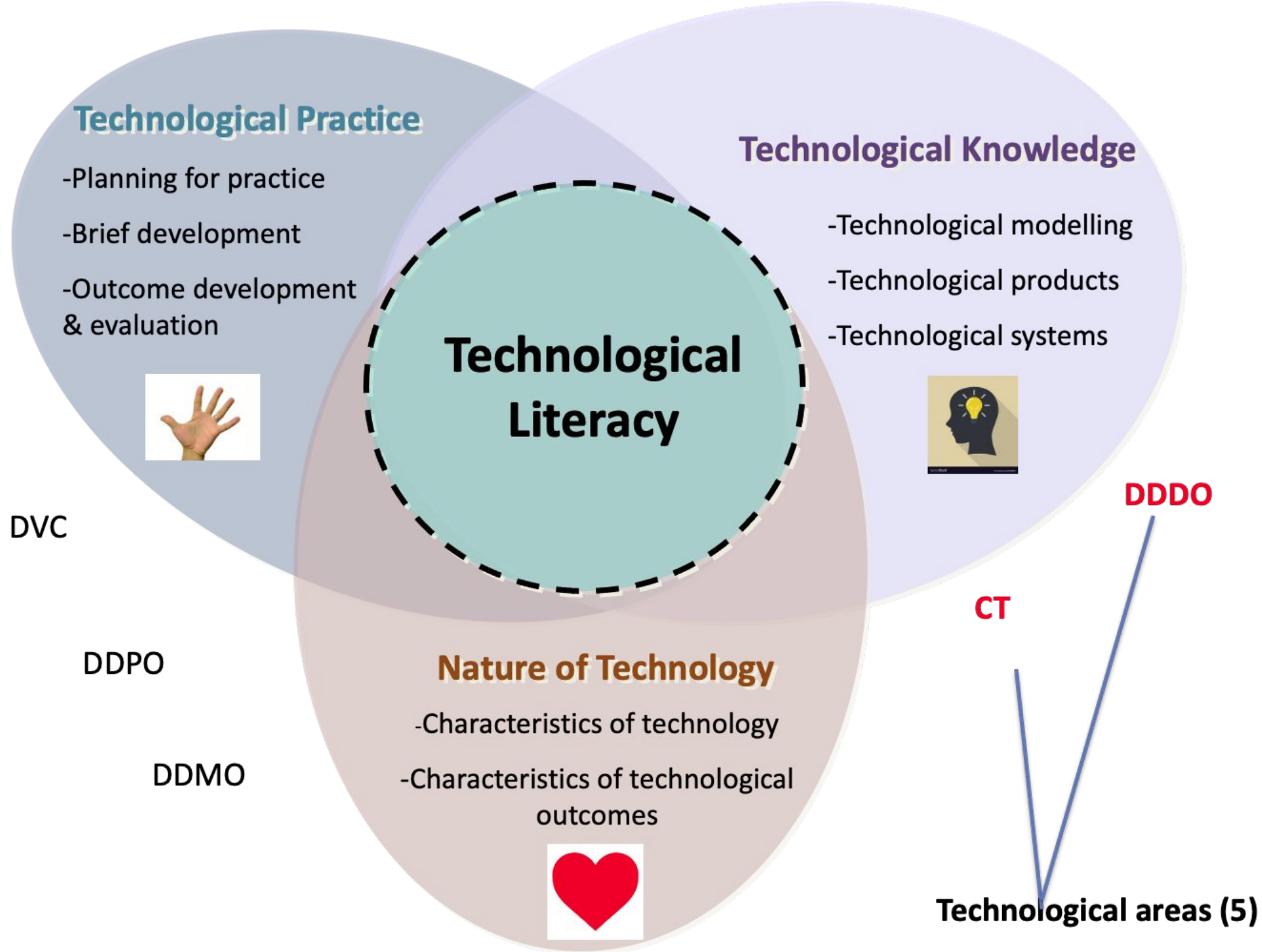
Technology – Learning Area Structure

Three strands

- compulsory shaping learning experiences across the five areas.
- described separately, but almost always integrated and entwined.
- embedded in each of the five technological areas.

The technological areas provide the context for learning.







Digital Technologies and Hangarau Matihiko learning

Our education system equips children and young people with the skills and knowledge to participate, create and thrive whatever pathway they choose to take.

In response to this fast-evolving world we have adapted our National Curriculum to now include digital technologies learning.

About Digital Technologies and Hangarau Matihiko (DT and HM) learning

Progress Outcomes

(for CT & DDDO)

Computational thinking for digital technologies: Exemplar 9

PROGRESS OUTCOME 4



Robotics challenges

Annotation

Jamal and Roman are able to decompose a robotics problem into logical steps, write an algorithm for the problem, and create a program for a robot. They test whether the program functions as intended when downloaded to the robot and then refine their algorithm and program. In doing so, they show that they are able to use a block-based programming environment to create a program that uses:

- sequence (blocks in the correct order)
- inputs (readings from colour and ultrasonic sensors)
- selection and iteration through the use of repeat-until loops.

They also show that they can:

- refine an algorithm and program to be more precise
- understand connections between programming and algorithms by using an algorithm as code comments to guide and document programming.

Background

The students have been learning to program robots using the LEGO MINDSTORMS® EV3 integrated development environment (IDE). They have practised writing algorithms to decompose problems. They have worked in teams to write, test and debug programs to solve different challenges, using input from various sensors to make decisions about how a robot's motors should move. They are learning the fundamental building blocks of programs (sequence, selection and iteration) so that they can combine these into larger programs to solve a series of problems.

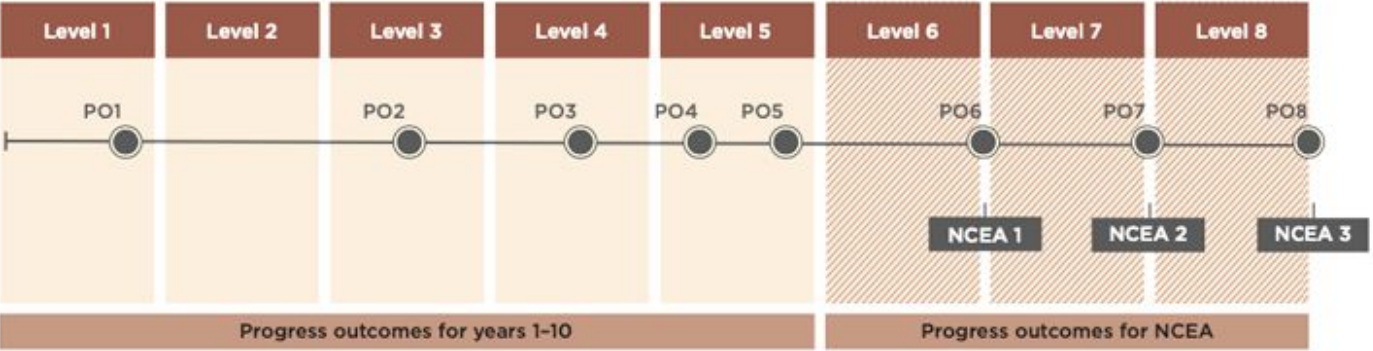
Task

The students are asked to work in pairs to write algorithms for problems that may arise when developing larger programs to solve multi-step robotics challenges.

They are then asked to test their algorithm by translating it to LEGO MINDSTORMS® EV3 code, using the algorithm as code comments and checking to see their program works when downloaded to the robot. The students are asked to refine their algorithm (and program) if bugs are found upon testing.

This task provides an opportunity for students to use the discipline-specific language of computer science.

Computational thinking for digital technologies



The alignment to levels 1-5 of the New Zealand Curriculum (NZC) is tentative and theoretically derived until teachers have had the opportunity to implement the digital progressions.

Jamal and Roman formulate their original algorithm for the problem.

Progress outcome 4

Student response

right up up up
right right down down
right right up
up right right right up

Mr Cusack: What did you notice when Hemi tested your instructions, Cheryl-Ann?
Cheryl-Ann: They worked. He went to each plant and got to the beehive.

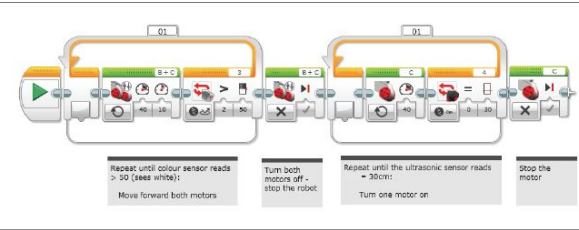
Progress outcome 1

With your partner(s) write the algorithm for:

Moving forward until the robot detects white, then turning the robot until an object is detected (e.g. a can) 30 cm or closer and then moving the robot toward that object.

Repeat until colour sensor reads > 50:
Turn both motors on
Turn both motors off
Repeat until the ultrasonic sensor reads = 30cm:
Turn one motor on
Stop the motor

They test their algorithm by translating it into a program that uses input from colour and ultrasonic sensors, selection through use of comparison operators (greater than and equal to), and iteration through a repeat-until loop. Their code comments are taken from their algorithm.



Jamal: We tested the program, but the robot just spins around and around and never stops.

Mrs MacKenzie: What is the logic you are using to stop your repeat loop? Also, have you thought about how the robot will move toward the object once it detects it?

Roman: We are making our loop continue until it sees an object "equal to" 30 centimetres away. This won't detect anything closer than 30 centimetres. We have to find a way to detect it closer than 30 centimetres.

Digital Technologies Learning Matrix

Curriculum Levels 1, 2, and 3

Learning Area Whakataukī:

Kaua e rangiruatia te hāpai o te hoe;

e kore tā tātou waka e ū ki uta.

Don't paddle out of unison;

our canoe will never reach the shore.

Big Ideas			
Digital technologies are made by people, for people, within cultural, social, and environmental contexts	Digital outcomes are created for a purpose by following appropriate processes	Digital technologies enhance and expand human possibilities. Outcomes are created to solve problems and imagine new futures	All digital technologies are underpinned by algorithms and computer science principles
Significant Learning			
Students will understand how digital technologies impact on end users by considering the following mātauranga Māori principles: kotahitanga, whanaungatanga, manaakitanga, wairuatanga, and tikanga			
At Curriculum Level 6, students will...	At Curriculum Level 7, students will... (indicative only)	At Curriculum Level 8, students will... (indicative only)	
- investigate and consider possible solutions for an authentic context or issue - understand that digital technologies and the concepts that underpin them are influenced by the people, societies, and cultures that create them	- investigate a specialised digital technologies area and propose possible solutions to issues they identify within that area - compare the impacts of digital technologies outcomes and concepts from a range of social and cultural perspectives (including mātauranga Māori)	- independently investigate a specialised digital technologies area and propose possible solutions to issues they identify - analyse the impacts of digital technologies outcomes and concepts that underpin them from a range of social and cultural perspectives (including mātauranga Māori and accessibility)	

NCEA Achievement Standards Digital Technologies & Hangarau Matihiko

Digital Technologies & Hangarau Matihiko

Computational Thinking (CT) Designing and Developing Digital Outcomes (DDDO)

3	3.1 (AS91900) Conduct a critical inquiry to propose a digital technologies outcome [6]	3.5 (AS91904) Use complex techniques to develop an electronics outcome [6]	3.9 (AS91908) Analyse an area of computer science [3] (External)
	3.2 (AS91901) Apply user experience methodologies to develop a design for a digital technologies outcome [3]	3.6 (AS91903) Use complex techniques to develop a network [4]	
	3.3 (AS91902) Use complex techniques to develop a database [4]	3.7 (AS91906) Use complex programming techniques to develop a computer program [6]	
	3.4 (AS91903) Use complex techniques to develop a digital media outcome [4]	3.8 (AS91907) Use complex processes to develop a digital technologies outcome [6]	
2	2.1 (AS91890) Conduct an inquiry to propose a digital technologies outcome [6]	2.5 (AS91894) Use advanced techniques to develop an electronics outcome [6]	2.9 (AS91898) Demonstrate understanding of a computer science concept [3] (External)
	2.2 (AS91891) Apply conventions to develop a design for a digital technologies outcome [3]	2.6 (AS91895) Use advanced techniques to develop a network [4]	
	2.3 (AS91892) Use advanced techniques to develop a database [4]	2.7 (AS91896) Use advanced programming techniques to develop a computer program [6]	
	2.4 (AS91893) Use advanced techniques to develop a digital media outcome [4]	2.8 (AS91897) Use advanced processes to develop a digital technologies outcome [6]	
1	1.1 (AS91877) Develop a proposal for a digital outcome [3]	1.6 (AS91882) Develop a computer system [4]	1.10 (AS91886) Demonstrate understanding of human computer interaction [3] (External)
	1.2 (AS91878) Develop a design for a digital outcome [3]	1.7 (AS91883) Develop a computer program [4]	
	1.3 (AS91879) Develop an outcome to manage data [4]	1.8 (AS91884) Use basic iterative processes to develop a digital outcome [6]	
	1.4 (AS91880) Develop a digital media outcome [4]	1.9 (AS91885) Demonstrate understanding of searching and sorting algorithms [3]	
	1.5 (AS91881) Develop an electronics outcome [6]		

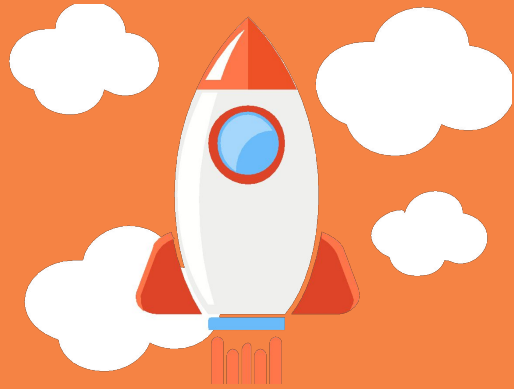


Digital Technologies and Hangarau Matihiko

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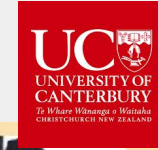


Kaua e rangiruatia te hā o te hoe,
e kore tō tatou waka ki uta



Presenter 2: Sarah

Digital Technologies in the classroom



Dilworth
Transforming Boys' Lives



ROYAL OAK
INTERMEDIATE
KA HERE - TO FLY

Knowledge Creation

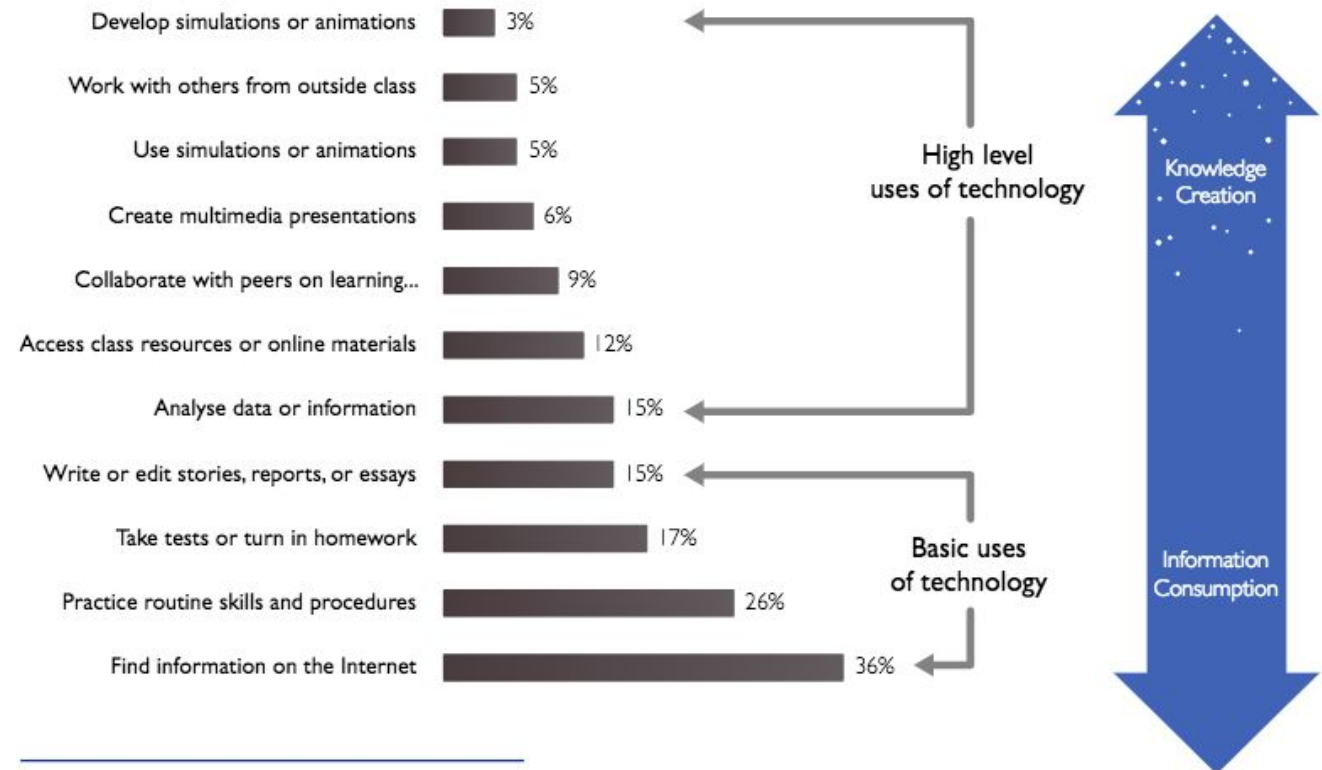
How can we ensure our students
deepen their knowledge in
Digital Technologies?

By moving from being...

... **'users'** to **'creators'**

"A rich seam", Michael Fullan

Figure 7: Technology Use and Knowledge Creation



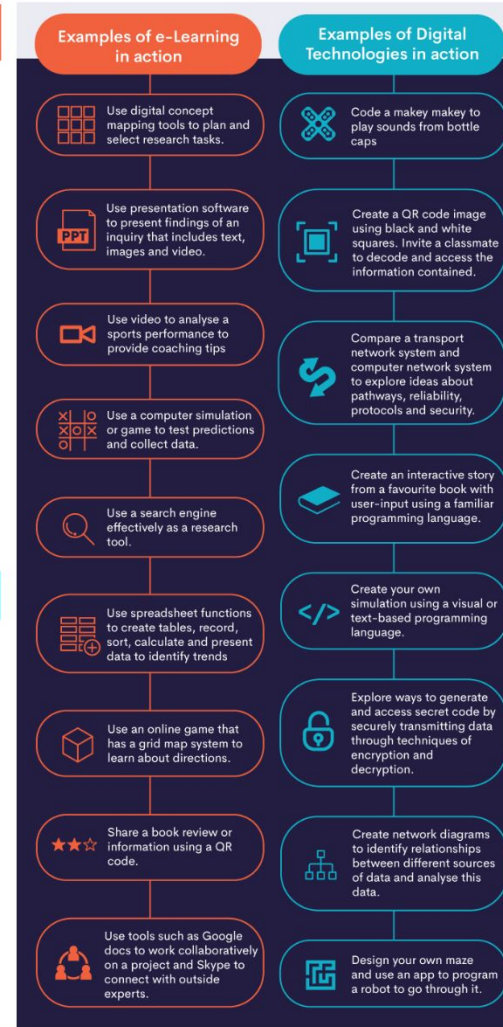
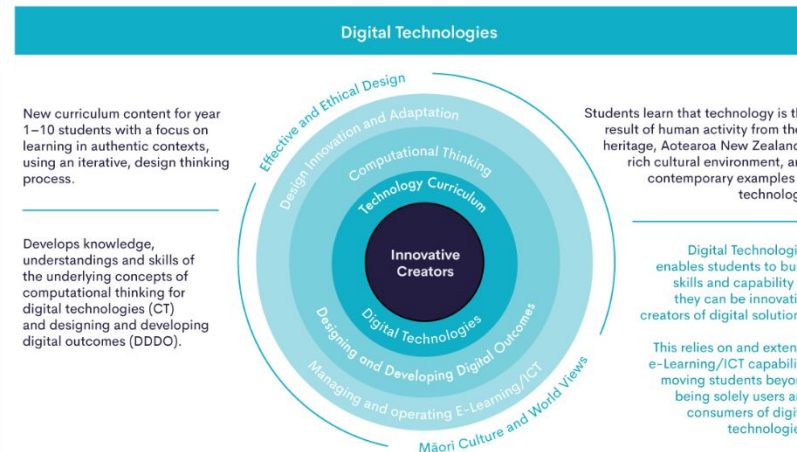
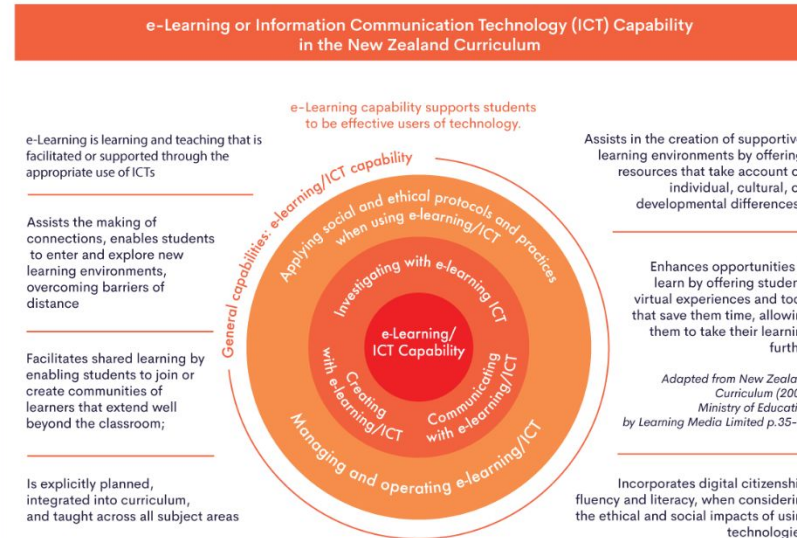
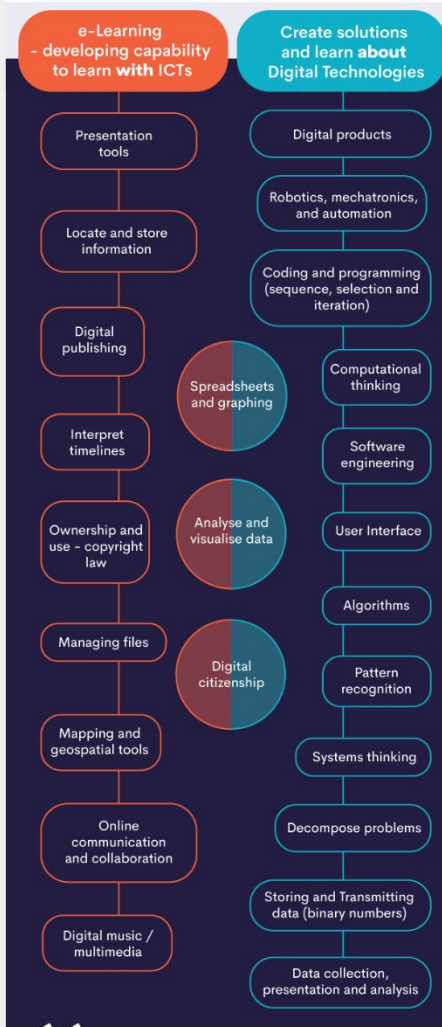
Technology Use and **Knowledge Creation**

e-learning versus Digital Technologies

Where is creating content
for VR in this space?

‘users’ to ‘creators’

Kia Takatū ā-Matihiko
Digital Readiness Programme



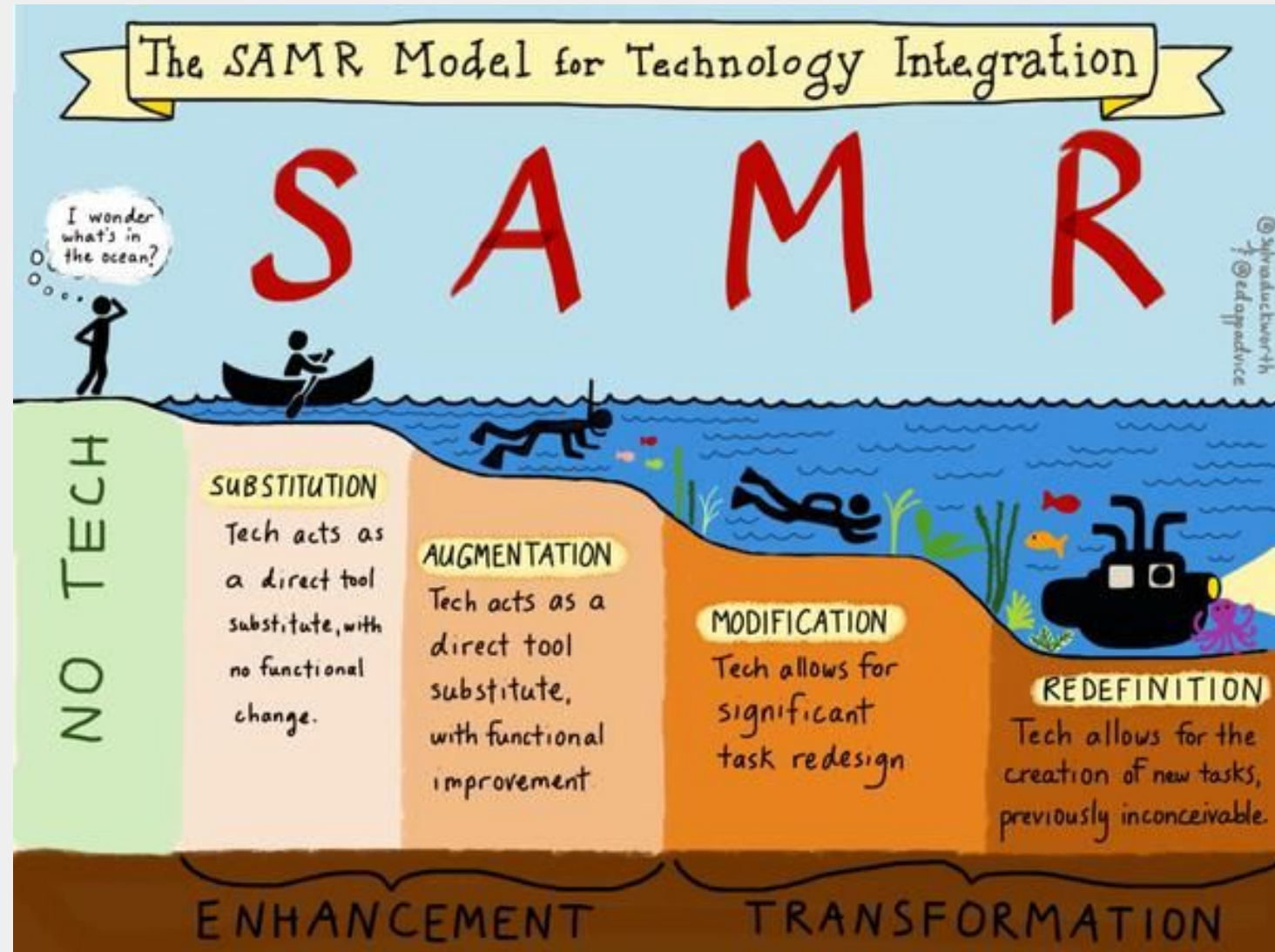
SAMR Model

Moving students from being digitally fluent as ‘users’ to being digital ‘creators’.

Integrating digital technologies
into the classroom.

‘users’ to ‘creators’

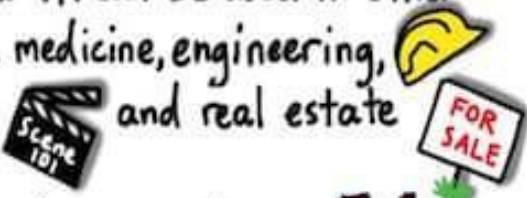
Sylvia Duckworth



Why use VR in the classroom?

Top 10 Reasons to Use Virtual Reality in the Classroom

By @MariaGalanis & @Andrea_Trudeau

-  **1** Travel to and explore places all over the world without leaving the classroom
-  **2** Develop empathy for communities in crisis by stepping into their shoes
-  **3** Experience different careers first-hand
-  **4** Explore the depths of the ocean and the vastness of space
-  **5** Time travel to key events and places from the past
-  **6** Explore within the human body
-  **7** Allow students to share their world with others by creating their own VR content
-  **8** Discover how VR can be used in other industries like medicine, engineering, entertainment and real estate
-  **9** Explore how VR can be integrated into every subject area and curriculum
-  **10** Promote curiosity and wonder!

@sylvia_duckworth

Sylvia Duckworth

How can we use VR in the classroom?

Google expeditions & Google Tour creator - no longer accessible from 30th June.

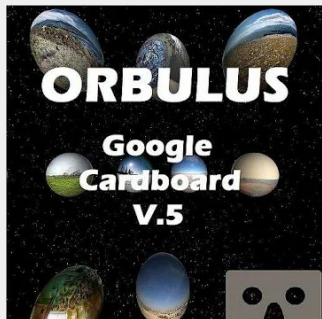
Most content is being migrated to the Arts & Culture site: <https://artsandculture.google.com/>

- **VR experiences** for a range of themed subject areas. Explorable places and environments.
- **Curriculum Integration:** VR experiences to help teach History, Science, Geography, etc in the classroom
- **Learn languages** through immersive experiences and cultures.

How can we use VR in the classroom?



Experience an authentic trench from the First World War in virtual reality. See and hear the trench in this amazing virtual museum designed to be explored with Google Cardboard.



The ability to stand on Mars, visiting the Salt Flats, New Year's Fireworks on Hong Kong Harbour or chill looking at the Northern Lights. View caverns, Bond moments and iconic locations from around the world.

The Google Cardboard app experiences:

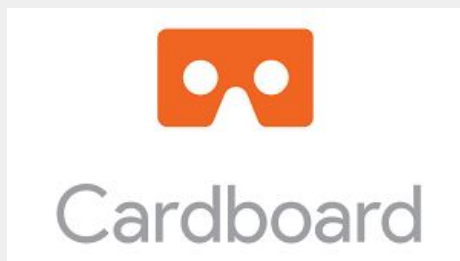
Explorer: Explore exciting environments.

Exhibit: View 3D objects from a museum collection.

Urban Hike: Take a hike through iconic cities around the world.

Kaleidoscope: Enjoy a fun stereoscopic take on the old classic.

Arctic Journey: Fly alongside Arctic terns, create your own flower garden, relax under the northern lights and more.



How can we create with VR in the classroom?

VR environment creation (Cospaces):

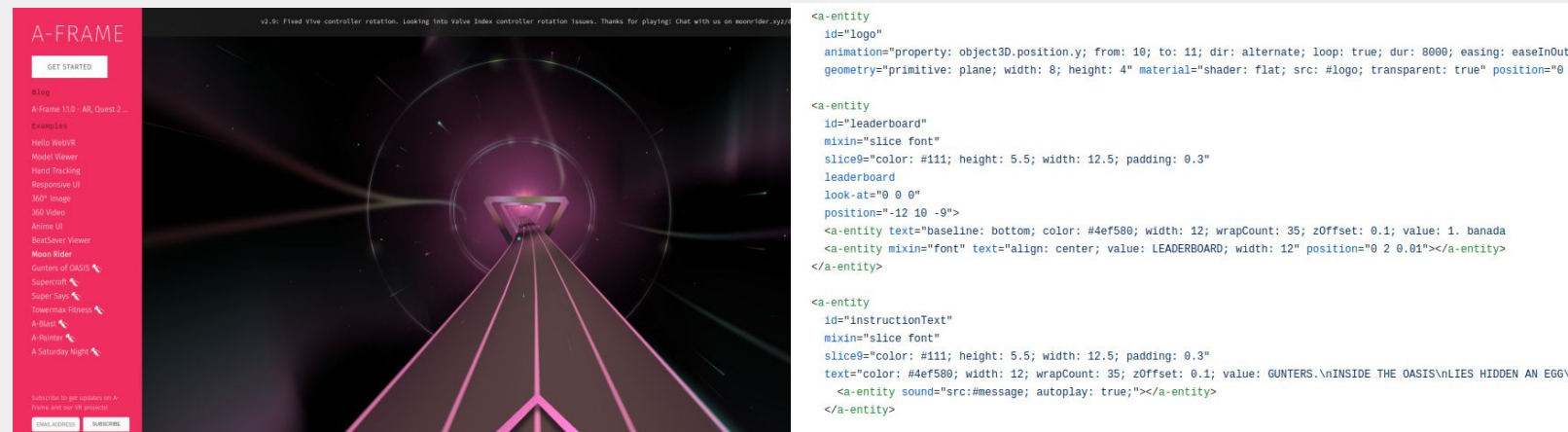
Game design, architectural design, demonstrating scientific principles, English dioramas, etc



Google Street View app: 360 images for creating own virtual worlds.

Unity: C# programming environment to create VR content.

A-Frame - <https://aframe.io>



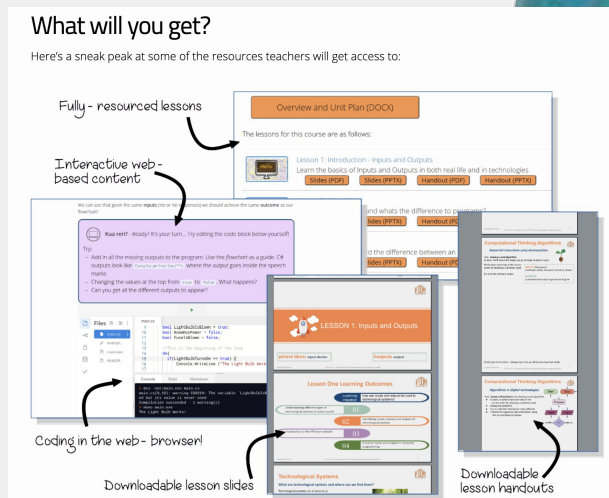
How can VR Voom Education help students to be 'creators'?

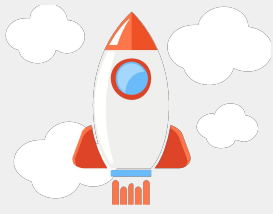


New course for 2021: VR Creation Programme (NZC Levels 3-5)

Our programme covers a range of topics targeting the New Zealand Curriculum. The first course will include the following modules:

- Module 1: Introduction to VR programming and game design principles
- Module 2: Diving Deeper into C# Programming (*coming soon*)
- Module 3: Bringing it all together to create a mobile-VR app (*coming soon*)
- Module 4: 3D modelling & animation (*coming soon*)





Module One Outline

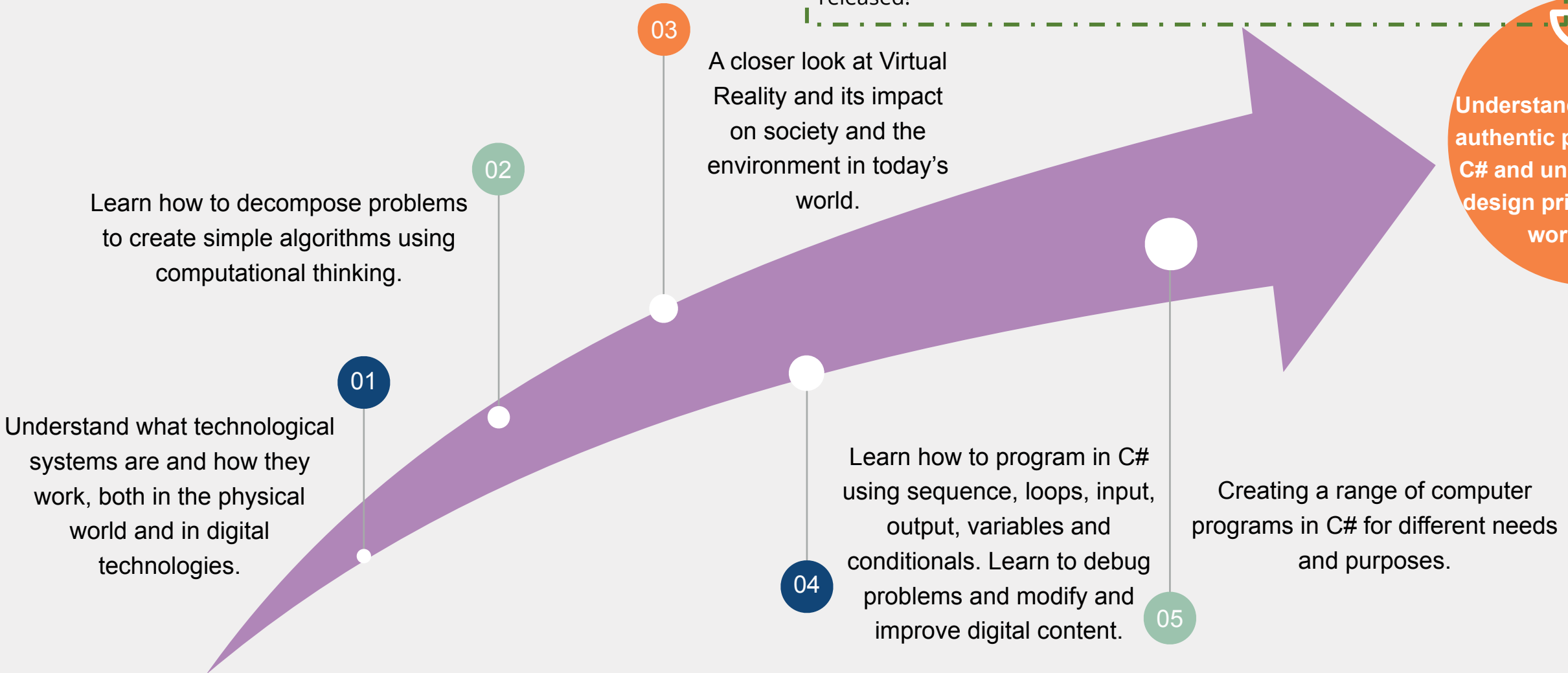
19th May 2021: Lessons 4 and 5 have been released for Module 1!

12th May 2021: Introductory Offer: Module 1 is available for **\$100 + GST per year subscription.**

3rd May 2021: We are excited to announce the first module has been released!



Understand how to create authentic programs using C# and understand game design principles for the world of VR.

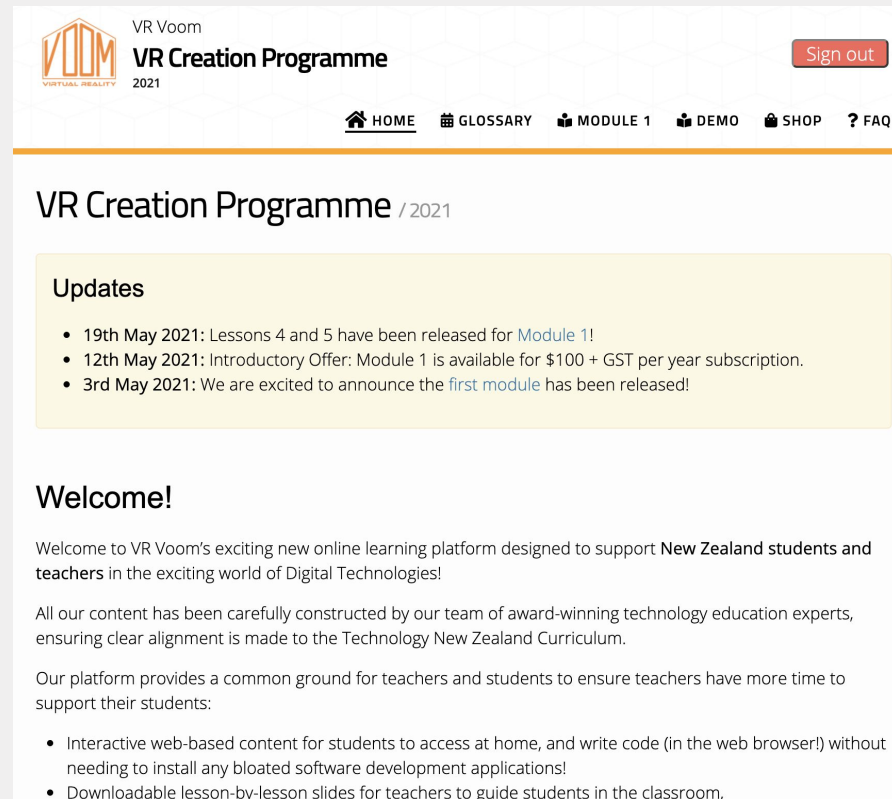


Course One - Introduction into VR Programming & game design principles

How can I find out more?



Explore the website...

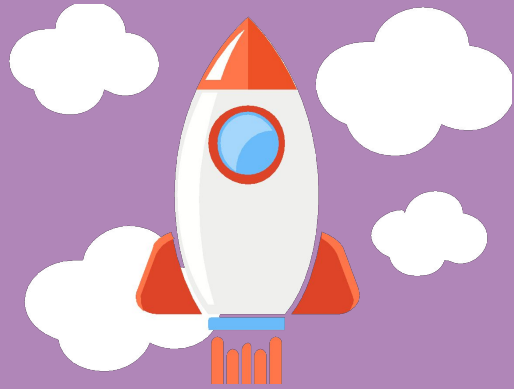


<https://vrvoom.education>

Follow the facebook group...



<https://www.facebook.com/vrvoomeducation>



Presenter 3: **Nasser**

Computational Thinking

Who am I?

Software Engineering @ University of Auckland:

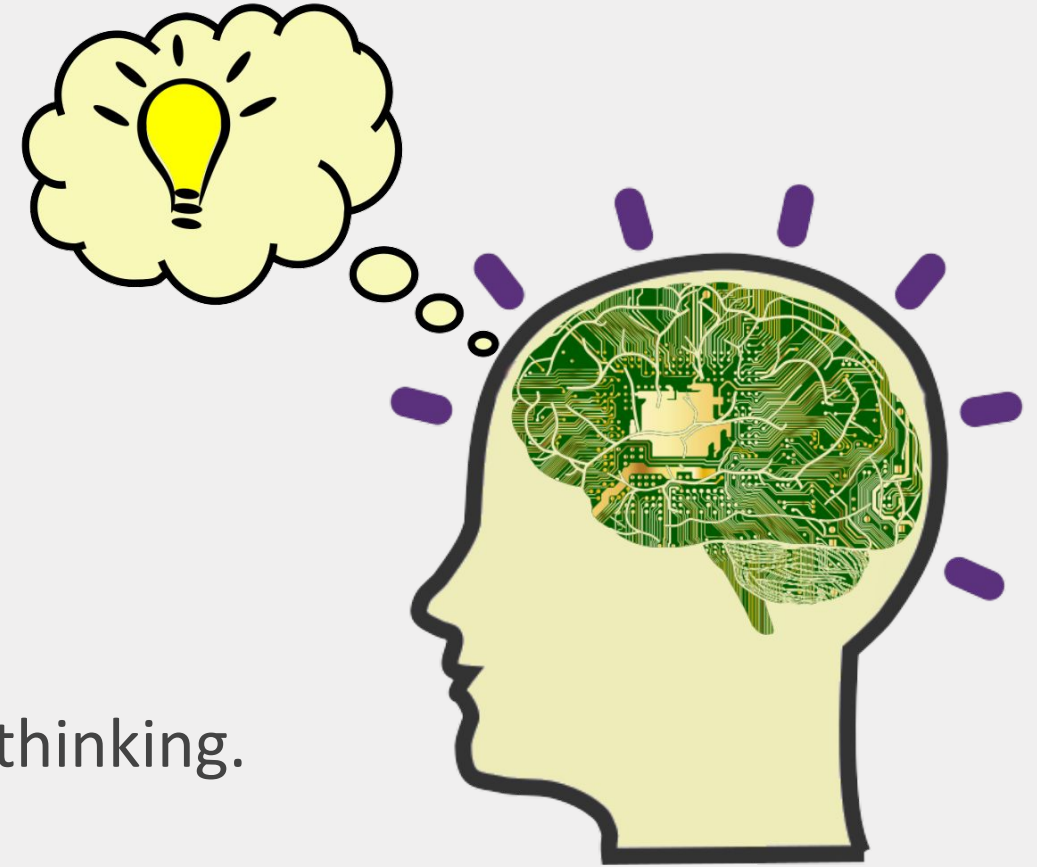
- *Undergraduate (2002-2005)*
- *Postgraduate (2006-2010)*
- Postdoctoral Fellow (2011)
- Lecturer (2012+)
 - Software Engineering Masters Advisor (2013+)
 - Director of Software Engineering (2019+)
- Digital Educational Engineering, Computing Education Research



Computational Thinking vs Programming vs Coding

Computational Thinking

- A way that humans think (not computers).
- A **fundamental** skill (not a rote skill).
- Conceptualising and abstracting.
- **Ideas** (not artifacts).
- Complements mathematical and engineering thinking.



Great reading: Jeannette Wing (2006) “*Computational Thinking*”, Communications of the ACM.

Computational Thinking vs Programming vs Coding



Programming

- The design aspects of coding.



Coding

- Actually writing code (and testing it).
- Somewhat a rote skill.
- Artifacts (not ideas).



Is It Easy or Difficult?

- Common view is “programming is difficult”
 - Too abstract, cryptic, mysterious.
 - High dropout rates.
 - Gender and cultural disparities.
- But actually, programming is easy!
- Are our expectations unrealistic?
 - What progress do we think a beginner should make?
 - What progress can a beginner make?
- How do we assess programming skills?
 - Unachievable standards?

```
set number to 5
repeat while number > 0
do
  display number
  change number by -1
display new line
count with number from 1 to 5 by 1
do
  display number
```



Great reading: Andrew Luxton-Reilly (2016) “Learning to Program is Easy”, ITiCSE

What Happens at University?



- **Coding**

- Formally taught in first year (“CS1”).
- Variables, if/else, control flow, loops, code conventions.
- Typically perceived as being **easy**, and subsequently “a given” in future courses.

- **Programming**

- CS2 onwards.
- Design principles beyond code conventions, advanced programming concepts, data structures, etc.
- Definitely **a step up** compared to what students have seen before.

- **Computational Thinking**

- Some courses “dedicated” for lower-level CT (e.g. algorithmics).
- Usually takes time, maturity over many courses (particularly for larger-scale problem solving).
- Building larger software systems in teams over many weeks (or even months).

University Computing Study Options (e.g. at UoA)

- **Science**

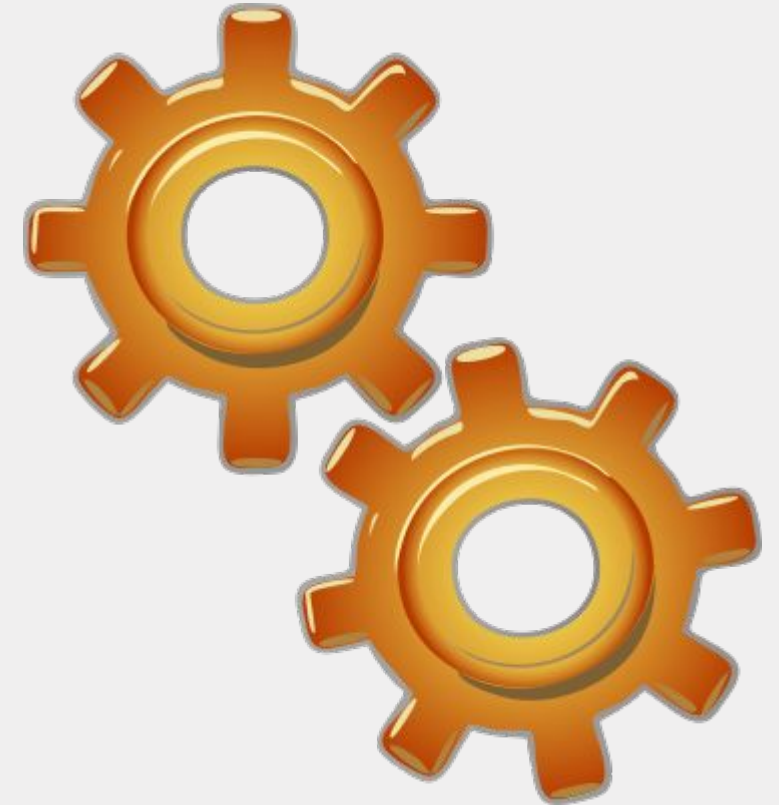
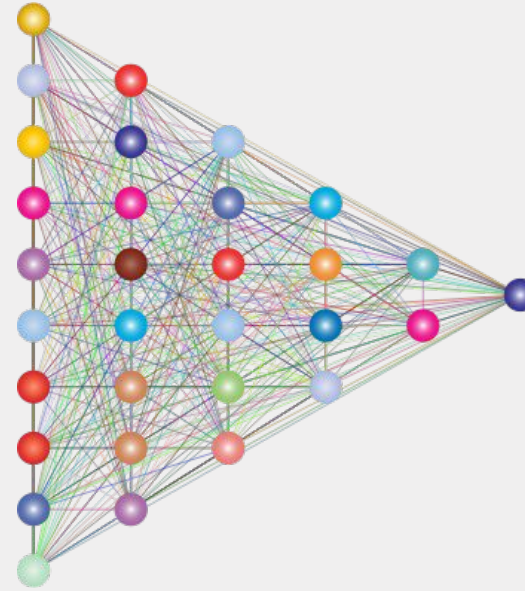
- Computer Science
- Data Science

- **Engineering**

- Computer Systems Engineering
- Software Engineering
- Engineering Science
- Mechatronics

- **Business**

- Information Systems



Preparation for University?

None expected!

But a **(massive) bonus** if they have experience:



- They already know what it is, know what they are **getting themselves into**.
- They have **already embraced the challenges**.
- CT and programming **take time**, cannot be mastered in a couple of courses.
- University courses can **expect a lot** from students, even as beginners.
- High workload leads to **surface learning, plagiarism, failing**.
- With prior experiences, students can focus on **reinforcing understanding**.

Powerful Motivating Tools

- **Games**

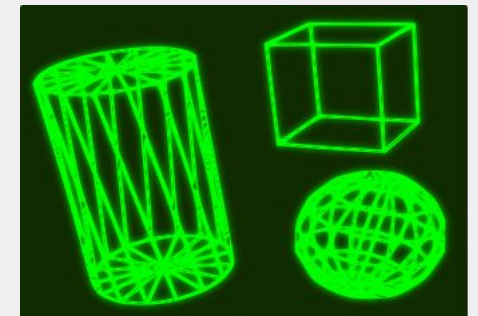
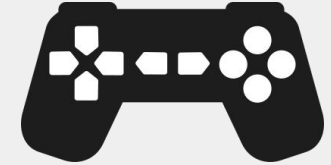
- Game-based learning.
- Gamification.
- Hours and hours time-on-task to build the game!

- **VR**

- Builds on the motivational benefits of games.
- It's new, it's exciting, it's an attention grabber, it's engaging.
- Understand differences of the possible pathways:
 - Programming (Software development)
 - 3D and animations (Graphics and Media Design)



Breakout
(Atari 1970s)



Example university course with similar approaches





University of Auckland
SOFTENG 281
Semester 1 (2021)



Topics

Here you will find the topics covered and the associated material to help you learn it.

Some topics are larger than others, and so might span over multiple lessons.

So, it's important to keep updated with what's happening in class.

[Course Introduction](#)

An overview and introduction to the course, with important information to be aware of.

[Git, GitHub and repl.it](#)

What is Git, GitHub, and repl.it? And our first 1% activity!

[Communicating with machines](#)

Computational thinking, programming, coding, assemblers, compilers, interpreters

[Introduction to Java](#)

Basic concepts you should already be familiar with, but here in the context of Java

[More programming fundamentals in Java](#)

switch statement, break and continue, String methods, return statements, Arrays

[OOP thought process](#)

OOP mentality, software quality, classes, instances

[Classes core concepts](#)

Mastering the core concepts of classes, constructors, instance fields, instance methods

Object reference types

The following is a very brief overview of the core concept at play here



Watch on  **Free Java Video Course** by Marcus Biel

When it comes to object reference variables, it is important to understand that "equal" can mean one of two things:

Identity

Note: *Identity* is sometimes also called "reference equality". But we'll stick to using the term "*identity*" as this avoids confusion.

Identity is when we have two object reference variables (or even the same object reference variable), and they are both pointing to the *exact same instance* on the heap.

In other words, the *address* stored is the same in both object reference variables:

Run ▶

open in 

```
1 class Main {
2   public static void main(String[] args) {
3
4     Colour c1 = new Colour("Red", 255, 0, 0);
5     Colour c2 = new Colour("Red", 255, 0, 0);
6     Colour c3 = c2;
7
8     if (c1 == c2) {
9       System.out.println("c1 and c2: SAME identity.");
10    } else {
11      System.out.println("c1 and c2: DIFFERENT identity.");
12    }
13  }
```

Console

Shell

OpenJDK Runtime Environment (build 11.0.6+10-post-Ubuntu-1ubuntu18.04.1)

Recommended online videos



Let's get real: "If you ain't struggling, you ain't learning"

*This course has been designed to promote a **life-long learning ethos** towards software development.*

Watching someone else write code is only the start. You need to *get your hands dirty* yourself.

You will be a great programmer by doing *lots of practical* programming exercises.

It's this **struggle that makes you learn**, and then things will "click"!

Copyright VR Voom

Applications of software



- Airline reservations
- Banking systems
- Commerce (trade, online auctions, ...)
- Communication systems (e-mail, messengers, VOIP, ...)
- Computer graphics (animations, special effects, ...)
- Databases
- Games (mobile, PCs, ...)
- Immersive technologies (AR, VR, ...)
- Mobile systems
- Training (drills, simulations, testing, ...)
- ...

Careers in software development

What is Software?



*“Software is the invisible writing that whispers the **stories of possibility** to our hardware.*

*It is these stories that will **be told by**—and that **will define**—the lives of future generations.”*

- Grady Booch, IEEE Software, 2013

Careers in software development

What is Software's potential?



“Software is the invisible writing that whispers the stories of possibility to our hardware.

*It is these stories that will **be told by**—and that **will define**—the lives of future generations.”*

- Grady Booch, IEEE Software, 2013



Presenter 4: Thomas

Virtual Reality and getting started

Virtual Reality (VR) - What is it?

"... computer-generated simulation of a three-dimensional image or environment that can be interacted with in a **seemingly real or physical way** ..."

Virtual Reality allows us to experience un-imaginable scenarios where we can actually interact meaningfully in that world. We could:

- Go to space and explore planets.
- We could submerge underwater and learn about marine life.
- We could even take a step back into the past and learn what it was like to live hundreds of years ago!

VR is simply a **tool** that allows us to experience a limitless amount of experiences as if we were actually there.



VR Experiences - Training

What else can VR be used for?

VR lends itself to many different industries. Training is one of these and is a great application of VR technology. It:

- Creates a safe environment from potentially dangerous training
- Reduces the costs of training
- Allows varied content and scenarios to easily be added
- Enables remote learning



VR Experiences - Education

What else can VR be used for?

VR can also be used in classrooms to educate students through a different medium. It has already been used by many countries around the world. It:

- Allows for immersive learning experiences
- Can create virtual field trips into dangerous areas
- Allows for interactive remote learning



Pictures from
<https://www.classvr.com/virtual-reality-in-education/>

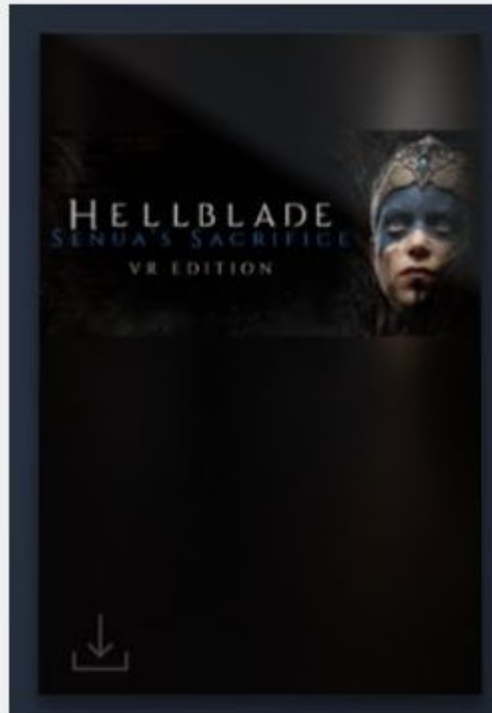
Video from Youtube Channel "Phia" -
https://www.youtube.com/channel/UCMMBpWfWUd3xlcOxrot_neA

VR Experiences - Entertainment

What else can VR be used for?

And of course, VR already excels at creating immersive and exciting experiences for entertainment. However, just because it's entertaining doesn't mean it can't teach you something too! Below is but a small selection of VR games that teach you or empower you to do things through gamification. ***What else could be taught this way?***

Mental Health Awareness



Artistic creativity



Socializing and Design

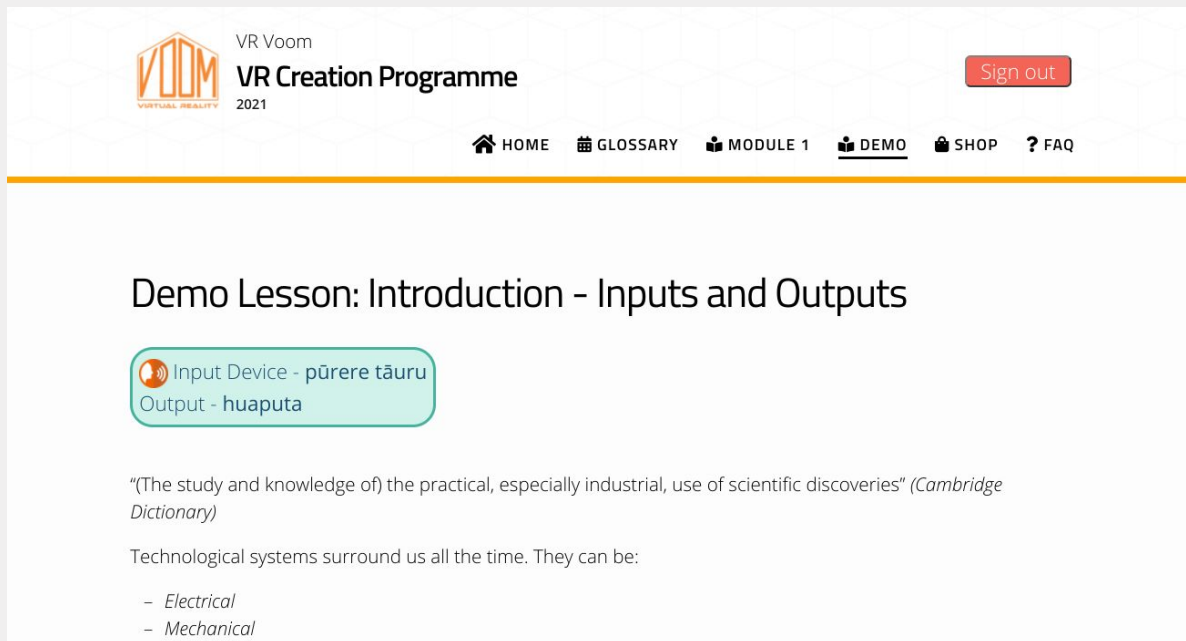


Physics Puzzles



Virtual Reality (VR) - Hands on Practice

Head over to vrvoom.education and sign up/sign in to access the Demo session. Here you can see what one of our introduction slides look like and also get to change to practice some C# coding!



The screenshot shows the VR Voom website. At the top, there's a navigation bar with the VR Voom logo, the text "VR Voom VR Creation Programme 2021", a "Sign out" button, and a menu with links: HOME, GLOSSARY, MODULE 1, DEMO (highlighted), SHOP, and FAQ. Below the navigation bar, the main heading is "Demo Lesson: Introduction - Inputs and Outputs". Under this heading, there are two buttons: "Input Device - pūrere tāuru" and "Output - huaputa". Below these buttons, there's a quote: "(The study and knowledge of) the practical, especially industrial, use of scientific discoveries" (Cambridge Dictionary). Below the quote, it says "Technological systems surround us all the time. They can be:" followed by a list: - Electrical, - Mechanical.

VR Voom
VR Creation Programme
2021

Sign out

HOME GLOSSARY MODULE 1 **DEMO** SHOP ? FAQ

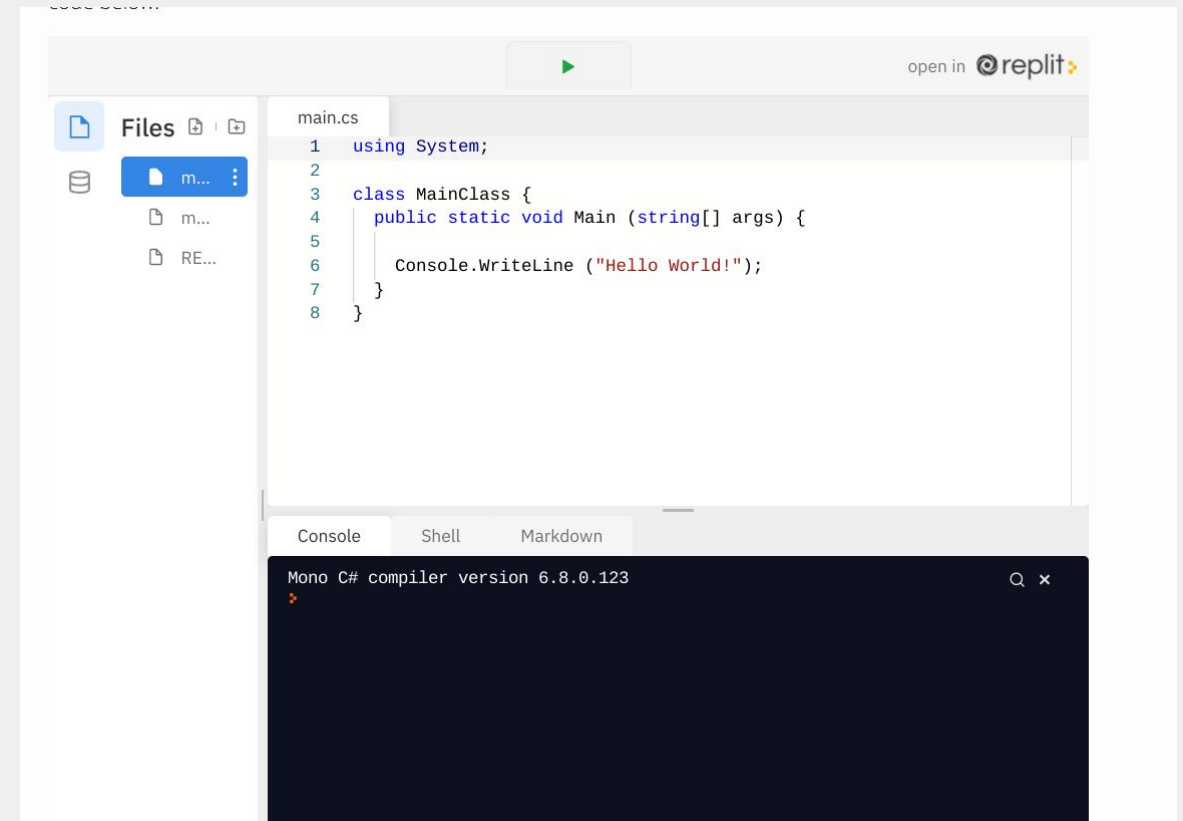
Demo Lesson: Introduction - Inputs and Outputs

Input Device - pūrere tāuru
Output - huaputa

"(The study and knowledge of) the practical, especially industrial, use of scientific discoveries" (Cambridge Dictionary)

Technological systems surround us all the time. They can be:

- Electrical
- Mechanical



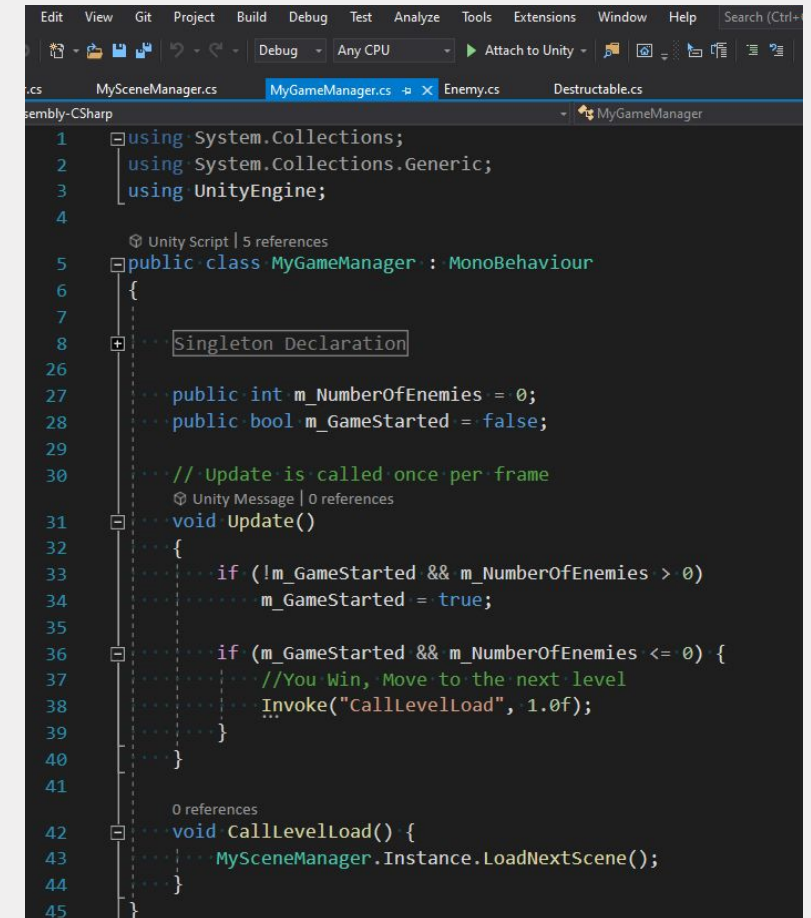
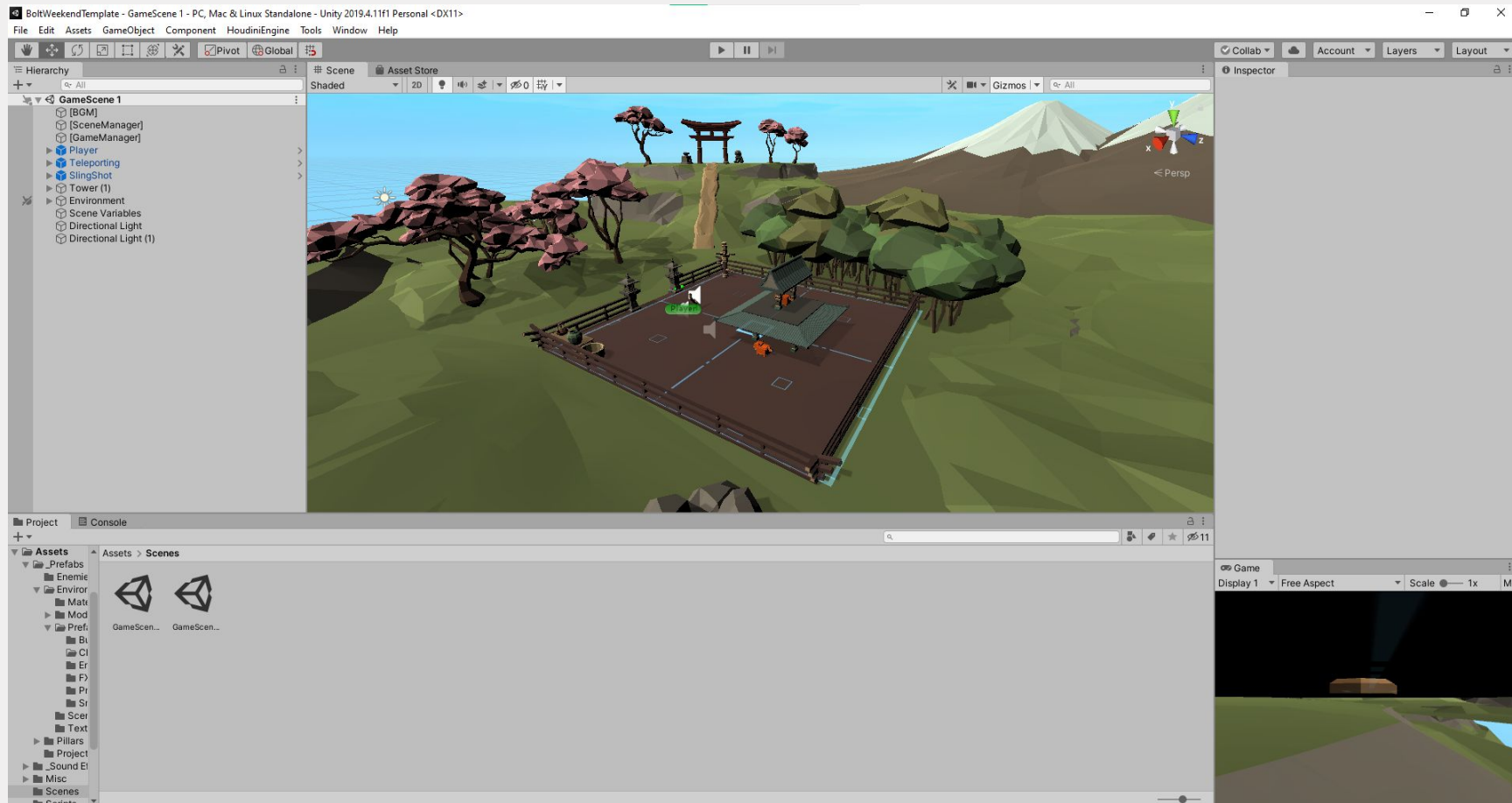
The screenshot shows a C# code editor interface. At the top right, there's a button "open in repl.it". On the left, there's a "Files" panel showing a folder "m..." and a file "RE...". The main editor area shows a file named "main.cs" with the following code:

```
1 using System;
2
3 class MainClass {
4     public static void Main (string[] args) {
5
6         Console.WriteLine ("Hello World!");
7     }
8 }
```

Below the code editor, there's a "Console" tab selected, showing the output: "Mono C# compiler version 6.8.0.123".

Virtual Reality (VR) - Demo Time

Enjoy a live demo on how we can use C# to create an immersive VR experience!



Ahakoa he patai?
Any questions?

Do you have any questions for the VR Voom team?

*Any
Questions?*

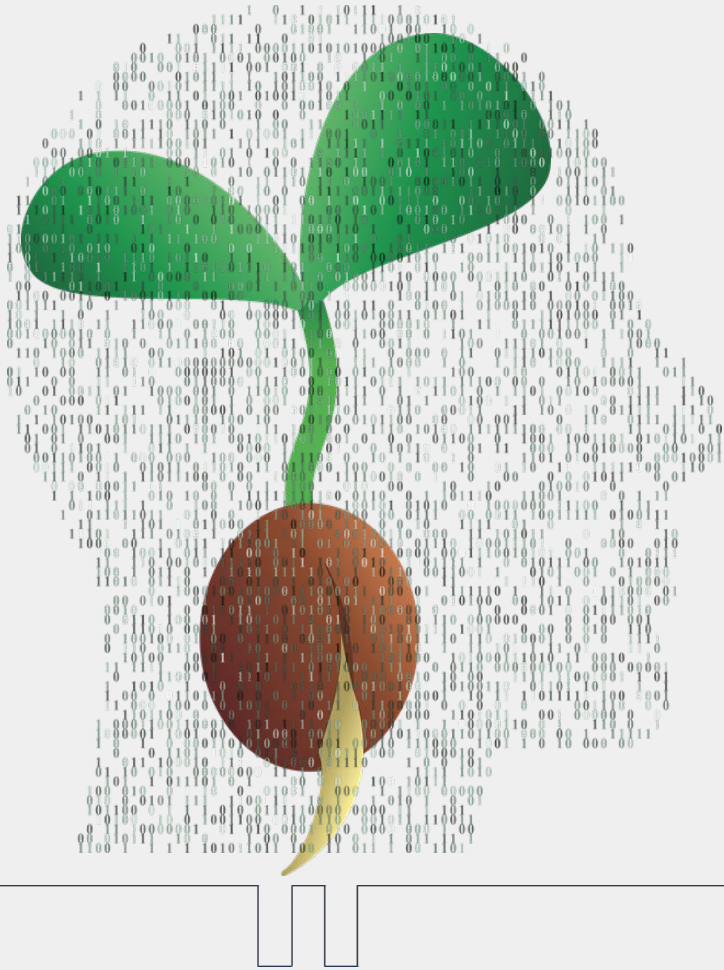
A large white lightbulb graphic on the left side of the slide. Inside the lightbulb, the word "Presentation" is written in orange and "REFLECTION" is written in blue. Below the lightbulb, the name "Puumahara" is written in orange. Above the lightbulb, there are several small white icons: a gear, an envelope, a camera, and a plug.

Learning Intention

To learn how can the VR Voom team support you?

- ☒ Did you find today's session useful?
- ☐ Would you like to know more about how we can help you in the classroom?
- ☒ Is there anything you would like to know more about?

Help us to help you



Kua mutu tēnei kaupapa
Manaakitia mai mātou katoa
Te rangimarie
Ki runga i ngā iwi o te ao

Our work and practices are finished for now.

May blessings be amongst us

Let there be peace

For all in the world.

Kia ora koe! *Thank you*

Ka pai! *Well done!*

