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Building Indigenous knowledge: Exploring the Pedagogy of Māori knowledge in the Digital Computing Information Technology Tertiary Sector of New Zealand

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See table of contents

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Article abstract

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Building the academic capacity of people and academic programmes in Information Technology that supports Mātauranga Māori is pioneering for Indigenous academics. Navigating this pathway in the tertiary sector is delegated many times to the Indigenous academic to take leadership in this discipline. It also becomes a challenge for the Indigenous academic to retain leadership in these areas when these topics become globally attractive, like Cyber Security, where the representation of Indigenous experts are scarce in this industry and the outcome is that knowledge transfer tends to be the responsibility of the non-Indigenous academics to lead capacity building initiatives. This article discusses five key issues: 1) programmes in the Digital Computing Information Technology sector; 2) Mātauranga Māori in Information Technology; 3) the pedagogy of teaching and delivery; 4) Indigenous leadership in this sector; and 5) capacity building initiatives. It draws heavily from the literature and experience of those academics who work in the Institute of Technology and Polytechnics in Aotearoa New Zealand.

Building Indigenous knowledge: Exploring the Pedagogy of Māori knowledge in the Digital Computing Information Technology Tertiary Sector of New Zealand

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Abstract

In 2021, Computing Information Technology Research and Education New Zealand (CITRENZ, 2021) held a conference for academics to explore information technology in a changing world. It provided a platform for those academics that teach in this industry a forum to discuss knowledge transfer and teaching practices. A workshop on "Mātauranga Māori in Information Technology," which is a specialised type of expertise that continues to be in its infancy was presented. Mātauranga Māori in academia is a body of Indigenous Māori knowledge passed down from generation to generation, stretching back to *te ao marama*, the creation of the world (Sadler, 2007). Therefore, the depth of Mātauranga Māori is embedded in the earth and waters that cover the lands (Royal, 1998). Exploring ways to transfer this type of knowledge to a classroom or global online environment for Information Technology is a new type of pedagogy.

Building the academic capacity of people and academic programmes in Information Technology that supports Mātauranga Māori is pioneering for Indigenous academics. Navigating this pathway in the tertiary sector is delegated many times to the Indigenous academic to take leadership in this discipline. It also becomes a challenge for the Indigenous academic to retain leadership in these areas when these topics become globally attractive, like Cyber Security, where the representation of Indigenous experts are scarce in this industry and the outcome is that knowledge transfer tends to be the responsibility of the non-Indigenous academics to lead capacity building initiatives. This article discusses five key issues: 1) programmes in the Digital Computing Information Technology sector; 2) Mātauranga Māori in Information Technology; 3) the pedagogy of teaching and delivery; 4) Indigenous leadership in this sector; and 5) capacity building initiatives. It draws heavily from the literature and experience of those academics who work in the Institute of Technology and Polytechnics in Aotearoa New Zealand.

Introduction

The tertiary education sector in New Zealand encompasses a wide spectrum of providers including Private Training Establishments (PTEs), Institutes of Technology and Polytechnics (ITPs), Wānanga, Universities, and Workplace Training. In addition to universities that regulate their own educational programmes, the qualifications authority of the New Zealand government approves educational programmes. Founded in 1989, the role of the qualification's authority ensures qualifications are credible, robust, accepted nationally and internationally, help learners succeed, and report to the New Zealand government's Education Minister. The New Zealand government's Tertiary Education Commission (TEC), under the direction of the Education Minister, is responsible for overseeing the funding of all post-compulsory education and training offered by all providers. The TEC evaluates,

assesses, and implements its tertiary education strategy and associated set of priorities. Both the TEC and the New Zealand Qualifications Authority (NZQA) are responsible for the success of all learners in New Zealand, particularly Indigenous leaners due to the partnership and agreement—the Treaty of Waitangi—between the British representatives and the Indigenous Māori in 1840. It is unfortunate that success outcomes for Indigenous Māori learners in ITPs have not been forthcoming since the decree of the commission in 2012 to eliminate minority pass rate disparities from polytechnics and institutions. The deputy chief executive of the commission indicated that a whole ecosystem approach would be viable considering the failure of past attempts to address disparities based on isolated interventions (Gerritsen, 2021).

In 2019, the New Zealand Government under the direction of its' TEC subsidiary, announced the merger of its' sixteen Institutes of Technology and Polytechnic to form Te Pūkenga - New Zealand Institute of Skills and Technology (Te Pūkenga, 2020a). The merger would commence in April of 2020, and Te Pūkenga would reimage vocational education, learning, and skills for industry in Aotearoa New Zealand. The tone of Te Pūkenga would resonate a learner centric shift that would fit around the learner's lifestyle, the learner's world, and the world around the learner (2020b). Te Pūkenga would postulate learning both inside and outside the learning environment with emphasis on the latter for learner success. In retrospection of the merger, Te Pūkenga would mandate the Treaty of Waitangi or *Te Tiriti* (Te Tiriti o Waitangi [Māori version], 1840) and the Māori learner's world to substantiate their voice:

> In accordance with Te Tiriti o Waitangi, Te Pūkenga is focused on ensuring our services work well and respond with excellence to the needs of Māori learners and their whanau, and to the aspirations of iwi and Māori communities through Aotearoa. (Te Pūkenga, 2020c, p. 5, para 1)

ITPs in Aotearoa New Zealand are undergoing a period of change and reform. The direction from their government conglomerate has caused a rethink in strategy and an alignment of operational services. Te Pūkenga's new direction of a holistic approach to educational services would see ITPs facilitate a *te ao Māori* [the Māori world] view for the benefits of their Māori learners. This implies that the Digital Computing Information Technology sector within the ITPs should have a deeper understanding of what is known as "things Māori" or matauranga Māori to deliver education, learning, and skills for its' Māori learners.
The incentive of this article is to explore matauranga Māori in the Digital Computing Information Technology (DCIT) sector and ways of knowledge transfer. To accomplish this, the article discusses five pivotal issues in this sector: 1) programmes in the DCIT sector; 2) Mātauranga Māori in Information Technology (MMIT); 3) the pedagogy of teaching and delivery; 4) Indigenous leadership in this sector; and 5) capacity building initiatives.

The article asserts that MMIT can only be defined by those who are Indigenous Māori academics disciplined in the tertiary sector of Information Technology. It re-defines the matauranga Māori term *whanau* [family] as well as a pedagogical approach toward teaching and delivering whanau in IT-based courses. There is an urgent need and a call to action for more Indigenous Māori academic leadership in the DCIT sector to support MMIT, as revealed by a short study of Indigenous Māori academics in the sixteen ITPs. The article points out that while there is a small representation of Indigenous Māori academics in the DCIT sector, knowledge is primarily transferred to Māori learners by non-Māori academics. According to the article, capacity building enablers should target Indigenous Māori academics and Māori in decision making positions from the DCIT sector as the highest

priority. In the conclusion of this article, the author provides evidence of how the concepts raised are effective and have led to high success rates for Māori learners.

Background

In November of 2019, Te Pūkenga began work on the *Te Pae Tawhiti Excellence Framework* (Te Pūkenga, 2020c). The framework would contain six outcomes for subsidiaries to confer services and practices conducive to Māori (p. 9). The motivation for the framework was linked to the continuous failed attempts by tertiary providers to increase success pass rates for Māori learners (Gerritsen, 2021). The five-to-seven-year commitment strategies made by tertiary providers back in 2012 had not come to fruition. Hitherto, TEC intervened, announcing a nationwide service change delivery:

> In working to achieve this objective, we know it is not Māori learners or communities that need to change to fit with us; rather, it is our responsibility to ensure our services improve for the betterment of Māori. (Te Pūkenga, 2020c, p. 9, para 1)

In July of 2021 Te Pūkenga released the *Te Pae Tawhiti Insights* (Te Pūkenga, 2021a) report, which was the findings and analysis of responses collected from subsidiaries. The report indicated that not all subsidiaries were consistent with their understanding of Te Tiriti and its application in their sector (p. 7). As an Indigenous Māori academic in the DCIT sector, I would concur with these findings. For example, my subsidiary of DCIT would have found it difficult to gather perspectives of Te Tiriti when compared to subsidiaries such as Early Childhood Care (ECE) or Nursing. On one hand, our DCIT degree programmes sparingly have courses that provide services for Māori. On the other hand, ECE and Nursing degree programmes have courses with embedded services for Māori. Consider the Bachelor of Teaching in Early Childhood Education offered at the Waikato Institute of Technology (WINTEC), which has *te reo Māori* [Māori language] and *kōhanga reo kaiako* [Early Childhood Teacher] educators (Wintec, 2022a); or WINTECs Postgraduate Diploma in Health and Social Practice, which involves working with *tangata whaiora* [person seeking health] patients (Wintec, 2022b, p. 4). Since ECE and Nursing subsidiaries already provide services for Māori learners within learning curriculum, their treatment of Te Tiriti is superior to that of our DCIT subsidiary.

The juxtaposition of the given example provides a basis to discuss how Te Tiriti may be applied to subsidiaries of DCIT. Moreover, such discussions would begin by examining the experiences of Māori learners studying in the field of Information Technology (IT), and, for that matter, by examining the experiences of matauranga Māori working in the DCIT sector. Throughout many years, I have observed my sector's simplistic view of Te Tiriti. The sector has been isolated from Māori learners due to its unattractive technical, complex, and difficult subject matter. Lately, more and more Māori learners have chosen IT as a career, which has challenged my sector to evolve and change.

Key Issue 1: Programmes in the DCIT Sector

The DCIT sector offers a variety of programmes related to information technology, including certificates, diplomas, and degrees. For example, a student who is passionate about database design and administration would enrol in a New Zealand Diploma in Database Administration (Level 6), similar to a student who is interested in specializing in cyber security would enrol in a New Zealand Diploma in Cybersecurity (Level 6), Graduate Certificate in Cybersecurity, Graduate Diploma in Cybersecurity (Level 7), or a similar field

such as a Postgraduate Diploma in IT Security Management (NZQA, 2022c). Alternatively, a student enrolling in a Bachelor of Applied Information Technology (Level 7) would study broader aspects of information technology. Primarily, the DCIT sector has a strong focus on tailoring programmes towards specialised IT skills, which include software engineering, software development, IT network infrastructure, information systems, cyber security, IT systems administration, database administration, web development, computer networking, data analytics, cloud computing, and technical training support (NZQA, 2022c).

The programme's level determines the degree of learning complexity involved. The New Zealand Qualifications Framework (NZQF) is divided into 10 levels covering a range of qualifications from certificates to doctoral degrees. Levels 1 to 3 are delivered at secondary school—secondary school is pre-tertiary education and post primary school, intermediate school education—and programmes at level 5 onwards are delivered at tertiary providers. In some cases, tertiary providers offer level 3 and level 4 foundation programmes as a means of transitioning students into level 5 programmes. The DCIT sector offers programmes from level 4 to level 10, with certificate programmes at level 4 to level 6; degree programmes beginning at level 5; postgraduate diploma programmes at level 8; master's programmes at level 9; and doctoral programmes at level 10.

Key Issue 2: Mātauranga Māori in Information Technology (MMIT)

In 2008, the New Zealand Qualifications Authority (NZQA) Māori Advisory Group, Ngā Kaitūhono, was established. The advisory group was responsible for ensuring that NZQA's approach to matauranga Māori was consistent with its Māori Strategic Action Plan (NZQA, 2022a). However, it was not until 2012 when NZQA embarked on a new 2012-2017 government educational Māori strategic plan, Te Rautaki Māori (NZQA, 2022b), that Ngā Kaitūhono would begin discussions towards contextualising matauranga Māori for the tertiary sector. These discussions would coin a definition for matauranga Māori using the Ranga Framework for explanation (Doherty, 2012).

Figure 1. Ranga Framework[1]

Multi-centric	Generic Knowledge; non-Māori knowledge; principles and values
	Kaupapa Māori theory
Māori-centric	Mātauranga Māori; Māori principles and values; whakapapa, manaaki, kaitiaki, waiata, pōwhiri

Figure 1 is an illustration of matauranga Māori located in the Māori-centric strand, interweaving with the knowledge, principles, and values of NZQA located in the Multi-centric strand. Without a doubt, it was important for NZQA to be aware of perceived differences between general knowledge (multi-centric knowledge) and Māori knowledge

[1] The depiction illustrates the top half of the framework. The original framework includes Iwi-Centric knowledge to which Matauranga Māori can draw its philosophies; however, Doherty described it as de-contextualised knowledge drawn from heterogeneous iwi, and therefore has not been included for this discussion (Doherty, 2012).

(matauranga Māori). The transfer of knowledge to educational curricula and institutional services is unfortunately not always transparent.

For example, the term whanau, which means family in multi-centric knowledge, would be understood as administering to the immediate family when applied to the academic curricula profile for certification in health and wellbeing (Unitec, 2022, p. 10); however, in Māori-centric knowledge, the term whanau would apply to administering to immediate family, relatives, distant relatives, in-laws, or friends. Further, when deliberating tertiary educational services, the phrase "whanau support" would imply support and discussions from family in multi-centric knowledge; however, in Māori-centric knowledge, apart from what has already been imparted, the term would include support and discussions from other students, study groups, tutors, lecturers, programme managers, departments, or the institution. The example illustrates obvious misunderstandings between centric knowledge strands, to which I have observed the term whanau and others such as *whakama* [ashamed, shy, respect], *tautoko* [support], *kanohi ki te kanohi* [face-to-face], or *korero* [chat], cause confusion between Māori learners and non-Māori IT staff.

For one system of knowledge to not subsume the other, the knowledge, values, and principles of multi-centric knowledge must be transferred to those of Māori-centric knowledge. The Ranga Framework proposed *Kaupapa Māori Theory* (Doherty, 2012, p. 20) as a political buffer between each strand. Kaupapa Māori Theory provides the space for constructing new sets of knowledge, values, and principles—for example, whanau or whanau support—when working with matauranga Māori. At this point, I make the claim that philosophies, pedagogies, idioms, and vernacular of matauranga Māori can only be interpreted and applied by those who are Māori. I draw a parallel to that of Kaupapa Māori Research as explained by Smith (2015) to whom in-part infers a *by Māori, for Māori, with Māori* (p. 85) plea. Smith acknowledges outright that research on Māori can only be conducted by Māori to elicit Māori understanding, in other words: elicit matauranga Māori. Thus, I conclude that it is the sphere of Kaupapa Māori Theory where MMIT can emerge, to be interpreted and applied by those who are Māori academics, disciplined in the tertiary sector of IT.

In 2021, Rakena (decedent of Ngapuhi and Tainui) and I (decedent of Ngati Porou and Ngati Raukawa) presented to an audience of information technology specialists, professionals, business, and educators at the national Computing Information Technology Research and Education New Zealand (CITRENZ, 2021) Conference. I hold the title of Principal Academic Staff Member, and Dr. Rakena holds the title of Team Manager at the Waikato Institute of Technology, Aotearoa New Zealand. Between us, we have more than 40 years of tertiary educational training in the sector of DCIT. Listed as "Workshop: Kaupapa Māori Approach to Teaching Computing" in CITRENZ proceedings, we conferred the aforementioned showcase as "Mātauranga Māori in Information Technology."

We presented five target areas with corresponding reflective questions to promote workshop discussions (see Table 1). Target areas were derived from Rakena's PhD thesis, *As Proud as We are: A Case Study of Educational Achievement and Learning for Mature Māori Computing Students* (Rakena, 2016), a unique study that highlighted the struggles and difficulties successful mature Māori students experienced while studying in computing or information technology at tertiary institutions. Findings from Rakena's thesis (pp. 198-210) were extrapolated, interpreted, and contextualised for the CITRENZ audience using Kaupapa Māori Theory.

Table 1 illustrates the contextualisation of the concepts of "stakeholders," "pastoral care," "learning environment," "establish relationships," and "celebrate success" from matauranga Māori IT pedagogy. For deeper understanding of MMIT, each of the target areas is related to the pertinent key issues addressed in this article.

Table 1. Target Area and Workshop Questions presented at the CITRENZ Conference

Target Area	Workshop Question	Contextualisation for MMIT
1) Stakeholders	What responsibilities or commitments are provided for Māori Learners?	• Key Issue 4: Indigenous leadership in this sector • Key Issue 5: Capacity building initiatives
2) Pastoral Care	What pastoral care are provided for Māori Learners?	• Key Issue 4: Indigenous leadership in this sector • Key Issue 5: Capacity building initiatives
3) Learning Environment	How is learning tailored for Māori Learners?	• Key Issue 3: The pedagogy of teaching and delivery
4) Establish Relationships	How does the IT Center enhance good relationships with Māori Learners?	• Key Issue 4: Indigenous leadership in this sector • Key Issue 5: Capacity building initiatives
5) Celebrate Success	How does the IT Center celebrate success for Māori Learners	• Key Issue 4: Indigenous leadership in this sector • Key Issue 5: Capacity building initiatives

Key Issue 3: The pedagogy of teaching and delivery

The theory and practice of teaching and delivery of MMIT is influenced by its psychological development of Māori learners and their ability to digest systemic IT subject matter. At CITRENZ, we also presented MMIT approaches to pedagogical practice. Table 2 presents a refined compositional practicum based on kaupapa Māori theory for the matauranga Māori term whanau.

It is at this point that I want to draw attention to the Waikato's Institute of Technology's Ako: Teaching and Learning Theory & Practice (Ako) framework. Ako relates to an educational framework of teaching and learning approaches interwoven with principles of *ako*. The term ako (to both teach and learn) is dependent on Māori epistemologies of values, knowledge, and views of the world (Pihama et el., 2004; Pere, 1982). The framework covers teaching approaches of inclusive practices (Hockings et el., 2012), work-integrated learning (Cooper et al., 2010), blended learning (Graham et al., 2013), flipped classrooms (University of Texas,

2022), and project-based learning (Buck Institute for Education, 2013). Interwoven are the delivery of learner centred (Biggs, 1999), authentic learning (Pedaste et al., 2015), and inquiry-based learning (Spronken-Smith, 2008, p.2) approaches. The Ako framework was introduced in 2017 (Wintec, 2017), providing Indigenous Māori academics in IT with the opportunity to integrate MMIT pedagogical practices.

Table 2. Practicum based pedagogy approaches for MMIT

Pedagogy Approach	Matauranga Māori in IT
Group activities	Whanau as collective learning
Clustering and timetabling Māori learners	Whanau as a psychological learning enabler
Te Ao Māori themed assessments	Kaupapa Māori Assessment

Te Pūkenga would encourage culturally connected learning content for the betterment of Māori learners. Indeed, connecting through culture provides familiarity to learn unfamiliar content in meaningful ways (Watanabe Kganesto, 2017). For example, in nursing education, Mason Durie's *Whare Tapa Wha* (Durie, 1985) health model guides students with a holistic approach to nursing care. The model uses a house (whare) to symbolizes factors surrounding the patient, with four walls (tapa wha). Applying nursing care to the four walls can improve the well-being of the patient. The model has a culturally intrinsic philosophy, it is simple to apply, and its symbolic representation is meaningful and understood. In contrast, IT concepts do not have a cultural philosophy, they are abstract, and have not been defined in Kaupapa Māori Theory for symbolic representation.

Consider the subject matter of blockchain, which uses Merkle Trees for data encryption with cryptographic hashing (Yang et al., 2019), or hacking prevention with Dijkstra's algorithm (Srivastave et al., 2017). These concepts would require a program practicum in a programming language such as C++, C#, or Java. Tertiary programmes such as Software Engineering or Cyber Security would expect content delivery of the subject matter, which is often delivered in a congested lesson. IT academics are challenged to be the *guide on the side* (King, 1993), and most recently include the Māori learner's world (Te Pūkenga, 2020c). The immediate approach for knowledge transfer in IT would be the *sage on the stage* (King, 1993, p. 30) for reasons of preparation time, ease of delivery, or the ability to regurgitate and retain subject matter during delivery. However, the effect on Māori learners is the inability to associate concepts to their world, inability to understand abstract concepts, and a counterproductive learning delivery. As far as I am aware, Merkle Trees, Dijkstras algorithm and many other IT concepts do not have Māori cultural symbolic connotations. Therefore, IT concepts would remain abstract and unfamiliar to Māori learners until Māori academics specialised in the DCIT sector could come forth.

When IT concepts are not culturally relevant to Māori learners, the delivery and approach can be out of alignment. The adoption of a cultural approach of "whanau as collective learning" can assist Māori learners in acquiring IT concepts more effectively within the teaching/learning environment. The term whanau as redefined for MMIT is a combination of both *Kaupapa whanau* (Cunningham et al., 2005, p. 16) and *Matauranga-a-whanau* (Pohatu, 2015, pp. 32-33). Kaupapa whanau allow groups not based on genealogy or ancestry to come together to share a common purpose. Matauranga-a-whanau examines the behavioural

influences and relationships in whanau while engaged in a common purpose. In addition, Pohatu suggested that *mahana* [states of warmth] is a highly effective enabler for enhancing Māori learner engagement:

> Mahana marks the willingness of the heart, mind, and soul to co-operatively connect their collective wisdom, intelligence, shared and integrated efforts and experiences, with whanau-constructed warmth and its humanising ways. (p. 33)

The significance of belonging to a distinct body of people for Māori learners is essential to their psychological and physiological development. These bodies can exist as small pockets of learning-groups—whanau as collective learning—inside the classroom. IT content can be delivered as group activities to promote images, insights, and energies as collective thoughts. Māori learners can be grouped together to form pockets of kaupapa whanau groups. The purpose of the group activity would be to stimulate mahana within the kaupapa whanau groups. The role of the IT academic becomes the guide on the side, who watches for Matauranga-a-whanau with the intention of directing the kaupapa whanau towards the cruxes of the activity. IT abstract concepts now fall under the purview of the whanau as collective learning, which is easier to digest and comprehend on a collective basis than on an individual basis.

To further support whanau as collective learning, group formations should be continuous and consistent throughout learning. While it may seem to be an attempt on the part of IT academics to prevent the same groups from forming by intentionally assigning groups (Cornell University, 2022), my experience has shown this to be counterproductive and culturally insensitive. I have observed learners grouping naturally based on ethnicity. Asian learners' group with other Asian learners, Indian learners' group with other Indian learners, and thus Māori learners will naturally group with other Māori learners. Webb (2009) claims that the benefits of working in a group depends on the nature of the learners' participation in the group work. Separating naturally formed groups in the learning environment only inhibits participation affecting communication, discussions, sharing of knowledge, or the extent to which help is given and reciprocated. Thus, for the improvement of whanau as a collective learning experience, groups should be formed naturally based on an MMIT pedagogy.

Using "whanau as a psychological learning enabler," the intention is to establish kaupapa whanau groups characterized by endorsed matauranga-a-whanau relationships that are active both inside and outside of the classroom. They should be established during the first year of study by clustering or timetabling Māori learners together, and they should be maintained throughout the course of study. Programmes of study in ITPs (see Table 4) are designed in such a way that in their first year of study, classes tend to be of a similar nature. There are some slight adjustments in the second year of study, when specializations such as Cyber Security or Software Engineering are introduced; however, some classes are taught across all specializations. Within the third year of study, solid kaupapa whanau groups with strong matauranga-a-whanau relationships have been developed, even though classes tend to vary more due to specialist classes. The whanau as collective learning group, which exists both intrinsically and extrinsically to the classroom, then allows Māori learners to cope with individualistic specialist classes.

To conclude this section, we will discuss the use of "te ao Māori themed assessments" for cultural assessment relevance. Johnston (2010) debated the issues of cultural assessments and how they often marginalize student cohorts. When cultural assessments are introduced as a mechanism for assessing performance, disparities arise between those from the culture and

those from the non-culture, with assessment outcomes favouring the former (p. 1). *Kaupapa Māori Assessment* as described by Rameka (2021) is intrinsic to te ao Māori, incumbering all epistemological and ontological Māori philosophies. As a result, kaupapa Māori assessments will be tricky to create in the IT sector because of the interconnected Māori philosophies, and Māori IT academics are in short supply (see Table 4). Accordingly, we can draw an inference between cultural assessment and kaupapa Māori assessment for the DCIT sector as te ao Māori themed assessments.

The MMIT practice of te ao Māori themed assessments consists of using either Māori, *hapu* [sub-tribe], or *iwi* [tribe] in an assessment plan as an abstract or real entity. Māori as an abstract entity for a Data Analytics course assessment could be, for example, creating an analytical dashboard solution for Hauora Aotearoa: Health New Zealand. Hauora Aotearoa (pseudonym) refers to an abstract persona, where the assessment may include one or more dashboard outcomes of Māori interests, but the overall outcomes are typically standard business analytical ventures. Māori as a real entity would be participating with Māori or obtaining consent from Māori to be used in an assessment. An example for a Software Engineering course assessment where Māori are a real entity could be developing a software solution for a Māori-owned company or societal group.

Using this approach, academics in IT may use Māori as an abstract entity or as a real entity. For IT academics, both approaches have the potential to support MMIT in the DCIT sector. As a Māori academic in IT, I have initiated both approaches for te ao Māori themed assessments. Based on my experiences, I believe that Māori as a real entity has far more rewarding learning outcomes than Māori as an abstract entity. Taking a closer look at the Ako framework, Māori as a real entity applies the pedagogy of inclusive practices, work-integrated learning, flipped classrooms, and project-based learning. The delivery is learner centered, and I have witnessed situations in which students have assumed responsibility for their own learning and have shown leadership over the process. As an example, my third-year students in the Bachelor of Applied Information Technology mobile development course produced an app for faculty and students at the Waikato Institute of Technology. They engaged with a cohort consisting of Wintec Māori Academic Achievement Centre staff, Māori Student Support Centre staff, Māori leaders, and Māori elders. Students presented and delivered their solutions to the cohort, and their journey has been documented in Pou Tiaki news media (Hope, 2020). A solution was delivered from a particular group—"the Whanau" group—which was made up of Māori learners and a single Asian learner who was adopted into the group as one of them.

Key Issue 4: Indigenous leadership in this sector

MMIT identifies Indigenous leadership in this sector as Indigenous Māori who hold managerial positions in DCIT or Indigenous Māori who teach on degree level or higher programmes in IT. Our workshop presented MMIT initiatives to CITRENZ acknowledging that our success outcomes (see Table 6) had been attributed to support and leadership on the part of our DCIT sector. Table 3 indicates that there were three types of leadership: institutional leadership, sector leadership, and academic leadership.

Institutional leadership is composed of the executive members and the board of trustees of an institution. They initiate, drive, and enforce policies that promote change within the DCIT sector. A successful implementation of MMIT begins with institutional leadership. MMIT is

fortunate that Te Pūkenga's governmental directions are reshaping better educational services for Māori learners by identifying matauranga Māori as a major enabler. ITPs have reciprocated undertaking institutional reform and political change (TEC, 2020).

Sector leadership are those who hold managerial positions in the DCIT sector. Their role reinforces projects undertaken by institutional leadership; in addition, they can tailor initiatives to the needs of the sector. If MMIT is to have a significant impact on Māori learners in the DCIT sector, Indigenous Māori should hold positions of leadership in the sector. I have seen the rise and fall of Māori development initiatives in our DCIT sector over the past two decades. Initiatives have been discontinued due to budget cuts, insufficient staffing resources, successful and unsuccessful completion of performance criteria checklists, tokenism, lack of cultural understanding, or redirection of institutional directives. When Rakena was appointed Programme Coordinator in 2017, there was an initial adoption of matauranga Māori initiatives, but those were fully embraced by our DCIT sector when Rakena was promoted to Team Manager in 2019. The implementation of MMIT from the perspective of an Indigenous Māori leader has contributed to the successful completion of Māori learners in our DCIT sector**.**

Table 3. Leadership in DCIT for Matauranga Māori in Information Technology (MMIT)

Target Area	Leadership Variants
1) Stakeholders	• Institutional leadership
2) Pastoral Care	• Institutional leadership • Sector leadership • Academic leadership
3) Learning Environment	• Academic leadership
4) Establish Relationships	• Sector leadership • Academic leadership
5) Celebrate Success	• Institutional leadership • Sector leadership • Academic leadership

For the purposes of this article, academic leadership refers to a cohort of Indigenous Māori IT Academics who teach at the graduate level of Information Technology. We have excluded academics who teach courses at levels 2 to 4 of IT sub-degree programmes. This is based on the assumption that knowledge transfer from sub-degree to degree is vastly different. It should be noted that some IT degree programmes have levels 5 and 6 sub-degree programmes that provide a staircase to degree programmes. Therefore, Māori IT Academics who teach on sub-degree programmes of levels 5 and 6 (see Table 4) have been included in the cohort.

To determine the representation of Indigenous Māori IT academic leadership within the DCIT sector, we conducted a study on the sixteen ITP websites. The survey 1) identified the sector from the ITP webpage; 2) identified the IT programmes offered in the sector; 3)

identified the number of teaching staff visible on the webpage from the DCIT sector; 4) verified Indigenous Māori teaching staff by their name, LinkedIn profiles, or publications; and 5) identified the programme level taught by Indigenous Māori.

Table 4 shows the outcomes of the data collected from the ITP website study. The programmes offered were the standard Information Communications Technology (ICT) sub-degree programmes of NZQA (NZQA, 2020) and IT Degree programmes offered by the DCIT sector. Sub-degree programmes from levels 2 to 4 and programmes not listed on NZQA were not collected for the study. Furthermore, programmes associated with moving images, digital media, and media broadcasting were not collected. The ITPs that provided IT programmes were identified by a "y" or a "y*" when the ITP offered multiple programmes at the same level. For example, Ara Institute of Canterbury, offers a New Zealand Diploma Level 6 in both Cyber Security and Systems Administration. Another example is Manukau Institute of Technology, offering a Postgraduate Diploma in Applied Technologies Level 8, and a Postgraduate Certificate in Applied Technologies Level 8. A "u" was applied when there was no visible website for data collection, or it was difficult to decipher plausible data on the website.

Tai Poutini Polytechnic did not have an IT programme listed and therefore was indicated with "n/a." The Manukau Institute of Technology had a staff member whose speciality was digital media and broadcasting, which was not part of the scope of the study and therefore was indicated with "n/a." The Nelson Malborough Institute of Technology and Southern Institute of Technology utilised ZoomInfo.com as their business contact tool. ZoomInfo displayed the name, contact information, job title, location, and last updated from staff member details. However, ZoomInfo did not provide a clear indication of the staff's teaching area, and further investigation using a guest account limited the search to five pages. Therefore, these institutions were indicated with a "u" for unobtainable. Whitireia New Zealand had merged with Wellington Institute of Technology (WelTech), which subsumed data collected thereof.

Findings from Table 4 indicate a deficiency of Māori academic leadership in the DCIT sector. The study identified 196 ITP academic staff members working in the DCIT sector, of which 5 were identified as Māori academics, representing 2.6% of the total. According to the study, there were 2 or 1.0% Māori academics teaching on the IT programmes examined. Furthermore, the number of Māori academics teaching at Level 7 and above within the surveyed programmes was 1, corresponding to 0.5%.

The findings imply that knowledge transfer in the DCIT sector is predominantly delivered by non-Māori academic staff. As a result, MMIT and the support services for Māori learners and the world around them are delivered by 2.6% of Indigenous Māori IT academics. Further, the study indicates that Indigenous Māori hold only 0.5% of IT tertiary teaching and training positions at the upper levels of higher education. Globally appealing topics such as Cyber Security, Software Engineering, Data Analytics, and Network Architecture can increase student numbers, attract learners, and gain support from Te Pūkenga. However, Te Pūkenga would need to orchestrate initiatives for 97.4% of its non-Māori academics in the DCIT sector to fulfil their mandate on providing adequate services for Māori learners studying those topics.

Table 4. 2022 Webpage study of Indigenous Māori academic IT staff from Te Pūkenga[23]

	Digital Computing Information Technology Sector (DCIT)												
	IT Programme							Teaching Staff					
										Level taught by Māori			
Te Pūkenga	New Zealad Certificate (Level 5)	New Zealand Diploma (Level 5)	New Zealand Diploma (Level 6)	Bachelor Degree (Level 7)	Graduate Diploma (Level 7)	Postgraduate (Level 8)	Masters (Level 9)	Number of Staff	Māori	Level 5	Level 6	Level 7	Level 8-Level 9
Ara Institute of Canterbury		y*	y*	y*	y			9	0				
Eastern Institute of Technology		y		y	y	y	y	26	2	u	u	u	u
Manukau Institute of Technology		y	y	y	y	y*	y	11	1	n/a	n/a	n/a	n/a
Nelson Malborough Institute of Technology	y	y		y	y			u	u	u	u	u	u
Northland Polytechnic (NorthTec)		y	y	y	y			2	0				
Open Polytechnic	y	y		y	y*			5	0				
Otago Polytechnic				y	y*			20	0				
Southern Institute of Technology	y	y		y	y	y*	y	u	u	u	u	u	u
Tai Poutini Polytechnic	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0				
Toi Ohomai Institute of Technology		y	y					5	0				
Unitec Insitute of Technology		y	y	y	y	y	y	37	0				
Universal Colledge of Learning		y	y	y*	y*			3	0				
Waikato Institute of Technology	y	y		y	y	y*	y	15	1	y		y	
Wellington Institute of Technology (WelTech)	y	y*		y	y*	y*	y	63	0				
Western Institute of Technology		y						u	1	y			
Whitireia New Zealand	Merged with WelTech												

Key Issue 5: The capacity building initiatives

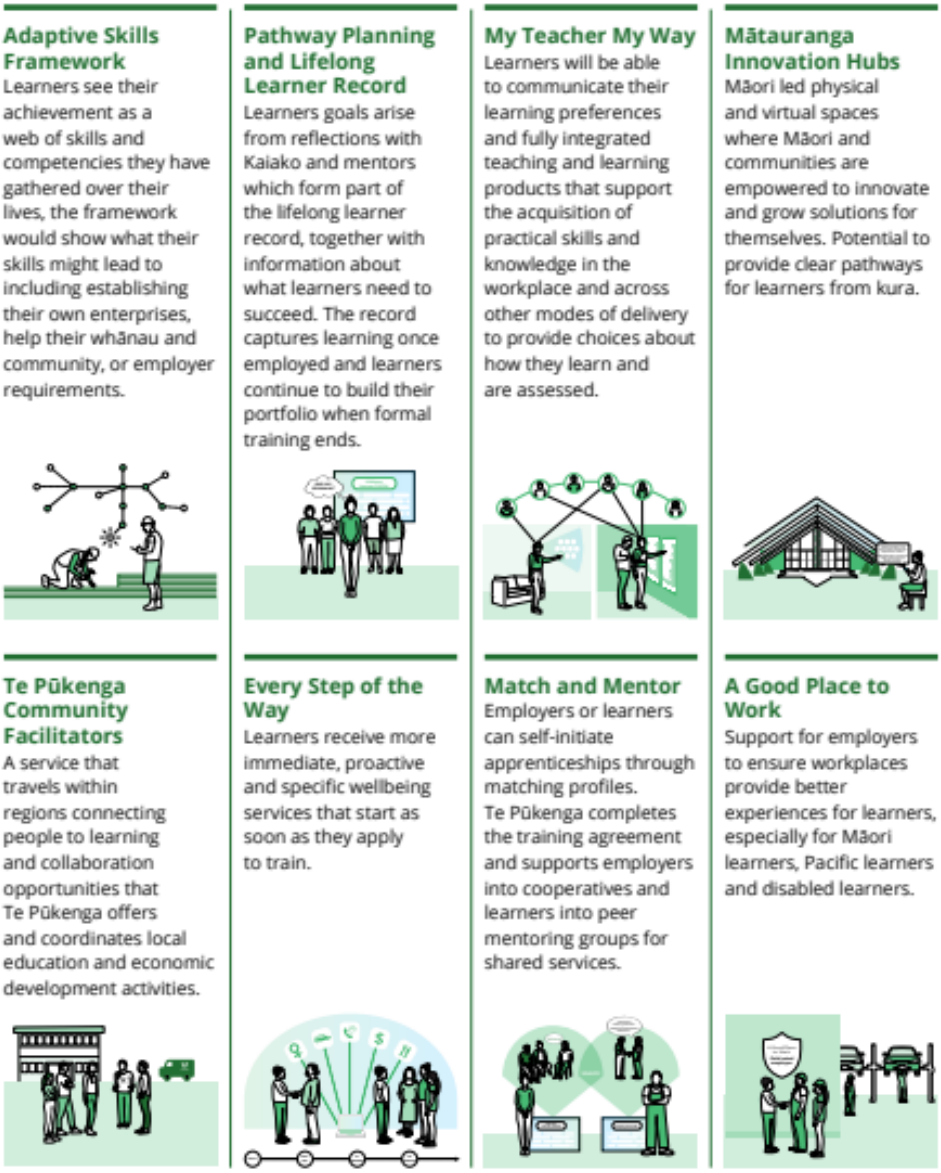
In October of 2021, Te Pūkenga launched their proposed operational model for vocational and on-the-job learning (Te Pūkenga, 2021b). The proposal illustrated eight service concept tenets that could enhance successful learning experiences for learners, their whanau, and connections to employers (see Figure 2). It remains to be seen how these service concepts will be applied and how they will function in each subsidiary. For these reasons, the DCIT subsidiary needs to determine how these services will be deployed and what capacity-building initiatives are appropriate and adequate for learners, especially Māori learners in IT.

We provide a starting point for IT capacity building initiatives by comparing the issues raised in this article with the tenets of the Te Pūkenga service concept. A preliminary assessment of the enablers of capacity building in the DCIT sector for the growth of MMIT and an attunement with Te Pūkenga is provided in Table 5.

Increasing the number of Indigenous Māori academics in IT is the most important focus. The transfer of knowledge always begins in the classroom, and for MMIT practices to be effective for Māori learners, Māori academicians in IT must lead the way. Furthermore, it is equally important to increase the number of Indigenous Māori academics in decision making positions within the DCIT sector. Though this study did not investigate the representation of

[2] y = programme offered, y* = multiple programmes offered, u = unobtainable, n/a = not applicable.
[3] The data collected was based on the visibility of the ITP website at the time (February, 2022) and interpreted from the best of the researcher's knowledge. For accurate depictions of Māori academic representation in the DCIT sector would require a national survey of all participating ITPs which this survey has not provided.

Figure 2. Te Pūkenga service concepts[4]



Māori academics in decision making positions from the ITP websites, we noted the large majority of non-Māori at the CITRENZ conference. A study investigating the representation of Indigenous Māori in decision making positions within the DCIT sector is needed. A call to action is being issued to the DCIT sector to recruit, train, or upskill Māori academics to teach high level IT courses, and to recruit Māori in leadership positions. It would then be feasible to deploy MMIT concepts such as whanau and Te Ao Māori themed assessments once there is a larger cohort of Maori IT academics. To that end, the DCIT sector would be fulfilling its commitment to Te Pūkenga's service concepts and to Māori learners.

[4] From Te Pūkenga (2021b). *Whakaumu I Te Ako: Proposed Te Pūkenga Operating Model*. (p. 40).

Table 5. Enablers for Capacity Building in the DCIT sector for Māori Learner Support

Capacity Building Enablers in DCIT	Service Concept Tenant Alignment
1) Indigenous Māori Academics in IT	• Pathway Planning and Lifelong Learner Record • Matauranga Innovation Hubs
2) Indigenous Māori in decision making positions	• Match and Mentor • A Good Place to Work
3) MMIT whanau – kaupapa whanau and matauranga-a-whanau	• My Teacher My Way • Matauranga Innovation Hubs • Every Step of the Way • Match and Mentor
4) Te Ao Māori themed assessments	• My Teacher My Way • Matauranga Innovation Hubs • Te Pūkenga Community Facilitators • Match and Mentor

Conclusion

This article has advocated a matauranga Māori pedagogy approach to assist the DCIT sector with a deeper understanding of things Māori. MMIT was defined as a sphere of knowledge to which terms such as whanau could be interpreted and redefined to support matauranga Māori pedagogy delivery in information technology. It will take more work to ensure additional terms, such as whakama, tautoko, kanohi ki te kanohi, or korero can be appropriately interpreted for the DCIT sector. However, with Māori IT academic teaching staff constituting 1% of the Te Pūkenga DCIT sector teaching in the programmes described in this article, the work ahead appears bleak.

According to the study survey, there is a shortage of Māori IT academics which may have resulted from a limited recruitment pool that has existed for some time. It has already been discussed in this article that IT courses are unattractive for Māori learners, and Rakena (2016) described the difficulties his study participants encountered while studying in IT and computer science. With such obstacles having pre-existed prior to the delivery of MMIT pedagogy and with many lucrative IT careers currently offered in industry, the DCIT sector may struggle to fill the void of Māori IT academics. This article does not fully address the retention rates of Indigenous Māori academics in the DCIT sector but highlights the importance for further research and investigation.

Despite the challenges ahead, Rakena and I presented outcomes at CITRENZ corresponding to Māori learner success through MMIT strategies. The data presented in Table 6 was taken from our institutions Kia Eke Panuku tracking system. The Kia Eke Panuku system, tracks student course completion retention rates from the time the student contacts the DCIT sector or makes an enquiry (0 – Te Ara Tauira), to the time they complete their qualification or re-enrol for the following semester (7 - Kia eke panuku). The programmes shown are that of the

Bachelor of Information Technology, New Zealand Diploma in Information Technology, and the New Zealand Certificate in Information Technology Technical Support.

The percentage results from the Kia Eke Panuku system show steadily increasing percentages between 2019 and 2021. Importantly, in 2021, Māori learner retention and completion rates were significantly higher than the 50% average for their institution. Table 6(a) shows a 23.91% increase with corresponding increases of 21.42% and 19.23% for Tables 6(b) and 6(c) respectively.

Table 6: Student successful completion retention rates for Māori learners

(a) Māori learner retention completion rates for the Bachelor of Applied Information Technology was 73.91%, when compared to the institutions average of 50% in 2021

Māori Student Successful Completion Retention for
Bachelor of Applied Information Technology (2019-2021)

Kia Eke Panuku		2019	2020	2021
0	Te Ara Tauira - Enquiry or first contact	61	36	23
1	Kia tika - Application made but not pursued	1	1	1
2	Manaaki tangata - Application made but did not accept		3	2
3	Whakamana I te tangata - Cancelled before class began	3	1	3
4	Mahi tahi - Cancelled before 10% attendance cut-off			
5	Whakaaro whanui - Didn't complete or lost after 10% cut-off	2	1	
6	Kia tupu kia hua - Completed 1st Semester but did not complete qual. Or re-enrol	6	4	
7	Kia eke panuku - Completed qual. Or re-enrolled following semester.	49	26	17
	Percentage	80.32	72.22	73.91
	Total Attrition	12	10	6

(b) Māori learner retention completion rates for the New Zealand Diploma in Information Technology Technical Support was 71.42%, when compared to the institutions average of 50% in 2021

Māori Student Successful Completion Retention for
New Zealand Dip. Information Technology Tech Suppt. (2019-2021)

Kia Eke Panuku		2019	2020	2021
0	Te Ara Tauira - Enquiry or first contact	8	9	14
1	Kia tika - Application made but not pursued	1	1	1
2	Manaaki tangata - Application made but did not accept			3
3	Whakamana I te tangata - Cancelled before class began		1	
4	Mahi tahi - Cancelled before 10% attendance cut-off		1	
5	Whakaaro whanui - Didn't complete or lost after 10% cut-off	2		
6	Kia tupu kia hua - Completed 1st Semester but did not complete qual. Or re-enrol	1	4	
7	Kia eke panuku - Completed qual. Or re-enrolled following semester.	4	6	10
	Percentage	50	66.66	71.42
	Total Attrition	4	3	4

(c) Māori learner retention completion rates for the New Zealand Certificate in Information Technology was 69.23%, when compared to the institutions average of 50% in 2021.

Māori Student Successful Completion Retention for
New Zealand Cert. Information Technology Level 5 (2019-2021)

Kia Eke Panuku		2019	2020	2021
0	Te Ara Tauira - Enquiry or first contact	11	12	13
1	Kia tika - Application made but not pursued	1	1	1
2	Manaaki tangata - Application made but did not accept	1	1	2
3	Whakamana I te tangata - Cancelled before class began	7	1	
4	Mahi tahi - Cancelled before 10% attendance cut-off			
5	Whakaaro whanui - Didn't complete or lost after 10% cut-off		2	
6	Kia tupu kia hua - Completed 1st Semester but did not complete qual. Or re-enrol	1	1	1
7	Kia eke panuku - Completed qual. Or re-enrolled following semester.	1	6	9
	Percentage	9.09	50	69.23
	Total Attrition	10	6	4

The MMIT initiatives in IT presented at CITRENZ have proved to be operationally successful. There is merit in considering the MMIT concept of whanau, te ao Māori themed assessments, and Indigenous leadership in this sector. Success can also be contributed to the supporting institutional leadership and the comradery of IT staff. Nevertheless, as an Indigenous Māori academic teaching on high level IT degree programmes, I have often become inspired by the expressions of Māori learners when they see one of their own lecturers teaching in an area of expertise that is underrepresented by Māori.

References

Biggs, J. (1999). What the student does: Teaching for enhanced learning. *Higher Education Research & Development*, *18*(1), 57-75. http://dx.doi.org/10.1080/0729436990180105

Buck Institute for Education [BIE]. (2013). Project-based learning for the 21st century. http://www.bie.org

CITRENZ. (2021). *CITRENZ Programme.* CITRENZ 2021, Wellington, New Zealand. https://itx.nz/CITRENZ#Programme

Cooper, L., Orrell, J., & Bowden, M. (2010). *Work integrated learning: A guide to effective practice*. Routledge. https://doi.org/10.4324/9780203854501

Cornell University. (2022). *Center for teaching innovation: How to create and manage groups.* https://teaching.cornell.edu/resource/how-create-manage-groups

Cunningham, C., Stevenson, B., & Tassell, N. (2005). *Analysis of the characteristics of whānau in Aotearoa*. Ministry of Education.

Doherty, W. (2012). Ranga framework—He Raranga Kaupapa. In Haemata Ltd, T. Black, D. Bean, W. Collings, & W. Nuku (Eds.), *Conversations on Mātauranga Māori* (pp. 15-36). New Zealand Qualifications Authority. https://www.nzqa.govt.nz/assets/Maori/ConversationsMMv6AW-web.pdf

Durie, M.H. (1985). A Maori perspective of health. *Social Science & Medicine, 20*, 483–486. https://doi.org/10.1016/0277-9536(85)90363-6

Gerritsen, J. (2021, October 11). Tertiary institutions given 10 years to end minority pass rate disparity. *RNZ*. https://www.rnz.co.nz/news/national/453303/tertiary-institutions-given-10-years-to-end-minority-pass-rate-disparity

Graham, C.R., Woodfield, W., & Harrison, J.B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *The Internet and Higher Education*, *18*, 4-14. https://doi.org/10.1016/j.iheduc.2012.09.003

Hockings, C., Brett, P., & Terentjevs, M. (2012). Making a difference-inclusive learning and teaching in higher education through open educational resources. *Distance Education*, 33(2), 237-252. http://dx.doi.org/10.1080/01587919.2012.692066

Hope, S. (2020, September 17). Waikato student produced app makes Waiata easy and accessible. *Stuff*. https://www.stuff.co.nz/pou-tiaki/te-reo-maori/300110042/waikato-student-produced-app-makes-waiata-easy-and-accessible

Johnston, M. (2010). Towards culturally appropriate assessment? A contribution to the debates. *Higher Education Quarterly, 64*(3), 231–245.

King, A. (1993). From sage on the stage to guide on the side. *College Teaching 41*(1), 30-35. http://dx.doi.org/10.1080/87567555.1993.9926781

NZQA. (2022a). *Ngā Kaitūhono*. New Zealand Government. https://www.nzqa.govt.nz/maori-and-pasifika/te-rautaki-maori/nga-kaituhono/

NZQA. (2022b). *Te Rautaki Maori a te Mana tohu Matauranga: The Maori strategic plan for the New Zealand Qualifications Authority.* New Zealand Government. https://www.nzqa.govt.nz/assets/Maori/Te-Rautaki-Maori/Te-Rautaki-Maori-Draft-Strategy.pdf

NZQA. (2022c, July). *Qualifications – search results.* New Zealand Government. https://www.nzqa.govt.nz/nzqf/search/results.do?q=&area=76450&searchSubject=Information+Technology&type=&lvl=&credit=&status=Current

Pedaste, M., Mäeots, M., Siiman, L.A., de Jong, T., van Riesen, S.A.N., Kamp, E.T., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review, 14*, 47–61. DOI: http://dx.doi.org/10.1016/j.edurev.2015.02.003

Pere, R. (1982). *Ako: Concepts and learning in the Maori tradition*. Hamilton.

Pihama, L., Smith, K., Taki, M., & Lee, J. (2004). *A literature review on Kaupapa Maori and Maori education pedagogy*. https://akoaotearoa.ac.nz/download/ng/file/group-996/n3979--literature-review-on-kaupapa-mori-and-mori-education-pedagogy.pdf

Pohatu, T. (2015). Matauranga-a-whanau: He Konae Aronui. *Aotearoa New Zealand Social Work, 27*(4), 32-38.

Rakena, B. (2016). *As proud as we are: A case study of educational achievement and learning for mature Maori computing students.* [Doctoral dissertation, Curtin University]. espace. https://espace.curtin.edu.au/bitstream/handle/20.500.11937/1716/226838_Rakena%202015.pdf?sequence=2&isAllowed=y

Rameka, L.K. (2021). Kaupapa Māori assessment: Reclaiming, reframing and realising Māori ways of knowing and being within early childhood education assessment theory and practice. *Frontiers in Education, 6, 1-9.* https://doi.org/10.3389/feduc.2021.687601

Royal, T.A.C. (1998, January). *Mātauranga Māori: Paradigms and politics*. A paper presented to the Ministry for Research, Science and Technology. https://www.mcguinnessinstitute.org/wp-content/uploads/2016/10/Politics-and-Paradigms-Charles-Royal.pdf

Sadler, H. (2007). Mātauranga Māori (Māori Epistemology). *The International Journal of the Humanities: Annual Review, 4*(10), 33-46. http://dx.doi.org/10.18848/1447-9508/CGP/v04i10/58246

Smith, L.T. (2015). Kaupapa Māori research: Some Kaupapa Māori principles. In L. Pihama & K. South (Eds.), *Kaupapa Rangahau a reader: A collection of readings from the Kaupapa Maori research workshop series led* (pp. 46–52). Te Kotahi Research Institute. https://researchcommons.waikato.ac.nz/handle/10289/12026

Spronken-Smith, R. (2008). *Experiencing the process of knowledge creation: The nature and use of inquiry-based learning in higher education.* University of Otago. https://ako.ac.nz/assets/Knowledge-centre/inquiry-based-learning/SUMMARY-REPORT-Inquiry-based-Learning.pdf

Srivastave, V. K., Umar, M., & Mangla, K. (2017). Prevention against hacking using Dijkstra algorithm. *International Journal of Advance Research in Science and Engineering, 6*(5), 645-652. http://www.ijarse.com/images/fullpdf/1495456434_ijarse651.pdf

TEC. (2020). *Reform of Vocational Education (ROVE).* New Zealand Government. https://www.tec.govt.nz/rove/reform-of-vocational-education/

Te Pūkenga. (2020a). *Introduction to Te Pūkenga*. https://xn--tepkenga-szb.ac.nz/news/category/news/introducing-te-pukenga

Te Pūkenga. (2020b). *Listening to our learners.* https://xn--tepkenga-szb.ac.nz/news/category/News/listening-to-our-learners

Te Pūkenga. (2020c). *Te Pae Tawhiti -2020 to 2025 working draft Te Tiriti O Waitangi excellence framework.* https://xn--tepkenga-szb.ac.nz/assets/Publications/TTW_Excellence_Framework_Nov_2020_Working_Draft.pdf

Te Pūkenga. (2021a). *Te Pae Tawhiti: Insights into Te Tiriti o Waitangi and Maori equity practices throughout our network.* https://xn--tepkenga-szb.ac.nz/assets/Publications/Te-Pae-Tawhiti-Insights-into-Te-Tiriti-o-Waitangi-and-Maori-Equity-practices-throughout-our-network.pdf

Te Pūkenga. (2021b). *Whakaumu I Te Ako: Proposed Te Pukenga operating model.* https://xn--tepkenga-szb.ac.nz/assets/OM/Proposed-Operating-Model.pdf

Te Tiriti o Waitangi [Māori version]. (1840, February 6). New Zealand Government. https://waitangitribunal.govt.nz/treaty-of-waitangi/te-reo-maori-version/

Unitec. (2022). New Zealand certificate in health and wellbeing (social and community services). https://www.unitec.ac.nz/sites/default/files/public/NZCHW-MENTHLTHAS.pdf

University of Texas at Austin Faculty Innovation Centre. (2022). *Flipped Classroom*. https://facultyinnovate.utexas.edu/teaching/strategies/flipping/different

Watanabe Kganetso, L.M. (2017). Creating and using culturally sustaining informational texts. *The Reading Teacher 70*(4), 445-455. http://dx.doi.org/10.1002/trtr.1546

Webb, N. M. (2009). The teacher's role in promoting collaborative dialogue in the classroom. *British Journal of Educational Psychology, 79*, 1–28. http://dx.doi.org/10.1348/000709908X380772

Wintec. (2017). *AKO: Teaching and learning directions 2017-2020*. Wintec. https://wintecac.sharepoint.com/sites/hru/Teaching&LearningDirections/Pages/Principles-andPractices.aspx

Wintec. (2022a). *Early childhood teacher: Kaiako Kōhungahunga*. https://www.wintec.ac.nz/future-you/explore/jobs/education/early-childhood-teacher

Wintec. (2022b). *Postgraduate Health and Social Practice 2022: A prospectus for health professionals considering postgraduate study.* https://wintecprodpublicwebsite.blob.core.windows.net/sitefinity-storage/docs/default-source/study-at-wintec/programme-

guides/postgraduate_health_social_practice_programme_guide_webf2dcc05d24ac672cb0a7ff0000a25e42.pdf?sfvrsn=dac1c333_50

Yang, X., Liu, J., & Xiaohe, L. (2019). Research and analysis of blockchain data. *Journal of Physics: Conference Series 1237*(2): 022084. https://doi.org/10.1088/1742-6596/1237/2/022084.