

# Demographic Impacts: ICT Education in Rūmaki Reo

**Dr Terri C. Lomax**

School of Computing and Mathematical Sciences,  
Auckland University of Technology

[tess@aut.ac.nz](mailto:tess@aut.ac.nz)

**Ruth Lemon**

Te Whānau o Te Uru Karaka,  
Newton Central Primary School, Auckland

[ruth.lemon@gmail.com](mailto:ruth.lemon@gmail.com)

## Abstract

Radical changes in the demographic profile of New Zealand, particularly in the Auckland region, cause us to reflect on the impact of such changes, and give rise to some interesting questions – including whether we still accept Hofstede’s analysis of New Zealand as an individualistic country. We have been interested in the adoption of IT by Māori, in the low numbers of Māori taking IT courses at university, and factors affecting the success of these Māori students. We explore the impact of Ta Te Ao Māori on educational approaches and if these impacts also apply to other collectivist cultures.

*Keywords:* Demographics, Hofstede, Māori, Education.

## 1 *Hei Whakatakinga: Introduction*

Hofstede (1983) studied the impact of the personal values of IBM employees, as they related to their work situation. Individual cognitions arise from patterns of thinking, feeling and acting learned in early childhood. Comparing the mind to a computer with a mental programme, Hofstede’s model consists of three elements: the universal programme, the collective programme and the individual programme. The universal programme includes love, joy, and sorrow: common for all people. The collective programme includes culture learned not inherited whilst the individual programme holds the personality of each person, partly inherited and partly learned. According to Hofstede’s model, technical terminology is a cultural construct, and genres and conventions are “norms” that fit particular cultures. Hofstede’s model gives us a framework with which to talk about the impacts of culture on uptake of IT skills, management, and related issues.

An important critique of Hofstede’s work is that culture does not necessarily line up with national boundaries. New Zealand is a country where there are distinct cultures – it is a bicultural country, now in the authors’ view as argued below, rapidly becoming a multicultural polyglot with an increasing proportion of brown faces. When we investigate regional differences further problems with Hofstede’s analysis become apparent.

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When Hofstede profiled New Zealand in the late 1970’s, 86% of the population identified as NZ European. (Statistics NZ, 1976 census). Hofstede’s analysis was therefore based upon a predominant workforce in IT being white, male and European; and he classified New Zealand as an individualistic culture. However, in the 2006 census (Stats NZ (2006)), only 67.6% identified as European, [another 11.1% as New Zealander], 14.6 identified as Māori, 6.9% identified as Pacific Peoples, and 9.2% identified as Asian. The Asian ethnic groups grew the fastest, increasing from 238,176 in 2001 to reach 354,552 in 2006 (an increase of almost 50 percent).

Table 1 illustrates some of the regional variations in demographics in New Zealand. The Auckland region, containing one third of the New Zealand population, is significantly multicultural. Hofstede’s suggestion that New Zealand is an “individualistic” country probably is no longer accurate in Auckland, [whereas the Tasman Region may well still fit that analysis]. The middle of the North Island is clearly bicultural. The South Island is a predominantly European population (as exemplified by the Tasman region). Northland (30% Māori) and Gisborne (47% Māori) regions have significant Māori populations, but like the Waikato (21% Māori) and Manawatu-Wanganui (20% Māori) regions are bicultural. Value sets originally from Māori culture to a lesser or greater extent pervade New Zealand. We expect that demographic changes will impact on delivery of ICT education.

This paper considers firstly relevance of Māori cultural differences to the uptake of information technologies. Secondly we consider the role of technology in the classroom, and fundamental cultural considerations that impact on how we teach in Tā Te Ao Māori. We outline a research project that looked at meta-cognitive processes in constructing web sites, utilising an action research methodology in a kaupapa Māori framework, in a rūmaki reo classroom. The research outcomes are developed into a relational framework for teaching “Ako Hangarau” and some principles for teaching are outlined for teaching in a collectivist (Maori) culture. These principles can be explored and researched at different levels of education, to discover if they can be applied in wider contexts.

## 2 *Māori Cultural Difference.*

Māori society, we argue differs radically from European society in New Zealand. Māori have been noted to form an underclass as a consequence of colonisation and land thefts which have impacted on socio-economic status (Rankin 1995, Bishop 2007). Whilst nearly 30 percent of New Zealand households had computers as at the 1998 e

**Table 1. New Zealand Population Demographics by ethnicity. (source: Statistics New Zealand 2006 census)**

Regional Council	European	Māori	Pacific Peoples	Asian	Middle Eastern/Latin American/African	Other Ethnicity	
						New Zealander	Total Other Ethnicity
Auckland Region	0.56	0.11	0.14	0.19	0.01	0.08	0.08
Gisborne Region	0.54	0.47	0.03	0.02	0.00	0.09	0.09
Manawatu-Wanganui Region	0.73	0.20	0.03	0.04	0.01	0.12	0.12
Tasman Region	0.83	0.07	0.01	0.01	0.00	0.15	0.15
<b>Total</b>	0.68	0.15	0.07	0.09	0.01	0.11	0.11

HES survey, only 23 percent of Māori households and 17 percent of Pacific Island households had computers. (NZ Govt, 1998). The Asian population, also a collectivist society, exhibits a very different social dynamic. Households containing at least one person of Asian thnicity at the 2001 Census had the highest level of Internet access, with 58 percent of households connected. (Stats NZ (2004)).

Khaled et. al.(2006) suggest that the cultural differences between NZ Europeans and Māori are sufficiently different that games aimed at persuasion (anti-smoking) require a different emphasis for Māori versus European audiences. They point out that much of the variation in cultural differences are due to the individualism versus collectivism dimension that Hofstede defined, and this has marked implications for relationships between people, and the content of their game. They point out that whilst designers of Persuasive Technologies might not consciously embed their cultural assumptions into their products, culture is sufficiently pervasive that it affects a person's attitudes, beliefs, and assumptions in ways they are not able to consciously identify. It is useful to consider characteristics of Māori society in contrast to the European population, because such differences may inform us about the changes we might expect to see over time in the way we operate as a society, and in terms of the educational issues we may have to face.

Duncker (2002) pointed out that the use of libraries did not fit some (older) Māori students at Waikato University, because they were uncomfortable with the technology, and also had (cultural) assumptions about libraries - for example the use of Western classification schemes were said to make Māori material relatively un-accessible to Māori. Duncker suggested that digital libraries in particular emphasised individualism rather than collectivism, which made the use of digital libraries laborious for Māori. Her small sample, although not representative of the majority of Māori students in CS and IS classes with whom we are familiar (who are young, and computer literate), led to a conclusion that there are clashes for Māori in Western style library classification systems and library content, due to a lack of culturally specific

classification systems on the library side, and a lack of awareness of Western classification systems on the Maori side. She points out that Māori have traditional tribal knowledge repositories that are emotionally and cognitively different from Western Libraries, and that Western Libraries classification systems misrepresent Māori content. She suggests that this problem is not limited to Māori, but affects all indigenous peoples, in particular those who have an oral tradition.

Massey et. al. (2001) point out that culture partially determines a person's communication preferences and behaviour. People choose a communication style based upon how they predict the receiver will respond. In making such predictions, communicators rely on experience of past events, and future expectations. A fundamental cornerstone of Tā Te Ao Māori is whakapapa, the relationships between and before, a genealogical ordering and sequencing of the world. According to Ranginui Walker (1996), the concepts of evolution and progression are also inherent in whakapapa. Whakapapa lines link us right back to the creation stories and the understandings of the beginnings of the world. Land is integral to whakapapa. Identity and mana (standing) result from whakapapa not only who whanaunga (family) are, but to which maunga (mountain), awa (river), whenua (land), waka (canoe) and marae (home village) this whakapapa ties the person. Each and every element, person or phenomena can be traced, acknowledged and positioned in relation to others (Royal 1998).

Whakapapa is therefore central in the communication of information and of understandings. Through myth, song, whakataukī, there exists an infinite tapestry of countless threads. By re-weaving or integrating these threads whakapapa functions as the foundation of many understandings. Māori Marsden and Te Aroha Henare (1992) comment on the pervasiveness of whakapapa as a tool for transmitting knowledge. Lomax (1995) pointed out that whakapapa is the basis for codifying Māori "scientific" knowledge. Bevan-Brown (1998) and Royal (1998) examined whakapapa as a tool in Māori research, including:

- establishment of whānau connections between the researcher and the researched

- as a metaphor for the development and presentation of the research process
- examining the nature and origin of phenomena, connections, relationships, trends
- to locate phenomena and predict future phenomena.

Relationships are all important. Maori apply whakapapa not only to human relationships, but also as a meta-model for codifying knowledge about the environment and relationships between humans and the environment.

### 3 Tā Te Ao Maori and Computing.

Teachers of ICT are technical communicators. Kampf (2002) suggests that it is the technical communicators who need to become aware of differing communication patterns that arise because of cultural differences. Intercultural interactions can result in paradigm shifts.

Moeahu-Teitinga (2005) asserts that Māori had a strong oral tradition for maintaining knowledge; they maintained strategies for communication, building and developing technologies and managing, storing and transmitting information as an integral part of who Māori were, and rapidly acquired formal literacy when new modes of communication were made available. Whilst most Māori are literate, there is still a preference for face-to-face communication, especially for important issues, and for education. One of the major perceived issues for Maori with new technologies is contained in the following question: When you adopt a technology, do you adopt the cultural assumptions that go with it?

Pinkard (2004) points out that there is a dearth of articles in the educational literature that deal with cultural impacts on development of computer-based learning tools. He says

“One might ascertain from this silence that the cultural diversity represented in classrooms is irrelevant to the design process or that learning tools are being developed to be culturally neutral. However, I argue that the concept of a culturally neutral computer-based learning tool is an oxymoron ....” (page 415)

Stewart (1993) asks whose knowledge is validated by the use of technology as a medium for instruction and in whose interests and for whose needs is the planning done. Does the use of computers undermine ngā taonga tuku iho (treasures from our ancestors)? Stewart’s research on specific pieces of software utilised in schools as part of the taha Māori curriculum points out that an all-Pākehā team designed the software. How much connection or relevance could it have to Māori students when the mindset that developed it defines Māori from an outsider’s perspective? Are computers just another tool for colonisation, or is it possible to utilise the tool to maintain diverse cultural identities? Are there better ways of teaching ICT?

Kampf (2005) points out that physical theories are constructions of the human mind – and are artifacts of

dynamic, man-made cultures. Technical disciplines are tied to the cultural systems in which they function. Keegan (1996) argues that you cannot place an indigenous student, whether Māori or Pacific Island, alone in a foreign environment, teach them through foreign or alien pedagogies and expect success. This gives rise to some fundamental questions about culture and how demographic changes are going to impact on education. Some questions one might ask are:

- Given the oral tradition of Māori how do we develop computer literacies from an oral cultural stance?
- How can we utilise computing tools within a tā te ao Māori space?
- How do we reframe our teaching practice in ICT to take into account the Māori world-view and Māori identity?
- Does the Māori world-view have relevance to other collectivist cultures – and if so, what impact will this have on teaching practice?

Search (1999) suggests that it is valuable to reconsider how indigenous cultures view space, time and action, as a basis for reconsidering how we design computer interfaces. Symbols are a consequence of action, and it is the action that integrates sensory experiences into an understanding of complex relationships. Search suggests that Western concepts of space and time are limited by Newtonian concepts of causality and have a linear perspective that indigenous cultures do not have. Indigenous cultures utilise a temporal continuum where time and space are collapsed into a single frame which encompasses past, present and future. Search suggests that suitable metaphors, icons and webs of association allow us to collapse time and space in a computing environment.

Cuban (1993 in Warschauer 1999:40-41) studied educational innovations within a period of 110 years (including the use of film, radio and TV) and found that none had major impacts or changed American education. Cuban suggested that deeply held cultural or societal beliefs about knowledge, teaching practice, and how (and what) children should learn, maintains the stasis in education. These deep beliefs ensured that policymakers, administrators, managers and teachers prescribe courses that "inculcate into children the prevailing social norms, values, and behaviours that will prepare them for economic, social, and political participation in the larger culture". Cuban’s work is closely aligned with the ideas and thinking underpinning this research.

### 4 Research Process

This research was based at Newton Central School, a decile 6 inner-city Auckland school. The focus of the research lay in the planning and implementation of two online units in an immersion Māori language classroom. The class group consisted of between 14-22 students over the two units, with Māori students, some also having Pacific Island or Pākehā descent. The group ranged from year 4-6, with one year 7 student during the first unit.

#### 4.1 Kaupapa Māori Research

Kaupapa Māori research is framed within a Kaupapa Māori framework (Bishop 1996, Tupu, Ngature & Young 2004). Kaupapa Maori as a theoretical approach arose out of the need for a re-claiming of power and control, a re-negotiation of the sphere of interest and creation of an academic sphere in which Māori voices are privileged. That is, it is a framework where

*...to be Māori is taken for granted. Māori language, culture, knowledge and values are accepted in their own right (Smith 2003)*

Kaupapa Māori has emerged for the same reasons as indigenous research 'taukumekume' where there is an ongoing counter-hegemonic struggle, acknowledging that there is a need to create an academic space from which Māori researchers can name their own world, and can theorise about the dynamics and relationships of that world. The emergence of kaupapa Māori research coincided with the struggles to develop alternative empowering systems of education, something Graham Smith argues helped in the developing of a range of strategies with which to deal with and engage in theory-making and research in new ways that dealt with, or started dealing with issues of colonisation and inequality in education (in Smith 2005:90).

Jill Bevan-Brown (1998) summarised the literature on Māori research and identified ten important components. Important for this work are the following:

kaupapa Māori research comes from a Māori cultural base;

the researcher is involved in the research with full knowledge of the rights and responsibilities that accompany the research journey;

the journey begins with Māori identified needs and goals and is of benefit to Māori communities;

the research celebrates and acknowledges 'being Māori', exploring engagements and connections with the research question.

One criticism of this framework, namely the subjectivity of the researcher, is a problem shared with action research.

#### 4.2 Action Research

Action research was originally based within the teaching profession, but has grown and evolved into a complex area, with a range of approaches, researcher positions and research goals, in which knowledge is viewed as "a living process" (McNiff and Whitehead 2002:18). It is through the act of doing, reflecting, and re-doing, that you learn and grow as a practitioner. As a discipline, it moves away from the traditional theory-into-practice model, towards a theory being developed as a result of reflection on practices. "Observations turn into descriptions turn into explanations" (2002:22). Action Research has strong parallels with Pohatu' Āta framework (2000).

Carr and Kemmis (1983, in Clear 2000:89) define three main forms of action research:

- Technical: the researcher is an expert and facilitator of the research, which sometimes focusses on "efficiency and effectiveness of practices" (Carr and Kemmis, 1983, in Clear 2000:90). In other words, the research focus is work-based. How can existing practices be improved?
- Practical: the researcher collaborates with the practitioner, with the aim of improving practitioner practices.
- Emancipatory: the participants share responsibility for both practice and the action research process.

#### 4.3 Links between Action Research and Kaupapa Māori theory

The most obvious similarity or commonality between action research and kaupapa Māori theory is that of the praxis between theory and practice. Those who are involved or committed to the area, practising or living in the field, are those who do the research. Theory cannot be divorced from practice, nor can the research be divorced from either the participants or the beneficiaries. Thus a kaupapa maori research model best maps to the 'emancipatory' form of action research.

McNiff and Whitehead (2002:3) argue that action research is not a means of coming to a harmonious conclusion in thought and action, but "a problematic practice of coming to know through struggle." Kaupapa Māori rose out of a need to fight, to re-negotiate, a way of reclaiming that which has been lost or taken, and acts as a focal lens for 'te whakahau i te wairua Māori ki roto i a tātou' (the revitalisation of te reo me ōna tikanga within us). This process can be one of self-reflection, although there are many methodological approaches to both kaupapa Māori research and action research (cf. Bevan Brown, 1998? Bishop, 1996?).

#### 4.4 Methodology

Below is a summary of the most significant differences between the two online units:

2003 Unit	2005 Unit
Individual work.	Tuakana teina, a focus on group work / peer support. Some individual work.
A set topic and information.	Each group chose and scoped their topic.
The stories and origins of the internet.	The stories. The students' relation to the medium.
Team-taught.	Taught alone.
Teacher-driven assessment with a competency focus. A technical base.	Feedback integral. More of a focus on the iterative process of design.
One term – ten sessions	Three terms, with extra

of 1½ hours. Timeframe too short. Unrealistic expectations.	time set aside on a small-group basis, as needed.
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Tools used to record the research journey included:

- Teacher's journals kept on a weekly basis
- Lesson plans, with a brief reflection of key notes
- Photos taken within the class environment
- Saving copies of the students' work at differing stages of the unit
- Collaboration and discussion with colleagues in order to reflect on units that had been delivered and re-think how units could be improved
- Feedback, dialogue and communication from the rōpū (group) at and during all stages of the 2005 unit

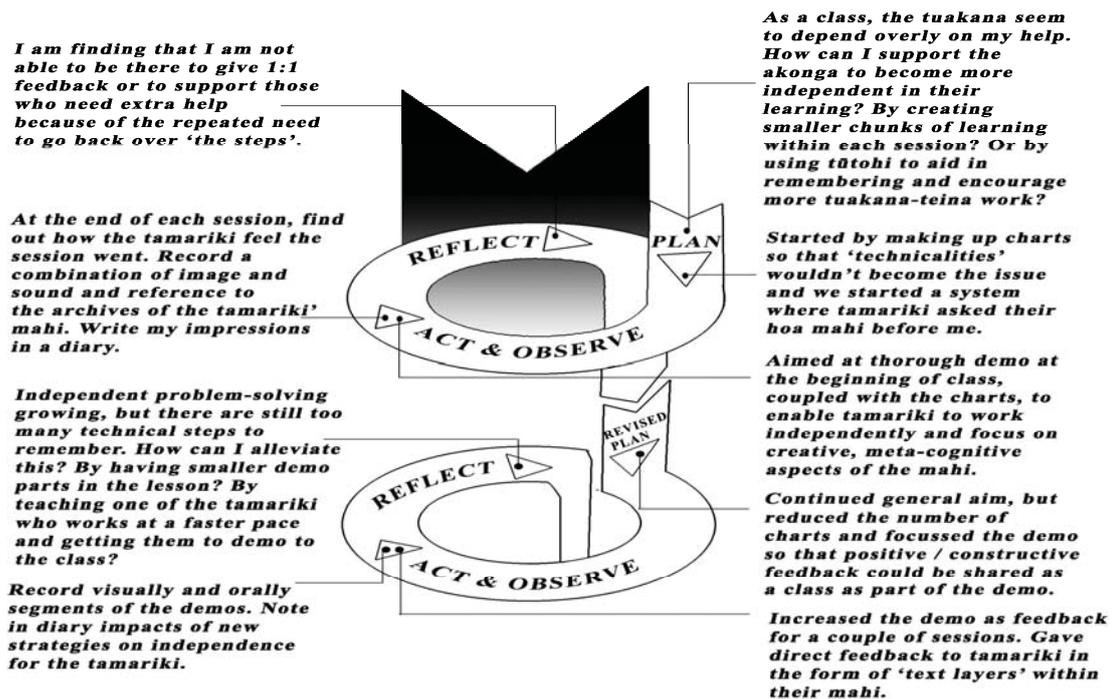
A comparative analysis of the two units allowed a series of principles to be developed, which guided subsequent deliveries of this unit. The findings from these initial cycles are currently being implemented in the classroom. The third cycle of the online units was completed by Term 3, 2006.

#### 4.5 Research Outcomes – what we found!

There are two key outcomes from this work: the development of a teaching framework and the development of a series of principles which have enhanced our ICT learning. Key to both of these outcomes is the understanding that children can achieve way beyond expectations if the right approach is taken.

Piagetian theory suggests that children aged 7-11 are at the stage of 'concrete operations'. Logical sequences and low-level abstract thinking (eg. adding with numbers instead of objects) are seen as a natural progression. Our experience is that tamariki from the age of 8 were attaining the level of 'formal operations' from 11-15. There was a high level of motivation and creativity that reflects the communication in a visual and oral manner. Tamariki have filmed and edited music videos, scripted and recorded a radio programme, composed waiata and designed CD covers. The expectations in the classroom over other curriculum areas are just as high and the tamariki excel. I strongly believe that some of the reasons for failure lie in expectations, and that these expectations need to be raised for Māori children.

Figure 1. An elaboration of the action research cycle (adapted from McNiff and Whitehead, 2002).



#### 4.6 Prioritisation of Māori epistemology

Tuakana-teina or the poutama framework (Tangaere, 1997) plays a fundamental role that results in a much stronger group of learners, confident in sharing what they know, able to demonstrate something they had learned to the rest of the class, ready to go over to a friend's computer to help them with a problem. In Figure 1, there is a brief summary of one of the plans

in which tuakana-teina encouraged and facilitated collaborative learning.

The placing of the tamariki at the centre of the kaupapa ako, as in Rose Pere' model (Pere, 1982) served to build relevance and support engagement with the kaupapa. This is reflected in the restructuring of the 2005 unit to provide a space for tamariki to discuss, create and visually represent their existing knowledge and relation to the medium of the internet. It is also

fundamental to the decision to allow students to define their topic and area of research. In the 2003 unit, intrinsic motivation was so low that at one stage, a student came up to me and asked if he could climb the tree outside. In the space of the 2005 unit and, I believe, as a direct result of this sharing of responsibility, students were requesting extra time, were wanting to work through their lunchtimes, before-school. Tamariki are able to contribute to the lessons' directions, as well as collaboratively working towards concrete goals that serve to deepen the group's engagement with the kaupapa ako.

#### 4.7 Relationships: engaging as a rōpū with the kaupapa ako

A key underpinning theory in this area was that tamariki would engage with the kaupapa ako at a deeper level if they saw it to hold relevance to them. The techniques that worked the best in facilitating this were:

- Completed mahi entered into the TVNZ / Netguide competition. This provided a physical reason for beginning the journey.
- Mutual discussion about steps planned within a kaupapa ako, useful not just in the engagement of tamariki with the topic, but also in establishing prior knowledge.
- Mahi-ā-rōpū – working with a mixed-level group allowed for grouping that would facilitate tuakana-teina. The practice of tuakana-teina also extended between groups.
- Varying the ways in which the demonstrations took place to avoid complacency.
- Collaborative whānau sharing was important for motivation.

##### 4.7.1 Feedback - Feedforward

Feedback is essential. Open shared engagement is based on trust. To facilitate an environment where tamariki share their true feelings about a kaupapa ako, about the things they don't yet understand, about the aspects they are enjoying there needs to be strong relationships and different avenues for feedback. There needs to be alternative summative strategies with feedback at the end of every unit. We share as a whānau and record our thoughts without putting names beside them.

##### 4.7.2 Integrating āta

Āta means to move thoughtfully and with deliberation, acknowledging the relationships and dynamics of your environment Taina Pohatu' Āta framework (Pohatu, 2000) is fundamentally important in the classroom as an enabler for growth.

From this framework we have re-interpreted some principles, which have been most beneficial in planning and replanning during the 2005 unit.

Āta-haere: Allow time in class, when things don't seem to be working, to create a space to fix the

problems without creating stress. Rethink and approach the mahi in a different, considered way. Reformulate discussion about abstract concepts, for example, links – why not open a book and use the metaphor of the contents page?

Āta-whakarongo: Listening is the key to the facilitation of open and honest feedback, a trust and respectfulness of what is shared. It is fundamental in recognising that a tamaiti needs extra support. For example, the tamariki were supposed to be researching. One student appeared to have been surfing music sites instead. A combination of the previous principle and this, led to the discovery that her browser had the Media Player window open and she had tried to do a search in that window, not knowing at all what to do with all of the interstitials that resulted. She had no internet access at home and no computer.

Āta-kōrero: Preparing exactly what is to be said. If this is practised alongside āta-whakarongo, āta-haere, āta-whakamārama and āta-tuhi, then amendments and changes in direction to what has been prepared will start to occur naturally, in response to the direction of the tamariki' questions. A return to the theories for a deeper look at the languages and protocols of the Internet was requested by the tamariki, who wanted to know more about SGML, HTML, FTP, TCP/IP and packet switching.

Āta-tohutohu: Think very carefully about the instructions to give, reflecting on the way tamariki follow instructions, thinking about improvements or changing instructions if necessary, and thinking about appropriateness of the mahi being undertaken at each stage of the journey. In the 2003 cycle, it was not until half-way through the unit that a child demonstrated she did not understand what a link was. This was one of the many reasons for an increased focus on feedback-feedforward in the 2005 unit. Through careful deliberation on how you are going to ask for something, how you are going to explain, as well as a very careful ear when questions are being asked, I felt much happier that students were not just regurgitating what I'd said, but were able to apply what they had learnt and develop their thinking about the medium, their design and their research.

Āta-whakamārama: When explaining something, it is up to the ākongā (students) what they do with your kōrero. It is up to you as kaiako (teacher) to think about what tamariki have taken onboard and how to revisit an explanation if needed. This is communication at the spiritual, emotional and intellectual level.

Āta-titiro: To look and study kaupapa (agendas) and their many relationships. It is of great value in our whānau to share the stories and to contextualise each of the mahi we have undertaken. Looking carefully and exploring the context helps tamariki find the relevance to them of the kaupapa ako (teaching agenda).

#### 4.7.3 Whakapapa as research, metaphor and construct for learning

This is of value in two main ways.

1. There are many areas of the computer that lend themselves to the use of whakapapa as metaphor: website structures, site managers, video production. This metaphor is understood by all of the tamariki and facilitates a coming to grips with sometimes quite abstract concepts.
2. Using stories to share the growth and development of the Internet, for example, allows the tamariki to become aware of histories. Ki mua, ki muri – this enables tamariki to develop an idea of the possibilities inherent in a specific medium. It also enables tamariki to relate to the kaupapa ako, as well as to begin asking questions about the gaps they see in the stories.

#### 4.7.4 Poutama: the transition from concrete to abstract concepts

There are two key strands in this section. The 2003 website unit had a very technical focus, yet insufficient time to allow tamariki to build an understanding of these skills. Second, there were occasions in the classroom, where I attempted to introduce a kaupapa with more abstract concepts, without introducing the foundational concepts first. This meant that the tamariki hadn't reached a high enough level of understanding or experience with the kaupapa ako to be able to work independently (part of the cycle discussed in Figure 1).

The poutama framework was useful for structuring lesson planning and also in the reflection part of the action research cycle. If a lesson hadn't gone well, there needs to be an evaluation of expectations and identify stages of abstraction that tamariki needed to have reached.

#### 4.7.5 Use, critique and discussion of medium—building understanding

The first step to being able to design for a specific medium is familiarity or exposure. Tamariki need to apply their knowledge and use the Internet. It is not enough just using a medium. This was one of the key thoughts in the re-planning of the unit for 2005. The end products in the 2003 unit were almost identical in structure, with only one page variance between all of the students' work. The page layout was also very similar. The decision was to utilise surfing as a means to:

- get the students to figure out what they thought guidelines for good design were
- facilitate feedback-feedforward as well as provide a space for formative assessment
- critically research online

#### 4.7.6 Time as delimiter of unit vs. the kaupapa ako as definition of unit

One of the most difficult things in the classroom space is the perception that one needs to complete a unit within a term. However, one unit can explore several essential skills. When time limits a unit of teaching, it can lead to cutting the corners, accepting second-best.

#### 5. Hei Whakakapinga - Summary.

Ako is a dynamic process, teaching and learning complementing the other, part of the whole. It involves trust, motivation and ownership of the learning, which is carried out through a range of techniques or pedagogies, from modelling, to participation in practical work, tuakana-teina or peer support, waiata, whakapapa, whakataukī and whakataūākī. Traditionally, ako was known to be a life-long process, starting from the womb and founded within and about the whānau.

Technology is and always has been a core part of everyday life. It is not something static and constantly evolves. Information, communication and technology are inherently part of each of us, a reflection of identities. It was argued that things Māori do not equate with "things traditional" and that because of the very mixed whakapapa from which computers arose, computers are not a technology belonging to any one people. The ways in which people relate to, use and come to communicate and express themselves with computers defines whether the tool becomes one for empowerment and celebration of identities or one for colonisation. A collation of major themes in terms of other cultures found that primary goals in the utilisation of technologies for these groups focussed on people and their relationships with each other within the context of their cultural identities and language. Potential NACCQ sector strategies for addressing the current under-representation of Māori in computing qualifications (Tupu, Ngatuere, Young, 2004) could include strategies targeting:

- the relationships between lecturer and student, between and amongst students and between students and the units of study.
- prioritisation and/or encouragement of Māori epistemology: where are the links between and to Māori ways of knowing?
- feedback-feedforward, the facilitation of an environment of trust, where difference is not just acknowledged, but celebrated.
- incorporation of the ideas of whakapapa as metaphor and storytelling as instructional approach.

For Maori, we believe that certain teaching frameworks have more effect than others. This work has developed some of the existing pedagogical models, and presented this reframing in the form of a revised model (Ako Hangarau). Every principle which was developed has relationships as its foundation. The

Ako Hangarau framework is a relational framework, where the dynamics between and the relationships within the classroom community are fundamental. Hofstede's framework is useful in examining the outcomes of the research, allowing us to see

differences in the rūmaki reo classroom, which could allow insight into principles for successful ICT integration with Pacific Islander or Asian classes. We'd like to suggest that our outcomes provide a model that may be generalised for collectivist societies.

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## 6 Glossary

Ako - teaching and learning.

Ako Hangarau - teaching and learning with technology

Āta – carefully, with deliberation and respect to the environment, acknowledgement to variations in relational dynamics.

Āta-haere - to move.

Āta-kōrero – to speak.

Āta-titiro – to look or watch, observe.

Āta-tohutohu – to instruct.

Āta-whakamārama – to explain.

Āta-whakarongo – to listen.

Awa – river.

Hei Whakakapinga – summary, conclusion.

Hei Whakatakinga – introduction.

Kaupapa – topic, subject.

Kaupapa ako – learning area, topic, unit.

Kaupapa Māori – a framework for thinking that arose at the same time as the establishment of kōhanga reo as an inherently Māori pathway of ako in the 1980's.

Ki mua, ki muri – Forward, backward (literally) the concept of thinking to the past to progress to the future.

Mahi - work

Mahi-ā-rōpū – group-work, collaborative work.

Maunga – mountain.

Ngā taonga tuku iho – treasures from our ancestors.

Poutama – ‘the stairs to heaven’, a tukutuku pattern and framework that is symbolic of the process of scaffolding, providing support in learning.

Rōpū - group

Rūmaki reo – immersion Māori language, where culture and language forms the foundation of all curriculum areas.

Tā Te Ao Māori – Māori world-view.

Taha Māori – a government-driven evolution in curriculum design, where Māori was added as a subject.

Tamariki – children.

Taukumekume - an ongoing counter-hegemonic struggle.

Te reo me ōna tikanga – language and its customs.

Te whakahau i te wairua Māori ki roto i a tātou - the revitalisation of te reo me ōna tikanga within us.

Tuakana – seniors / elder of a group / more experienced.

Tuakana-teina – the relationship between an elder or more experienced person to that of a younger or less experienced person.

Tūtohi – chart.

Waiata – song.

Waka – canoe.

Whakapapa - the relationships between and before, a genealogical ordering and sequencing of the world.

Whakatauākī – proverbs or sayings, where they can be attributed to a specific person.

Whakataukī – proverbs or sayings.

Whānau – family.

Whanaunga – relative, relation.

Whenua – land.