Draft for Consultation

Hangarau Matihiko
English version
Minister’s Foreword

Tēnā tatou katoa

New Zealanders are now living in a digital society. Our young people need to be confident and fully equipped to contribute and flourish in the economy of the future.

Many of our young people are already ‘digital natives’, born into an age where computers, mobile devices and the Internet are so familiar they cannot imagine life without them. But the digital world is fast moving and ever changing. Young people need to keep ahead of this change, understand the theory and science behind the technologies they use, and be able to participate in the digital world as the creators – not just users – of innovations and inventions.

We also need to prepare them now to adapt to technology and jobs that have not yet been invented – robotics, artificial intelligence, nanotechnology, and advances in connectivity all offer the potential to revolutionise business and industry.

New learning in Digital Technologies | Hangarau Matihiko will equip our young people for this digital future. A quality curriculum empowers our children to be the best they can possibly be, bolsters their understanding of the world around them, and expands what they experience at school. It reflects the needs of the learner, their family and whānau, and our society as a whole.

As tomorrow’s business leaders, data scientists, artists, health workers, chefs, engineers, user experience designers, urban planners, farmers or navigators, creating and developing digital technologies will be a core requirement for success. The new curriculum will enable students to learn the foundations of digital technologies and better understand how it’s connected to other fields of learning from all the way from Year 1 to Year 13.

It is critical that we enable our children to succeed, from their first year in school or kura.

A curriculum is effective only if we equip skilled teachers to deliver it. While the new curriculum introduces opportunities for students, it also presents exciting change for the teaching workforce. Many New Zealand schools and kura already teach digital skills as part of their curriculum, and these changes will enable them to build on this.

It is essential for parents, whānau, Communities of Learning | Kāhui Ako, schools and kura to work together and make a contribution to the ongoing development of our curriculum. Your input will be important to ensure that the content will suit the learning needs of our children and young people.

I am excited to present the new Digital Technologies | Hangarau Matihiko curriculum content. I thank the experts who helped to design, develop and test it. I acknowledge the teachers, kaiako and leaders who will bring it to life for, and with, our young people.

The new curriculum has the potential to be the ultrafast broadband of learning. Working together will ensure the very best and brightest futures for young New Zealanders now and into the digital age.

Ngā mihi,

Hon. Nikki Kaye
Minister of Education
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New Zealand is a digital nation. Digital technologies are transforming how we live; shaping our homes and our workplaces, changing the way that we interact with each other and love our everyday lives.

Our education system needs to change how we prepare our children and young people to participate, create and thrive in this fast-moving digital world.

Incorporating digital technologies will support young people to develop the confidence and skill not only to use digital technologies (DT) but to design and build digital systems.

These developments expand human possibilities by addressing needs and realising opportunities to meet new and emerging societal needs. Technology is much more than designing and making technological outcomes, it involves critiquing past, existing and possible future technologies, while considering their environmental, social and cultural impact. For the first time the learning in digital technologies is explicit within the learning area.

From 2018, Digital Technologies | Hangarau Matihiko will be strengthened in The New Zealand Curriculum and Te Marautanga o Aotearoa, starting at Year 1.
This document summarises how the DT | HM curriculum content will look when incorporated into Te Marautanga o Aotearoa. The content will continue to be refined throughout the year, and all the materials attached are in draft form.

This development reflects the effort of a number of leading curriculum and Technology Area experts across the country, including teachers, kaiako, leaders and representatives from subject associations. These experts have identified the key technological areas that provide the clearest framework for illustrating student progression in Technology.

Our priority is to ensure that the new curriculum content will work for teachers, kaiako, schools and kura, so our learners can achieve the best possible learning outcomes. We need your feedback to ensure we have got it right.

Your feedback will also be invaluable for determining the supports leaders and teachers will need to effectively implement the new curriculum content in their Kāhui Ako, schools and kura. There will be opportunities around the country to learn more and provide feedback over July and August 2017.

When you provide feedback we encourage you to consider the following questions:

**Consistency**
- To what extent does the updated Technology Learning Area reflect the vision of Te Marautanga o Aotearoa?

**Connections**
- To what extent are the linkages between the proposed new content and the rest of the Hangarau clear?
- How might we reflect digital technologies learning in the name of the Technology Learning Area?

**Adaptability**
- How useful is the consultation material in considering how to integrate and adapt the proposed DT | HM content to design local curriculum for your students?

**Clarity**
- In relation to the consultation material, how easy to understand was:
  - How all the elements of the changes fit together?
  - How the elements of the changes fit with the existing Hangarau Learning Area?
  - The various parts of the proposed new curriculum content?

**Coherency**
- Consider whether the proposed new curriculum content:
  - Helps me to understand student progress in Computational Thinking for Digital Technologies
  - Helps me to understand student progress in Designing and developing digital outcomes

**Future Focus**
- To what extent do you agree that the proposed new content ensures students have the skills, knowledge and capabilities they need to fully participate in the 21st century and beyond?
- To what extent do you agree that the intent and direction of the proposed new content will have a positive impact on students’ competencies in thinking, using language, symbols and texts, and participating in and contributing to communities of the future?

**Making use of the new curriculum content**
- What do you anticipate being the biggest challenge in teaching and integrating the DT | HM curriculum content into teaching programmes?
- What support do you think you might need to strengthen your teaching practice across the Technology Learning Area?
How the Hangarau wāhanga ako has changed

The Hangarau wāhanga ako was first developed with five Aho (2008)
• Hangarau Koiora
• Te Tuku Mōhiohio
• Ngā Hanga me ngā Pūhanga Manawa
• Te Tāhiko me te Hangarau Whakatina
• Hangarau Kai

The inclusion of Hangarau Matihiko (2017) lead the reference group to the decision to embed Te Tuku Mōhiohio into the new aho - Hangarau Matihiko.

Hangarau Matihiko then created a ripple effect on the front end of the wāhanga ako. This led to the reshaping of the iho, Te Whaitake o te Ako i te Hangarau, Te Hangarau Te Hanga o tēnei Wāhanga Ako, Ngā Āhuatanga o te Hangarau and Te Whakaharatau Hangarau to ensure that Hangarau Matihiko was visible and had whakapapa to the front end of the Wāhanga Ako.

These changes are illustrated below:

<table>
<thead>
<tr>
<th>CURRENT STRUCTURE OF TE WĀHANGA AKO HANGARAU</th>
<th>REVISED STRUCTURE OF TE WĀHANGA AKO HANGARAU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iho</td>
<td>Revised to reflect inclusion of Hangarau Matihiko</td>
</tr>
<tr>
<td>Te Whaitake o te Ako i te Hangarau</td>
<td>Revised to reflect inclusion of Hangarau Matihiko</td>
</tr>
<tr>
<td>Te Hanga o tēnei Wāhanga Ako</td>
<td>Revised to reflect inclusion of Hangarau Matihiko</td>
</tr>
<tr>
<td>Ngā Āhuatanga o te Hangarau</td>
<td>No changes</td>
</tr>
<tr>
<td>Te Whakaharatau Hangarau</td>
<td>No changes</td>
</tr>
<tr>
<td>Hangarau Koiora</td>
<td>No changes</td>
</tr>
<tr>
<td>Te Tuku Mōhiohio</td>
<td>Revised and embedded in Hangarau Matihiko Dual</td>
</tr>
<tr>
<td></td>
<td>• Computational Thinking</td>
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<td></td>
<td>• DDDO</td>
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<td></td>
<td>Unique to Māori medium</td>
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<tr>
<td></td>
<td>• Ngā Ariā o te Hangarau Matihiko Arareo Māori</td>
</tr>
<tr>
<td></td>
<td>• Te Tangata me te Rorohiko</td>
</tr>
<tr>
<td>Ngā Hanga me ngā Pūhanga Manawa</td>
<td>No changes</td>
</tr>
<tr>
<td>Te Tāhiko me te Hangarau Whakatina</td>
<td>No changes</td>
</tr>
<tr>
<td>Hangarau Kai</td>
<td>No changes</td>
</tr>
</tbody>
</table>

6
Draft
Introducing Progress Outcomes to Hangarau

Learning in hangarau matihiko will be charted by reference to a set of progress outcomes. These progress outcomes are clear and discrete descriptors of the significant steps learners take as they progress. This is a new approach for Māori medium.

The progress outcomes recognise that there are key points in a learner’s journey irrespective of curriculum level or year level. At this stage we expect the Hangarau wāhanga ako to have the progress outcomes for Computational Thinking in Digital Technologies (covering algorithms, programming and data representation), and Designing and Developing Digital Outcomes (covering digital applications and digital systems) Ngā Ariā o te Hangarau Matihiko Arareo Māori and Te Tangata me te Rorohiko.

When looking at programming (in the Computational Thinking in Digital Technologies technological area), we might see how students develop learning from programming simple instructions in a non-digital environment (eg, stepping out a sequence), to developing software or programming robots. Similar growth in learning can be noticed as students develop in each of the progressions. These progressions will be supported by examples of rich teaching and learning activities in everyday classroom programmes.

Outcome Statements

These statements describe expected learning at the end of years 10 and 13 for Computational Thinking for Digital Technologies and Designing and Developing Digital Outcomes. They draw from the learning described in the progressions and represent the skills, knowledge and attitudes of a digitally capable learner.

Learning Area Statement

The current Hangarau Learning Area Statement describes the essential purpose for learning in Hangarau, specifically answering the questions of why study hangarau and what it is about.

This has been revised to make more explicit expectations for learning in Hangarau Matihiko, from school entry to end of Year 10.
1. New Statement for the Wāhanga Ako Hangarau
The Relevance of Learning Technology

Technology subjects must be relevant so they are not studied for no real purpose. Through technology, students are enabled. To gather technology understandings, we begin in the Māori world and its relevance to the modern world. They should focus on the values, then skills, and the learning’s of technology that they are familiar with.

The Structure of this Learning Area

There are two strands, Primary Concepts of Technology and Technological Practice.

From these, six technology learning areas are derived. Food Technology, Biotechnology, Construction and Mechanical Engineering, Sending Information, Electronics and Control Technology, and Digital Technology too.

It is appropriate to explore the characteristics of different resources in each technology topic. Further, there is another place for serious consideration of process and production. Those parts are in the design plan of the student.

Each strand has different learnings. The two strands need to be joined to the selected learning areas as a foundation for the technology work.

The learning areas proceed from the broader subject to assist. There are possibly two to three learning areas that are relevant. Digital Technology are connected to all learning areas and learning subjects.

Assessment should correspond to the aims in the strands.

Characteristics of Technology

Technological practice is demonstrated by:

- the people and all of their characteristics;
- the needs and the available pathways of the wider world.

Students research and investigate to understand peoples’ values and beliefs, and to understand the effect of those characteristics on formulating technology.

To know how to protect land and the environment, and the connection between technology practice and the community. The divine gene and the human gene co-exist in people and land.

Sustainability practices of the ancestors right up to the present need to be considered. The impacts of technological products on our Earth Mother and our Sky Father need to be thoroughly examined.

The land endures, people perish.
The land endures, people flourish.

Draft
Technological Practices

In this strand, technological understandings and skills are strengthened.

Technological practice is the culmination of the knowledge and skills that produce an outcome.

In most technological developments, communities of practice are established, from the outset of design through to completion and beyond. These communities are tremendously relevant to the development, and also the implementation of solutions, and the progress of new technologies.

Design Thinking

This is a path toward completion with five principal parts. Page 9

1. Dedication - to people and their thoughts and feelings and knowing the users and their needs.
2. Define - the major issues and the available pathways.
3. Propose ideas - formulating concepts, and outcomes/solutions.
4. Original model - construct an original model.
5. Experiment - test the model and adapt correspondingly.

Design thinking is essential to all technology advancements undertaken by students.
2. **Outcome Statements for Computational Thinking for Digital Technologies**
In addition to the progress outcomes, the learning progressions are defined by two Outcome Statements, which represent the skills, knowledge and attitudes of a digitally capable learner at the end of Year 10, and of a learner on the path to specialisation in one or more areas of digital technologies at the end of Year 13. These are the bookends for NCEA, representing the start and end points for learners at senior secondary level.

These draft outcome statements are the basis for the reviewed NCEA Level 1 achievement standards for Digital Technologies | Hangarau Matihiko.

<table>
<thead>
<tr>
<th>END OF YEAR 10</th>
<th>END OF YEAR 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students understand that there can be multiple algorithms for the same problem, some are better than others, and by recognising patterns between problems they can generalise known algorithms so they can re-apply these.</td>
<td>Students can analyse a selection of areas of computer science (e.g. formal languages, network communication protocols, complexity and tractability, artificial intelligence, graphics and visual computing, big data) in relation to how the area is underpinned by the key ideas of algorithms, data representation and programming.</td>
</tr>
<tr>
<td>Students can independently decompose problems into algorithms and distinguish between algorithms and computer programs.</td>
<td>They can evaluate how the synthesis of these key ideas is applied effectively when developing real world applications.</td>
</tr>
<tr>
<td>They can implement algorithms by creating programs which uses inputs, outputs, sequence, loops and selection using comparative operators and logical operators.</td>
<td>Students can use an accepted software engineering methodology to design, develop, document and test a complex computer program.</td>
</tr>
<tr>
<td>Students can explain/document their programs and use an organised approach for testing and debugging.</td>
<td></td>
</tr>
<tr>
<td>Students understand how computers represent different types of data using binary digits and can use variables of different data types within their programs.</td>
<td></td>
</tr>
</tbody>
</table>
3. Outcome Statements for Designing and Developing Digital Outcomes
Outcome Statements – Designing and Developing Digital Outcomes

END OF YEAR 10

Students will be able to use a range of software to develop and combine digital content to create an outcome. They can work through an iterative process to design, develop, create, store, test and evaluate digital content that meets its purpose. They will recognise social and end-user considerations that are relevant when developing digital content.

They will be able to make decisions (largely independently) about appropriate tools/techniques, software and file types to use when developing digital outcomes, and be able to explain their decisions.

Students understand the role of operating systems in managing personal computer hardware, security, and application software. They can apply file management conventions when creating and storing digital content and use a range of appropriate storage devices.

END OF YEAR 13

Students can work independently or within collaborative, cross-functional teams to effectively apply a refined, iterative development process to develop quality, fit-for-purpose digital outcomes that meet design specifications. They will synthesise social and end-user considerations that are relevant to the outcome when developing digital content.

Student developed outcomes will integrate specialised knowledge of digital applications and systems from a range of areas:

- LAN (local area network) architecture
- Internet of Things (development of a system of interrelated computing devices, hardware and applications)
- complex electronics environments and embedded systems
- digital information systems
- user experience design
- complex management of digital information
- creative digital media
4. Outcomes Statements for Concepts of Digital Technology
### Taumata Mātauranga mo Ngā Āria o ngā Whakatupuranga Hangarau Matihiko Arareo Māori (Concepts of Digital Technology)

<table>
<thead>
<tr>
<th>END OF YEAR 10</th>
<th>END OF YEAR 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Technology students demonstrate and promote how to implement Māori values, knowledge and education. They have begun and are confident in using a range of relevant curriculum terms and phrases of Digital Technology literacy.</td>
<td>Digital Technology students hold fast to and appropriately use Māori values, knowledge, and education in all relevant activities. Their use of a range of curriculum and contextual language of Digital Technology literacy is confident, competent, fluent and proficient.</td>
</tr>
</tbody>
</table>
5. Outcome Statements for People and Computers
Students are participating digital citizens.

They are aware of the importance of learning pathways to guide their pursuit of digital technology careers, careers and digital technology in their world, nationally and globally.

They review technology design issues with the solutions already identified and prepared to improve use.

Students are confident and knowledgeable contributing digital citizens.

They settle on the digital technology career choices, careers and many digital technologies of their world, nationally and globally, and decide on relevant careers for themselves.

They research and analyse the characteristics pertaining to planning decisions and the types of technology that will be used.

They analyse and relate the outcomes to improving use.

They analyse, review and use the essential principles of running activities.
6. Progress Outcomes for Computational Thinking for Digital Technologies
Computational Thinking for Digital Technologies Progression

Listed below are the eight signposts proposed, at this stage in the development, for the computational thinking for digital technologies learning progression. The design and writers oversight team estimates that signposts 1 to 5 are most likely to reflect learning in the first 10 years of school, whereas signposts 6 to 8 represent learning in senior secondary. Examples of exemplars from sign post 1-5 in computational thinking are included below.

**Signpost 1**
Students break down a simple non-computerised task into a set of precise, unambiguous, step by step instructions (algorithmic thinking). They are able to give these instructions, and identify if they have gone wrong and correct them (simple debugging). By doing this they show that they can use their decomposition skills to take a task and break it down into its smallest steps.

**Signpost 2**
Students understand that an algorithm is a step-by-step process to solve a problem, that we can use these to write computer programs, and these programs need to have precise and unambiguous instructions so that the computer can follow them. Students can give, follow, and debug simple algorithms in both computerized and non-computerized environments. They can use these algorithms to create a simple program involving input, output and sequencing in an age-appropriate programming environment.

**Signpost 3**
Students understand what algorithms are, the difference between algorithms and programs, and that there can be more than one algorithm for the same problem. They are able to decompose problems into step-by-step instructions to create an algorithm for a computer program, and use logical thinking to predict the behaviour of these programs. They are able to develop and debug simple programs that use inputs, outputs, sequence and loops. Students understand that computers store data using just two states, represented by binary digits (bits).

**Signpost 4**
Students can decompose a problem to create an algorithm using three building blocks of programming: sequencing (putting instructions one after the other), selection (choosing which part of the algorithm to execute based on some values), and iteration (repeating part of the algorithm with a loop). They can implement the algorithm by creating a program that uses inputs, outputs, sequencing, loops and basic selection using comparative operators. They can debug simple algorithms and programs by identifying if things have gone wrong with their instructions, correcting them, and are able to explain why it went wrong and how they fixed it. Students understand that computers can represent data with binary digits, and that computers have a way to detect errors that have occurred in data storage and transmission. Draft as of 4 May 2017 To be updated following exploratory trials and psychometric analysis. Students evaluate different algorithms in terms of their efficiency as they recognise that computers need to search and sort a lot of data.

**Signpost 5**
Students can independently decompose problems into an algorithm that is articulated in such a way that a computing device can understand. They can implement the algorithm by creating a program which uses inputs, outputs, sequencing, loops, variables of different data types, and selection using comparative operators and logical operators. Students can determine when to use different types of control structures. Students can explain/document their programs and use an organised approach for testing and debugging. Students understand how computers store more complex types of data using binary digits.
**Signpost 6**

Students are able to determine and compare the cost (computational complexity) of two different iterative algorithms for the same problem size (searching and/or sorting) in relation to the number of comparisons and time taken. Students understand the concept of coding information (e.g. compression, encryption, error control), typical uses of coded information, and how widely used technologies are enabled by coding. Students are able to apply a modular structure to a program to make it more efficient and store data in collections.

**Signpost 7**

Students understand that some computational problems cannot be solved by algorithms, and that some are intractable (no machine exists that has the power to execute the algorithm) so we need to use a heuristic solution. Students can discuss the purpose of a selection of data structures and evaluate the use of a data structure in terms of tradeoffs between performance and storage requirements and their suitability with different algorithms. Students can use an iterative process to design, develop, document and test an advanced computer program.

**Signpost 8**

Students can analyse a selection of areas of computer science (e.g. formal languages, network communication protocols, complexity and tractability, artificial intelligence, graphics and visual computing, big data) in relation to how the area is underpinned by the key ideas of algorithms, data representation and programming. They can evaluate how the synthesis of these key ideas is applied effectively when developing real world applications. Students can use an accepted software engineering methodology to design, develop, document and test a complex computer program.
Progress Outcomes for Designing and Developing Digital Outcomes
Designing and Developing Digital Outcomes Progression

Listed below are the five signposts proposed, at this stage in the development, for the Designing and Developing Digital Outcomes progression. The designers and writers estimates that signposts 1 to 3 are most likely to reflect learning in the first 10 years of school, whereas signposts 4 and 5 represent learning in senior secondary.

**Signpost 1**
Can participate in a teacher-led development to create, manipulate, store, retrieve and share content.

This includes:
- Identifying digital devices and their purpose and knowing that humans made them.
- Identify the inputs and outputs of a system.
- An awareness of some applications and their purpose (face-time, draw studio).
- An understanding that computers store content and we can retrieve it later.

**Signpost 2**
Given some parameters/criteria and tools and/or techniques they are able to make decisions (largely independently) about creating, manipulating, storing, retrieving, sharing and or testing content (developed for a specific purpose) within a fundamental system.

This includes:
- Understand that digital devices develop/change over time & the influence/impact they have on humans/society.
- Understand the particular roles of components in a fundamental input, process, output system and how they work together.
- Understanding that inputs are transformed into outputs within a fundamental system and the “control” role that humans have in this.
- Purposefully use an increasing range of applications (software and file type).

**Signpost 3**
Given some parameters they are able to make decisions (largely independently) about the best tools/techniques to solve the problem. They work through an iterative process to design, develop, create, store, test and evaluate digital content that meets its purpose.

This includes:
- Select appropriate software and file types for particular purposes based on key features, and justify selection. Use selected software to develop and combine digital content to create an outcome.
- Understand the role of operating systems in managing personal computer hardware, security, and application software. Explain the conventions of file management procedures and use of storage devices.

**Signpost 4**
Able to independently work through an iterative process to design, develop, create, store, test and evaluate digital content that meets its purpose.

Note: In the continuum between signpost 4 and 5 there is increasing flexibility, confidence, improved optimisation of tools and techniques and applying more specialised contexts.

**Signpost 5**
Able to integrate their knowledge of digital applications and systems to plan, design, develop/test and create quality, fit-for-purpose digital outcomes that meet design specifications.

This includes:
- Understanding the hardware components, protocols, and network architecture, used in a Wide Area Network (WAN) and apply this to assemble, configure, and manage a WAN.
- Discussing, designing, constructing, and debugging complex electronic environments and embedded systems in terms of their sub-systems and programming structures.
- Understanding how an information system adds value to an organisation. Explaining the interaction of the main components of an information system (hardware, software, data procedures and people) and the importance of end-users and security management.
- Effectively applying an iterative software engineering process to develop digital outcomes.
## Concepts of Digital Technology and People and Computers

### AT THE END OF YEAR 4: LEVELS 1-2 OF TMOA

**Concepts of Digital Technology**

Digital Technology students demonstrate how to implement Māori values, knowledge and education. Some relevant terms and phrases of Digital Technology literacy are also used.

### AT THE END OF YEAR 8: LEVELS 3-4 OF TMOA

**Concepts of Digital Technology**

Digital Technology students use Māori values, knowledge and education. They have begun and are confident in using a range of relevant curriculum terms and phrases of Digital Technology literacy.

### AT THE END OF YEAR 10: LEVEL 5 OF TMOA

**Concepts of Digital Technology**

Digital Technology students demonstrate and promote how to implement Māori values, knowledge and education. They have begun and are confident in using a range of relevant curriculum terms and phrases of Digital Technology literacy.

### People and Computers

**Students define their existence as digital citizens and explain the characteristics that are relevant.**

They have developed their competence in the activities people carry out in the community, and have developed their ability to teach/learn digital communication technology and to contribute to their world. They identify and also support technology design matters and responses to those matters.

**Students define their existence as digital citizens and explain the characteristics that are relevant.**

They are aware of the connection between teaching/learning and work, and they develop their digital technology communication skills to contribute to their world, to the country and to the global community. They explore matters and solutions of technological design already identified.

**Students are participating digital citizens.**

They are aware of the importance of learning pathways to guide their pursuit of digital technology careers, careers and digital technology in their world, nationally and globally. They review technology design issues with the solutions already identified and prepared to improve use.
AT THE END OF YEAR 11: LEVEL 6 OF TMOA

Digital Technology students hold fast to Māori values, knowledge and education. Their use of the range of curriculum and contextual language of Digital Technology literacy is confident, fluent and proficient.

Students are participating confident digital citizens. They are aware of the importance of learning pathways to guide their pursuit of digital technology careers, careers and digital technology in their world, nationally and globally. They illustrate, and explain the characteristics pertaining to design decisions and the types of technology used to improve use. They illustrate and explain the essential principles of organising action.

AT THE END OF YEAR 12: LEVEL 7 OF TMOA

Digital Technology students hold fast to and appropriately use Māori values, knowledge, and education in all relevant activities. Their use of a range of curriculum and contextual language of Digital Technology literacy is confident, competent, fluent and proficient.

Students are confident and knowledgeable digital citizens. They investigate the range of digital technology careers and careers with digital technology in their world, nationally and globally. They illustrate, and explain the characteristics pertaining to design decisions and the types of technology used to improve use. They analyse, review and use the essential principles of running activities.

AT THE END OF YEAR 13: LEVEL 8 OF TMOA

Digital Technology students hold fast to and appropriately use Māori values, knowledge, and education in all relevant activities. Their use of a range of curriculum and contextual language of Digital Technology literacy is confident, competent, fluent and proficient.

Students are confident and knowledgeable contributing digital citizens. They settle on the digital technology career choices, careers and many digital technologies of their world, nationally and globally, and decide on relevant careers for themselves. They research and analyse the characteristics pertaining to planning decisions and the types of technology that will be used. They analyse and relate the outcomes to improving use. They analyse, review and use the essential principles of running activities.
Concepts of Māori Language Digital Technology Developments

The Digital Technology student demonstrates how to implement Māori values, knowledge, and education. Appropriate vocabulary and phrases of Digital Technology literacy are also used.

The Learning Context

That students search for the longest path in a network by following a rule.

The teacher’s role is to teach a process for explaining the practice of a rule to be followed by the student, for example, from a rectangle to a triangle to a circle and back again. Students predict how many changes are possible in the network, and search for the longest path in that network. The protocols of the database and understanding of the links to mathematics are researched. Students should become accustomed to aspects of constructing and applying processes, and correcting them if there are errors.

In this video one sees:

• the connection of the basis of Coding, i.e. the Process.
• children learning aspects of a network and gaining understanding of the rule of the process to correctly complete the activity.
• children collecting data relating to the types of beginnings possible with a network.
• the connection of Digital Technology to Te Marautanga o Aotearoa, namely, to Te Reo Māori and also Literacy.
• children following instructions, and giving instructions for the longest path in a network through following the rule.

Discussion

Students explore the structure of networks.

• How many changes of the rule are possible?
• How many shapes are there in total?
• How many groups? How many columns?
• Is it possible to use all the combinations?
• What is the strategy? Where does it begin?
• Working in pairs: explain to your partner the longest path you searched for.
  - How to explain the first base?
  - How to explain the shifts of the path?
  - How to explain the changes in the network to follow a new path?

Where To Now?

For this student to continue developing, focus on:

• Exploring the use of the processes to arrange and analyse data.
• Using various types of code-writing applications to transfer student instructions to a code environment
• Other process activities to seek the shortest path.

Links to Digital Technology

The student is able to:

• thoroughly analyse a rule;
• discuss the possible results;
• follow and apply a process;
• formulate strategies to produce results;
• collect data on the paths followed;
• follow and give instructions to someone else;
• make corrections when s/he make errors.

Links to the Curriculum

Characteristics of Technology

1. Communicate about the connection of people and the environment, that is:
   - Explain the values used by people. (T2)

Technological Practice

2. They communicate and support their wants as a basic plan, i.e:
   - a process to begin building with. (T1)
3. They test and evaluate the results on the basis of the nature of:
   - the intended or available means. (T2)

**Links to Mathematics**

**Number and Algebra**

The simple strategies for multiplication, division and choosing simple fractions for whole numbers.

**Patterns and Relationships**

Supplementary patterns, basic multiplication patterns, and geometry patterns and relationships the patterns within multiplication partitions of a number.

**Position, Direction and Transformation**

Grids, ordered pairs, the main directions and basic maps to show location, procedure, and basic transformation.

**Resources**

Concepts of Māori Language Digital Technology Developments

The Digital Technology student uses Māori values, knowledge and education. The student has begun and is confident in their use of a range of complex vocabulary and phrases relating to Digital Technology literacy.

The Learning Context

Writing a code so a robot goes correctly from home to the marae.

The role of the teacher is to assist students to prepare and lay out the land map and arrange the instructions. Their role is also to show useful applications appropriate for the technological skills of the student.

In this video one sees:
- the links of Coding to Writing and Mathematics
- the ease of preparing a land map as a path for a robot.
- children practicing coding skills: sequencing instructions, correcting code errors, sending code with an iPad
- some ‘hidden’ benefits of digital devices, namely, getting students to talk, working alone and in pairs.
- the fun and ease of operating robots with code.

Discussion

- Is the sequencing of the actions correct?
- What difficulties emerged while you were sending code with an iPad?
- What difficulties emerged while you were controlling the robot?
- What is the difference between sequencing written instructions and sequencing coding instructions?
- What are the similarities and differences between your code collections and those of other students?
- What new understandings have you about operating a piece of digital equipment?
- Have you achieved your learning objectives?

Were To Now?

For this student to keep growing, they need to focus on:
- altering a land map to broaden the types of instructions,
- attaching digital devices to robots, like a camera to broaden the types of code learnt.
- using other related and relevant application.

Links to the Digital Technology Curriculum

Coding

The student is able to:
- convert instructions written as a code request for going to a place
- practice the types of robot movements, such as moving forward, moving backward, turning right.
- correctly sequence the instructions.
- correct errors so robots move correctly.

Digital devices and creations

The student is able to:
- prepare and input code onto a digital device, such as an iPad, or tablet.

Digital applications

The student is able to:
- use useful code-writing applications to display their lesson.
- choose the appropriate level of a application relating to the activity being undertaken.
Links to the Curriculum

**Characteristics of Technology**

1. Carefully consider values and beliefs used, to understand the characteristics of the result produced. Carefully consider:
   - technological principles;
   - relevance to people;

**Technological Practice**

**Level 3**

2. Sequencing a meaningful map design

3. Testing and evaluating the design. Selecting one method to produce an absolutely correct result.

**Level 4**

4. Use maps, testing to see:
   - the development;
   - the adequacy of the work.

5. Bring together practical and intellectual skills, as well as creative skills.

6. Understand the operation of technological systems

**Links to the Curriculum**

*A Writing Bird - Instructive Writing*

The basis of instructional writing is to show the reader how to do a task. The main thing is that someone else can follow the instructions.

**Level 3 and 4**

Take off/ Fly

- Instruction for going to a place

**Resources**

- A Writing Bird - Instructive Writing

Types of application code

- Blockly
- Path
- Wonder

**Resources**

- *A Writing Bird - Instructive Writing*

Types of application code

- Blockly
- Path
- Wonder
The Direction of Your Digital Compass

Concepts in Māori Language Digital Technology Developments
The Digital Technology student embodies and promotes Māori values, knowledge and education. The student is confident and competent in their understanding of the breadth of subject vocabulary and phrases related to Digital Technology.

The Learning Context
Students identify and respond to statements so they understand their own Digital Compasses.

The teacher’s role is to plant in the students the protocols and responsibilities of digital citizenship. Teaching activities begin with discussion and communicating ideas for the statements. Each student is to think of the five types of response, and select one response for each statement. Finally, the statements are grouped into these three digital citizenship concepts:

- respecting and protecting yourself;
- respecting and protecting others;
- respecting and protecting intellectual property.

Then the major topics/issues are discussed such as these statements that emerge in the classroom, the school and the broader learning cluster.

Discussion
- What are the concepts and the key topics/issues of each statement?
- Talk on one of the topics/issues that have affected you? What happened? What problems emerged?
- What strategy was followed to resolve the problem?
- Who helped you?
- What is the difference between a connection issue and a face-to-face problem?
- How are connection resources like iPAD applications used correctly?

Where to Now?
For this student to continue to grow, they need to focus on:

- the values of the school/kura and their relevance to the three digital citizenship concepts
  - respecting and protecting yourself;
  - respecting and protecting others;
  - respecting and protecting intellectual property.

Group the classroom into the values of the kura/school. Each group arrives at some agreements that confirm that value.

- a contract, a Digital citizenship agreement for the whole kura/school, including students, families, teachers, and boards too.

Links to Digital Technology
By the end of Year 10: Level 5 of TMoA
The student is a participating digital citizen. They understand the importance of the learning paths guiding their pursuit of digital technology careers, and careers with digital technology in their world, nationally and globally as well. They evaluate technology design issues and the responses already identified and adjust them to improve performance.

Links to the Curriculum
Characteristics of Technology
1. They promote their own beliefs or values to produce outcomes:
2. For the whānau, the community, the hapū, or the iwi, and explore the impacts on other cultures and client groups.

Technological Practices
3. A strategy is sought to promote the results that have emerged.
Resources

- www.digizen.org
- Netsafe. (Sept 2016) Resources for secondary schools (Years 9–13)
- Park, Yuhyun. (Sept 2016) 8 digital life skills all children need – and a plan for teaching them World Economic Forum.
- Project DQ What is DQ? 8 digital skills we must teach our children

In Addition:

- Statements

  Forwarding disparaging texts about someone else.
  Using mobile phones in the classroom.
  Speaking with someone else in the digital world about something private.
  Downloading a model essay from the kura/school’s website.
  Informing your friends of a website relevant to homework.
  Visiting websites in emails you receive from strangers.
  Sending your photos to a stranger.
  Sending photographs of your friends to Facebook without asking their permission.
  Agreeing to all friend requests in Facebook no matter whom.
  Swearing, and writing lies on your friend’s Facebook page.
  Sending hyperlink relevant to Mathematics to your friends.

- Responses

  Good
  Not good
  From the context
  Up to You/ Your Turn
  What is the problem?
10. Appendix
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<tr>
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<td>Curriculum Levels</td>
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**Te Tangata me te Rorohiko**

 Ka tuahutia e te ākonga tana noho hei kirirarau matihiko, ā, ka whakamārama hoki i ngā āhuatanga e hāngai ana. Kua tīmata tana whanake i tōna mōhio ki ngā mahi ka tūtuki i te tangata i te hāpori, ā, kua whanake hoki tana āhei ki te ako i ngā pūkenga whakawhitiwhiti hangarau matihiko me te tāpae hoki ki tōna ao. Ka tautahi, ka taunaki hoki ia i ngā take hoahoa hangarau me ngā urupare ki aua take.

Ka whakaatu te ākonga Hangarau Matihiko me pēhea te whakatinana i ngā uara, ngā mōhio me ngā mātauranga Māori. Ka whakamahia hoki ētahi kupu hāngai, rerenga hāngai hoki o te reo matatini o te Hangarau Matihiko.

Ka whakamahi te ākonga Hangarau Matihiko me pēhea te whakatinana i ngā āhuatanga me ngā mātauranga Māori. Ka whakamahia hoki ētahi kupu hāngai, rerenga hāngai hoki o te reo matatini o te Hangarau Matihiko.
Te Tangata me te Rorohiko
Whakatupuranga Ari
Curriculum Levels 1 2 3 ā
Hangarau Whakatupuranga hangarau matihiko me te whan kirirarau matihiko, hoki huatanga e hoki o te reo matatini o te Hangarau Matihiko.

Ka whakatinana, ka whakatairanga hoki te ākonga Hangarau Matihiko i ngā uara, ngā mōhiotanga me ngā mātauranga Māori. He māia, he mataatau hoki tōna mārama ki te whānuitanga o ngā kupu marau e hāngai ana me ngā rengarāhui hāngai hoki o te reo matatini o te Hangarau Matihiko.

Ka tāmāu te ākonga Hangarau Matihiko i ngā uara, ngā mōhiotanga me ngā mātauranga Māori. He māia, he mataatau, he kaiaka hoki tana whakamahī i te whānuitanga o te reo marau me te reo horopaki hoki o te reo matatini o te Hangarau Matihiko.

Ka tāmāu, ā, ka mātua whakamahī tika i ngā uara, ngā mōhiotanga ngā mātauranga Māori i ngā mahi katoa e hāngai ana. He māia, he mōhio, he mataatau, he kaiaka hoki tana whakamahī i te rangiwāhītanga o te reo marau me te reo horopaki hoki o te reo matatini o te Hangarau Matihiko.

Ka tāmāu, ā, ka whakamahī tika i ngā uara, ngā mōhiotanga ngā mātauranga Māori. He māia, he mataatau, he kaiaka hoki tana whakamahī i te whānuitanga o te reo marau me te reo horopaki hoki o te reo matatini o te Hangarau Matihiko.
Te Te Hoahoa me te Hanga Otinga Matihiko

Poutohu 1
Ka whai wāhi ki tētahi mahi whakahiao he mea ārahi nā te kaiako, ki te waihanga, te te raweke, te te pupuri, ki tē tiki ki te tuari hoki Kei rito mai:

- Te toutou pūrere maatăhiko me tōna pūtāke i runga i te mōhio nā te tangata i hanga.
- Toutou i ngā kōkuhunga me ngā whakaputanga o tētahi pūnaha
- Ka aro ki tētahi pūmanawa me te pūtāke i aua pūmanawa (kanohi-kitea, taiwhanga waituhi)
- Ka mārama ko tā te rorohiko he pupuri kōrero, ā, tālao ake tīkī atu ai.

Poutohu 2
Mēnā ka hoa tohu toutou/paearu me ngā taputapu/āhuatanga rā nei ka whakatau tikanga (ā-takitahi te tuinga) mō te waihanga, te raweke, te pupuri, te tiki, te tuari, me te whakamatau rānei i te kōrero (i whakahiotohia mō tētahi take motuhake) i roto i tētahi pūnaha tūtūrū. Kei rito mai

- Ka mārama he mea tipua, he mea panoni hoki te pūrere i roto i te huringa o te wā, ā, he awenga/pāanga anō tōna ki te tangata/porihanga.
- Ka mārama ki te mahi ake o tēnā, o tēnā wāhanga o te kōkuhunga tūtūrū, te tuanga, te pūnaha whakaputanga me te āhuā mahi ngātahi ō aua wāhanga.
- Ka mārama he mea whakaumu ngā kōkuhunga hei whakaputanga i roto i tētahi pūnaha tūtūrū me te kawenga ‘whakamatau’ a te tangata.
- Ka ātā whakamahi i te whanuitanga o ngā pūmanawa (momo kōnae)

Poutohu 3
Ka mārama ko tēnei mea te wāhanga, te whakakai te tūhia pānui, te āhuatanga o te wāhanga. Ka whakakai o te tūhuwhare (pārā i te whakakōpētanga, i te whakahaere) ki te mārama kōrero. Kua mārama ko tēnei whakatau me ngā whakamana kōrero, te whakahāere i tētahi ātāwhanga, te wāhanga, te whakamana kōrero, te āhuatanga o te whakahau i te whakahau. Ka taea te whakamahi ki te ahuwhenua kāhui no ngā whakamana kōrero, te āhuatanga o te whakahau.
Poutohu 3
Ka mārama ki tēnei mea te hātepe, ki te rerekētanga i waenga i te hātepe me te papa to, ā, ka neke atu i te ko tō kai te hātepe ka taea mō te hōpanga kotahi. Ka taea te whakaraupapa hōpanga ki ngā tohutouhī ngāwari ki te hanga hātepe mō te papa to rohoriko, ka whakamāhi i ngā whakaaro raupapa ki te matapaki i te whanonga o ēnei papa to. Ka taea te whakahia te tāpu iho ki ngā papa to e whakamahia ana i ngā kōkōhunga, i ngā whakaputanga me ngā rauapapa me ngā hohokohi. Kua mārama hoki e rua ngā āhuatanga mō te pūpū rauranga, ko ngā ma tāhūrau ēnei, ā, ngā bits.

Poutohu 4
Kua noho ki te whakaraupapa hōpanga ki te hanga hātepe mā te whakamāhi i ngā papa waihana e toru i tēnei mea o te papa to: rauapapa (te raupapa tohutouhī), kōwhiringa (te kōwhiri ko tēhea wāhanga o te hātepe e whakahaere mai ai ki ngā uara i tohau), me te tukurua (he tukurua i tētahi wāhanga o te hātepe me te loop e whai ana). Ka taea te whakarouru i te hātepe mā te hanga i tētahi papapono e whakamāhi ana i ngā kōkōhunga i ngā whakaputanga, i ngā rauapapa, i ngā hohokohi me ngā papa to taketake mā te whakamāhi i ngā paheko whakairitite. Ka taea ngā āhuatanga me ngā papapono ngāwari te tāpu iho me te tukurua mēnā kua hē ngā tohutouhī, te whakatikia i aua hē, me te whakamārama mai he aha i pēnei ai, i pēhea hoki te whakatikia. Ka mārama hoki te whakakautu mai o te rohoriko i ngā rauranga mā te whakamāhi i ngā mātā tāhūrau, ā, ka taea e te rohoriko te rāpu i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā mātā tāhūrau, ā, ka taea e te rohoriko te rāpu i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā rauranga. Ka aro ki te hune me te rūanga mā te whakamihinga o ngā wehe wehe e papa to e mahi e tahi hatepe i tahi. Whakatupuranga papa waihanga, me te huirau, ka whai hoki i ngā whakamihinga o ngā wehe wehe e papa to taketake mā te whakamāhi i ngā paheko whakairitite. Ka taea ngā āhuatanga me ngā papapono ngāwari te tāpu iho me te tukurua mēnā kua hē ngā tohutouhī, te whakatikia i aua hē, me te whakamārama mai he aha i pēnei ai, i pēhea hoki te whakatikia. Ka mārama hoki te whakakautu mai o te rohoriko i ngā rauranga mā te whakamāhi i ngā mātā tāhūrau, ā, ka taea e te rohoriko te rāpu i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā rauranga mā te whakamāhi i ngā rauranga. Kua noho hukihuki mai i te 4 Haratua 2017. Ā tōna wā ka whakahoupi i muri i ngā whakamāturanga me ngā tātarianga. Ka arotokea ngā mōmo āhuatere papa to e pā ana ki te tere te te pai o te rohoriko te rāpu me te wehe wehe i tēnei mea o te rauranga.