

TEACHERS' PERSPECTIVES OF PROFESSIONAL DEVELOPMENT FOR EFFECTING CHANGE IN MĀORI MEDIUM CLASSROOMS: A MATHEMATICS EXPERIENCE

NGĀREWA HĀWERA

MERILYN TAYLOR

FACULTY OF EDUCATION

THE UNIVERSITY OF WAIKATO

"He manga wai koia kia kore e whitikia?"

ABSTRACT

In 2010 twenty-three Maori medium schools were given the opportunity for professional development with the Draft Ngā Whanaketanga Rūmaki Māori: Pāngarau (NWRM) (National Standards Māori Medium: Mathematics). The study provided a unique opportunity to listen to teachers' views about their professional development as they sought to implement national standards for mathematics education. Data was obtained from teachers in three schools to help identify key factors that they considered influential for their professional growth and development. The findings show that effective leadership, the development of high quality professional relationships between participants, appropriate resourcing and the serendipitous nature of professional learning, all contributed to the implementation of this government mandate.

BACKGROUND

In New Zealand all schools including Māori medium are now expected to be actively implementing Ngā Whanaketanga Rūmaki Māori: Pāngarau (NWRM) (National Standards Māori Medium: Mathematics) for children in their first eight years at school. Consequently, school leaders and teachers are being supported with professional development opportunities with the intent of improving students' learning and achievement across the *New Zealand Curriculum or Te Marautanga o Aotearoa* (Ministry of Education, n.d).

The aim of this article is to share the views of some teachers in Māori medium schools regarding their professional development when introduced to Ngā Whanaketanga Rūmaki Māori: Pāngarau (NWRM). This paper explores key factors expressed by these teachers that influenced their professional development. Teacher perspectives are important when considering what might constitute effective professional development for them (Ashdown, 2002; Bishop, Berryman, Tiakiwai, & Richardson, 2003; Clement & Vandenburghe, 2003; Timperley, 2005).

LITERATURE

Garrett and Bowles (1997) state that professional development for teachers is of three main types. The first is where teacher development focuses on enhancing teacher knowledge and skills to improve learning opportunities for children. The second form concerns teacher development for self-understanding, while the third type highlights the context of the working environment. Ares (2006) suggests that social and cultural contexts matter if there is an expectation that transformative change will occur.

Nayler and Bull (2000) suggest a distinction between professional growth and professional development. Professional growth refers to a continuous process of learning that accommodates teacher needs and aspirations. Professional development is a term used to describe programmes which have had little input from teachers themselves.

In the past, much teacher development has been located away from a school. Recent trends have indicated a movement towards enhancing teacher professionalism within their working context. Schools therefore have had to explore alternative ways in which to take responsibility for their own learning whilst appreciating that restricting professional development to on-site locations without external stimulus and challenge can be limiting because poor existing practices may be perpetuated (Garrett & Bowles, 1997; Timperley, 2005).

In Māori medium contexts a number of factors have been identified that support effective professional development for teachers. These include having professional development to meet their needs at the time it is needed; having time and space away from the pressures of the classroom; working school-wide with the relevant material and resources, and having continuity with the same facilitator (Murphy, Bright, McKinley, & Collins, 2009).

Making "connections" with people is an important cultural practice for Māori. Taking the time to find out who people are and something about their background is a key idea for establishing a positive working relationship with Māori participants (Bishop et al., 2003; Glynn et al., 1997; Macfarlane, 2004). This precept has to be acknowledged and acted upon for professional development to be effective.

Accessibility to the facilitator and appropriate responses to their needs was noted by teachers keen to participate in professional learning for improved educational

outcomes for Māori (Bishop et al., 2003). Selby and Karatea-Goddard (1996) report that Māori teachers attributed success of professional development programmes to a facilitator whom they regarded as easy to talk with, readily accessible, knowledgeable and well organized with a very professional approach. A model of professional development found to be successful for teachers working with Māori children is one where the facilitator is a member of the school teaching staff or community (Hindle, Marshall, Higgins, & Tait-McCutcheon, 2007).

Discussion and opportunities for interaction and reflection with trusted friends and colleagues are vital avenues for professional development (Breyfogle & Spotts, 2011; Lin, 2005; Nayler & Bull, 2000; Timperley, Wilson, Barrar, & Fung, 2007; Tripp, 2004). Teachers in Māori medium require an environment where they can speak openly about their needs in mathematics without fear of ridicule (Rogers, 2003). Bishop et al. (2003) reported positive teacher views of professional development when there was dynamic interaction and power sharing between all participants.

Research has noted that having opportunities to observe examples of effective practice enabled teachers to consider ways of implementing new ideas in their programmes. Such occasions can help to bridge any separation between theory and practice (Cohen, 2004; Timperley et al., 2007; Selby & Karatea-Goddard, 1996). Classroom observation of a teacher's practice by a perceived expert, however, can be fraught. There are those who consider observation as a means to help improve student achievement and classroom programmes, while others indicate that such observation can be undermining (Ashdown, 2002; Timperley, 2005). Timperley (2005) argues that the rationale for observing classroom practice should focus on addressing student achievement and must be clearly understood by the relevant parties for professional development to be effective. Teachers are unlikely to be motivated to participate in professional development if they do not consider it to be relevant, meaningful and worthwhile (Timperley et al., 2007).

Fullan (1993) states that dynamic interaction between members of an organisation can contribute to a vision for school-wide change. Effective leadership for Māori medium contexts is crucial to ensure that necessary change occurs (Hohepa, 2010). School leadership can directly impact on student outcomes and the smaller the school, the more direct influence a principal is likely to have (Robinson, Hohepa, & Lloyd, 2009).

Katz, Earl and Jafaar (2009) suggest there are two forms of leadership that play a critical role in teacher professional development. Formal leadership is concerned with encouraging and motivating others, setting and monitoring the process, sharing leadership, providing support and building capacity within their schools. Informal leadership occurs within a school where key teachers emerge as those who demonstrate and guide colleagues by their exemplary teaching, learning and reflective practices (Spillane, Camburn, & Pareja, 2007).

Effective school leaders understand that uncertainty is part of subsequent change and that time and support for teachers will be needed for the implementation of any innovation (Heifetz & Linsky, 2004). Clement and Vandenburghe (2003) indicated that teachers appreciated organisational support that facilitated their participation in professional development opportunities. These involve the timely distribution of relevant information and the initiation of discussions about innovations regarding classroom practice. Teachers also value frequent interactions with school leaders that focus on the provision of learning opportunities with time and space to collaborate with others. A further responsibility of school leaders includes the management of their school budget. They must be able to plan and manage the disposal of their assets on hand according to the strategic priorities of their institution (Marshall, Adams, Cameron, & Sullivan, 2003; Fullan, 2007).

The learning of mathematical concepts has been linked to development in language and communication (Anderson & Little, 2004; Barton, 2008; Hunter, 2009; Ittigson, 2002). The growth of Māori medium educational contexts has resulted in a rapid development of appropriate mathematics vocabulary. This has increased pressure on teachers in Māori medium to not only learn the necessary vocabulary for teaching mathematics but also for them to consider how they might ensure appropriate mathematical thinking and language development can occur for their learners (Christensen, 2004; Fairhall, Trinick, & Meaney, 2007; Meaney, Trinick, & Fairhall, 2009).

Accessing appropriate materials and resources that align pedagogically and philosophically with valued goals has been a significant challenge for those teaching and assessing in Māori medium classrooms. Professional development with suitable

resources is essential for improving the quality of teaching and learning (Murphy et al., 2009; Robinson et al., 2009; Selby & Karatea-Goddard, 1996).

THIS STUDY

The schools (kura) in this study ranged from Decile 1–5 and have rolls of less than 100 children. They are all Kura Kaupapa Māori providing 80–100% of their programmes in te reo Māori. Two kura are urban-based, located in different cities, while the third is rural.

Kura	Decile	Roll	Children	Staff interviewed
A	5	85	Yrs 0-8	4
E	3	76	Yrs 0-13	4
U	1	51	Yrs 0-10	4

The Lead Facilitator for the implementation of Ngā Whanaketanga nominated the three schools for the study. Tumuaki (principals) were initially contacted to establish interest and availability of their kura to participate in this information gathering process. They were also asked to nominate 2–4 of their teachers to be involved in the research. Information and consent forms regarding participation of staff at each kura were sent out for formal agreement and dates confirmed for interviews. One day was designated to be spent in each kura for the data-gathering process. A total of four teachers including the tumuaki from each kura were interviewed individually. Interviews of approximately 45–60 minutes were conducted in te reo Māori or English (participant choice) in a quiet place away from the classroom.

Research questions for the overall study were:

- What models are being used by Māori medium schools to implement Ngā Whanaketanga Rūmaki Māori Pāngarau (NWRM) Development Project?
- What factors support the implementation of NWRM Pāngarau in the selected schools; and why?
- What factors hinder the implementation of NWRM Pāngarau in the selected schools; and why?
- What professional development and resources are needed to support the implementation of NWRM Pāngarau?

This paper focuses on data from the three kura regarding factors that teachers considered supported their professional

development with Ngā Whanaketanga Rūmaki Māori: Pāngarau.

RESULTS AND DISCUSSION

There were a number of factors that emerged from the data that supported teacher professional development with Ngā Whanaketanga. These included the following key ideas.

1) THE VIEWING OF PROFESSIONAL DEVELOPMENT AS OPPORTUNE

The teachers interviewed had recently participated in intensive professional development with Te Poutama Tau (Numeracy Development Projects) and perceived that to be a positive and successful experience for themselves and their children. For these teachers, their professional growth in mathematics continued to be a priority.

It [Ngā Whanaketanga] has the potential to make my teaching more focused and ensure coverage

We saw it as beneficial because we have to do it anyway

Pāngarau is a priority in the school. We have high expectations and we have targets

Kia rua tau ki te Poutama Tau ... it just seemed like a natural progression kia whai i te whanaketanga, nā te mea kei te aro ki ērā atu whenu...kua rite mātou nō te mea kua oti Te Poutama Tau

After two years on the Numeracy Project ... it just seemed like a natural progression to follow the whanaketanga, because it focuses on the other strands ... we were ready because we had completed Te Poutama Tau

... could see the benefits in terms of... our staff development... and could only be good for student outcomes

The political climate regarding National Standards indicated that assessment using Ngā Whanaketanga would be compulsory from 2011 in all Māori medium contexts. These teachers were aware of this political imperative and were keen to explore any avenue that might support their knowledge and understanding of it. They considered that early exposure to this government initiative would support their goals for improving student outcomes by ensuring there was more focus on teaching and assessing a wider variety of mathematics ideas. Their views are commensurate with conditions suggested by research where effective professional growth and development support the enhancement of teacher knowledge, skills and self-understanding

in a continuous process (Garrett & Bowles, 1997; Murphy et al., 2009; Nayler & Bull; 2000).

2) SCHOOL LEADERSHIP

The teachers' perceptions of the importance of tumuaki (principal) support for effecting change in Māori medium aligns with research by Hohepa (2010). These teachers recognised that support from their school leaders was an essential component for providing professional development opportunities for them.

It's important to have tumuaki on board for things to happen or for it [professional development] to be successful in a school

T [tumuaki] likes us to be up-to-date

I te mea i kite rātou ngā painga o te Poutama Tau me ngā mahi i mahiā ki te taha o X, ka whakae mātāpono rātou

[Because they saw the benefits of Te Poutama Tau and working with X (facilitator), they agreed in principle]

We have tumuaki support... has not been really involved in the pd but is really supportive

Needs pd with principals and senior management with how to implement so that everyone is consistent with expectations when implementing

Data indicates that teachers were encouraged and motivated by such support for their professional learning. These findings connect with contentions by Katz et al. (2009) that school leadership is critical for teacher learning. Leaders ensure that the necessary conditions are available for their staff to participate and focus on their learning and any change that might ensue. Principals with a vision that includes capacity building in their school need to demonstrate such commitment to teacher professional development. This may be important for sustained professional learning and development (Hohepa, 2010).

3) WHOLE SCHOOL PARTICIPATION

Teachers in this study felt that attending professional development opportunities as a whole staff supported their learning best.

School-wide is good 'cos we're all going through the learning process together. I don't like going to pd myself where I go away, whakangungu [develop] myself then have to come back and try to teach the staff.

It's good that we all go, not just part of the staff... Had time as a whole staff to focus on Ngā Whanaketanga...

Ki te mahi ngātahi ... ka tino pai.

[If we work together ... it will be good]

Na runga i te āhua o tēnei kura pakupaku... kei te whaia e mātou katoa.

[Because we are a small school... we are all doing it]

We do things together... otherwise you don't see that integration, that connectiveness.

The concept of being a "kura kaupapa" is based on the notion of the school operating as a whānau (family) and doing things together (Ministry of Education, 2008). The size of the schools meant that all members were able to support each other closely in their school programmes and classroom activities. The planning, teaching and assessment practices across these schools were perceived to be conducive to maintaining coherency between school programmes and whānau members.

For any initiative to be effective, the participation and support by all teachers in these contexts is deemed necessary. This finding is consistent with research by Murphy et al. (2009). The past practice of one or two staff members attending off-school sites for professional development and then returning to share information with colleagues was not a favoured approach with these teachers.

4) ALLOCATION OF TIME AND SPACE

Ngā Whanaketanga for pāngarau was introduced to the schools by facilitators

as part of a government initiative. Having time away from the responsibilities of the classroom to learn about and understand the expectations involved in implementing Ngā Whanaketanga was an important factor identified by these teachers.

We had time to discuss children and all parts of the whanaketanga.

...need to allocate time so that people can be released from classrooms to sit down and study the material.

Like hui each Monday. A shorter block means there's not so much to take in and gives me a bit of time to reflect on what we've discussed.

He wā roa ki te tiro tiro haere ki te pukapuka rā me te whakaaro pēhea ka whakahaere koe taua wāhanga... Tino rawe ki te noho ki te taha o X ia wiki

[Takes a long time to look through the book and think about how to do that part... Good to sit with X (facilitator) each week.]

Need time to learn to use the rauemi [resource] available.

The provision of time and space meant that these teachers were able to focus attention on the content of Ngā Whanaketanga, the support material provided and how such ideas might impact on their teaching and assessment practice. It is unrealistic to expect teachers in Māori medium to continue helping children learn mathematics without allocating time and space during the day for concentrating on items designed to influence their practice. Effective professional development in these contexts requires teachers to be given appropriate time and space to focus on self-understanding of major ideas to be implemented and how these might impact on practice (Garrett & Bowles, 1997; Murphy et al., 2009).

5) RELATIONSHIPS WITH FACILITATOR

Data indicated that having a positive relationship with their facilitator was an important factor for the teachers in these kura for this professional learning experience.

Lucky having X [facilitator] 'cos we already had a good relationship with her... very approachable... always wanting to help.

Kua kitea ōna painga ... Ki te kawea e ia, kāore e kore he painga kei roto.

[We've seen her good work... If she was doing this, there was no doubt that it would be beneficial]

Need someone who can interpret and help use the folder... Lucky to have X [facilitator]... have immediate access for queries and concerns.

X [facilitator] has been the glue.

Mei kore ā X tērā pea kore i whakaae... tino roa tō mātou whanaungatanga ki a ia... Kāre he kaiako tua atu.

[If not for X (facilitator) we would not have agreed... We have known her for a long time... There is no better teacher].

Each teacher expressed the importance of working with a facilitator with whom they had already established a long-standing high quality professional relationship. Teachers here expected and considered that they received worthwhile information from their facilitator in a way that supported their learning. They had previously worked with the facilitator in their Te Poutama Tau development programme and knew them well. Continuity in professional development programmes is important for Māori medium teachers (Glynn et al., 1997; Murphy et al., 2009).

These teachers also appreciated that their facilitator appeared open to being available at any time to answer queries they might have concerning Ngā Whanaketanga. Being approachable and accessible was appreciated and aligns with other research about teacher relationships with facilitators in Māori medium contexts (Bishop et al., 2003; Selby & Karatea Goddard, 1996).

It is possible for "new" people to establish positive and productive relationships with Māori in these contexts but the social aspects of whanaungatanga (relationships) are complex and it will take time for trust to develop (Macfarlane, 2004). Providers of professional development for these contexts need to take cognisance of this idea and respond appropriately.

6) HE KUPENGA HAO I TE REO SUPPORT

MATERIAL

Each teacher interviewed in the three schools expressed how helpful the material produced by He Kupenga Hao i te Reo was for their professional learning.

Gives examples of how to teach as well. Have to adapt it. It's enhanced my teaching especially in the strands... It's given me lots of ideas for my teaching plus contexts for teaching... reasons for kupu [vocabulary]...

Y's [mathematics expert] folder is fantastic but spent a lot of time unpacking the ariā matua [main concepts]. You need an advisor to help unpack and explain how to use it.

Resources are really specific and detailed. Seems to be more support so it's easier to plan... can pick up the folder... has extension activities...

Ka whakamahi mātou ngā pukapuka, tino piata ngā mahi.

[When we use the books, the work is really clear]

Y's [mathematics expert] mahi [work] has made the planning easier... It's linked to Te Marautanga o Aotearoa.

Teachers saw links in this resource to Te Marautanga o Aotearoa that helped to reassure them that their implementation of Ngā Whanaketanga aligned with key ideas in the overall curriculum document for kura. The teachers perceived that He Kupenga Hao i te Reo supported their learning and understanding of the content of Ngā Whanaketanga. The exemplars for possible learning activities also proved useful for teachers when considering their planning and pedagogy.

Responses indicated too that there was a range of thinking regarding the understanding of this material. Some teachers expressed how clearly the ideas were presented, thereby increasing their accessibility to the mathematics embedded in Ngā Whanaketanga. Others articulated the need for support from a facilitator to understand the key mathematics concepts and how these might impact on their assessment and teaching practice.

Earlier research reports that many teachers in Māori medium have indicated that access to relevant and appropriate material for professional development has been a challenge (Murphy et al., 2009; Robinson et al., 2009; Selby & Karatea-Goddard, 1996). However, teachers in this study

indicated that this resource material presented in te reo Māori provided them with helpful guidance and support to more quickly incorporate the ideas embedded in Ngā Whanaketanga into their programmes.

7) SUPPORT WITH TE REO MĀORI

Data in this study indicated that the learning of numerous new mathematical terms quickly for a wide variety of mathematics ideas was a challenge for these teachers.

The reo has been a big learning curve for all of us... That's been one of the struggles... learning kupu hou (new words)...

We now have the vocab for other whenu (strands).

Also need to look at huarahi hei āwhina i te reo pāngarau... kia kaua te reo e noho hei ārai ki te ako.

[Also need to look at ways to support the mathematics language... so that the language is not a barrier to learning]

The kupu, that is the real difficulty.

We've set a goal of learning 10 new pāngarau [mathematics] words each week.

For me learning the new language, te reo Māori mo te Pāngarau [the Māori language for the mathematics] has been important... understanding that before I can put it across to them.

Teachers' mathematics programmes in recent years had largely focussed on tau (number) because of the past government initiative. Ngā Whanaketanga across all areas of mathematics in the curriculum was now being introduced. Teachers were unaccustomed to utilising a mass of specialised kupu for teaching and assessing a range of mathematical areas that Ngā Whanaketanga now demanded. They understood that learning new vocabulary quickly was a necessity and were therefore intent on satisfying this requirement.

Teaching key ideas in mathematics while children are learning a language has always been an issue in Māori medium (Christensen, 2004; Fairhall et al., 2007; Meaney et al., 2009). Any initiative that impacts on the teaching of mathematics in those contexts must consider the implications of learning te reo Māori for communicating mathematically. Children need to develop mathematical discourse that supports appropriate cognitive development in mathematics (Barton, 2008; Hunter, 2009; Ittigson, 2002).

8) FUNDING CONSIDERATIONS

This data shows that leaders at each school were concerned about the allocation of funding for this sole opportunity for early professional development with Ngā Whanaketanga.

It's good pd but difficult to free up kaiako. That's an expense to the school. That's \$8000 that the kura has to pay a reliever.

X's [maths expert] hui once a term are expensive. Couldn't afford to all go... Was great... need funding.

Needs to be funded. Had to fund all of this ourselves.

The Board also pays relievers... for teachers.

Me whakatū he rā whakangungu ki ia rohe pea ma ngā pouako pēnei i te Poutama Tau.

[Need to have professional development days in each district for teachers, just like the Numeracy Project]

Planning for professional development is an important consideration for a principal and Board of Trustees. An integral part of their roles is to ensure that adequate funding and time is allocated to areas targeted for development. The allocation of financial reserves for relievers, professional development hui, resources, catering and travel are key factors when managing a school. If teachers in kura are to participate in any form of professional development, school leaders require appropriate support and notification so as to incorporate such events into their strategic plan and budget (Fullan, 2007; Marshall et al., 2003).

9) COLLEGIAL SUPPORT

Making meaning of and developing ways of using Ngā Whanaketanga is a complex process. These results show that teachers appreciated being able to discuss their experiences of Ngā Whanaketanga with their colleagues.

The people thing is important... being able to converse with others and say I did this with this. What did you do with it?

Struggled with how to assess... Was good to meet with other teachers to consider this.

Good to have regular cluster hui... go along and share examples of tamariki's [children's] work. Those are valuable... We might put an assessment on the table and let the other kaiako determine where they think the children are at... where are the places they need to develop.

Good that we all have been having discussions over cups of tea... struggling with the same things.

Teachers welcomed regular opportunities for exploring the ramifications of this new initiative. The teachers were concerned about assessing children's work appropriately and found it helpful to have discussions with others in kura who were involved in the same process. This finding aligns with research stating how powerful such interaction can be in supporting professional development (Breyfogle & Spotts, 2011; Lin, 2005; Naylor & Bull, 2000; Timperley et al., 2007; Tripp, 2004). Collegial discussion between people working in similar contexts is particularly pertinent for teachers in Māori medium (Rogers, 2003).

Forming overall teacher judgements about children's work is a key aspect of implementing Ngā Whanaketanga or National Standards. An important factor is ensuring consistency of decisions by teachers not only within a school but also between schools. Moderating children's work and sharing issues and concerns with colleagues is imperative. Those organising Ngā Whanaketanga professional development for kura need to make sure that participants are provided with opportunities to develop their thinking and skills when making such judgements. These decisions have major consequences for children and teachers in kura.

10) MODELLING & OBSERVING

Data indicates that the model of a facilitator demonstrating the process of assessing children's understanding of mathematical ideas was well regarded by teachers in the three schools.

The Te Poutama Tau [Numeracy Project] model is really good too...that thing about the modelling, observations and feedback...

He tino kaha a Whaea X ki te haere mai ki a tātou taha ki te mahi ki tētahi roopu. She models for us...is good.

[Whaea X (facilitator) is really good at coming beside us and working with a group...She models for us...is good]

Māna e tauira ngā mahi. Rawe tōna whakaako...ka mātaki tōna mahi-ā- tinana, tōna whakamārama kupu...Ka kite, ka mahi.

[She demonstrates the work. Her teaching is good...we watch her body language, her explanation of words...We see and then we do]

Ia Rāpare ka haere mai ia ki roto i te akomanga. Ka whakaaturia tētahi wāhanga ki ngā tamariki, ki ahau hoki kia kite au me pēhea te whakamahi. He rawe!
[Each Thursday she comes into the classroom. She shows some work to the children and to me too so that I can see how to do it. It's good!]

For these teachers, the physical presence of an expert working with children in their own classes was crucial for helping them to make connections between the expectations of Ngā Whanaketanga and the reality in their classroom. The benefits of these experiences meant that each teacher was able to observe, discuss and reflect on the sessions and what it revealed to them. This finding aligns with research that suggests it is worthwhile for teachers to observe examples of effective practice as it can have significant impact on their learning (Cohen, 2004; Timperley et al., 2007; Selby & Karatea-Goddard, 1996).

CONCLUSION

This study investigated experiences that teachers in Māori medium schools had with Ngā Whanaketanga. Particular factors that were critical for the implementation of a new curriculum imperative emerged from this research. Those planning to conduct professional learning effectively in these settings need to ensure that such factors are attended to.

Active and participatory leadership within the school is vital. School leaders recognised the success with Te Poutama Tau where their staff had experienced the positive benefits of professional development in mathematics. The momentum generated with Te Poutama Tau led the schools to believe that any further professional development in mathematics was to their advantage. Boards of Trustees and principals were pivotal in engineering their school's participation with Ngā Whanaketanga. Their proactive stance exemplifies the general philosophy that promotes the pursuit of academic excellence for children in Māori medium (Ministry of Education, 2008).

This research concurs with that of Bishop et al. (2003) with respect to the importance of developing relationships with participants when embarking on new professional ventures. Continuing the strong professional relationship with the facilitator who had previously supported them with Te Poutama Tau helped the teachers to engage readily with the material and the complexity of the expectations of Ngā Whanaketanga. This was despite the financial and personnel constraints that impacted on each kura as a consequence of their decision to commit resources and time to learning about new expectations for pāngarau.

Ngā Whanaketanga is about summative assessment. The resources for the professional development were largely presented in te reo Māori in ways that teachers found readily accessible. This helped teachers to understand the teaching and assessment ideas implicit in the whanaketanga, thereby affecting the subsequent planning and choices of mathematics tasks they could use with children. The serendipity of this whole professional development experience about assessment was that teachers also learned more mathematics and a broader range of pedagogical practices.

For the participants, learning about Ngā Whanaketanga also impacted on their continued development of discourse about mathematics education. Ongoing school and cluster hui (meetings) meant that teachers were in a position to share challenges and ideas about their experiences as they evolved over time. These occasions, both formal and informal, contributed to the professional deepening of teachers' thinking.

Listening to these teachers has provided unique insights into factors that impact on their professional development. In this study views from staff in schools with less than 100 children attending have been obtained. It would be beneficial to

research the implementation of Ngā Whanaketanga with larger schools and those kura who may be reticent about implementing this government initiative. Such discussions would add further insights into factors that influence professional development in mathematics for Māori medium contexts. Listening to teachers is important (Ashdown, 2002; Bishop et al., 2003; Clement & Vandenburghe, 2003; Timperley, 2005). Research that involves teachers' views provides unique insights that can influence future directions for Māori children's learning in mathematics.

HEI MIHI

Hei whakamutu ake tēnei wāhanga, ka mihi ake ki ngā tumuaki me ngā kaiako i whakaae kia uru mai ki tēnei rangahau. Ka nui te mihi ki a koutou e kaha poipoi ana i ā tātou tamariki i roto i ngā kura. Ko te tumanako ka whai hua ēnei kōrero hei tautoko i ā koutou katoa.

Ngā mihi hoki ki te Tāhūhū o te Mātauranga mo te tautoko i ngā mahi rangahau nei.

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