MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA

Digital Technologies | Hangarau Matihiko

Draft essence and outcome statements

From 2018, Digital Technologies | Hangarau Matihiko (DT | HM) will be integrated into the Technology | Hangarau Learning Areas of *The New Zealand Curriculum* and *Te Marautanga o Aotearoa*. This document summarises the current approach to what the DT | HM curriculum content will look like when incorporated into *The New Zealand Curriculum* and *Te Marautanga o Aotearoa* at the start of 2018. This content will continue to be refined throughout the year, and all the materials attached are in draft form. These drafts have informed the development of the draft NCEA Level 1 content.

As part of this document, we are able to provide drafts of:

- Revised draft essence statements in *The New Zealand Curriculum* and *Te Marautanga o Aotearoa* for Technology | Hangarau; and
- Draft Year 10 and Year 13 'outcome statements' in four learning progressions – two dual progressions for both English and Māori medium education, and two unique progressions to Māori medium education. These map the development of 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 technology at the end of Year 13.

The Essence Statement

The purpose of the draft revised essence statements is to situate DT | HM clearly and coherently within the Technology and Hangarau learning areas. The curriculum essence statements describe the essential purpose for learning Technology | Hangarau in each curriculum: the core of the learning covered, and an answer to the key question "why study Technology | Hangarau?"

The most obvious change from the previous essence statements in *The New Zealand Curriculum* and *Te Marautanga o Aotearoa* is that the reviewed essence statements now reflect that Digital Technologies | Hangarau Matihiko are important parts of the National Curriculum from Year 1. But these revised essence statements also reflect a more acute focus on design and computational thinking.

The appended draft essence statements have been developed in consultation with a number of expert partners, including representatives from technology subject associations. This draft content will continue to be developed throughout 2017 in concert with these experts, and will include opportunities for you to consider and provide feedback on a full suite of curriculum content.

The Learning Progressions

Learning in Digital Technologies | Hangarau Matihiko will be charted by reference to learning progressions. Learning progressions map a learner's development in key skills, knowledge and attitudes, as their understanding grows throughout their education. Similar progressions are already used in the Learning Progression Frameworks in reading, writing and mathematics within *The New Zealand Curriculum* for Levels 1 to 5. Progressions for Hangarau Matihiko have been developed to also support learners' development in kōrero, pānui, tuhituhi and pāngarau.

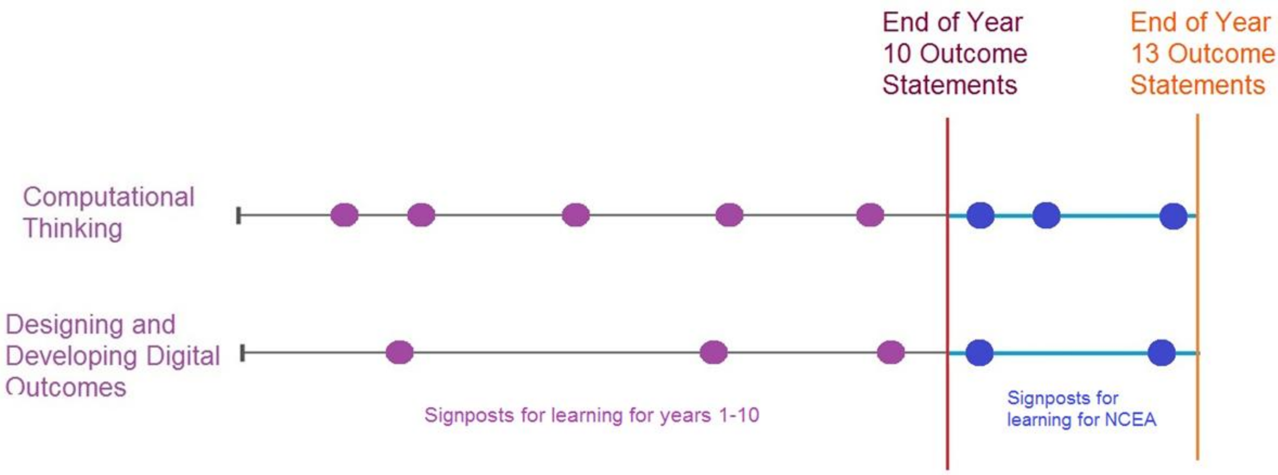
The progressions recognise that there are key points in a learner's journey irrespective of curriculum level or year level. At this stage we expect DT | HM to have the following learning progressions:

- Learning Progression Frameworks for Digital Technologies | Hangarau Matihiko which reflect both *The New Zealand Curriculum* and *Te Marautanga o Aotearoa*, which include the progressions: *Computational Thinking in Digital Technologies* (covering algorithms, programming and data representation), and *Designing and Developing Digital Outcomes* (covering digital applications and digital systems); and

- Two further progressions which reflect the unique aspects of *Te Marautanga o Aotearoa*: *Ngā Ariā o Ngā Whanaketanga Hangarau Matihiko Arareo Māori* (Concepts of Digital Technology), and *Te Tangata me te Rorohiko* (People and Computers).

When looking at programming (in the Computational Thinking learning progression), we might see how students develop learning from creating simple instructions in a non-digital environment (eg, stepping out a sequence), to developing software or programming robots. Similar evolutions of understanding will take place 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.

We currently expect that all four progressions will have broadly the following format:



The dots in this chart are examples (for illustrative purposes only) of signposts – significant evolutions in the sophistication of students' understanding. These signposts may not align to the ends of school years, or to curriculum levels. Instead, they will reflect how long it actually takes to bring a learner from one signpost to the next. The number and location of the signposts in both of these progressions are subject to change. A similar structure to the above will apply to the progressions which draw on unique aspects of *Te Marautanga o Aotearoa*.

In addition to the signposts, the learning progressions are defined by two key 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.

MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA

Appendix 1

Draft outcome statements

These draft outcome statements are the basis for the reviewed NCEA Level 1 achievement standards for Digital Technologies | Hangarau Matihiko. We ask that you consider these, in particular, in assessing whether the draft Level 1 achievement standards are fit for purpose.

Computational Thinking in Digital Technologies

End of Year 10	End of Year 13
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. 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 and selection using comparative operators and logical operators. They can take these skills and work in a collaborative environment to solve computing problems. Students can explain/document their programs and use an organised approach for testing and debugging. Students understand how computers store different types of data using binary digits and can use variables of different data types within their programs.	Students can analyse a selection of areas of computer science (eg, 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.

Designing and Developing Digital Outcomes

End of Year 10	End of Year 13
By the end of year 10 students will be able to make decisions (largely independently) about the best tools/techniques to solve the problem. They can work through an iterative process to design, develop, create, store, test and evaluate digital content that meets its purpose. They can take these skills to select appropriate software and file types for particular purposes based on key features, and justify the selection. Use selected software to develop and combine digital content to create an outcome. Students can understand the role of operating systems in managing personal computer hardware, security, and application software. Students can explain the conventions of file management procedures and use of storage devices.	By the end of year 13 students will be 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. They can apply this learning to more specialised contexts which include: • Using different creative digital technologies to create digital content for the web, interactive digital platforms, and print. • 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.

Ngā Ariā o Ngā Whanaketanga Hangarau Matihiko Arareo Māori (Concepts of Digital Technology)

Hei te mutunga o te tau 10	Hei te mutunga o te tau 13
Ka whakatinana, ka whakatairanga hoki te ākonga Hangarau Matihiko i ngā uara, ngā mōhiotanga me ngā mātauranga Māori. He māia, he matatau hoki tōna mārama ki te whānuitanga o ngā kupu marau e hāngai ana me ngā rerenga hāngai hoki o te reo matatini o te Hangarau Matihiko.	Ka tāmau, ā, ka mātua whakamahi tika i ngā uara, ngā mōhiotanga ngā mātauranga Māori i ngā mahi katoa e hāngai ana. He māia, he mōhio, he matatau, he kaiaka hoki tana whakamahi i te rangiwhāwhātanga o te reo marau me te reo horopaki hoki o te reo matatini o te Hangarau Matihiko.

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.	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.

Te Tangata me te Rorohiko (People and Computers)

Hei te mutunga o te tau 10	Hei te mutunga o te tau 13
He kirirarau matihiko whai wāhi te ākonga. E mārama ana ia ki te hira o ngā huarahi ako e ārahi ana i tana whai umanga hangarau matihiko, umanga me te hangarau matihiko hoki i tōna ao, i te motu, i te ao whānui tonu. Ka arotake ia i ngā take hoahoa hangarau me ngā urupare kua tautohutia kētia me te whakatika kia pai ake te whakamahinga.	He kirirarau matihiko māia, mōhio tāpae hoki te ākonga. Ka whakaū ia i ngā kōwhiringa umanga hangarau matihiko, umanga me te hangarau matihiko huhua hoki o tōna ao, o te motu, o te ao whānui tonu, ā, ka hāngai ana whakatau umanga mōna. Ka rangahau, ka arohaehae hoki ia i ngā āhuatanga ka pā ki ngā whakatau whakahoahoa me ngā momo hangarau ka whakamahia. Ka arohaehae, ka whakahāngai hoki ia i ngā kitenga ki te whakapai ake i te whakamahinga. Ka rangahau, ka arohaehae, ka whakamahi hoki i ngā mātāpono matatini o te whakahaere tūmahi.
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 improve use. They analyse, review and use the essential principles of running activities.

Appendix 2

Draft essence statements

The New Zealand Curriculum – Technology

What is technology about?

Kaua e rangiruatia te hāpai o te hoe;
e kore tō tātou waka e ū ki uta.

Technology is intervention by design. Design is the use of intellectual and practical resources to create and develop technological outcomes that expand human possibilities by addressing needs and realising opportunities. Design is characterised by innovation and adaptation and is at the heart of technological practice. Design is informed by critical and creative design thinking and awareness of practices such as design processes and computational thinking.

Technology's strength is that it makes enterprising use of a range of skills and knowledge of practices for exploration and communication, some specific to areas within technology and some from other disciplines. These include visual literacy; the ability to make sense of images and the ability to make images that make sense, and undertake digitally-aided design, programming, software development and other forms of technological modeling.

Why study technology?

With its focus on design thinking, technology education supports students to be innovative, reflective and critical in designing new products, systems and tools that will benefit people, while expressing empathy for the cultural, ethical, environmental, political, and economic conditions of the day. The aim is for students to develop broad technological knowledge, practices and dispositions that will equip them to participate in society as informed citizens as well as providing a platform for technology-related careers. They learn about technology as the result of human activity, experiencing and/or exploring historical and contemporary examples of technology in a variety of contexts. They also expand their discipline-specific-capabilities as they develop models, products, software and systems.

Learning area structure

The learning area comprises five technological areas, two of which are specifically digital technologies focussed: computational thinking for digital technologies, designing and developing digital outcomes, designing and developing materials outcomes, designing and developing processed outcomes, and design and visual communication (DVC). The three strands of technological practice, technological knowledge and the nature of technology are embedded within each of these technological areas.

DT: Computational thinking for digital technologies

Computational thinking enables a student to express problems, and formulate solutions in a way that means a computer (an information processing agent) can be used to solve them.

Students develop computational and algorithmic thinking skills, and an understanding of the computer science principles that underlie all digital technologies. They become aware of what is, and is not, possible with computing, so they are able to make judgments and informed decisions as citizens of the digital world. Students learn core programming concepts and how to take advantage of the capabilities of computers, so that they can become creators of digital technologies, not just users. They will develop an understanding of how computer data is stored, how all the information within a computer system is presented using digits, and the impact that different data representations have on the nature and use of this information.

DT: Designing and developing digital outcomes

Students understand that digital applications and systems are created for humans by humans. They develop increasingly sophisticated understandings and skills related to designing and producing quality, fit-for-purpose, digital outcomes.

They develop their understanding of the digital Information technologies that people need in order to locate, analyse, evaluate, and present digital information efficiently, effectively, and ethically. They become more expert in manipulating and combining data, using information management tools to create an outcome. They become aware of the unique intellectual property issues that arise in digital systems, particularly approaches to copyright and patents.

Students also become more aware of how to build, install, maintain, and support computers, networks, and systems so that they are secure and efficient.

Students develop knowledge and skills in using different creative digital technologies to create digital content for the web, interactive digital platforms, and print. They construct digital media outcomes that integrate media types and incorporate original content. They also learn about the way electronic components and techniques are used to design digital devices, and become increasingly skilled in integrating electronic components and techniques to assemble and test an electronic environment.

Designing and developing DVC outcomes

Students learn to apply design thinking and develop an awareness of designing by using visual communication to conceptualise and develop potential design ideas in response to a brief. In doing so they develop a visual literacy; the ability to make sense of images and the ability to make images that make sense. Students apply their visual literacy by using sketching, digital modes and other modelling techniques to produce effective communication and presentation of design ideas.

Students draw on their knowledge of design to understand that designers identify the qualities and potential of design ideas in terms of the broad principles of design (aesthetics and function) and of sustainability, and that they are influenced by human, societal, environmental, historical, and technological factors.

Designing and developing materials outcomes

Students develop knowledge and skills to form, transform and manipulate resistant materials, textiles and fashion in order to create both conceptual and prototype technological outcomes that solve human problems and satisfy needs and opportunities. They develop an increasing awareness and understanding of the systems, structures, machines and techniques used in manufacturing products. They gain experience from using manufacturing processes and related quality assurance procedures to produce prototypes, batches or multiple copies of a product.

Students demonstrate increasingly critical, reflective and creative thinking as they evaluate and critique technological outcomes in terms of the quality of their design, their fitness for purpose and their impact and influences on societies and the environment. They become increasingly skilled in applying their growing knowledge of design principles to create innovative and feasible outcomes that realise opportunities or resolve current and future-focused real world issues.

Designing and developing processed outcomes

Students develop knowledge of the materials and ingredients that are used to formulate food, chemical, and biotechnological products. They develop their expertise in forming, transforming and manipulating materials or ingredients to develop conceptual, prototype and final technological outcomes that will meet the needs of an increasingly complex society.

Students engage in a range of processes related to food technology, biotechnology, chemical technology, and agricultural technologies. They explore the impact of different economic and cultural concepts on the development of processed products, including their application to product preservation, packaging, and storage. They also develop understandings of the systems, processes and techniques used in manufacturing products and will gain experience from using these, along with related quality assurance procedures, to produce prototypes or multiple copies of a product.

Students demonstrate increasingly critical, reflective and creative thinking as they evaluate and critique technological outcomes in terms of the quality of their design, their fitness for purpose and their wider impacts. They become increasingly skilled in applying their growing knowledge of design principles to creating desired, feasible outcomes that resolve real world issues.

Strands of Technology

The three strands of technology are embedded within each of these five technological areas. In the **technological practice** strand, students examine the practice of others and undertake their own. They develop a range of outcomes, including concepts, plans, briefs, technological models, and fully realised products or systems. Students investigate issues and existing outcomes and use the understandings gained, together with design principles and approaches, to inform their own practice. They also learn to consider ethics, legal requirements, protocols, codes of practice, and the needs of and potential impacts on stakeholders and the environment.

Through the **technological knowledge** strand, students develop knowledge particular to technological enterprises and environments and understandings of how and why things work. Students learn how functional modelling is used to evaluate design ideas and how prototyping is used to evaluate the fitness for purpose of systems and products as they are developed. An understanding of material properties, uses, and development is essential to understanding how and why products work the way they do. Similarly, an understanding of the constituent parts of systems and how these work together is essential to understanding how and why systems operate in the way they do.

Through the **nature of technology** strand, students develop an understanding of technology as a discipline and of how it differs from other disciplines. They learn to critique the impact of technology on societies and the environment and to explore how developments and outcomes are valued by different peoples in different times. As they do so, they come to appreciate the socially embedded nature of technology and become increasingly able to engage with current and historical issues and to explore future scenarios.

Over the course of years 1–6 and years 7–10 students will learn in all five technological areas. Knowledge and skills are learned in context. By offering a variety of contexts, teachers help their students to recognise links and develop generic understandings. Students should be encouraged to access relevant knowledge and skills from other learning areas.

In years 11–13, students work with fewer contexts in greater depth. This requires them to continue to draw fully on learning from other disciplines. For example, students working with materials and/or food technology will need to refer to chemistry, and students working on an architectural project will find that an understanding of art history is invaluable. Some schools may offer courses such as electronics and horticultural science as technology specialisations.

Learning for senior students opens up pathways that can lead to technology-related careers. Students may access the workplace learning opportunities available in a range of industries or move on to further specialised tertiary study.

Te Marautanga o Aotearoa – Hangarau

Tīkina atu i tuawhakarere
i te ao kōhatu
ngā mōhiotanga o rātou mā
hei kawe i a tātou i roto i te ao tūroa.
Kua takoto kē te whāriki i rarangahia e rātou
wānangahia, tuakina kia tau
rangahaua kia maumahara
manakohia kia whiwhi ai
te mātauranga Māori motuhake.

Ko te iho o te hangarau kei te waiata nei. Mai i Ngā Āhuatanga o te Hangarau me Te Whakaharatau Hangarau a ō tātou tūpuna tae noa ki ngā tukanga o te ao hurihuri, i whakatakotohia e ō tātou tūpuna he huarahi hei whāinga mā tātou.

Kia kauria e te ākonga te au moana o te hangarau. Ka ea tēnā mā te pakirehua, te whakawhiti kōrero, te raweke, me te whakamātau kia mau tonu, kia whakahāngai, kia whakahou tonutia ā muri atu.

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 whakahiato i ngā mōhiotanga hangarau, ka tīmata 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 taunga ana ia.

Te Hanga o tēnei Wāhanga Ako

E rua ngā whenu, ko Ngā Āhuatanga Matua o te Hangarau me Te Whakaharatau Hangarau.

Kātahi ka taka mai ki ngā aho hangarau e ono. Ko te Hangarau Kai, ko te Hangarau Koiora, ko Ngā Hanga me ngā Pūhanga Manawa, ko Te Tuku Mōhiohio, ko Te Tāhiko me te Hangarau Whakatina, ko te Hangarau Matihiko hoki.

E tika ana kia tūhuratia ngā āhuatanga o ngā momo rawa kei ia kaupapa hangarau. Ā, he wāhi anō mō te āta whakaaro ki te taha tukanga me te taha whakanao. Kei roto aua wāhanga i te mahere hoahoa a te ākonga.

He rerekē ngā mōhiotanga kei ia whenu. Me hono ngā whenu e rua ki ngā aho kua kōwhiritia hei tūāpapa mō te mahi hangarau.

Mai i te kaupapa whānui ka taka iho ngā aho hei āwhina. Tērā pea e rua, e toru rānei ngā aho e hāngai ana. Ka pāhekohekotia a Hangarau Matihiko ki ngā aho, me ngā kaupapa ako katoa.

Me hāngai te aromatawai ki ngā whāinga kei ngā whenu.

Ngā Āhuatanga o te Hangarau

Ka whakaahuatia te whakaharatau hangarau e:

- ngā tāngata me ō rātou āhuatanga katoa;
- ngā hiahia me ngā huarahi wātea o te ao whānui.

Ka rangahau, ka tūhura ngā ākonga kia mārama ai rātou ki ngā uara me ngā whakapono o te tangata, kia mārama anō ki te pāpātanga o aua āhuatanga ki te whakahiato hangarau.

Ka mōhio ki te tiaki whenua, ki te tiaki taiao, me te pahekotanga i waenganui i te whakaharatau hangarau me te hapori. Ko te ira atua, ko te ira tangata e noho ngātahi nei te tangata me te whenua.

Me whakaaro ki ngā mahi toitū a ngā tūpuna tae noa mai ki tēnei wā. Me āta titiro ki te pānga o te otinga hangarau ki a Papatūānuku rāua ko Ranginui.

"Toitū te whenua, whatungarongaro te tangata.
Toitū te whenua, toiora te tangata."

Te Whakaharatau Hangarau

I roto i tēnei whenu ka pakari haere ngā mōhiotanga me ngā pūkenga hangarau.

Ko te whakaharatau hangarau te tōpūtanga o ngā mōhiotanga me ngā pūkenga e puta ai he otinga.

I te nuinga o ngā whanaketanga hangarau, ka whakatūria ngā hapori mahi mai i te tīmatanga o ngā mahi hoahoa tae noa atu ki te mutunga, ā, ki tua atu. E tino whaitake ana ēnei tū hapori ki te whakawhanaketanga, ki te whakatinanatanga hoki o ngā rongoā, me ngā kōkiri hangarau hou.

Te Hoahoa Whakaaro

He huarahi rapu otinga tēnei e rima ōna wāhanga matua.

1. Te ngākaunui - ki te tangata me ōna whakaaro, ōna kare ā-roto hoki me te mōhio ki te kaiwhakamahi me ōna matea.
2. Te tautuhi - i ngā take matua me ngā huarahi wātea.
3. Te taka whakaaro - waihanga ariā, rapu otinga/rongoā hoki.
4. Te tauira taketake - hangaia he tauira taketake.
5. Te whakamātau - whakamātauria te tauira taketake, ā, panonihia kia hāngai.

E tino waiwai ana te hoahoatanga whakaaro i ngā kōkiritanga hangarau katoa ka whāia e ngā ākonga.

Ngā Aho	Hei whakamārama
Hangarau Koiora	Tū tonu
Te Tuku Mōhiohio	Kua whakakorengia
Ngā Hanga me ngā Pūhanga Manawa	Tū tonu
Te Tāhiko me te Hangarau Whakatina	Tū tonu
Hangarau Matihiko (he Aho hou)	Ko ngā hangarau matihiko ngā utauta tāhiko, ngā pūnaha, ngā pūrere me ngā rauemi ka whakaputa, ka rokiroki, ka tukatuka raraunga rānei. Ko ngā pāpāho pāpori, ngā kēmu tuihono me ngā taupānga, ngā rongorau, ngā taupānga whakaputaranga, ngā mahi rorohiko ā-kapua, ngā āheinga whakawhitiwhiti pūnaha ērā tae atu ki ngā pūrere pūkoro. E tino whaitake ana te matatauranga matihiko ki te whanaketanga o te kaiakatanga whakamahi hangarau matihiko i ngā kura. Koia ko te āheinga ki te mahi haumaru, te mahi matatika hoki me te hangarau i te kaiwhakamahi e waihanga ana, e raweke ana, e torotoro haere ana hoki i ngā pārongo kia angitu. Ko tēnei mea te matatauranga matihiko ko te hīraurau ngātahi i ngā hopanga o te ao tūturu i ngā ākonga e whai ana i ō rātou whāinga ako.

Te Marautanga o Aotearoa – Hangarau (English translation)

Take hold from antiquity
from the distant past
the knowledge of the ancestors
to carry us in this enduring world.
The mat woven by them has already been laid
discuss, dissect, to resolve
research to remember
desire to attain
unique Māori understandings of knowledge.

The essence of technology is in this chant. From The Characteristics of Technology and The Technological Practices of our ancestors, to the processes of the modern world, our ancestors have laid out a path for us to follow.

Let the student swim the current of the ocean of technology. That will be fulfilled by inquiry, discussion, modification, and trialling in order to continuously preserve, make relevant, and update going forward.

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 learnings 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."

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.

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.

The Aho	***A Clarification***
Biotechnology	*No changes*
Disseminating Knowledge	*To be removed*
Construction and Mechanical Engineering	*No changes*
Electronics and Control Technology	*No changes*
Digital Technology (new Aho)	*Digital technologies are electronic tools, systems, devices and resources that generate, store, or start up databases. These include social media, online games and applications, multimedia, publishing applications, computing via the cloud, communication system capabilities, and more, including mobile devices.* *Digital education is highly important to development of expertise in using digital technologies in kura. That is the ability to work safely and ethically with the technology while the user is creating, handling/manipulating information successfully.* *This 'digital education' is the cooperative solution to the scientific problems of the real world while students pursue their learning goals.*