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Ngārewa Hāwera
University of Waikato, New Zealand., ngarewa@waikato.ac.nz

Merilyn Taylor

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"I Learned Quite a Lot of the Maths Stuff Now That I Think of It": Māori Medium Students Reflecting on Their Initial Teacher Education

Ngarewa Hawera
Merilyn Taylor
University of Waikato
New Zealand

Abstract: Research involving preservice or initial teacher education (ITE) indicates that mathematics education is a vital component of study. Little is known however, of indigenous student views of their compulsory mathematics education courses for a teaching degree. This research contributes to that knowledge space as it explores Māori medium ITE students' perceptions of mathematics education in Aotearoa New Zealand. A thematic and qualitative analysis of a focused group discussion provides insights into key factors that students reported as significant links between their university and practicum experiences (teaching practice in schools). Some suggestions for strengthening that programme were also expressed. Findings indicate that factors linked to teacher 'cultural competencies', including an ethic of care, respectful relationships, revision of content knowledge, language learning, assessment practices, exposure to different ideas and planning and pedagogy were important. Navigating student-mentor teacher tensions as well as clarifying the significance of ideas in texts were highlighted as areas for strengthening. Mathematics educators preparing students for indigenous primary school settings may find this study useful.

Keywords: initial teacher education, mathematics, practicum, Māori, language, content, pedagogy.

Introduction

The Aotearoa New Zealand Context

In 1840 when New Zealand became a colony of the British, there was a rapid increase in the formal education of Māori people through the medium of the English language. Early Government policies actively supported the use of English for instruction in schools that ultimately led to a decline in the use of the Māori language amongst Māori. The early twentieth century saw the introduction of Māori being punished for speaking their language at school. The continuation of government policies actively encouraged assimilation contributing to only 25% of Māori being fluent in their language by 1960 (Hunn, 1961). In the 1980s with the establishment of kohanga reo (language nests) there was a resurgence of interest amongst Māori in learning their language. As children from kohanga reo reached primary school age (5-13 years) the demand for schools to educate them in the Māori language became the imperative. Tertiary providers had to ensure that their pool of graduates included those with the

appropriate knowledge, skills and language for teaching in those contexts (Kana, 1999; Nepe, 1991). This included the teaching and learning of mathematics.

Expectations of Teachers of Mathematics

Research has shown that effective mathematics teaching requires appropriate content knowledge of mathematics and pedagogy (Anthony & Walshaw, 2007). Walshaw (2012) states that "sound content knowledge is a prerequisite for accessing students' conceptual understandings and for deciding where those understandings might be heading" (p.182). Teachers with inadequate knowledge are unlikely to recognise and act on key points about children's thinking and what that might reveal (Senk, Tatto, Reckase, Rowley, Peck & Bankov, 2012).

Learning to teach is a complex task. Strong conceptual understanding of mathematics and pedagogy means that when teaching, attention can focus on the promotion of problem-solving practices and appropriate discourse (Hunter, 2009; O'Dwyer, Wang & Shields, 2015). Being able to ask process questions of learners and expecting active participation in discussions supports the understanding of mathematical concepts (Reinhart, 2000). The ability to adapt mathematical tasks and resources (Breyfogle & Williams 2008; Roche, Clarke, Clarke & Sullivan, 2014) while navigating the intricacies of the planning process are also critical skills for novice teachers to learn (Bailey, 2015, Roche, Clarke, Clarke & Sullivan, 2014). Additionally, teachers are expected to develop knowledge and expertise in a range of assessment practices (Hodgen & van den Heuvel-Panhuizen, 2014; Neill & Fisher, 2010).

Language

In Aotearoa New Zealand, teachers in many Māori medium settings are expected to facilitate learning through the Māori language for at least 80% of the school day. The majority of teachers in those contexts are second language learners of Māori which complexifies the teaching process. The language proficiency of teachers has been identified as a critical issue (Author, 2014; Murphy, Bright, McKinley & Collins, 2009; Skerett, 2011). Acquiring sufficient language proficiency for teaching a range of curriculum areas including mathematics is not a simple matter for second language learners. They have to grapple with, understand and implement a specialised register where words and meanings can be different to those in everyday parlance. For mathematics, the register is a formalised system that includes symbols, pictures, words and numbers. Some parts of the register are exclusive to mathematics, but others for example the word 'table', have been taken from everyday language and then connected to mathematics in a unique way (Kotsopoulos, 2007). To advance mathematical thinking, each learner must develop their vocabulary and an understanding of the way the language is organised. It is essential to develop competency with language-in-use and mathematical discourse (Barwell, 2014).

A mathematics register normally evolves over time in response to societal and discipline demands. However, due to early government policies that prohibited the use of the Māori language in formal educational settings, the natural development of a such a register was ad hoc, rather than planned. Recognition of the need for a consistent set of mathematical words and phrases to support learning through appropriate discourse has led to the mathematics register undergoing rapid development of concepts being recorded in the Māori language (Trinick & May, 2013). Teachers are expected to acquire and implement the appropriate language while teaching mathematics concepts (Meaney, Trinick & Fairhall, 2012; Trinick & May, 2013). This situation has resulted in additional pressure for Māori medium Initial Teacher

Education (ITE) students and lecturers as the pāngarau (mathematics) vocabulary development has increased dramatically and continues to expand (Trinick & Dale, 2012).

Ethic of Care

Learning to teach involves developing an ethic of care for students (Bell, 2011; Gomez, Allen & Clinton, 2004). Caring for students "...encourages student commitment to school and engagement in their learning" (Perez, 2000. p.103). An ethic of care is not just about being kind to students. It involves caring about student achievement and enacting strategies to support that. Teachers can demonstrate caring practices for their students in a number of ways including having high expectations of them despite pervading stereotypical notions of race, gender and economic status (Perez, 2000). Enacting care can include supporting students to take responsibility so they have some control and agency in their learning experiences and can achieve success. Caring involves a reciprocal relationship between students and teachers that is continually negotiated (Gomez et al, 2004). It is therefore valuable to acknowledge and explore student perceptions of care as those views can vary according to ethnicity. The acknowledgement of ethnicity is important if culturally responsive teaching is an aim (Garza, 2009).

University

At the University of Waikato in Aotearoa New Zealand, the Bachelor of Teaching is a three year undergraduate degree comprised of 20 courses, one and a half of which are for compulsory mathematics education (taught in the first eighteen months). The courses focus on the promotion of conceptual understanding and the need to develop skills in teaching mathematics while demonstrating cultural competencies. An emphasis on improving academic success for Māori as Māori has been mandated in recent government policy (Ministry of Education, 2011) and mathematics education papers are expected to demonstrate this. ITE students who struggle with mathematical ideas are given the opportunity to explore some concepts as an integral part of their programme. This approach has proven to be worthwhile for the development of beginning teachers including those in the specialized Māori medium cohort (Author, 2006). The structure of the specialized degree prohibits further formal study of mathematics education practices and pedagogies.

There is a paucity of information about Māori medium ITE students' perceptions regarding their mathematics education and the effectiveness of those courses. At this university approximately 50-60 percent of the mathematics education papers for the Māori medium cohort are taught in the Māori language. Part of the Year Two course requires students to teach in that language in a Māori immersion setting. This research was designed to investigate the views of students from one cohort who had completed the ITE mathematics education courses and two out of three compulsory practicums.

Methodology

Kaupapa Māori methodology is a conceptual framework based on a theory of change. (Smith, 1995). As an indigenous form of research it assigns space for Māori to be involved on their terms (Smith, 1999). Bishop (1996) states that Kaupapa Māori methodology places Māori at the centre of agenda, thereby positioning them to dictate the parameters and direction of research they may be involved in. Key principles inherent in Kaupapa Māori methodology are

aroha ki te tangata (respect for people); titiro, whakaronga...kōrero (look, listen...speak) and kanohi kitea (the seen face; that is present yourself to people face to face) (Smith, 1999). These tenets of cultural sensitivities are required for effective research with Māori because they embrace notions of mutual respect and a sharing of power between participants.

A focus group methodology was selected as the mechanism for generating qualitative data. Rabiee (2004) suggests that "data generated through the social interaction of the group are often deeper and richer than those obtained from one-to-one interviews" (p.656). Focus groups generally include the selection of a small group of participants who have a particular interest in a given topic. They can share common experiences and would be comfortable talking with researchers and each other (Rabiee, 2004; Silverman, 2014). Pre-existing groups where there is already an element of trust amongst members can be an advantage when exploring issues of a personal or sensitive nature. Participation in a focus group can be empowering for those from a minority ethnic group (Rabiee, 2004).

This research involved Māori medium ITE students and two researchers. The students and one researcher identified as Māori. All participants were familiar with the cultural ideas, practices and principles of 'Tātaiako: Cultural Competencies' as described in government policies for effective teaching of Māori learners in Aotearoa schools (Ministry of Education, 2011). The competencies include:
Ako: Takes responsibility for own learning and that of Māori learners;
Wānanga: Values exposure and discussion of new ideas;
Whanaungatanga: Actively engages in respectful working relationships;
Manaakitanga: Demonstrates integrity, sincerity and care; and
Tangata-whenuatanga: Affirms Māori learners as Māori.

After ethics approval was gained for the study, students who had passed the two compulsory mathematics education courses and successfully completed the Year One and Two practicums were invited to participate in the research. Students were introduced to the project by a different Māori lecturer while attending a non-mathematics education class. A written invitation was extended to 13 students eligible to participate. Six students gave written consent and a focus group discussion with the two researchers was organized.

The one hour conversation was audiotaped and notes taken by both researchers. The conversation was later transcribed and coded.

Research Questions

The following research questions were emailed to the participants prior to the conversation occurring at the university.

How useful were the Year One and Year Two pāngarau [mathematics] courses for supporting your teaching on practicum?

In your view, are there ways in which the pāngarau [mathematics] programme for Kākano Rua (the Māori medium cohort) could or should be strengthened? If so, how?

Results and Discussion

The two research questions guided the discussion with the students. Data has been collated and analysed to identify themes that have implied adherence to key principles embedded in Tātaiako: Cultural competencies for teachers of Māori Learners (Ministry of Education, 2011). The order of presentation is not indicative of importance.

Ako: Taking Responsibility for Own Learning and that of Māori Learners

The first theme that emerged centred around taking responsibility for assessing children's thinking in mathematics and acknowledging its importance for subsequent planning. The following quotes exemplify key points in the data:

> *I found the interviews from the first year (course) useful…had new entrants…used those assessments from the Numeracy Project to learn what I could do to help their mathematical knowledge…I learned quite a lot of the maths stuff now that I think of it… it was the easiest way for me to find out about them… I just talked about it with my AT (Mentor Teacher). She just said Go for it. That's your group, your lesson…*
> *Pai rawa taua taumahi uiui. I ako ahau me pēhea te karawhiu pātai hei whakaaraara au i te hinengaro o te tamaiti, nō reira i ngā tau e rua i āwhina tērā i a au i ngā noho ā kura.*
> *(That interview assignment was really good. I learned how to ask questions to evoke the thinking of a child, so that helped me in these two years when I was on practicum).*

The Māori medium ITE students appreciated and understood a key message from the university tutorials about the importance of ascertaining children's prior knowledge of a mathematics topic when beginning a new area of study. In the Y1 university course, students are introduced to the practice of interviewing and recording a young primary school child's thinking to assess their understanding of whole number. This exercise is extended in the Year Two paper to a 50-60 minute 'exploratory' session with three to four Year 7-8 children (11-12 year olds) on a different topic. Learning to ask questions that give children opportunities to show, demonstrate or explain their mathematical thinking is a crucial element of such episodes. The ability to then make sense of the conversations and recordings is another skill that ITE students must develop so that they can begin to make decisions regarding future mathematics learning experiences. Conversations facilitated through the use of specially constructed interview tools or carefully selected activities can be revealing and provide insights for future mathematics teaching and learning (Higgins & Weist, 2006; Neill, 2010). These ITE students confirmed that assessing children's prior learning as part of the mathematics education programme at university, was valuable for their practicum experience. They revealed that they were able to take responsibility for an act that would assist them to plan an appropriate mathematics programme for their learners.

Ensuring ITE students develop skills assessing children's mathematical thinking before attending practicum can support them to feel confident in 'taking charge'. Data in this study indicates that some students were able to demonstrate such confidence by initiating events through discussion with their mentoring teacher. How much 'control and agency' a student is permitted has to be negotiated (Gomez et al., 2004) because the teacher has ultimate responsibility for care of the children and student (Rhoads, Samkoff & Weber, 2013).

Planning for mathematics learning is an important responsibility for new teachers. This can be problematic (Bailey, 2015; Roche, Clarke, Clarke & Sullivan, 2014). There are a number of factors involved including accounting for children's learning needs, teacher mathematics and pedagogical content knowledge, the demands of relevant curriculum documents and the use of appropriate resources. ITE student comments indicate that planning a unit for their university paper had a positive impact on their practices supporting them to take responsibility when on practicum.

> *…learned how to develop a unit …was helpful for me on prac … they were doing algebra and fractions …I was still able to develop a unit.*

The way that we planned the unit [at university] was really helpful for me…was able to use that kind of format for my other units as well…was cool as.

In Aotearoa New Zealand there are eight learning areas in the primary school curriculum that are expected to be explored with learners. It is essential that ITE students plan units of work to manage and maximise learning opportunities for children. Some ITE students stated an appreciation of the support they received for this in their university paper. Data indicates that the suggested unit plan format for pāngarau (mathematics) was fit for purpose and proved to be a helpful guide for planning in other areas of the curriculum as well. This finding indicates that giving students a possible template for planning a unit can assist them with navigating the complexities of the planning process. It implies that the university courses need to continue supporting ITE students in this practice so they are confident about executing a similar process while on practicum.

Wānanga: Values Exposure and Discussion of New Ideas

Attending university means exposure to alternative ideas. Students in Māori medium are required to be knowledgeable about the New Zealand curriculum document (for English medium classrooms) and Te Marautanga o Aotearoa (curriculum document for Māori medium settings). One student indicated a need to ensure that working with both policy documents continues in order to prepare ITE students for any situation they might encounter on practicum.

In class [at university] we used the marautanga [curriculum document for Māori medium schools] ...when we went to school [for practicum] they used NZC (New Zealand curriculum) ...I needed to familiarize myself with it… so we need to still do stuff with NZC.

Engaging ITE students with more ideas to support pedagogical development and practice for teaching mathematics is important (Sullivan, Clarke & Clarke, 2009). In this study data indicated that students were able to draw on a range of texts they had been introduced to at university. Examples of points shared are:

Readings are good…are understandable…Because they are short and understandable then we'll read them.

…didn't really use (New Zealand text)…I used more the [course] readings.

For some ITE students material and ideas promoted in required course readings, class sessions and digital sources may be new to them and quite different to those experienced in their own schooling and previous practicum occurrences. Students in this study perceived the required paper readings that contained a selection of articles from national and international sources to be useful. However, the required textbook, (New Zealand specific) was not viewed as valuable. If students are required to attend to additional texts about teaching and learning mathematics, it is incumbent on lecturers to support them to appreciate the significance that the information might have for them.

The ability to access, critique and adapt mathematics tasks as material for teaching, is promoted as a useful skill for teachers to develop (Breyfogle & Williams, 2008-9; Clarke & Roche, 2010) and is a focus in the Year Two mathematics education course. ITE students in this study confirmed that learning to critique and adapt activities proved to be a worthwhile aspect of their mathematics education courses. This practice became easier over time. Comments included:

…used a couple of the tasks that we had at uni for my little ones…just about adapting the task for my littlies

...the stuff that I wanted the kids to learn I found it hard to find resources for so every night I was making up a new worksheet or new mahi [task] but they

were all adapted from stuff I had seen on nzmaths (website).....was hard to adapt at first but after awhile the practice made it easier…ended up really benefiting the kids because it was aimed just for them.

Students understood that mathematics tasks can be accessed from different sources and while such activities might be prepared for a particular level or context, they could still be valuable for other learners when adapted. Some students perceived that their ability to adapt tasks supported them to better meet the needs of the learners they worked with.

While there are numerous tasks that can be easily accessed from books and digital sources, these must be carefully scrutinized and modified if necessary, to ensure they are suitable for the group of learners about to be taught. ITE students require opportunities to develop such features of effective practice if they are to provide appropriate activities that challenge and promote mathematical thinking. Learning such skills is not an easy process for some students and requires sound mathematical and pedagogical knowledge as well as understanding of the curriculum demands at different levels (Anthony & Walshaw, 2007). The mathematics education at this university would do well to continue providing such opportunities for their ITE students.

Sound teacher mathematical knowledge is an important factor for those attempting to support children's learning of mathematics (O'Dwyer, Wang & Shields, 2015; Roche, Clarke, Clarke & Sullivan, 2014; Walshaw, 2012). Comments from ITE students illustrated how developing a conceptual understanding of mathematics ideas influenced their pedagogical practice. The following statements are examples of thoughts shared by one student in this study.

I whakapakari au…he paku māramatanga e pā ana ki te hautau ....i tērā tau he āhua uaua mōku te whakaako i te pāngarau i runga anō i taku māramatanga paku ki te kaupapa.
(I have developed more… I had little understanding of fractions ...last year it was difficult for me to teach mathematics because I understood so little about the topic).
I tēnei tau pai rawa ngā hautau…i āhei ahau ki te kuhu ki te akomanga ki te whakaako i te hautau i runga i taku mōhio he māramatanga pai tāku.
(This year, fractions were good…I was able to enter the classroom and teach fractions because I knew I understood it).
I whakaako koutou i ngā ariā kia mārama pai me pēhea te whakaako ariā hautau ki te ākonga.
(All of you taught the concepts so that it was really clear how to teach conceptual understanding of fractions to the students).

The Māori medium curriculum document, Te Marautanga o Aotearoa and the New Zealand Curriculum document (for English medium settings), demands that teachers have sound conceptual understanding of mathematics, including fractional number, to teach children up to Year Eight. Developing knowledge of this content can be a challenge for many ITE students (Chinnappan & Forrester, 2014) and teachers (Sullivan, Clarke & Clarke, 2009).

Teaching fractional number was a major topic for these students in their second year paper. Feedback showed that they appreciated how classes at university supported them to revise and develop their understanding of mathematics. One student noted that he found it difficult to teach fractions in his first year because of his limited understanding of those ideas but felt much more prepared for this topic after the completion of his Year Two paper. Future sessions at university need to continue offering time for reviewing some mathematical content as part of exploring pedagogical possibilities.

While students considered it could be useful to review a greater range of mathematics ideas in courses, it was acknowledged that time constraints would prove restrictive.

Pirangi kia whakuru ngā kaupapa kia kore e rua ngā kauapapa anake i te tau tuatahi. Engari kei te mōhio ahau e kore e taea te whakauru ngā kaupapa katoa no reira tērā pea ka taea te whakauru ētehi atu kaupapa i te tau tuatahi.
(I would like to add more topics in our first year so that we don't just focus on two. But I know you can't put all the topics in there so perhaps there could just be some added).

Mathematics education courses for ITE programmes rely on students having prior knowledge of mathematical concepts in order to focus on developing pedagogical practice. For some students however, there will still be some mathematical ideas that they need to clarify before teaching. One student commented:

…don't know if I could do statistics. That would need a lot more….for me to get more content knowledge before I would be eager to teach that but number, geometry and algebra…most of them I think I would be alright…

It is important that ITE programmes offer students opportunities to review, discuss and explore possible 'new' ways of engaging with mathematical ideas. Students need to be encouraged to take advantage of the various avenues that are available to them beyond their scheduled classes, for discussion, advice and guidance. It is incumbent on the education provider to ensure that students understand the role they must play for their professional growth. Avenues that can be explored and made explicit to ITE students include digital resources, written materials, support personnel at the university as well as their peers.

Whanaungatanga: **Actively Engages in Respectful Working Relationships**

For Māori, developing positive relationships with those around you is critical for any endeavour (Bishop, 1996; Smith, 1999). When ITE students are working with children during practicum, the university expectations are that students and mentor teachers will build positive collegial relationships with each other to support the facilitation of children's learning in ways that have been modeled, discussed and suggested. The mathematics education courses emphasize pedagogy that assists children to develop conceptual understanding of mathematics ideas. However, there are occasions that practice by mentor teachers is perceived by students to be in conflict with that promoted in university classes. Such situations can result in confusion for the student. Tensions arose for two students who perceived a dissonance between the pedagogical practice that was promoted and discussed at university and the practice they were exposed to in their school experience. Examples of their thinking are indicated below:

...did a multiplication unit…doing conceptual understanding… The teacher implied that I should just do rote learning…didn't really like that…What we learn here is not encouraged……trying to get them to understand…but it wasn't encouraged…
...get the conceptual understanding cause it makes sense but in schools they don't teach that. They teach rules…I had no idea what they were doing…had to ask the teacher..so maybe the maths lecturers could give examples of how it is shown in schools today as well as the conceptual understanding… Don't think that should be the focus but it should be, this is what they do…

University mathematics education programmes may need to ensure that ITE students are exposed to alternative ways of teaching and learning that may be promulgated in schools. Students need support to not only build but maintain positive working relationships with their mentor teacher. Aligned with this, they need to develop strategies for managing and upholding such relationships when differing viewpoints emerge. Alerting students and mentor teachers to

expect and initiate professional discussions about "philosophies of teaching and philosophies of mentoring" would be helpful (Rhoads, Samkoff & Weber, 2013, p.127). Such communication could promote more alignment between university education and school practices, and promote effective working relationships (whanaungatanga) between ITE students and the more experienced teacher.

Tangata Whenuatanga: Affirms Māori Learners as Māori

The ability to speak Māori is a valued part of the Māori culture (Ministry of Education, 2011). Teaching learners to speak, read and write in Māori is a key aspiration for Māori medium settings. Students who enter Māori medium ITE programmes have been mostly schooled in English medium schools and are second language learners of the Māori language. Of the six students interviewed, two had been schooled only in Māori medium settings and thereby felt positive about their ability to teach and converse in the Māori language. Developing competency for teaching mathematics requires a broad knowledge of language and how words can be used fluently and appropriately in sentences that are meaningful and make sense (Barwell, 2014).

Data from these students indicated that they approved of the university assignment demanding that they plan and teach a mathematics unit in the Māori language prior to beginning their Year Two practicum. While most expressed apprehension beforehand regarding their proficiency in that language, they ultimately felt the challenge had been worthwhile. Comments shared by them included:

> *Pushed us to having to use te reo Māori (the Māori language) when teaching a unit… took me out of my comfort zone.*
> *Really appreciated being pushed out of my comfort zone… good preparation for prac really so it's a good thing.*

The nature of the evolving register for mathematics means that teachers, lecturers and ITE students need to continually consider, learn and become proficient at using specific terminology in their teaching of mathematics. They require opportunities to hear, learn and use the mathematics register in the Māori language at university and in authentic contexts (Trinick & Dale, 2011). Mathematics education programmes for students such as these therefore need to continue offering opportunities to develop mastery of the mathematics register in the Māori language. This affirms Māori ITE students' culture and contributes to their confidence as mathematics teachers.

Students also expressed appreciation of the lecturer's ability to speak Māori. Data indicated that the lecturer was perceived as helpful for developing their language proficiency to work mathematically with children. As well as learning mathematical terminolgy, students had to develop the ability to encourage participation and meaningful discourse with and between learners. Comments from two students included:

> *When lecturers speak in te reo Māori (the Māori language) in pāngarau (mathematics) we as students learn how to communicate with tamariki (children) … It benefits both of us…student teachers and the tamariki …*
> *The best thing about having a Māori speaking lecturer…some things just make sense in reo Māori*.

One ITE student whose education was completed wholly in Māori medium settings also suggested that having a lecturer who spoke the Māori language meant that he could spend his energy on accessing and understanding the mathematics more readily. Having an English speaking lecturer would have created a layer of difficulty that may have inhibited his learning of mathematics. He commented:

Ae, me whai kaiako Māori, ā, e āhei ana ki te kōrero Māori…i te mea, ko ētahi tāngata, taiohi rānei i puta mai i ngā Kura Kaupapa Māori, ā, e mārama ana taua tangata ki ngā kupu Māori. Na reira, mehemea he kaiako reo Māori e whakaako ana, ka taea te tangata e ako ana ki te whai māramatanga pai mo te kaupapa pāngarau. Mehemea i te tū tētahi kaiako kāore i te mōhio ki te kōrero Māori, ka hapa, ka raru nui ētahi tangata, pēnei i ahau. Nā reira, ki tōku tirohanga, me whai kaiako e mōhio ana ki te kōrero Māori, Pākeha mai, Māori mai.
(Yes, need to have a Māori lecturer who can speak Māori….because, some people [ITE students] who come out of Māori medium schools can speak Māori. Therefore, if there is a Māori speaker lecturing, the learner is able to focus on understanding the mathematics. If the lecturer cannot speak Māori, people like me will be in trouble. Therefore, I think there should be lecturer here who can speak Māori, a Māori or Pākeha [European non-Māori]).

Ensuring that ITE students were supported by an appropriate lecturer able to speak Māori was advantageous for affirming them as Māori and as future mathematics educators. Ultimately for one student, it did not appear to be important whether the lecturer was Māori or European non-Māori. Future ITE education for Māori medium students would do well to continue with this specialised approach.

Manaakitanga: Demonstrates Integrity, Sincerity and Care

The ability to establish a safe learning environment and develop positive relationships with learners is important for Māori students (MacFarlane, 2004). An ethic of care has been noted for effective ITE student and teacher development. The following data highlights points that emerged from four of the students:

When I went to kura (school) to do my unit .man I had butterflies just knowing that we had the support from our kaiako [teacher]…and them believing in us… just knowing that…it gives you that extra boost to know that I can do that...she wouldn't let me out there if she didn't think I could do it…just knowing that your kaiako are there to help you is a good support
Time to see you (lecturer) one on one, to see whether we are on the right track…that type of āhua (disposition)…that's really helpful. Not everyone will do that.
Having an approachable lecturer is a really big help especially for us. have a good lecturer who can deliver well and students get it!

Students who enter Māori medium ITE programmes may be anxious about their mathematical knowledge, thinking and Māori language. They require a teacher who is sensitive to their background, culture and perspectives if they are to engage with the academic challenge before them (Author, 2014). An ethic of care must go beyond kindness to one that nurtures and challenges students to achieve. Data from these students showed they appreciated the ethic of care demonstrated by their lecturer (Perez, 2000). Students perceived that the kaiāko (teacher) believed in them, particularly when challenging them to construct and teach a mathematics unit in Māori.

To express high expectations on its own is insufficient. An authentic ethic of care requires action from both lecturer and students. Each party needs to take responsibility and act appropriately to ensure success (Gomez et al., 2004). In this case, data indicates that lecturer pedagogy, approachability and sharing of time were characteristics that supported students to

take action. Students felt that their needs were important to the lecturer, worthy of attention and would be acted upon.

Further demonstration of enacted ethic of care commented on by two students were the optional content tutorials provided by the mathematics education programme. Data included:

> *Pai mō nga mea e ahua tomuri ana in the lectures. (Good for those ones who don't quite grasp what's happening in the lectures)*
> *What she went over in the extra tutorials meant we didn't need to spend class time on that...should be more optional tutorials for content…not just for the test.*

The organisation of extra content tutorials was appreciated by these students as providing additional occasions outside timetabled classes to consolidate their personal mathematics understandings. These tutorials were organised with the university Centre for Tertiary Teaching and Learning that offers support for all university students at no cost. Students understood that there was much content and pedagogical material to review and consider in the course yet programmed class time was limited. The extra mathematics content tutorials provided the students with an opportunity to take responsibility for their learning and act accordingly. The role of the university was to demonstrate sincerity and care for students by providing a pathway to meet the high expectations of their mathematics education.

To maintain or strengthen programmes, lecturers working with Māori medium ITE students in mathematics education may need to understand the requirement for enacting a strong ethic of care for their students. While study requirements must be challenging and academically rigorous, lecturers must be prepared to support students in ways that enact Tātaiako principles.

Conclusion

> *I noticed this year you don't really notice how much the work you do here really does help you out in the schools …like you're sitting here, Oh my gosh why are we learning this? But then at prac …everything that we learn here eventually helps!*

The above quote exemplifies the overall appreciation these students expressed about the mathematics education programme. Employing Kaupapa Māori methods ensured a genuine cultural space for this cohort of indigenous students to participate and articulate their views of the university and practicum experiences for teaching mathematics. The Tātaiako cultural competencies proved to be a suitable lens for analysing the data to examine links between key principles important to Māori, ideas espoused in university programmes and the experiences students gained in practicum situations.

Generally, students felt prepared for the teaching opportunities and challenges they faced. They were able to make a number of connections between their university studies and practicum experiences. Assessment for learning mathematics and the suggested unit planning approach appeared worthwhile. Opportunities to review their mathematical content knowledge and critique resources and tasks for meeting children's needs, was also valued. Students appreciated working with a lecturer who demonstrated proficiency for teaching mathematics in the indigenous language and who was able to offer support for teaching in Māori medium contexts. These factors clearly demonstrate the sincerity and ethic of care required for nurturing Māori medium ITE students and should be maintained, so that they feel well prepared as Māori for their professional responsibilities. Additionally, it would appear the provider in this study has evidence that it is having some success in meeting the demands of government policy regarding the preparation of teachers according to the Tātaiako cultural competencies.

Suggestions for strengthening the programme were limited. The value of required texts needs to be made explicit if more Māori medium students are to appreciate their worth. This may require ensuring that links between readings and learning mathematics in the Māori language are made more overt. In addition, alerting and supporting students to anticipate and navigate possible tensions with mentor teachers would be advantageous for contributing to and maintaining effective working relationships. More emphasis on students developing and articulating their philosophy about mathematics learning may help them to participate in professional conversations with colleagues on practicum. Further research in this area would be useful.

A limitation of this study is that the data was gleaned from only six students. However, the research does reveal some valuable insights about the preparation of teachers of mathematics for Māori language immersion settings.

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