Te Poutama Tau: A Case Study of Two Schools

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This paper reports on two schools that have made positive mean stage gains in the Number Framework. The Number Framework is a key component of Te Poutama Tau, which aims to lift teacher capability and raise student achievement in Māori-medium education. The results of these case studies may help to inform schools, numeracy facilitators, and policy initiatives in order to support the future implementation of Te Poutama Tau projects in Māori-medium and kura kaupapa Māori.

Introduction

Te Poutama Tau is a professional development programme focusing on numeracy for teachers in Māori-medium schools and classrooms. It is a component of a key government initiative aimed at raising student achievement by building teacher capability in the teaching and learning of numeracy. Te Poutama Tau is based on the Number Framework developed for New Zealand schools. The framework is divided into two key components, knowledge and strategy. The knowledge section describes the key items of knowledge that students need to learn. The strategy section describes the mental processes that students use to estimate answers and to solve operational problems with numbers. It is important that students make progress in both sections of the framework.

Students are assessed individually at the beginning of the programme, using a diagnostic interview, and again at the end of the year. The diagnostic interview is designed to provide teachers with quality information about the knowledge and mental strategies of their students and to assist in locating each student's position on the Number Framework. The results for each student, classroom, and school are entered on the national database. The database shows the progress that students have made on the Number Framework between the initial and final diagnostic interviews.

Te Poutama Tau Case Studies

This study examines two schools that participated in Te Poutama Tau in 2003 and that achieved positive mean stage gains on the Number Framework. Students involved in the programme were expected to make a mean stage gain of at least one stage. This was based on the calculations for the English-medium numeracy projects. (See Thomas & Ward, 2002, p. 13.)

Māori-medium mathematics education is still very much in its infancy, so it is important to identify key factors that promote student achievement. Studies in Māori-medium education (Hohepa 1993; Smith, 1999; Bishop & Glynn 1999; Bishop, Berryman, & Richardson, 2001) note the key role of culture and that effective teachers create caring relationships and structured, positive, and co-operative environments. Glynn, Berryman, & Glynn (2000) focus on the impact of home and school relationships on learning and achievement. Studies by Christensen, 2003 and 2004, note the issue of language fluency on achievement. Christensen (2004) argues that there is a strong link between students' proficiency levels in te reo Māori and their progress

through the stages in the Number Framework. He notes that there is significant correlation between language proficiency and performance in the diagnostic interview (Christensen 2003, p. 27). However, considerable research is still required to assist in improving student achievement.

Methodology

For the purposes of this research, schools that participated in Te Poutama Tau in 2003 were selected on the basis of the results of their students' performance in the diagnostic interview. This was done by ranking schools that entered initial and final data in the national database in terms of their mean stage gain overall.

There was a cluster of five schools and/or classrooms that achieved similar results. Schools who participated in Te Poutama Tau did so either as whole schools (in general, these were the kura kaupapa Māori) or as Māori-medium units (classes in English-medium schools). It was decided to concentrate on only two schools. This was based first on manageability of the data and the process. If there were more schools, there would be less time given to investigating the results of each one. Secondly, two schools provided the opportunity to identify the common factors that may have contributed to their positive mean stage gain. It was decided to examine two of the schools, kura A and kura E, using the bigger data samples to minimise the chance of "one-off" spikes and dips. The advice of the Te Poutama Tau numeracy advisers for the two schools was also sought, in order to gain their perspectives on the implementation of Te Poutama Tau in these particular schools. In both cases, the numeracy facilitators confirmed the schools' positive attitudes and commitment to the programme.

Once the two schools were selected, the principals were sent a letter explaining the nature of the research contract. This was followed up by a phone call to establish the identity of the researcher, to establish positive relationships, and to confirm the schools' willingness to participate. The principals and teachers from the case study schools who were involved in the 2003 Te Poutama Tau project were sent questionnaires (see Appendix E), followed by an interview. The interview questions focused on the following areas:

- The socio-cultural and demographic features of the school and its community
- Relationships between the school and its local community, including links to the local iwi and hapū
- The experience and qualifications of management and teachers, particularly in relation to pāngarau
- Attitudes and involvement of school management and teachers in Te Poutama Tau
- The effect of the Te Poutama Tau programme on classroom practice
- Teacher reflections on the implementation of Te Poutama Tau.

Each teacher was interviewed for 15 to 20 minutes. This was followed by an interview with the principal. The interview responses and the reflections of the staff involved in Te Poutama Tau are discussed in the first case study summary.

As a key component of the research methodology, consideration was given to relevant approaches to working with Māori-medium and kura kaupapa Māori. Principals were initially sent a letter informing them of the rationale and aims of the project. This was followed by a phone call to organise a visit to the school and to establish the identity of the researcher. Māori-medium schools tend to be resistant to research projects that do not benefit the school directly or Māori-medium education in general. However, the principals were very positive about being involved in the project and recognised the positive outcomes for students in relation to the Number Framework.

Most of the interaction with the interviewees was carried out in the medium of Māori to validate and to establish the commitment of the researcher to the importance of te reo Māori to the kura. This was followed up by a personal visit (kanohi ki te kanohi) to discuss issues relating to mutual benefits of the project, to outline the research process, and to establish cultural legitimisation. Before the interviews could begin, the researcher had to be formally welcomed onto the school grounds. In one of the cases, this involved whole-school participation in a formal pōhiri and in the other case, the researcher had been welcomed on in a formal pōhiri on a previous occasion at the launch of a Māori-medium mathematics dictionary. This process recognises the mana (power) and the turangawaewae (identity) of the school and the community.

Results

Case Study 1: Kura A

Kura A is a rural, full primary, decile 2 school with 245 students, of whom about 94% are Māori. For teaching and learning, the students were fairly evenly split between the English- and Māori-medium units. However, this study focused entirely on the Māori-medium component of the school, Te Whānau Reo Māori. Despite the dual medium of instruction of the school, the school identifies itself very closely with the local iwi and hapū. High numbers of children have links to the local iwi and a high percentage are also bussed each day from the nearby city to the school. Many of the parents attended the school as students themselves and feel a need for their children to be immersed in the reo and traditions of their own iwi. In some cases, children live with grandparents who still reside in the local area so that they can go to this particular school. The concept of a strong and vibrant iwi identity flows strongly throughout the culture of the school. The school therefore plays a vital role in the maintenance of tribal identity and is the heart of its community.

A few of the parents work in professional fields, but the majority of parents/caregivers are in the low socio-economic category. Some of the students who reside with their grandparents do so to enable them to attend this school, but others are a "mokopuna whangai"; that is, they are being formally brought up by their grandparents, a relationship not uncommon in rural Māori communities. Most of the Māori students have regular contact with Māori-speaking whānau at home or in their whānau whānui or marae experiences. This intergenerational language flow is a vital component in the development of Māori language proficiency (Chrisp, 1998) and the maintenance of te reo Māori.

The school actively promoted community involvement in the project, particularly in sharing students' progress. A significant number of whānau attended the introductory hui to Te Poutama Tau and were fully supportive of the initiative. The Te Poutama Tau facilitators had a significant role in this process. The Board and parents were regularly informed of student progress on the Number Framework. Parents/caregivers were invited to participate in the development of aspects of the teaching and learning programme, particularly in the area of te reo and tikanga. The principal and other senior staff visited the local contributing kōhanga to discuss with staff and parents topics such as classroom routines. The principal felt that this strategy assisted in preparing kōhanga graduates for entry into primary school. Staff at the local kōhanga, who were often parents or whānau of students from the school, were also introduced to the Number Framework. The principal felt this had positive outcomes, with a number of kōhanga graduates entering the kura beyond the emergent stage of the Number Framework.

School Leadership

The principal is a Māori woman who has had 26 years in the teaching profession and 11 years in this particular school. She has a diploma of teaching and a diploma in bilingual education and is close to completing her Bachelor of Teaching degree. She is aware of the need to keep up to date with the range of initiatives designed to raise the achievement of students. The school also had been involved in a number of previous professional development contracts, so the principal and the senior teacher of the Te Wh nau Reo M ori syndicate were thus well experienced in managing professional development initiatives. The senior staff argued that the success of the initiatives was in part due to collaborative leadership and a common commitment to maintaining currency in national initiatives, particularly those that raised student achievement. As a consequence, the school was often called upon to trial local and national educational initiatives, including the pilot Te Poutama Tau project in 2002. The principal felt it was critical for the success of the programme that she be directly involved in the programme by attending professional development and progress meetings with the numeracy facilitators and by providing release time and financial support for staff involved, particularly the lead teachers. In collaboration with the staff, clear goals and expectations were developed. The programme was continuously monitored by the Te Poutama Tau facilitators. The principal felt strongly that the role of the senior teacher of Te Wh nau Reo M ori was essential to the success of the implementation of Te Poutama Tau in the school.

Teachers and Classrooms

As a group, teachers in kura A were also considerably experienced in teaching at the primary school level. Levels of experience ranged from 7 years' to 26 years' teaching, with the majority over 10 years. All the teachers involved in the project had taught for a number of years in the school, thus providing a relatively stable workforce. The principal noted that her staff created structured and positive learning environments, with excellent classroom management and routines. She believed that the focus on cooperative learning fitted very well with the teaching and learning philosophies of Te Poutama Tau.

All the teachers interviewed identified pāngarau as one of their favourite subjects, along with either literacy or te reo Māori, although a few admitted this was not always so. This response may have been due, in part, to the belief that this was the response the interviewer sought.

Class sizes ranged from 15 to 30 students across a number of age levels. Some of the teachers rated the language fluency of their students as the majority of their students being fluent, while other teachers rated their students as being "somewhat fluent". There was also an expectation that teachers would rate the Māori language proficiency of their students for Te Poutama Tau. This rating may well be influenced by each teacher's own level of fluency.

All teachers in kura A rated their students' attitudes to mathematics as now being very positive, with some seeing major shifts in attitudes during the implementation of Te Poutama Tau. Many felt that the effective strategies, particularly the classroom organisation and teaching pedagogy, they had developed in Te Poutama Tau could be transferred to other learning contexts.

Implementation of Te Poutama Tau

One of the key strategies of both the principal and the lead teacher of Te Poutama Tau was to keep the board and parents well informed of progress and targets for future development. The Poutama Tau facilitators attached to the school supported this process by also attending the meetings.

The principal, the staff, and the Te Poutama Tau facilitators interviewed felt there was total school commitment to the project. The principal worked in collaboration with the lead teacher, who played a critical role in implementation, in the setting of clear goals and expectations, and in establishing an appropriate time commitment for successful outcomes. Teachers did acknowledge some of the struggles, particularly understanding the content of the framework, the time needed to test students, and the linking of their classroom programmes to the outcomes of the diagnostic interview.

All the participants felt that they had made significant shifts themselves in a number of key areas in the teaching and learning of numeracy. Some of the shifts were in their own teaching pedagogy, while other shifts were in their attitudes and beliefs about how children learn numeracy. All the teachers felt their attitude towards the teaching of pāngarau was much more positive, and the outcomes were positive for students. This is consistent with previous Te Poutama Tau research (Christensen, 2004) in which facilitators were unanimous about the potential benefits of the programme in lifting teacher professional capability and student achievement.

Case Study 2: Kura E

Kura E is a relatively newly established urban primary school located on the outskirts of a medium-sized city. It is classified as a decile 1 school with a roll of 245 students who learn through the medium of Māori, with the overwhelming majority being of Māori descent. All those interviewed felt there was strong whānau involvement in school. However, the principal felt that the links to local iwi and hapū were not as strong as they could be. There had been significant urban migration during the 1950s and 1960s in the area, and, consequently, the local iwi were sometimes swamped by the infusion of other iwi and hapū. Therefore, the kura E population was still in the process of establishing its identity and relationships with the local hapū. This is not unusual with Māori-medium and kura kaupapa Māori located in cities where there has been significant urban migration.

As a consequence of urban migration, there was also a considerable Māori language shift in the migrating Māori community (Benton, 1981). "Language shift" refers to the change from one language to another as the primary language (Crawford, 1996). Many of the school's local community members migrated from the outlying rural Māori communities to the city, where economic opportunities for employment and commerce tended to be open only to those who are fully proficient in the dominant language, English. Consequently, there has been a decrease in the number of Māori speakers and limited opportunities for the language to be spoken.

This school was created in resistance to the dominant culture's disregard for the language and cultural aspirations of Māori in the area and as a means to revitalise the language and to establish a school based on the centrality of tikanga.

School Leadership

The principal is a Māori woman who has been teaching in primary schools for 36 years. She spent 18 years of those years as a principal in a variety of schools, including 5 years in a kura kaupapa Māori. She is passionate about the teaching of mathematics and has maintained a keen interest in curriculum developments in mathematics education over a number of years. She has also been significantly involved in the implementation of Te Poutama Tau in her kura and has attended all the numeracy workshops organised by the local Te Poutama Tau and numeracy facilitators. She felt that her active involvement in the professional development workshops assisted her greatly in the successful implementation of the project in her school.

The principal believes that her school has made significant shifts in the teaching and learning of numeracy. She believes this was due in part to the involvement of several beginning teachers who tended to be more receptive to new ideas and approaches than some of the more experienced teachers.

The principal felt that the involvement in the Numeracy Development Project has had a positive effect on other areas of pāngarau. Students were more motivated to learn, with the majority having developed positive attitudes to mathematics.

She used a number of techniques to closely monitor the progress of Te Poutama Tau and played a key role in the data analysis. Some of the techniques used included regular meetings with the lead teacher and numeracy facilitator, regular reports from teachers and syndicates, and the setting of targets with the teachers. When individual teachers required additional support, she either provided direct support herself or organised support from the lead teacher of Te Poutama Tau in the school.

Teachers and Classrooms

Teaching experience in primary/kura kaupapa ranged from year 2 to 15 years. However, the majority had taught for 2 to 3 years and a number were teaching that particular age group for the first time. The classes ranged from year 1–8, with the class sizes mainly around 15–20. The majority of teachers had a Diploma of Teaching, with no specific qualification in mathematics education. There was no overwhelming preference for any one curriculum area that teachers preferred to teach, although pāngarau did feature a few times.

Teachers felt that the majority of students were reasonably fluent in te reo Māori, with a level of proficiency that allowed them to interact in the medium of Māori. They noted that many of the students had developed more positive attitudes to pāngarau in general, and for many teachers, this was one of the most positive aspects of the programme.

A number of the teachers admitted that prior to the commencement of the programme, they had negative feelings towards pāngarau, but their involvement considerably changed their attitudes. The Number Framework enabled them to see progression through number much more effectively. The diagnostic tests and follow-up snap tests allowed teachers to clearly identify the stages at which the students were achieving. The structure and nature of the programme enabled them to see the content more explicitly in comparison to the pāngarau curriculum statement. Some saw the marautanga pāngarau as not being very "user friendly", but the hands-on nature of the programme appealed to many of the teachers. The teachers who were interviewed all felt they had been well supported by the school management in the implementation of Te Poutama Tau.

The implementation of Te Poutama Tau

In general, all those interviewed in kura E shared a common commitment to the implementation of Te Poutama Tau. The principal and the lead teacher managed most of the organisation tasks associated with its implementation. They were responsible for the data analysis (with the support of the numeracy facilitator) and for the setting of goals.

Results and Discussion

While it is difficult to isolate individual items, the outcomes of this study suggest that the following key points that the two kura have in common contributed to the positive progress of the students in the Number Framework. It would also seem that the following points cannot be seen in isolation from each other, but in combination.

- Teachers and principals felt there had been significant change over the duration of the project in teacher and pupil attitude to pāngarau. Previously, a number of teachers and students felt negative about the subject. For students, the way in which numeracy was taught in the project eased many of their anxieties and increased knowledge and confidence. This is consistent with the results from the studies by Christensen in 2002 and 2003.
- The principals participated in the professional development programmes with the teachers. They worked alongside staff to develop a shared sense of purpose and direction. By modelling desired dispositions and actions, principals enhanced the rest of their staffs' belief in the project and in their own capabilities and their own enthusiasm for change.
- The principals and lead teachers closely monitored the school performance during the year, setting clear goals for teaching staff. The goals were evaluated throughout the year.
- For teachers, the framework provided a much more explicit picture of the required content and how students progress through the content. This point is closely associated with the setting of goals and the monitoring of performance.
- Individualised support was provided for a number of the teachers. The principals recognised that some teachers needed support and guidance in order to make changes.
- The lead teachers played a significant role in the implementation of the project and were well supported by the Te Poutama Tau facilitators.
- As a result of the programme, the principal and staff focused on student learning, not only the knowledge and strategies of the Number Framework but also the development of positive attitudes.
- Both kura had a commitment to teaching and learning in the medium of Māori, but it is not clear from this research what impact the level of proficiency of the students had on progress through the Number Framework.

There may well be features of the two case study schools that are unique to them and that contributed to the positive results. Although the two schools are classified as decile 1, they are different in their histories, their staff, and their relationships with their local communities. For example, kura A had been established for a significant number of years, with families having connections to the school for a number of generations. On the other hand, kura E was recently established and is still developing relationships with the local community. The teaching qualifications of each group of teachers are also quite different. One group of teachers held predominantly diplomas of teaching, while the other group of teachers have Bachelor of Education degrees and other post-graduate qualifications. Neither of the two groups of teachers has specialised qualifications in mathematics or mathematics education. Teaching experience is also quite different between the two groups of teachers. The teachers in kura A who

participated in Te Poutama Tau have a mean of about 10 years' teaching experience, in comparison to kura E, in which the mean teaching experience is approximately 3 years.

Future Research

There has been research done in New Zealand on "successful schools" (Poskitt, 1993), on highly successful teachers in low-decile schools (Carpenter, McMurchy-Pilkington, & Sutherland, 2002), and on quality teaching for diverse students in schooling (Alton-Lee, 2003), but there has been little research on Māori-medium schools, as noted in the introductory section. Therefore, this report recommends:

- developing a set of criteria to identify successful Māori-medium schools and profiling a range of successful schools. This report is limited in that it focuses only on the mean stage gains on the Number Framework as a success indicator, when in fact there are a considerable range of success indicators.
- extending the case studies to an additional two schools from the 2004 Te Poutama Tau and comparing the results with the two schools from this study. The schools' numeracy data should also be analysed to develop a more detailed picture of the students' progress.
- examining effective strategies that teachers used in the various curriculum areas and the quality of the relationship between student and teacher. This study is limited in that it does not probe into identifying the effective teaching and learning strategies used by teachers to improve achievement.

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