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“The conference was awesome”: Social justice and a mathematics teacher conference

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Abstract

Professional development comes in many forms, some of which are deemed more useful than others. However, when groups of teachers are excluded, or exclude themselves, from professional development opportunities, then there is an issue of social justice. This article examines the experiences of a group of teachers from a Māori-medium school who attended a mathematics teacher conference. By analysing the teachers’ sense of belonging through their ideas about engagement, alignment and imagination, we are able to describe how different kinds of relationships influence the inclusion/exclusion process. This leads to a discussion about what can be done by the teachers as well as conference organisers to increase these teachers’ likelihood of attending further conferences in the future.

Keywords

Indigenous schooling, professional learning, Māori, professional conferences, modes of belonging, dialogic communities

Social Justice and Mathematics Teacher Education

The long, high notes of the traditional call, the karanga, beckoned us forward to meet the tangata whenua, traditionally the Indigenous people of Aotearoa/New Zealand but who in this case were the organisers of the mathematics teacher conference. Eyes averted, we advanced with the international speakers just behind and the remaining participants following. Arriving at the front of the hall we took our places. Tony began the speeches in te reo Māori (the Māori language) for the tangata whenua, before Uenuku replied on behalf of the manuhiri or visitors. The songs from the manuhiri were sung by the teachers of Te Kura Kaupapa Māori o Te Koutu.

These activities were part of the pōwhiri, a ritual of encounter often used by the Māori, the Indigenous people of Aotearoa/New Zealand, when meeting different groups. Recently, it has been used at the beginning of conferences to formally welcome overseas speakers and to “show off” the bicultural nature of New Zealand (see for example Guidelines International Network, 2004). It removes the tapu or sacredness of the manuhiri and they become one with the tangata whenua (maori.com.nz, undated). Apart from this traditional Māori ritual, there was no other contribution from the Māori-medium education sector. There were teachers, Māori and non-Māori, of Māori students in schools that taught in English, but no workshops specifically on the needs of Māori students. Apart from the teachers from Te Kura Kaupapa Māori o Te Koutu, only one other teacher, from another school that taught in the medium of the Māori language, attended the conference, amongst the several hundred attendees. There were also no presentations by teachers or support staff from the Māori-medium education sector. This is despite the Ministry of Education funding for several years a professional development project called Poutama Tau, for teachers of numeracy in the Māori-medium sector. There were many presentations at the conference by those involved in the equivalent numeracy project for teachers who taught in English. The contrast between the opening and the remainder of the conference raised an interesting question. We felt that there was an issue of social justice that needed to be addressed when any group were excluded or excluded themselves from professional development.

¹ A kura kaupapa Maori is a Māori immersion school based on Māori principles.

In this article, we explore the perceptions of these Māori-medium teachers about their attendance at this mathematics education conference. We use Wenger's (1998) three modes of belonging -engagement, alignment, and imagination and consider how different kinds of relationship affect the teachers' feelings of belonging and thus the value that they saw from participating in this conference. From this analysis, we discuss how social justice operates in this example of mathematics teacher education. This is a complex issue with multiple perceptions. We offer a starting point for a discussion that should occur not only in New Zealand, but also in other countries with marginalised groups.

Recently social justice and equity have come to the forefront of mathematics education discussions. For example, the National Council for Mathematics Teachers (NCTM) (2000) has as the first principle in its standards document, "excellence in mathematics education requires equity—high expectations and strong support for all students". This emphasis on social justice and equity has resulted in a significant increase in research on mathematics education and Indigenous students (see Meaney, McMurchy-Pilkington, & Trinick, 2008 for a review of recent research in the Australasia area).

Although many researchers discuss social justice and equity (for example Gutstein, 2003; Cobb & Hodge, 2007), the concept of social justice in mathematics education has not been theorised to any great degree (Atweh, 2004). The variety of conceptions of what social justice could or should mean in mathematics education may have arisen because different situations call forth different aspects to be emphasised. In a recent article about our work in Te Kura Kaupapa Māori o te Koutu (Meaney, Trinick, & Fairhall, submitted), we state that "a socially just mathematics curriculum needs to be based on what students bring to their learning and the aspirations of their communities". Consequently, a socially just mathematics teacher education needs to build on what teachers bring with them to the learning process in order to meet the aspirations of the communities with whom they work.

The school, where the teachers work, is a Kura Kaupapa Māori. Originally outside the publicly funded education system, Kura Kaupapa Māori were created in New Zealand, as a consequence of the continual underachievement of Māori students academically and the loss of te reo Māori (Smith, 1990). Therefore mathematics education has a dual role; to support students' acquisition of mathematics knowledge and te reo Māori. This encourages the development of a strong Māori identity as a mathematician (Meaney, Trinick, & Fairhall, submitted). By exploring the teachers' perceptions of the mathematics teachers' conference, we discuss how their sense of belonging related to their beliefs about the purpose for teaching mathematics.

Before beginning our exploration, we provide background on: mathematics teacher conferences as professional development; why teachers may gain from attending them; the role of the Treaty of Waitangi in New Zealand society; and a description of the conference.

Mathematics teacher conferences and the provision of professional development

In many ways, mathematics teacher conferences do not fit the criteria for good quality professional development. Castle and Aichele (1994) suggested that in order for professional development to achieve "long-lasting qualitative change in a teacher's thinking and approaches to educating" (p. 3), it must be something that has been chosen by the teacher. When schools decide the professional development that teachers attend, an unforeseen consequence can be the adoption of short-term or one-off courses (Bolam, 1987). Mathematics teacher conferences provide short-term professional development opportunities that rarely have any follow-up. Bolam (1987) described short courses as being "an ineffective way of improving teacher and school performance" (p. 48). Their timeframe does not provide the couple of years that teachers need to make use of and reflect on new ideas in order to change their own pedagogy" (Begg, 1993, p. 84). When teachers are requested by the school to attend mathematics teacher conferences, it would seem unlikely that long lasting changes will be made.

However, most teachers, who attend mathematics teacher conferences, do so of their own choice and conferences such as the New Zealand Association of Mathematics Teacher Conference (NZAMTC) have several hundred attendees. Teachers regularly give up one week of the school holidays every two years to attend. In the US, thousands of teachers attend the NCTM conference every year. Attendances of these numbers suggest that although they are short-term professional development opportunities they still fulfil particular needs for teachers.

It is possible that the networking done between teachers in different schools and the sharing of ideas between like-minded teachers, stimulated the learning at these conferences. Gellert (2008) suggested that teachers need the active support of colleagues as well the impetus of exciting pedagogical approaches to implement new approaches. Furthermore this can be located within developing a sense of community:

In plain terms -people learn from and with others in particular ways. They learn through practice (learning as doing), through meaning (learning as intentional), through community (learning as participating and being with others), and through identity (learning as changing who we are). Professional learning so constructed is rooted in the human need to feel a sense of belonging and of making a contribution to a community where experience and knowledge function as part of community property. Teachers' professional development should be refocused on the building of learning communities. (Lieberman & Mace, 2008, p. 227)

However, it is difficult to know whether this is a valid interpretation as virtually no research has been done on what teachers gain from attending a professional conference, such as NZAMTC. In discussing a mathematics and science education conference for teacher to learn about new assessment techniques, Siegel, Bruning, and Giddings (1999) concentrated on the evaluation process rather than the teachers' learning process. Hatcher, Wiessner, Storberg-Walker, and Chapman (2005) discussed what had been learnt at a conference but not how it was learnt. Thus, the reasons why teachers attend professional conferences can only be speculated on.

Attendance by Te Kura Kaupapa Māori o Te Koutu teachers at NZAMTC

No matter why teachers attend professional conferences, there is no reason to think that teachers who work in Māorimedium schools would gain less than teachers from English-medium schools. In fact, it could be argued that teachers from Māori-medium schools have more to gain because of the limited mathematics professional development opportunities. In the past, teachers at this school lamented the lack of appropriate professional development, especially in the middle school and high school areas (Meaney, 2001). They felt that it was possible to attend English-medium professional development courses but there needed to be follow-up workshops to discuss how to adapt the original programme for their specific needs. Leaving the adaptation to the teachers themselves was an extra load as the very limited resources available in te reo Māori meant that implementing good teaching ideas often meant producing all necessary resources. If time was not factored into the professional development experience to do these adaptations, then it fell on the teachers to find spare time when back in their classrooms. Teachers at this time saw this as the main reason why new teaching practices described in English-medium professional development were not adopted.

Since then the Poutama Tau professional development project began in 2002 to support New Zealand teachers working in Māori-medium contexts (Trinick, 2005, 2006). Based on the number framework developed for New Zealand schools, facilitators provide in-school support. Results show relatively consistent increases each year in students' achievement in numeracy. However, teachers' mathematical content knowledge is still lacking in some areas and professional development needs to be ongoing (Trinick, 2006). The teachers of Years 0-6 at Te Kura Kaupapa Māori o Te Koutu had undertaken Poutama Tau since 2005.

All the teachers had been involved in an ongoing action research project on their mathematics teaching since 2005 (Fairhall, Trinick, & Meaney, 2007). In 2007, the focus was on improving the quality and quantity of students' writing in mathematics (Meaney, Trinick, & Fairhall, 2008 forthcoming) and this had connections to a key note speech at the conference by Helen Doerr, from Syracuse University. Her talk was on the professional development of a group of middle school teachers, who had also been looking at improving writing in mathematics (Doerr & Chandler-Olcott, 2009).

Uenuku Fairhall, the principal of the school (and the third author of this article), saw attendance at NZAMTC by the mathematics teachers as beneficial because of the links that could be made to the work already being done at the school and consequently paid their registration and accommodation. Potentially, the teachers had much to gain from NZAMTC as there were few alternatives for professional development and because it had connections to other professional learning situations. However, attending NZAMTC was something that was required of them, rather than something that many of them would have chosen themselves. This requirement could have been counter-productive in making the conference professionally valuable. It was also possible that unless there were explicit support for adapting ideas to fit the Māori-medium situation, then the teachers could feel unable to take up the ideas that were on offer.

The Treaty of Waitangi and NZAMTC

The perceptions of the conference would be affected by the teachers' own experiences and beliefs as well as by what the conference had to offer. However, if all facilitators implemented the principles of the Treaty of Waitangi, then the teachers would be supported in developing their students' te reo Māori skills and strong Māori identities through teaching mathematics.

The Treaty of Waitangi was signed by Māori chiefs in 1840 when New Zealand was ceded to the British Crown. However, differences between the English and the Māori version of the Treaty have resulted in much controversy over the rights and responsibilities for both parties. Generally, it is agreed that under the terms of the Treaty of Waitangi, New Zealand is a bicultural country, which should respect and actively maintain Māori culture and language (Durie, 1999). Although governments rarely fulfilled their obligations (Bishop & Glynn, 1999), recently there has been more emphasis on respecting the principles of the Treaty of Waitangi in all circumstances (Earp, 2004).

However, integrating the principles into decision making so the bicultural nature of New Zealand is actioned is not simple for non-Māori. Anderson, Averill, Easton, and Smith (2005) described attempts to incorporate the principles of the Treaty of Waitangi into a pre-service mathematics education programme. The prospective teachers were positive about including cultural activities in their mathematics programmes but were "less confident in describing mathematical links to Treaty principles" (p. 87).

Nevertheless, all New Zealanders need to actively support Māori language and culture in meaningful ways, not just through the token inclusion of ceremonies such as the pōwhiri or welcoming ceremony. As Bishop and Glynn (1999) stated “Maori demands for autonomy in [educational contexts] ... is a call for all those involved in education in New Zealand to reposition themselves in relation to these emerging aspirations of Māori people for an autonomous voice” (p. 62-63, italics added). Retention of language and culture by Māori people is the responsibility of Māori and non-Māori alike.

NZAMTC

NZAMT10 was held during the first week of the school holidays, at the end of third term in Auckland. Eight out of the eleven teachers from Te Kura Kaupapa Māori o Te Koutu attended. Five of the teachers taught in the primary section of the school (Years 0-6), one taught an intermediate class (Year 7), whilst another teacher taught an intermediate class (Year 8) as well as some high school classes. Uenuku Fairhall taught the remaining high school classes. Throughout the conference Tamsin Meaney initiated a dialogic community with the teachers as a medium for reflections and critique of the day’s presentations.

The conference had five keynotes, with the rest of the programme consisting of workshops. Workshop presenters were usually classroom teachers or mathematics or numeracy facilitators, employed by the Ministry of Education. Mathematics educators in universities or other organisations also presented. Conference organisers rarely solicit workshops except from keynote speakers and other sponsored participants. In 2008, the Poutama Tau facilitators had been approached to do presentations at NZAMTC but had declined. They did not feel that they ‘belonged’ at this conference and preferred to participate in a Māori-medium mathematics conference (Trinick, 2007 private communication).

Methods

Interviews with the teachers were held a month later. They were asked how they had found the conference, what they had gained from it and what they would like to see improved. Interviews were audio-taped and transcribed. The dialogic practice continued with project meetings, held once a term after teachers returned to school. The conference was a constant point of discussion. All meetings were audio-taped and transcribed. In September, 2008, teachers, who were still at the school, completed a questionnaire about their views of the conference and whether they wanted to present at the next NZAMTC in 2009. Comments are included from interviews, questionnaires and meeting notes from teachers T1-T10. We do not give the teachers pseudonyms for several reasons. Ours is a long running research project, making anonymity difficult to maintain in published material. Pseudonyms used consistently would not contribute to maintaining this anonymity. We also feel that using numbers concentrates the reader on what is being said rather than who has said it. The project belongs to everyone and every teacher needs to feel comfortable that what has been said was a true representation of everyone’s comments.

Findings

In this section, we outline the main themes from the data. The next section discusses these in relationship to Wenger’s (1998) three modes of belonging and how these modes were constrained or supported by three types of relationships: societal; professional; and social (Meaney, 2004).

The conference as beneficial professional development for teachers in Māori-medium schools

Many aspects were noted as being beneficial for teachers in Māori-medium schools. These ranged from classroom ideas, to opportunities to better understand each other from spending a week together. These comments suggest that concerns about mathematics teacher conferences as effective professional development are unfounded. Even after twelve months, the teachers still described how they found the sessions useful.

For example, T3, who was the Year 1 teacher in 2007, went to a session on using chess in mathematics:

I haven’t really tried anything yet but I am dying to. I am really going to get going also with the chess but I just haven’t had the time to get it settled yet. But over the Christmas period, I’ll get the resources together and get started next year. Uenuku [principal] is on board with it so he is happy about it.

The teacher eventually reported that she had started the chess club. Other teachers also talked about the ideas that they had implemented into their classrooms, either immediately or in the following year. In setting up a new practice, this teacher acknowledged the support from the principal. Support by leadership was also noted in other Māori-medium schools in regard to the implementation of Poutama Tau professional development project (Trinick, 2006).

Teachers also described an increase in confidence in teaching mathematics. One teacher wrote in the questionnaire from September 2008 that:

By observing others that ran the workshops and seeing their passion gave me more confidence and understanding that teaching maths should be meaningful to the students and to have fun doing it! (T4)

Mathematics teaching is an area that teachers in Māori-medium schools are often not confident with. For example, Trinick (2006) described the change in teachers' attitudes from being involved in Poutama Tau.

Prior to Te Poutama Tau, a number of teachers and students had negative attitudes towards pāngarau [mathematics]. Despite their professional training, many teachers still lack confidence, based on memories of their own mathematical learning experiences. In the case study schools, teachers and principals felt there had been significant change over the duration of the project in teacher and pupil attitude to pāngarau. Much of the change on the teachers' part was that they could see the positive outcomes and thus felt more inclined to change their practice. (p. 90)

Many of the teachers found the most beneficial sessions to be those related to what they were involved in at the school. For example, in November, 2007, T6 stated:

I went to a lot of Poutama Tau workshops. They were okay. One of the girls was really cool because they showed us how to use some of the resources we had, like the books we get. We get all the stuff but we don't really get told how to use it. They're like "here you go, go for it". Oh, cool. But this one was going, this is how we use it in class and this is other ways you can use it if you want so that's really cool.

The sessions at the conference were about the English-medium numeracy professional development project, not about the Māori-medium equivalent project. However, some resources were only written in English and thus the conference sessions increased the teacher's numeracy understandings.

The two teachers who taught the high school classes saw the conference as a rare opportunity to participate in interesting learning. In 2008, one teacher wrote in the questionnaire:

Where else will you get any professional development in this area? I find regional meetings absolutely boring, when there is a meeting or conference of some type. NZAMTC is where you get the chance to hear professional speakers local and from around the globe give inspirational talks. (T2)

The principal supported NZAMTC attendance because the conference provided "exposure to national and international ideas, trends and research findings (presented for teachers)" (September, 2008).

The teachers found that Helen Doerr's keynote had given them many ideas about writing in mathematics. In the September 2008 questionnaire, one teacher had described her as the most memorable aspect of the conference because she was "down to earth and pro-indigenous". However, one teacher at least felt that they had not made the most of the opportunity.

I came away thinking that Helen's programme was what we needed to achieve, what you were asking us to do. It really made sense to me. What we should have done was grab her and taken her to a classroom and thrashed it out. How do you start? What practical things do you do? As a team we could have taken a better opportunity with her. I thought it was great opportunity having her there but also a great opportunity lost. (T10, Nov 2007)

The conference also provided unexpected opportunities. T2 had attended sessions on unit standards. Unit standards are student assessments set by teachers as alternatives to achievement standards. Both unit and achievement standards contribute to students gaining the different levels of the National Certificate in Educational Achievement in the final years of high school. As unit standards are done internally, they are often developed and administrated by teachers and then moderated by the Ministry of Education.

TM: You did talk about unit standards [session as being beneficial]

T2: Yes that was interesting because they are obviously looking for a lot of Māori input into the Unit Standards. I chose that one to see what was it was all about. Getting ideas about setting up unit standards for the kids. This is my first year [in teaching it]. There are those who had been doing unit standards for a while so they were a great help. Do this, do that. I gained a lot out of them. In the end I was approached to go down to their next unit standards hui [meeting] because of the Māori input. (Nov, 2007)

This was one of the only occasions when Māori input was sought through the networking at the conference. However, it had the potential for ongoing benefit not just for this teacher but for the wider education community.

Whilst at the conference, the teachers had time to get to know each other in a way that a busy school schedule did not allow. Teachers had opportunities to socialise with each other and conference participants. Probably the most significant social relationship developed during early morning walks by the two youngest teachers and we are all expecting to be invited to a wedding. For these two teachers talk about the conference glowed with superlatives. The teachers also ate their meals together with Helen Doerr joining them for an evening meal and at the conference dinner. The teachers talked with her about her project and also her trip around New Zealand. Consequently, T10 felt comfortable to email her for further information about her project. It was at conference social events, such as happy hours, that some teachers also talked with teachers from other schools.

Generally the consensus was that the conference had been valuable to them as teachers even if not all the sessions had been useful. As T6 stated “[t]he conference was awesome” (Interview, 7/11/07).

Lack of sessions for teachers teaching in the medium of Māori

However, the teachers were critical of aspects of the conference. Although not all sessions were useful, the main concerns were the lack of connection to the need to support students’ fluency in te reo Māori [the Māori language] and to their strong Māori identities as mathematicians.

Many of the teachers mentioned the lack of sessions on teaching in a language other than English. The only Māori specific item at the conference had been that one of the suppliers had wanted to sell the school resources that were written in te reo Māori. This supplier had asked the organisers to request that the teachers look at the resources. T2’s felt that the resources were not of great value as the teachers themselves could easily develop them. There was a need for good quality resources that could support new teaching practices but these resources were not of this kind.

T6 felt that some of the workshops were useful, but inevitably teachers would have to translate the ideas and resources into te reo Māori. She felt that some support could have been provided by the presenters and has implications for the implementation of the principles of the Treaty of Waitangi.

And there was nothing, there was no talk about te reo at all, not in any of the ones that I went to which was kind of sad. So, what I did was went in and took their ideas pretty much. And then translated them, into te reo. It would be cool if they had like maybe not a whole maths hui [meeting] on for kura kaupapa Māori but just a little talk about doing it in other languages and stuff, not just the maths language. (Nov, 2007)

Another way for teachers to gain information on teaching numeracy through te reo Māori was attending the annual conferences connected to the Poutama Tau professional development project. These conferences support interactions between teachers, but only on issues to do with numeracy rather than wider issues to do with mathematics. They also do not have international speakers and do not support cross-fertilisation between English and Māori-medium sectors.

One teacher felt that there should be more sessions to support teachers in Māori-medium schools to become more confident in teaching maths.

I think there should be workshops that should guide teachers in this area. Particularly, Māori teachers. Maybe, a run of workshops that focus just on that need. Developing the confidence into teaching mathematics. Maths is draining and puts off a lot of wannabe teachers. (T2, Sept 2008)

Several teachers commented on the lack of other teachers from the Māori-medium sector. The teachers and principal also noted that there were only a limited number of sessions for primary teachers. One teacher stated, “There needed to be more maths related to primary teaching. I went to the ones that I thought would apply to the primary school because the rest was above our heads” (T10, interview 4/11/07).

Modes of belonging and their connection to relationships

Our aim in this article is to open up debate about the lack of teachers from Māori-medium schools and presentations on the mathematical needs of students from this sector as an issue of social justice. For the teachers from Te Kura Kaupapa Māori o Te Koutu attendance at NZAMTC was beneficial for their mathematics teaching. On the other hand, the absence of other teachers from the Māori-medium sector was a deterrent from their attendance at future conferences. In order to explore this further, we analysed the teachers’ perceptions of their attendance at the conference by categorising them according to Wenger’s modes of belonging and relating them to different types of relationships that the teachers participated in.

Wenger’s (1998) modes of belonging are part of his wider description of the relationship between communities of practice, identity and learning. For Wenger (1998), “practice is the source of coherence of a community” (p. 73). Therefore, mathematics teacher conferences would not generally be considered a community of practice. However, the teachers engaged in practices at the conference that contributed to them negotiating meaning about being mathematics teachers. Consequently, these conferences can be considered a subset of the wider community of practice of mathematics teachers. Perceptions of belonging supported teachers’ decisions about participating in a community of practice as mathematics teachers and this influenced and were influenced by their feelings of belonging to the mathematics teacher conference community of practice.

We believed that how these perceptions were formed was related to relationships that the teachers engaged in. Relationships are critical within Māori culture (Bishop & Glynn, 1999). Although communities of practice are essentially about the relationships between people, looking at the modes of belonging through the types of relationships provides a broadened insight into the inclusion/exclusion process. This insight would contribute to the debate about whether social justice needs were being served.

In doing research with this school ten years previously, Meaney (2004) had considered three levels of relationships that affected her role as an outside expert. These were: societal; professional; and social. These sets of relationships also seemed relevant within the context of attending the mathematics teachers' conference as the teachers were part of the interactions of the wider bicultural New Zealand society as well as having professional roles as teachers and social roles as friends.

As with any classification, the categories of the modes of belonging and of the different types of relationships are not clear cut. All the relationships interact with each other and they should not be considered as separate except as a way of being able to explore this social justice issue.

The three modes of belonging

The three modes of belonging are: engagement; imagination; and alignment. Wenger (1998) identified how different aspects of each mode both hindered and constrained a person's sense of belonging. For example, he discussed how what constituted competency in engagement "can become so transparent, locally ingrained, and socially efficacious that it becomes insular: nothing else, no other viewpoint, can even register, let alone create a disturbance or a discontinuity that would spur the history of practice onward" (p.175). One of our hopes in writing this article, is to discuss investigate how the established routines of mathematics teacher conferences could be disrupted so that groups of teachers who were excluding themselves could be encouraged to participate. Figure 1 reproduces, Wenger's (1998) summary of the different modes.

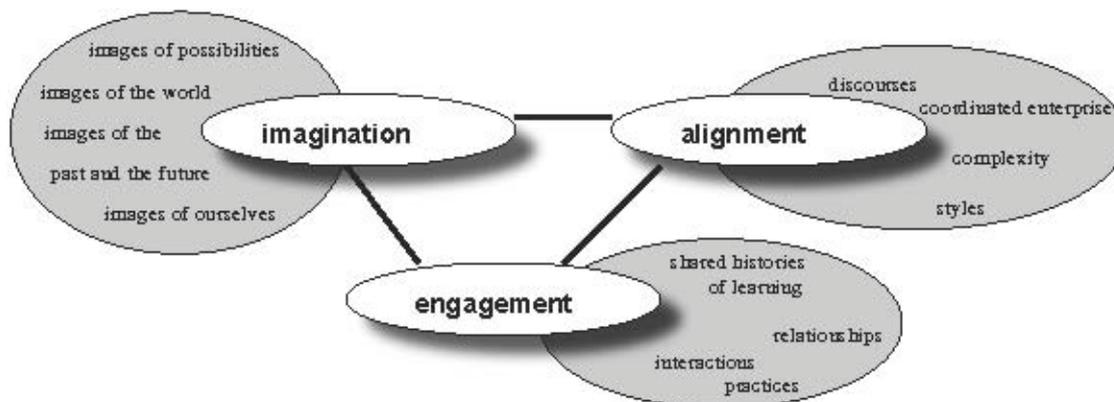


Figure 1. Modes of belonging from Wenger (1998, p. 174).

Engagement

For Wenger (1998), engagement is "active involvement in mutual processes of negotiation of meaning" (p. 173). The teachers felt that attending the conference was beneficial and actively participated by attending sessions and networking. Networking was important in building relationships with each other and had an impact on their willingness to jointly adopt ideas at the school.

Engagement of this kind could also lead to negotiating what it meant to be a participant at a mathematics teacher conference. For example, in discussing how having a teacher from another Māori-medium school was not something that she had seen at other conferences, T2 described her beliefs about why more Māori teachers did not attend.

Yes there was [another teacher from a Māori-medium school]. That was great. That was one more than we have ever seen before. It's still nowhere near enough. For all these major conferences there should be more. That's a question that we keep thinking why. I think they are still scared of maths. Specially Māori are still scared of the whole maths concept. The talk is too above. With Māori teachers they just want the nitty gritty. How to do it sort of thing and that's realistic. That is it. They want the stuff. When it comes to high falooting maths talking or anything they start shutting off. That's still sad. (T2. Interview 5/11/07)

In this extract, T2 described why she believed that most Māori teachers do not participate in mathematics teacher conference. Her ideas related to alignment and imagination, because there are implications about how both teachers and the conference structures would have to change to encourage Māori teachers to participate.

Wenger (1998) states "engagement is an interesting dimension of power: it affords the power to negotiate our enterprises and thus to shape the context in which we can construct and experience an identity of competence" (p. 175). Limited attendance by teachers from the Māori-medium education sector reduces their capacity to negotiate meaning. It is unlikely that the conference will become more about what teachers in the Māori-medium section want it to be, if there are not sufficient numbers attending for their voices to be heard. Yet, it is unlikely that these teachers would attend in large numbers as they do not perceive themselves to be competent members of it. Something needs to change if attendance and therefore engagement of teachers in the Māori-medium sector is likely to change. If this does not occur then these teachers are likely to continue to exclude themselves from participating in these conferences.

The teachers' perceptions on the benefits of attending the conference were related to being members of the community of mathematics teachers as mostly they talked about what they had seen or heard in relationship to their own practice. Participation in this community of practice of a mathematics teacher conference was a subset of being part of the community of practice of being a mathematics teacher. Teachers who do not attend these conferences can still be mathematics teachers and negotiate what this means but would not have the experiences from conferences to draw upon in this negotiation.

Imagination

The teachers used their classroom experiences and knowledge of their students to evaluate the usefulness of the sessions. In some cases such as how te reo Māori could be used, they imaginatively considered alternatives to the English-medium examples they saw. Imagination is "creating images of the world and seeing connections through time and space by extrapolating from our own experience" (Wenger, 1998, p. 173). The teachers were clear about how sessions could have been made more appropriate. The discussions that they had in meal sessions, during the evening and when they got back to school meant that imagination was social, rather than an individual activity: "the creative character of imagination is anchored in social interactions and communal experiences" (Wenger, 1998 p. 176).

The dialogic discussion around the conference continued, including with teachers who had not been able to attend. T1 who had not attended the conference talked about how T10 had described both Helen Doerr's session and an idea about teaching basic facts. T7 had also heard about a strategy that Helen Doerr's research teachers used for improving students' writing from T10 and as a result had implemented it into his programme.

TM: So they [the students] are orally presenting it? And then do they write?

T7: No, they are orally presenting their writing because if there are questionable answers that are produced and they've obviously heard everyone else's, then they go -maybe I have to redo mine. Plus I don't mind telling them that's not quite right, start again. ... I didn't actually go to the hui [mathematics teacher conference], it was just a chance meeting with T10. (Nov, 2007)

Imagination was employed not just in regard to teaching practices, but also in regard to their future participation at mathematics teacher conferences. When asked about giving a session at the next conference, some of the teachers were able to imagine themselves doing this, although only the principal had done previously. For example, the Year 1 teacher stated she would be prepared to give a session on "reading and writing in Maths at the year 0 – 2 level in Primary" (September 08). She was specifically interested at targeting teachers of Māori speaking children.

Imagination is a form of belonging that allows these Māori-medium teachers to jointly consider alternatives to what they were presently doing. They did this by comparing their current practices with an imagined alternative. The relative newness of the Māori-medium schooling sector and the lack of resources mean that teachers from these schools are used to having to imagine how English-medium teaching can be adapted. This is something that English-medium teachers do not need to do when they adapt conference ideas to their own classrooms. However, the skills that the teachers of Te Kura Kaupapa Māori o Te Koutu in adapting ideas could be valuable for the English-medium teachers to learn about, especially with the greater variety of children being found in mathematics classrooms.

Alignment

Wenger (1998) stated that alignment was "coordinating our energy and activities in order to fit within broader structures and contribute to broader enterprises" (p. 174). By being made to attend the conference, teachers were coerced into aligning their energy to what the principal perceived as being valuable. For some of the teachers, they found the experience so valuable that they were prepared to consider not only going to the next conference, but also giving a session. For others, this coerced alignment was less influential. One teacher stated:

I wasn't happy about losing a week of the holidays. I thought well we are here how can we get the most out of it. At the end of the day you are going to find something if you are positive. (T8, Nov, 2007)

When she was asked in September, 2008 about further attendance at NZAMTC, she stated that she was "uninterested". She was not prepared to align her energy to participating again. This was not because she had not found attendance valuable, as she had incorporated some of the activities into her teaching practice. However, the compromises that she had to make to her family situation meant that the disadvantages of aligning her energy in this way outweighed what she gained from the experience.

The lack of connections to te reo Māori and Māori culture resulted in many of the teachers being unwilling to align their energy to attending future conferences. T1 stated that unless there were more sessions on Poutama Tau, for primary teachers and based on Māori concepts, or in Māori then she was not prepared to attend NZAMT conferences. Although the other two modes of belonging produced strong incentives for attending the conferences, the work required to transform these experiences to suit Māori-medium classrooms, amongst other reasons, resulted in teachers not wanting to align themselves to attend another conference.

Coerced alignment can impact on the sense of belonging that teachers ultimately assume. Teachers at this school entered into a community of practice of mathematics teacher conferences that supported their negotiation of meaning as participants in the community of mathematics teachers. The conference gave them insights into other practices that they had not known about previously. However, coerced alignment will not be appropriate for all teachers and it is unlikely that more Māori-medium teachers will attend mathematics teacher conferences as a consequence. Ultimately, the conferences need sessions that connect explicitly to the teachers' main purposes for teaching mathematics so that teachers will want to align their energies to this community of practice.

Summary

The three modes of belonging provided insight into how the teachers' perceptions of the mathematics teacher conference related to their sense of identity, learning and communities of practice. Mathematics teacher conferences are a subset of the community of practice of mathematics teachers. Participating in conferences requires engagement, imagination and alignment, but the value of participation is in what it contributes to teachers' mathematics teaching practices. Attending conferences is not an end unto itself.

The current construction of sessions requires the teachers from the Māori-medium sector to adapt the activities and ideas from the conference to meet their purposes for teaching mathematics. Without any explicit discussion of mathematics as a vehicle for supporting students' te reo Māori fluency and strong Māori identities, then teachers are unlikely to continue to align themselves to this community. However, they may look for alternatives such as Poutama Tau conferences that are specifically to do with Māori-medium classrooms. The consequence of this will be a lack of input from international speakers that was something that these teachers found extremely valuable. It will also not contribute to the shared responsibility outlined in the Treaty of Waitangi for the maintenance of te reo Māori but rather leave it exclusively to be the responsibility of the Māori-immersion teachers.

How do different types of relationships influence belonging?

Analysing the teachers' perceptions by considering Wenger's three modes of belonging provides insights into the situation. Although the teachers saw benefits in attending the conference as professional development, they also perceived the lack of connections to their primary purposes for teaching mathematics to be problematic. In this section we explore how different types of relationships – societal, professional and social -have contributed to this situation and thus consider alternative courses of action. This section does not provide definitive solutions but rather points for a discussion that needs to occur between all participants of these conferences in regard to the principles of the Treaty of Waitangi.

Societal

“Societal relationships describe the positioning of different groups within society as a consequence of the development of cultural norms over long periods of time” (Meaney, 2004, p. 190). These relationships are often the hardest to identify because they allow dominant groups' knowledge to be considered as the norm. Bishop (2007), using the ideas of Michel Foucault, described how teachers can become embroiled in the acceptance of these norms:

That is, we are not of the explanations but rather, by drawing on particular discourses to explain and make sense of our experiences, we position ourselves within these discourses and act accordingly in our classrooms. The discourses already exist; they have developed throughout history and are often in conflict with each other through power differentials. Most importantly for our desire to be agentic, some discourses hold solutions to problems, and others don't. (p. xviii)

The school operated in the wider education system and discussions about what they saw at the conference and what they did in their classrooms were drawn from these societal relationships. They illustrate how wider societal relationships influence all interactions within bicultural New Zealand.

The teachers suggested that there was a need for the conference presenters, who generally discussed what they had done in their own classrooms, to consider the other situations in which their ideas could be used. Given that there is no formal induction into how to present at NZAMTC, unless English-medium teachers had experience of teaching mathematics to second language learners, it may be beyond their imagination to make connections to teaching in another language. Although the Treaty of Waitangi suggests that it is the responsibility of all New Zealanders to support the retention of Māori language and culture, most teachers from the English-medium education sector may never have had the opportunity to do this. They may also not have the skills or inclination to do so.

Consequently, it could be useful for mathematics facilitators from Māori-medium education section to run a session on how to adapt workshop ideas. This could be about adapting ideas generally but also about how to adapt them for Māoriimmersion classrooms. As well, the teachers from Kura Kaupapa Māori o Te Koutu could present at the next conference about how they had adapted the ideas from the 2007 conference. These ideas are only likely to have a positive impact on Māori-immersion teachers' alignment if there is an audience for these workshops.

Societal relations are those that describe how Māori and non-Māori interact. If change is to occur so that the responsibility for retaining te reo Māori and Māori culture is shared, then more needs to be done for this to become part of the general discourse among mathematics teachers. Too often mathematics is considered to be cultureless (Anderson, 1990) and the current ways that we interact at mathematics teacher conferences allows this paradigm to remain unquestioned.

Professional

It is important that professional relationships are nurtured so that kura kaupapa Māori teachers can fulfil their aims to support Māori language and culture and the educational aspirations of their students. To do this, professional relationships need teachers to “share their expectations and evaluate their experiences. [So that] They build a framework of collective orientations towards the teaching and learning of mathematics and modify it according to their classroom experiences” (Gellert, 2008, p. 100).

The professional relationships between the teachers meant that discussing the teaching of mathematics was part of their everyday experiences. Trinick (2006) noted that schools who obtained significant student achievement in the Poutama Tau project had teachers who collaborated frequently. Although teachers attending mathematics teacher’s conferences make many informal connections, more active encouragement of networking could be done. This especially may be the case for kura kaupapa Māori teachers, who are few in number and spread across the breadth of New Zealand. Often at academic conferences, caucuses are formed for Māori and Indigenous academic researchers and this could be a possibility for supporting the development of professional relationships across schools. However, Gellert (2008) warned that teacher networks need to be more than just about passing on information, if changes in teacher practices are to happen. Self-reflection needs to be an important component in the exchanges.

The professional relationships that the teachers were engaged in both at the conference and back at the school had a large impact on the teachers’ willingness to make changes to their teaching practices. With eight teachers and a researcher talking each evening, it was possible for everyone to consolidate their understanding of what sessions had been valuable. The dialogic community provided an environment in which they could collectively and individually decide on whether or not to change their teaching practices. Professional relationships occur within both societal and social relationships. Societal relationships, as discussed in the previous section, influence the level of discussion with teachers from other schools. Social relationships are about how friendships support the sharing of ideas and this is discussed in the next section.

Social

Weissglass (1994) suggested that to discuss issues meaningfully, teachers needed to have established good relations with colleagues. They do not need to be close friends but they do need to be willing to listen to each other in a caring way. Long term supportive relationships with colleagues contribute to effective learning environments in which participants have opportunities to share ideas (Timperley, Phillips, & Wiseman, 2003). For this group of teachers, being with each other for a week meant that they got to know each other in ways that were not possible during a normal, busy school day.

Social relationships were important in that they establish trust between people that allows them to build strong professional relationships. People are thus better able to understand of how they are integrated into societal relationships. If social relationships can be built between Māori and non-Māori through attendance at mathematics conference, then it is possible that professional relationships and societal relationships can be enhanced. Without this trust then it is unlikely that changes will occur and the principles of the Treaty of Waitangi become more than words on paper.

Whither the dialogue?

Although important the welcoming pōwhiri should not be the only ‘Māori’ aspect visible in the conference. New Zealand is a bicultural country and this should be reflected in the role that all New Zealanders take in supporting the resurgence of te reo Māori including within the teaching of mathematics. Not only is this a legal requirement under the Treaty of Waitangi but in having to come to grips with this commitment, many English-medium teachers could learn much about the importance of language generally in the teaching and learning of mathematics. It is not just the Māori teachers who could be missing out by limiting the interaction between teachers from the two education sectors. The comments from the teachers suggest a number of activities that could be undertaken both by the Māori-medium teachers, but also by conference organisers and workshop presenters. They are not proposing that the whole conference be changed, rather they suggest some alternatives in what could be offered so there was a greater choice for all teachers.

Traditionally, there has been limited support for teachers in Māori-medium education compared to their peers in English-medium education sector, especially in regard to the teaching of mathematics (Trinick, 2006). Conferences such as NZAMTC have great potential for providing professional development to Māori-medium teachers. As noted the conference influenced Te Kura Kaupapa Māori o Te Koutu teachers to change their teaching practices. Several stated that they would attend the next conference in 2009. It would be possible for organisers of other mathematics teacher conferences to provide extra support for networking and actively encourage attendance by teachers from Māori-medium schools. They could also solicit, from Māori-medium mathematics facilitators, workshops that would be of benefit not just to Māori-medium teachers but also to their English-medium peers. These could facilitate teachers to gain the maximum benefit from attending the sessions and thus decide to align their energy in this way.

Many of these changes that the teachers made were connected to the ongoing projects in the school such as the writing project and Poutama Tau. Involvement in these projects supported teachers to use their classroom experiences to evaluate the sessions at the conference. Their imagination contributed to a sense of belonging to a mathematics teacher conference. This was evident when they talked with Helen Doerr about what they were doing in their own classrooms. However, if teachers attended without these skills from other professional development projects, then this may limit how much they gain from conference sessions. These teachers may value sessions on how to make adaptations for their own classroom as well as activities to foster networks with teachers from other Māori-medium schools.

Teachers' perceptions of NZAMTC described the teachers' societal, professional and social relationships. These three types of relationships were intimately connected, with each influencing the others. The discussion based on the relationships raised a number of points that can become part of an ongoing dialogue. Social relationships are essential in that they contribute to teachers being comfortable with each other. This ease of interacting with each other supported the teachers in their professional relationships that they were engaged in when performing their roles as educators. By interacting, the teachers discussed what was valuable new information and decided individually and collaboratively to change their teaching practices. Societal relationships provided insight into why these teachers were generally the only teachers from the Māori-medium education sector. If it is considered valuable that more teachers from the Māori-medium section attend the NZAMTC conferences, then the conferences' sessions need to reflect the principles of the Treaty of Waitangi. This means supporting the retention and maintenance of te reo Māori and Māori culture. This is not a simple task to achieve. However, if presenters engage in dialogue, Māori-medium teachers are more likely to feel that they are not expected to make all the connections themselves. Their attendance is not merely to ensure that the pōwhiri is done appropriately for the benefit of overseas visitors but is symbolic of the joining of two different sets of teachers who all wish to improve the learning opportunities of all students, including Māori. Without some changes being made, few Māori-medium teachers will realise that "the conference was awesome" and social justice will not be achieved as they continue to exclude themselves from participating.

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