

**An exploration of ako-rich teaching practices in an English-medium
mathematics classroom drawing from the voices of Year 9 and 10
students, and their parents**

By

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Abstract

Ako is a traditional Māori concept underpinned by the notion of reciprocity. Ako-rich teacher practices are considered important for creating culturally responsive classroom learning environments, particularly for Indigenous Māori students. The confident implementation of teacher practices that reflect ako, gleaned from information provided in policy documents and professional development programmes, has proven challenging for many English-medium teachers. To help assist adoption of teaching practices consistent with ako, this study explored ways a Pakeha teacher could demonstrate ako-rich teacher behaviour indicator elements within student–teacher and parent–teacher interactions.

A mixed method ethnographic approach underpinned by sociocultural and kaupapa Māori theories was selected for this research carried out in a multiethnic junior secondary school mathematics classroom (Māori, New Zealand European/Pākehā, Asian). The sample comprised of the study teacher from a large, urban, English-medium school, one of the researcher’s Year 9 mathematics class, one of the researcher’s Year 10 mathematics class, and some students’ parents. Two data collection periods were used: the second of four 10-week school terms, over two consecutive years. Each data collection period included classroom observations, student surveys, student and parent interviews, teacher reflection, and cultural advice.

Within a holistic context of ako in mathematics, characteristics of ako-rich interactions were found to fit within three aspects of teacher practice where the teacher positioned themselves as a learner who gained knowledge by researching on their own, interacting with students, and interacting with students’ parents. The notion of reciprocity within ako was realised in this model when participants were recognised as individuals who have valuable knowledge to share, contributing to the collective knowledge generated in the classroom.

There is evidence that, for many students, mathematics teachers can enhance students’ engagement and enjoyment of mathematics by explicitly using ako-rich practices in the classroom. Evidence also indicates that positive parent–teacher partnerships were encouraged by ako-rich teacher practices, inside and outside of the classroom.

This research has shown that by explicitly practicing ako-rich behaviours in early secondary mathematics classrooms, shared understandings developed between students and teachers facilitated positive student experiences, which were accompanied by increased student engagement and achievement. Moreover, this research has also shown that shared understandings that developed between the students' parents and the teacher through ako-rich teacher behaviours encouraged positive and reciprocal partnerships that facilitated parents' involvement in their children's mathematics learning. The ako in mathematics model can be used by teachers, school leaders, and teacher educators to increase their confidence in understanding how to more authentically bring life to the rich Māori concept of ako in mathematics classrooms.

*This thesis is dedicated to my children:
Kate, Olivia, and Joseph.*

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Glossary

Aspiration

Refers to a strong hope, dream, or vision.

Expectation

Refers to short-term goals in students' learning journeys, which when realised may contribute to the achievement of the longer-term, idealistic aspirations.

Conscientisation

The process of developing a critical awareness of one's social reality through reflection and action. Deliberately used in this thesis rather than the term 'decolonisation', as the term conscientisation places the coloniser at the centre of the concept (Mackinlay and Barney (2014).

Culture

A culture is a shared way of life for a social group and includes shared knowledge, beliefs, values, perspectives, and behavioural norms (Sleeter & Banks, 2004). Defining and discussing culture is difficult as every culture is inherently diverse and dynamic, and individuals are multiethnic in that they move between different social groups. Throughout this thesis 'culture' refers to the characteristics of cultures with which an individual identifies, including through ethnicity, heritage, and social influences.

English-medium school

English-medium schools include those where students are taught the curriculum in English as the primary medium of instruction.

Māori-medium school

Māori medium schools include those where students are taught the curriculum in Māori language for at least 51% of the time, up to 100% of the time (Section 2.2.2.2).

Multiethnic

The term ‘multiethnic’ is commonly used in New Zealand, and hence in this thesis, to refer to groups of people from a range of heritage cultures.

School decile

The New Zealand Ministry of Education uses a numerical descriptor (between 1 and 10) called ‘school decile rating’ (or ‘decile’) to indicate the socio-economic status of a school’s catchment area. Approximately 10% of schools are given each decile rating descriptor, with a rating of 1 for the schools with the highest proportions of students from low socio-economic communities and 10 for the schools with the lowest proportion of these students (Agnew, 2011) (Section 4.1).

Treaty of Waitangi

New Zealand’s founding document, first signed on 6 February 1840. The Treaty is an agreement, in Māori and English, made between the British Crown and about 540 Māori chiefs (Orange, 2015). Different understandings of the Treaty have long been the subject of debate.

The thesis uses some terms in the Māori language. The translation for Māori words are given in the text the first time the term appears, in parentheses immediately following the term or, for longer translations, in page footnotes. Translations of Māori terms are provided below.¹

Māori term	Translation
<i>ako</i>	to teach, as well as to learn
<i>iwi</i>	Māori tribal affiliations

¹ In translation from Māori to English, some richness of meaning is lost. All definitions were sourced from the Māori Dictionary: <https://maoridictionary.co.nz/>

<i>Marae</i>	a fenced-in complex of carved buildings and grounds that belongs to a particular iwi (tribe), hapū (sub tribe) or whānau (family)
<i>Pākehā</i>	non-Māori New Zealanders, of European descent
<i>te ao Māori</i>	Māori worldview and values
<i>te reo Māori</i>	Māori language
<i>tikanga Māori</i>	traditional Māori practices
<i>tuakana-teina</i>	relationship between a more experienced and a less experienced person, specific to teaching and learning in the Māori context
<i>wairua</i>	non-physical spirit
<i>whakamā</i>	shame or embarrassment
<i>whānau</i>	parents and members of the wider family

Mā te rongo, ka mōhio
Through perception, comes awareness²

² This Māori whakatauki was sourced from Kingi, Russell, and Ashby (2017). There are alternative English translations of this line (the first of four lines) of the whakataukī and the other three lines of this whakatuaikī, which are found on pages 42, 140, and 283. Further details about this whakatauki are provided on p. 122 of this thesis.

Chapter One

1.0 Introduction: The Context of Ako-rich Classrooms

Ako: [teachers] taking responsibility for their own learning and that of Māori learners (Ministry of Education, 2011, p. 4).

Parents and whānau must be involved in conversations about their children and their learning (Ministry of Education, 2013, p. 18).

1.1 Introduction

As a teacher in a multiethnic English-medium classroom I experienced challenges when attempting to practise mathematics teaching in culturally responsive ways known to reflect the learning needs of Indigenous Māori students. A deep understanding of te ao Māori (the Māori world) and te reo Māori (the Māori language) are critical, if an accurate discourse from and of Māori culture is to be employed in English-medium classrooms. Care is required to avoid superficial or ‘tokenistic’ interpretations and implementations of Māori cultural concepts (Anderson, Averill, Te Maro, Taiwhati, & Higgins, 2010; Rubie-Davies, Webber, & Turner, 2018; Salmond, 1985).

The use of the English language to describe Māori ways of being is challenging. It is even more challenged in attempting to present and transmit ideas from Māori episteme to Eurocentric thinkers and non-speakers of Te reo Māori, in the English language (Edwards, 2013, p. 70).

My limited knowledge and understanding of both te ao Māori and te reo Māori, combined with my Pākehā (New Zealander of European descent) background proved to be barriers, challenging my confidence in practising the culturally responsive, Māori-preferred, pedagogy mandated for use in the Māori education policy, *Ka Hikitia – Accelerating Success* (Ministry of Education, 2013).

‘*Ka hikitia*’ means to step up, to lift up or to lengthen one’s stride. It means stepping up how the education system performs to ensure Māori students are

enjoying and achieving education success as Māori (Ministry of Education, 2013, p. 5).

The challenges faced when attempting to ‘step up’ my practice persisted, despite my engagement with a range of documents (such as *Tātaiako*) and professional development programmes (such as *Te Kotahitanga*) designed to support the implementation of *Ka Hikitia* into English-medium classrooms, which were ‘just like mine’ (Ministry of Education, 2013).

The Māori concept of ‘ako’ (to teach as well as to learn) is one of the foundational cultural concepts that underpin *Ka Hikitia*; ako embodies a Māori-preferred pedagogy (Ministry of Education, 2013). Māori educationalist Dr Rangimarie Rose Pere carried out distinguished work to explore the place and practice of ako in education, from a Māori perspective (Pere, 1994). Her work showed ako to be central in a culturally responsive approach to teaching and learning, highlighting the “timeless applicability of Māori modes of learning and their significance” (Edwards, 2013, p. 70). Indigenous Māori have longstanding ways to create, express, exchange, and share knowledge; the operationalisation of this knowledge is encompassed within ako (Edwards, 2013; Ferguson, 2008). The notion of the centrality of ako in teaching and learning has endured for many generations in Māoridom. It is in current times that the authentic practice of ako has been (re)recognised as contributing to a culturally responsive pedagogy aligned with the educational preferences of Māori students, and their parents³ for use in English-medium contexts (Berryman, Lawrence, & Lamont, 2018; Ministry of Education, 2013).

My initial purpose of this thesis is to explore tools detailing teacher behaviours that embody the concept of ako in an English-medium mathematics classroom. To achieve my purpose, I will present an examination of my deliberate practice of ako in a Year 9 and a Year 10 multiethnic mathematics classroom, suitable contexts in which to carry out the exploration of tools. An overarching aim is to be able to use thesis findings to inform those working in education systems reflecting the dominant culture of the society within which they sit, for example to inform the education of marginalised students provided by

³ The term *parent* is used in this thesis to represent any person who takes a parenting role with children (e.g., mothers, fathers, grandparents, extended family, whānau, and other guardians) (Hornby, 2011).

teachers who are not of the students' cultural group. In response to the challenges to my confidence that I experienced in practising teaching mathematics in culturally responsive ways, the thesis findings are used to suggest ways English-medium mathematics teachers can consider strengthening their own practice of ako when teaching mathematics.

Firstly, this study required a working definition of ako to form the basis in which to be deliberate, and for reflecting on my classroom practice (Appendix 1). The starting point for the exploration of literature leading to this definition of ako was *Tātaiako* (Ministry of Education, 2011), an educational initiative document supporting teachers to facilitate educational success for Māori students by 'giving life to' *Ka Hikitia* (Ministry of Education, 2013; Wilson, McChesney, & Brown, 2017). *Tātaiako* underpins the goals of *Ka Hikitia*, by helping teachers engage Māori students by using teaching practices that are responsive to and connect with students' cultural heritages and educational experiences (Wilson et al., 2017). This is achieved through the provision of behavioural indicators which describe teacher behaviours representative of culturally responsive concepts: ako, manaakitanga (values), wānanga (communication), whanaungatanga (relationships with high expectations), and tangata whenuatanga (place-based awareness and knowledge) (Averill et al., 2014; Ministry of Education, 2011). When enacted together, these five concepts reflect teachers' practice of Māori cultural competence and cultural understandings underpinning *Ka Hikitia* (Ministry of Education, 2008, 2013; New Zealand Teachers Council, 2011) (Section 1.4.3).

Culture can be defined as a system of shared understandings of "what words and actions mean, of what things are really important, and of how these values should be expressed" (Metge, 2014, p. 8). The notion of culture includes the aspect of an individual's heritage culture or ethnicity, and is widely accepted to be dynamic, evolving in response to social and physical structures, and influences from family and school processes (Mara, 1998). Māori are culturally diverse: "Māori students are no longer, if they ever were, monocultural" (Bishop, 2003, p. 258). Schools and teachers are therefore called upon to affirm different cultural heritage/ethnic identities by incorporating diverse cultural contexts into teaching practices (Hetaraka, 2019; Ministry of Education, 2007). Furthermore, as

ethnicity is viewed as just one of the characteristics that contributes to an individual's cultural diversity (Ministry of Education, 2007), it follows then that Alton-Lee (2003) recommends that teachers extend this call, and recognise “the diversity within individual students influenced by intersections of gender, cultural heritage(s), socio-economic background, and talent” (p. v). To this end, the five cultural behaviour indicators within *Tātaiako* are intended to be further developed with Māori communities, as shown by strong emphasis on place-based awareness, relationships with whānau, and whānau voice:

The behavioural indicators listed [in *Tātaiako*] are not exhaustive and can be developed further by schools/ECE services together with iwi to include expectations relevant to the local context (Ministry of Education, 2011, p. 4).

By making such a statement, *Tātaiako* (Ministry of Education, 2011) indicates that further research is required to gather perceptions of students and their parents in school contexts, informing the inclusion of relevant local expectations of the definition of ako that can then be put into practice in a school.

This chapter begins with establishing the background to this thesis with an overview of the context of the current New Zealand education system, with specific a focus on Indigenous Māori education stakeholders (students, parents, and teachers) (Section 1.2). Following this is an explanation of the motivations that lead to this research, and why ako was chosen as the particular cultural competence concept from *Tātaiako* to underpin the research (Section 1.3). Several policy and programme measures that have been initiated to support the implementation of ako in English-medium schools are then discussed (Section 1.4), before introducing the elements of ako that provided the framework used as a lens for this research (Section 1.5). A statement of the research question and aims follows (Section 1.6), before this chapter concludes with a brief outline of the thesis chapters (Section 1.7).

1.2 Background

In New Zealand's bicultural society, the nation's founding document, the Treaty of Waitangi,⁴ requires that the needs of Indigenous Māori learners are met, and accordingly ideals from this treaty underpin *Ka Hikitia* (Ministry of Education, 2013). However, the ideals of the treaty are yet to be fully realised and the current education system favours non-Indigenous learners (Anderson et al., 2010; Vale, Averill, Hall, Forgasz, & Leder, 2020). A persistent challenge facing the New Zealand education system is the disparity between the descendants of the dominant Pākehā colonisers and the minoritised Indigenous Māori. This disparity is reflected in educational (and other social) outcomes, measured by traditional means, which show Māori students underachieving (Alton-Lee, 2003; Bishop, Berryman, Cavanagh, & Teddy, 2009; Savage et al., 2011). The nationwide performance of Māori students in the subject of mathematics is of concern from primary school levels, where after five years of schooling, the disparity with their Pākehā counterparts has been noted as significant (Holt, 2001). National data in mathematics achievement showed that in 2015, 35% of Māori students achieved below the nationally expected standards at school in Years 1 to 8, compared to 20% of Pākehā students (Ministry of Education, 2015a; Wilson et al., 2017). This trend continues into secondary school mathematics (Vale et al., 2020) where Māori students throughout New Zealand (as a group) have been shown to underperform in relation to their Pākehā counterparts in international PISA (Programme for International Student Assessment) (Walshaw & Anthony, 2008) and TIMSS (Trends in International Mathematics and Science Study) (Ministry of Education, 2015b) testing.

Māori students experience better educational outcomes when their schooling is culturally responsive, meaning that it reflects and values their identity, language, and culture, aligning teaching and learning with their educational preferences (Bishop et al., 2009; Macfarlane, 2015; Ministry of Education, 2013). New Zealand classrooms, however, have tended to reflect the non-Indigenous European cultures, and many Māori learners have

⁴ The Treaty of Waitangi was a written agreement made in 1840 between the British Crown and Māori chiefs.

generally seen little of their culture reflected in English-medium education (Anderson et al., 2010; Glynn, Atvars, & O'Brien, 1999). So, in this section, the New Zealand education system is described in order to demonstrate the distribution of education stakeholders by ethnicity, along with school types, revealing the potential opportunities and challenges for Māori to access education aligned with Māori pedagogy (Savage et al., 2011). First, the numbers of Māori⁵- and English⁶-medium school types in the education system are presented (Section 1.2.1), followed by Māori student enrolment in these school types (Section 1.2.2). Māori teacher distribution within the school workforce will also be described (Section 1.2.3). A discussion of some negative implications of the information highlighted in Sections 1.2.1 to 1.2.3 will then be presented. Then, another factor that helps to promote positive outcomes for students – effective home–school partnerships between parents and teachers – is introduced (Alton-Lee, 2003; Biddulph, Biddulph, & Biddulph, 2003; McKinley, 2000; Ministry of Education, 2013). The involvement of the parents of Māori children in schooling and some associated benefits and challenges will be introduced in Section 1.2.4, before an overview is given in response to the implications and challenges discussed in Sections 1.2.1–1.2.4 (Section 1.2.5).

1.2.1 Māori- and English-medium school types in New Zealand

In New Zealand there are around 2530 schools,⁷ with this number having remained almost constant between 2014 and 2019, spanning the timeframe of this study. Of these schools: around 1945 are designated as primary schools providing education for learners between Years 1 and 8; around 170 schools as composite, providing education for learners between Years 1 and 15; and around 375 as secondary schools providing education for learners between Years 7 and 15. The majority of these schools provide students with an English-medium education. Around 70 schools (3%) are designated as Māori-medium schools, providing students with an education where the teaching is in te

⁵ Māori-medium schools include those where students are taught the curriculum in Māori language as the primary medium of instruction.

⁶ English-medium schools include those where students are taught the curriculum in English as the primary medium of instruction.

⁷All school, teacher, and student data referred to in this and the next section was obtained from <https://www.educationcounts.govt.nz/statistics/schooling/number-of-schools>

reo Māori and is based on Māori culture and values. In 2019, 31 of these Māori-medium schools were designated as primary, 41 as composite, and one as providing secondary education.

1.2.2 Māori student enrolment in New Zealand school types

In 2019, there were 816,632 students enrolled in Years 1 to 15 education in New Zealand; 197,343 of these students were identified as Māori (approximately 24% of all students), and 392,633 identified as European/Pākehā (approximately 48%). The other 226,656 of students identified as belonging to Pasifika, Asian, and other ethnic groups (collectively approximately 28% of all students) (see also Section 4.3).

Of the 197,343 students who identify as Māori, 134,123 were enrolled in primary education in 2019; 6219 of these students attended Māori-medium schools (approximately 4.5% of Māori students). Of the 63,220 Māori students enrolled in secondary education, 1811 attend Māori-medium schools (approximately 3% of Māori students). Overall, 4% of Māori students are enrolled in Māori-medium schools, so most Indigenous Māori students attend English-medium schools.

Of the 197,343 Pākehā students, 249,388 were enrolled in primary education, and 143,245 were enrolled in secondary education. A total of 29 European/Pākehā students attended Māori-medium schools, at any level, in 2019.

1.2.3 Māori teachers in New Zealand schools

In 2018 there were 60,634 teachers (excluding day relievers) employed in all types of New Zealand schools providing education from Years 1 to 15. This total includes 7,028 teachers (approximately 11.5%) who identify as Māori and 42,044 (approximately 69%) who identify as European/Pākehā.

The total number of 60,634 teachers comprises 34,439 primary and 26,195 secondary teachers. Approximately 11% of primary school teachers identify as Māori, 72.5% of primary school teachers identify as European/Pākehā, 3.4% identify as Pasifika, 3%

identify as Asian, and fewer than 1% identify as Middle Eastern, Latin American, and African (MELAA). Approximately 12% of secondary school teachers identify as Māori, whereas 65% of secondary school teachers identify as European/Pākehā, 3.3% identify as Pasifika, 5% identify as Asian, and fewer than 1% identify as MELAA. While there is no data available on the ethnicity of teachers by English- and Māori-medium school type, anecdotal data suggests that almost all Māori-medium school teachers identify as Māori. Hence, the proportion of Māori teachers in the English-medium type primary and secondary schools would be lower than the proportions above of 11% and 12%, respectively.

1.2.4 Parental involvement in schools

Parental involvement⁸ at school is defined as parents playing a part “in the educational processes and experiences of their children” (Jeynes, 2005, p. 245). The more successful⁹ (Bull et al., 2008) the involvement between parents and schools, the greater the positive impact on student learning (Biddulph et al., 2003; Mutch & Collins, 2012). mis (Kerbaiv & Bernhardt, 2018).

Traditionally, communications between school and parents between is one-way; schools provide parents with information regarding school administration and student progress. More recently, it has been recognised that the most effective communications with parents are those that are reciprocal, two-way connections through which schools “enhance the understanding of student backgrounds and learning needs; to consult with parents, whānau, and communities on school priorities; and to engage in collaborative goal setting” (Mutch & Collins, 2012, p. 172). High priority is placed on the development of such reciprocal connections between schools and students’ parents in New Zealand (Ministry of Education, 2007, 2011), and the importance of such connections for learning

⁸ There are a number of terms in use to represent parental *involvement*, for example ‘engagement’ and ‘participation’ are also used throughout the literature (Bull, Brooking, & Campbell, 2008).

⁹ Successful involvement includes interactions that are collaborative and mutually respectful, multi-dimensional, responsive to community needs, planned for, goal oriented, and focused on learning, timely and two-way committed to by all parties, with a shared purpose and positivity about benefits for children’s learning (Bull et al., 2008).

is expressed in education policy,¹⁰ literature, and research (Alton-Lee, 2003; Bull et al., 2008; Education Review Office, 2018; Ministry of Education, 2011, 2013; Mutch & Collins, 2012). In many contexts, school and teacher practice is not yet aligned to meet the expectations and outcomes signalled as important within such documents (Averill, 2020; Bishop, Berryman, Tiakiwai, & Richardson, 2003). Furthermore, although most parents care about their child's learning and are willing to enter into productive partnerships with teachers and schools (Bishop et al., 2003; Bull et al., 2008), parental involvement tends to lessen as their child progresses through the education system, with the least parental involvement observed in the secondary school context (Bull et al., 2008; McKinley, 2000; Mutch & Collins, 2012). Parental involvement often reflects the parents' own current and past experiences of teachers and education. Parents who perceive that teachers are not interested in their child's education and/or parents who themselves experienced education negatively when they were students are often reluctant to engage with their child's education (Bull et al., 2008; McKinley, 2000; Mutch & Collins, 2012). It is concerning that parents who identify as Māori (and other ethnic minority heritages) are among those least likely to be involved in their child's schooling at all levels (McKinley, 2000). Research that explores the nature of Māori parental involvement in their child's education is important to contribute to the fostering of collaborative teacher–parent partnerships and ongoing parental involvement.

1.2.5 Overview

Only 4% of Māori students are in Māori-medium schools where they experience a Māori culture and language-based education; most Indigenous Māori students attend schools where education is provided in the English medium. Furthermore, while 24% of learners are Māori, only one in 10 (or fewer) teachers in these English-medium schools identify as Māori. Therefore, the vast majority of teachers in New Zealand schools interacting with Māori learners are of European/Pākehā and other non-Māori heritages (Bishop & Glynn, 2003). Furthermore, as Māori are a diverse group (Penetito, 2011; Pere, 1988) (Section

¹⁰ Documents and resources provided by New Zealand government agencies responsible for overseeing education, guiding school and teacher practice.

1.1), it follows then that Māori teachers are also diverse (Lee, 2008). Such diversity can be noted between Māori teachers in relation to their engagement with, and understanding of, cultural competence (Lee, 2005), perhaps in a local and less familiar context (Meaney, Trinick, & Fairhall, 2013). A negative implication of the aspects of the New Zealand education system discussed in Sections 1.2.1–1.2.4 is that the cultural background (Bourdieu, 1973; Sullivan, 2001) of many teachers in New Zealand English-medium classrooms is likely to be misaligned with the cultural capital of their students, resulting in varying extents of cultural mismatch (Villegas, 1988) (Section 2.2.1). English-medium schools often lack the ability to nurture ‘Māoriness’ of students (Pere, 1994; Smith, 1997).

Several factors may influence the level to which parents become involved in their child’s education at any level of schooling. For example, barriers to effective parent involvement can present due to the parents’ own negative experiences of school (as a student themselves), their child’s negative experience of school observed at home, and parents perceiving that teachers lack care for their child’s education. Of particular concern is that Māori parents are least likely to be involved in their child’s education through relationships with teachers and schools (Education Review Office, 2018; McKinley, 2000; Weber et al., 2016).

To ensure the success of Māori learners, research that contributes to the alignment of the cultural pedagogy of teachers from many cultural backgrounds with Māori cultural learning preferences is required. Moreover, research that contributes to building effective home–school relationships with Māori parents is also needed. It is hoped that the findings of this research, on authentically operationalising Māori education policy and theory into teacher practice, will help disrupt the longstanding negative disparity in education experienced by Māori.

1.3 Motivations for this Study

In this section, my relevant professional and personal background of experience and interest in ako are presented to show my motivations for undertaking this research project.

My professional experience, which led to the motivation for this project, stemmed from my role as a mathematics teacher in an English-medium secondary school. In this role I am a stakeholder in the education of students who identify with cultures ranging from similar to, to very different from, my own (Section 1.1). While making my own observations of student mathematical achievement data, I frequently observed that when student achievement was aggregated by ethnicity the achievement results reported within the group of Māori students fell below that of their Pākehā counterparts. In surveys conducted by school managers prior to this study, some Māori students at the school had indicated that they were treated unfairly, due to their Māori ethnicity. These two aspects of students' educational experience were unacceptable to me in a professional sense, and also in a personal sense as the sole parent of three children of Ngāti Koata descent, who, at the time of the study, were attending or were soon to attend the study school. As there were few opportunities for engaging parents in teaching and learning decisions, I would have had little involvement in my children's learning had I had not been a staff member at the school.

The longstanding achievement disparity, students' negative learning experiences, and lack of parental involvement in relation to the education of Māori learners initiated my motivation to become involved in disrupting the status quo in a way that would contribute to making a positive difference for children 'like mine', and the children's parents, some of whom were 'like me'. I also wanted to help alleviate some of the challenges that teachers 'like me' were facing, despite their willingness and commitment to engage with Māori pedagogies.

I don't know what I'm doing, just give me some tools and I'll do it (Teacher at study school, following a professional development session I facilitated about utilising the behavioural indicators from *Tātaiako*).

It was challenging to engage in cultural pedagogical practices that I had not experienced myself as a learner, and more challenging to share my limited developing knowledge with others in a way they found useful for bridging the gap between theory and practice. The starting point for the new learnings I required in order that I could make a positive difference began with engagement in professional development programmes provided

through my school, aimed at addressing cultural mismatches (Section 2.2.1) in pedagogical interactions with Māori (Bishop et al., 2009). During my engagement in professional development programmes and related literature (Section 1.4) between 2002 and 2015, I learned that mono-cultural policies impeded rather than encouraged advancement in addressing Māori achievement in English-medium classrooms. In part this was due to epistemological racism (Bishop, 2000; Hetaraka, 2019; Scheurich & Young, 1997), in that educational policies developed within the traditional colonial education system in fact continue to serve the interests of the dominant colonisers (Bishop, 2000; Macfarlane, 2015; Smith, 2000). I also learned that *ako* (Ministry of Education, 2013) is about seeking the perspectives of Māori students, parents, and *whānau* to learn about Māori culture, knowledge, identity, and language; gaining a shared understanding to ensure educators can lay “the foundation on which to begin building effective relationships between Māori and the education system” (Hetaraka, 2019, p. 162). These aspects of *ako* resonated with me as the starting point for rejecting the status quo, turning to the stakeholders in education who held the greatest understanding of Māori preferences for teaching and learning (Bishop, 2012; Freire, 1972): the Māori students at our school, and their parents. Moreover, as *ako* was contained within the Māori words ‘*akonga*’ (student) and ‘*kaiako*’ (teacher) I felt that this concept was signalled as the heart of a classroom.

The behavioural indicators of *ako* provided by *Tātaiako* (Ministry of Education, 2011) are generic and provide only a starting point (Section 1.1). Developing them for local suitability has proven difficult in my school and generally (Bishop, Berryman, Wearmouth, Peter, & Clapham, 2012; Hetaraka, 2019; Timperley, Wilson, Barrar, & Fung, 2008). This research study set about to explore *ako* in a local perspective, as my attempts to include *ako* in my practice had felt rather ‘hit-and-miss’ and were often sidelined due to lack of immediate evidence being available to support their continuation within my informal observations. With little formal feedback gathered from students as to whether my practice was (i) effectively showing *ako* in a local context, (ii) seen as genuine or tokenistic, or (iii) making a positive difference to student learning experiences, I became concerned that I was discarding practices could have contributed to a lift in Māori student outcomes, if continued. I was also concerned that I was utilising my

position of power in the classroom to decide how ako should be demonstrated, which would result in the perpetuation of Pākehā dominance:

If one lesson is clear from the history of our country it is that imposition of a model [of change] from outside of the experiences, understandings and aspirations of the community group is doomed to failure. Failure that is, if the objective is other than assimilation or the perpetuation of a situation of dominance and subjection (Bishop & Glynn, 1998, p. 45).

Similar to the experiences of some New Zealand teachers found in literature, my school colleagues and I experienced limited confidence in understanding of what being Māori means and about how Māori students might learn differently to Pākehā students (Averill et al., 2014; Averill & McRae, 2020; Bishop, O'Sullivan, & Berryman, 2010). Through these experiences, it became clear to me that holding a strong commitment to disrupt the status quo for Māori stakeholders in English-medium secondary school education was not enough to effect sustainable change. Moreover, engagement with the Māori education strategy policy documents (Ministry of Education, 2008, 2013) and in the professional development programmes designed specifically to effect culturally responsive and relational pedagogy (Section 1.4) was similarly insufficient (Bishop et al., 2010). Rapid positive changes were required to the long-term outcomes for Māori in order to support the students who were currently in secondary school (Ministry of Education, 2013). An email communication between myself and a teaching colleague regarding my frustration at the lack of rapid (or any) changes being observed in our local context led to the undertaking this doctoral research:

After a meeting with all the teachers from the particular class you have been struggling with, when I talked with you, you finally realised that you weren't letting the students down; rather, you were the only one who hadn't given up on them as individual learners. I think this was the start of your awareness that you could work at the issue of students learning within their own identity (L. Austin, personal communication, August 12, 2014).

The professional appraisal conversation leading up to this email communication, illuminated the fact that I had an *awareness* of what I needed to do to raise Māori student achievement from a theoretical and moral standpoint. Although I lacked confidence in my

ability to enact and evaluate my practice of the cultural competencies mandated in *Ka Hikitia* and supported by *Tātaiako*, I was determined not to give up on any students.

In the next section, iterations of the New Zealand Māori education strategy are introduced along with the professional development research and implementation programmes and documents I have engaged with as a mathematics teacher.

1.4 Measures Implemented to Improve English-medium Education for Māori

In this section, iterations of the Māori education policy document *Ka Hikitia*, aimed at developing cultural competencies within the teacher workforce are introduced (Section 1.4.1). Then, professional development programmes and a resource document supporting the implementation of this policy document are described (Sections 1.4.2–1.4.3). Some successes and challenges of the implementation are then illustrated (Section 1.4.4). Finally, a summary of common themes of the documents and programmes, and a brief evaluation of the efficacy implementation of *Ka Hikitia* are given.

1.4.1 Māori education policy

The persistent educational disparity observed between Māori and Pākehā students attending English-medium schools gained increasing attention beginning in the 1990s (McKinley & Webber, 2018), with the first Māori education policy for use in English-medium schools released in 1999. The aim of this policy was to raise the quality of English-medium education for Māori (Ministry of Education, 2018). In 2005 the Ministry of Education reported improvements in Māori students' educational performance as a result of policy implementation (Ministry of Education, 2018).

In 2006 the first stage in the redevelopment of the Māori education strategy commenced, seeing the first iteration of the Māori education policy document *Ka Hikitia — Managing for Success: The Māori Education Strategy 2008–2012* being released in 2008, following public consultation (Berryman & Eley, 2017b; Macfarlane & Macfarlane, 2012; Ministry of Education, 2008). This iteration of *Ka Hikitia* sought to shift thinking in education from that

of “addressing problems and disparities to that of utilising and building on Māori potential and opportunities” (Te Maro, Higgins, & Averill, 2008, p. 49) (Section 2.2.1.1).

In 2012, feedback from a Ministry of Education-led survey informed the next phase in the Māori education strategy, and *Ka Hikitia — Accelerating Success 2013–2017* was released in 2013 (Ministry of Education, 2013).

The vision of *Ka Hikitia – Accelerating Success 2013–2017* is ‘Māori enjoying and achieving education success as Māori’. This vision means ensuring that all Māori students, their parents and their whānau participate in and contribute to an engaging and enjoyable educational journey that recognises and celebrates their unique identity, language and culture (Ministry of Education, 2013, p. 13).

It is this iteration of the strategy document that is currently in use by New Zealand schools. The student participants in this study experienced all their secondary education under the mandate of this iteration.

1.4.2 Professional development for implementation of *Ka Hikitia*

The introduction of the most recent revised Māori education policy (Ministry of Education, 2013) set the scene for new professional development initiatives. In this section, three research studies leading to the creation and evaluation of professional development programmes underpinned by the understandings within *Ka Hikitia* are briefly described. A summary of some commonalities between the professional development programmes will conclude this section.

The professional development programme known as *Te Kotahitanga* commenced in 2001 (Bishop et al., 2003). *Te Kotahitanga* gathered understandings of Year 9 and 10 Māori students about their learning. These understandings along with perspectives of students’ parents, teachers, and principals contributed to the co-construction of the Effective Teaching Profile (Bishop & Berryman, 2009). This teaching profile, which includes the practice of *ako*, was shared with teachers with the aim of reducing disparities in Māori achievement by improving pedagogy employed in the education of Māori learners (Bishop et al., 2009; Meyer et al., 2010). Data was collected

from approximately 50 case study schools during the 12 years in which *Te Kotahitanga* ran (Ministry of Education, 2011) and showed that teachers' practices increasingly reflected culturally responsive pedagogy in response to the shared understandings. Moreover, these improvements were linked with increased Māori student achievement in various curriculum areas including mathematics (Bishop et al., 2012; Meyer et al., 2010). Besides the success attributed to this programme, *Te Kotahitanga* also faced some challenges. Challenges included the uneven availability of subject-specific exemplars of teacher practice; teachers indicated a need for subject-focused support on subject-specific examples of culturally responsive pedagogy. Another challenge reported was that, due to problems with selecting participants, whānau voice collected was found not to be representative of the Māori students attending the case study schools. Therefore, only emerging patterns could be gathered from the parent data for consideration and comparison to student voice collected from several thousand students.

He Kākano (Ministry of Education, n.d.; University of Waikato & Te Whare Wānanga o Awanuiārangī, 2010) is the next school-based professional development programme that set out to improve outcomes for Māori learners through facilitating pedagogical change to be discussed in this section (Ministry of Education, n.d.). Launched in 2010 with Ministry of Education funding for three years, this programme focused on the improvement of culturally responsive school leadership and teacher practices underpinned by the *Te Kotahitanga* Effective Teacher Profile (Bishop & Berryman, 2009). *He Kākano* was led by school management, across 87 secondary schools (Hynds et al., 2013). Student success was reflected in data collected from nine case study schools, during interviews held with senior and middle managers, Māori students, and the students' parents. Positive changes reported also included increased awareness and understanding of cultural responsiveness by school leaders (Hynds et al., 2013). Challenges faced by *He Kākano* reported in the evaluation of the programme included a lack of ownership of the programme by school staff, which led to a lower than foreseen programme impact (Hynds et al., 2013). Another challenge was a perceived lack of understanding of the school position by the external providers delivering the programme (Hynds et al., 2013). Issues with data fatigue, gaps in data due to issues such as changes

in participants, and confusion over the timing and administration of data collection were reported as additional challenges faced by *He Kākano* (Hynds et al., 2013).

The final professional development programme discussed in this section, known as *Kia Eke Panuku: Building on Success* (Berryman & Eley, 2017a), commenced in 2013. Māori and non-Māori educationalists, along with over 150 senior secondary school Māori students who viewed their school as successful (across 58 secondary schools), were interviewed to gain their understandings of education. The *Kia Eke Panuku* programme, based on these shared understandings, ran for three years across 94 secondary schools, nationwide (Berryman, Eley, Ford, & Egan, 2015). The evaluation of *Kia Eke Panuku* showed positive results observed through gains in student achievement (Berryman et al., 2015), however this result was acknowledged as neither attributed to the policy mandate, nor the skills or strategies shared with teachers engaging with the programme:

Instead, we see that beyond the will (the mandate to change) and the skills of school personnel, the driver for reform rests with leaders who embrace the moral imperative to be the agents for change and who underpin their leadership with a refusal to tolerate a status quo that includes disparity for Māori students within their school (Berryman et al., 2015, p. 66).

A challenge to the success of the programme highlighted by facilitators was that there was “a great deal of confusion and uncertainty about how to interpret, let alone implement strategies to address, the central *Ka Hikitia* vision (Averill et al., 2014; Berryman, Kerr, Macfarlane, Penetito, & Smith, 2013, p. 7).

Summary

Three large, research-based professional development programmes initiated in New Zealand schools resulted in some progress toward *Ka Hikitia* being brought to life in classrooms (Alton-Lee, 2015; Berryman & Eley, 2017a; Hynds et al., 2013). These programmes and associated research projects were each carried out by external researchers who were not always familiar with, or to, the students involved. This factor potentially introduced limitations to the level of cultural responsiveness achievable (Section 3.1.2.2). The professional developers and researchers, not being the classroom teachers,

were not in a position to transform teaching and learning in line with their findings in a timely way, and then follow up any effects of changed practice with examination of further in-depth data. Furthermore, extended time periods between interviews (approximately one year) may have reduced the accuracy and level of student recollection of teacher practices explored during participant interviews. As data collection in these programmes was not specifically focused on ako, and neither was it subject or teacher specific, further research is required to explore how a teacher can facilitate the creation of an ako-rich mathematics classroom (Alton-Lee, 2003; Averill, Anderson, & Drake, 2015).

1.4.3 *Tātaiako* supporting the implementation of *Ka Hikitia*

In addition to the professional development programmes discussed above, a specific Māori education resource document known as *Tātaiako* (Ministry of Education, 2011) presents behaviours reflecting the overarching policy strategies in *Ka Hikitia* under headings related to five traditional Māori cultural competencies (Section 1.1), supporting teachers to:

...work to personalise learning for and with Māori learners, to ensure they enjoy education success as Māori. The competencies are about knowing, respecting, and working with Māori learners and their whānau and iwi so their worldview, aspirations, and knowledge are an integral part of teaching and learning, and of the culture of the school... (Ministry of Education, 2011, p. 4).

The intention of this document is to assist teachers in the English medium to develop culturally responsive learning environments and interactions with education stakeholders, to contribute to the success of Māori learners by describing competency behaviours for teachers. Teachers must ensure that they practise each of the competencies, while keeping in mind that the list provided is not exhaustive and is expected to be developed further by schools in collaboration with students and their parents (Ministry of Education, 2011; New Zealand Teachers Council, 2011). While *Tātaiako* advocates the importance of Māori worldviews as an integral part of teaching and learning (Ministry of Education, 2011), there has been criticism of the framework: teachers with varying degrees of Māori knowledge and understanding of Māori knowledge are left to the “interpretation of both

Māori conceptions and Māori identities” in *Tātaiako* (Hetaraka, 2019, p. 168); and the raising of Māori education achievement has been observed to have become “the sole responsibility of under-resourced teachers” (Hetaraka, 2019, p. 168).

1.4.4 The efficacy of *Ka Hikitia* implementation

Ka Hikitia (Ministry of Education, 2013), supported by professional development programmes and documentation (Sections 1.4.2 and 1.4.3), extended a call for educators across the New Zealand education system to deliberately step up their efforts to ensure more Māori students were enjoying and achieving educational success, as Māori (Averill et al., 2014; Berryman et al., 2015). The achievement disparity between Māori and Pākehā students has narrowed, however the “daily experiences of Māori students within our schools has not dramatically improved” (Berryman & Eley, 2017b, p. 8). Policy makers, principals, and teachers involved in the implementation of *Ka Hikitia* held genuine intentions to realise the best educational experiences for Māori students. However, the introduction of the strategy alone was insufficient to disrupt the ongoing patterns of traditional pedagogy that have perpetuated Māori student underachievement in ‘traditional’, New Zealand, English-medium education (Section 1.4.2).

An evaluation of *Ka Hikitia* (Ministry of Education, 2018) by the Office of the Auditor-General (Berryman et al., 2013) was critical of the launch and introduction of the policy within schools, mentioning that this was carried out “slowly and unsteadily” (p. 7). The report also stated that “the Ministry’s introduction of *Ka Hikitia* has not been as effective as it could have been, and furthermore that although there has been progress, the transformation which is required in New Zealand education system has not yet happened” (Berryman et al., 2013, p. 7). *Ako* is recognised as a fundamental concept woven through and across three iterations of the Māori educational strategy, associated initiatives, and resource documentation. *Ako*-rich classroom practices will help *Ka Hikitia* to be realised in order “to ensure the education system works well for every Māori student” (Ministry of Education, 2013, p. 10).

1.5 Ako as a Framework for Teacher Practice

As educators have increasingly begun to develop and practise culturally responsive pedagogies to address disparity in Māori education (Section 1.1), the concept of ako has been described by authors for an audience including non-Māori teachers of Māori learners in New Zealand. Glynn, Cowie, Otrell-Cass, and Macfarlane (2010) studied Māori and Pākehā teachers incorporating ako into their practice of teaching science to Māori learners at primary school. They stated that the significance between ako and the principles underpinning a “culturally relevant pedagogy and transformative education for culturally diverse learners suggest that these findings are of relevance to teachers working with Indigenous students in other contexts” (Glynn et al., 2010, p. 126). Dependence on many connected aspects of the Māori world (Pere, 1994) and a deep knowledge of Māori culture are required to fully describe this concept (Averill et al., 2015). Taking the complexity of ako (Pere, 1994) into account along with my Pākehā worldview and identity (Section 1.1), providing a concise definition for use in this thesis was a thought-provoking task.

At a basic level it is difficult to explain Māori terms and ideas in English, and still adequately express the depth of Māori thought with the ‘to and fro’ required as you move between thought and representation (Gidley & Gidley, 1994, p. 9).

Ako is a concept grounded in Māori understanding and describes a process that encompasses all aspects of the provision of an education based in Māori knowledge (Ministry of Education, 2008, 2011, 2013). The traditional translation of ako into the English language is ‘Māori pedagogy’ (Pihama, Smith, Taki, & Lee, 2004b). The literal meaning of ako has been given as both ‘to teach and to learn’ (Bishop, 2003; Smith & Reid, 2000). In the Māori education strategy document *Ka Hikitia* (Ministry of Education, 2013) and The New Zealand Curriculum document (Ministry of Education, 2007), both of which are used in English-medium education, ako is described as a two-way process of teaching and learning where the educator is learning from the student, and vice versa.

This two-way process of ako is described using a metaphor of conversation with teacher and learners taking turns in a conversation of reciprocal learning (Bishop, 2003).

Pere (1994) introduced the term ako in a traditional form, where there is not a clear distinction between teaching and learning, or between the teacher and the student (Glynn, 2015) and, instead, refers to a unified cooperation of learner and teacher in a single enterprise (Metge, 1984). As noted earlier, the interchangeable roles of the teacher and learner (Alton-Lee, 2003) are perhaps reflected by the word 'ako' itself being a root in the Māori words 'akonga' (learner) and 'kaiako' (teacher) (Edwards, 2013; Glynn et al., 2010; Macfarlane, Glynn, Grace, Penetito, & Bateman, 2008). The teacher is seen as a partner in this conversation, as opposed to the expert holder of knowledge. In this type of learning relationship, students can bring their own cultural sense-making to the learning to the classroom and share their worldview with others. Bishop and Berryman (2006, 2009) define such shared gaining and imparting of knowledge within interactive and dialogic learning relationships between student and teacher as promoting the co-construction of knowledge. Learner outcomes for ako-rich practices are summarised by Averill et al., (2015) as “students knowing that their teacher does not give up on their learning, knows how to help them learn, provides clear feedback on learning, and that their teacher enjoys learning from them” (p. 67). Teachers practising ako take responsibility for their own learning, as well as that of the students (Ministry of Education, 2011).

Tātaiako (Ministry of Education, 2011) also defines ako in teacher practice as the teacher “taking responsibility for their own learning and that of Māori learners” (p. 4), and extends this past the classroom, using the phrase “in the classroom and beyond” (p. 4). This indicates that the concept of ako reaches further than the student–teacher interaction in the classroom and extends into students’ lives outside of school. *Ka Hikitia* (Ministry of Education, 2013) and Averill et. al. (2015) support the extension of ako to contexts outside of school, as they present the inclusion of students’ parents, wider family, and community stakeholders in ako-based interactions. The two-way process of ako includes education providers seeking the perspectives of Māori students’ parents to ensure that within school

policies and teacher actions reflect the students' background in terms of culture, language, identity, knowledge, and values.

The foundation of an ako-rich classroom can be summarised as providing for reciprocity, cultural individuality, and the inseparable nature of connections between students and their families, both within the classroom and beyond (Ministry of Education, 2013) (Section 2.3.2). Positive interactions where the teacher does not give up on any students are paramount within ako-based teacher practice (Section 2.2). Drawing on knowledge presented in this section, a definition of ako was synthesised from my own worldview for the purpose of constructing a set of mathematics-specific teacher behaviour indicators of ako in practice: the 'ako-based teacher action' (ATA) behaviour indicator framework (Section 2.3; Appendix 1).

Summary

Māori students are empowered to experience better educational outcomes when teachers practise culturally responsive pedagogies to reflect student identity, language, and culture. However, most Māori students are educated in English-medium schools where processes are traditionally Eurocentric, and traditional measures favour non-Indigenous learners. Most teachers in English-medium schools identify as non-Māori. This distribution of Māori students and non-Māori teachers within schools underpinned by Eurocentric organisation and processes can result in cultural misalignment between students, parents, and teachers as educational stakeholders (Section 2.2.1). Effective home–school partnerships between teachers and parents also promote better outcomes for students. Māori parents are over-represented among the parents least likely to be involved in their child's schooling, which is perhaps augmented in secondary school where the lowest rates of *any* parental involvement are observed.

It is of little surprise, then, that the English-medium based New Zealand education system, mainly staffed by Pākehā, sees persistent disparities between the dominant Pākehā and Indigenous minority Māori learners. Adaptation of Europeanised models towards appropriate responses to the educational needs of Māori learners in the English

medium have been provided to educators (Durie, 1998) in the form of subject-generic Māori education strategies, implementation programmes, and resources (such as *Te Kotahitanga* and *Tātaiako*). Ako, a complex Māori concept reflecting reciprocity between the roles of teachers and learners through processes integrating all aspects of the provision of an education based in Māori knowledge, is a common concept within these various responses. However, due to the challenges of authentically translating the rich meaning of ako into the English language, teachers who lack knowledge of te ao Māori and te reo Māori may experience challenges when attempting to bring ako to life in their classroom practice. Such challenges can persist for teachers, despite the specifically constructed policy and professional development resources available to them. As mathematics continues to be widely recognised as a critical gateway to further educational and career opportunities (Vale et al., 2020), research focused on promoting equity for students in their learning of mathematics is important.

1.6 Research Questions

The two overall questions for this study were:

1. How can a Pākehā teacher enact the Māori cultural competency of ako in an early secondary school mathematics classroom, to facilitate students' positive experience of mathematics teaching and learning, increasing student engagement and achievement?
2. How can a Pākehā teacher involve the parents of Māori learners in their child's mathematics learning as part of the enactment of ako, using interactions that encourage the development of positive and reciprocal partnerships for sharing knowledge about student learning?

1.7 Outline of Thesis Chapters

The thesis describes the rationale and context underpinning this study, uses relevant literature to frame the research, explains how the study was implemented, presents the analysis of the data, and discusses conclusions and implications of the study findings. Specifically:

- Chapter Two describes recent studies and the current literature and knowledge about culturally responsive practice, particularly ako, used to inform the data-gathering methodologies and tools, and data analysis.
- Chapter Three outlines and justifies the methodology and methods of the study, the development of data-gathering tools (semi-structured and cogenerative dialogue interviews, and two surveys), the selection of the study participants, the analysis methods, and the model developed to describe the study findings.
- Chapter Four provides contextual information relevant to the study participants: the school and classroom environment and two study classes.
- Chapter Five focuses on classroom practices that help create ako-rich practice using analysis and findings from student-drawn data gathered through classroom observations, interviews, and surveys.
- Chapter Six describes the parents' perspectives on the dimensions of ako-rich practice that foster home–school links, determined primarily through the analysis of data from interviews.
- Chapter Seven summarises themes that emerged frequently throughout the study and thesis and summarises the study findings in relation to the main models used for analysis.

Finally, the overall study conclusions and links between the study findings, literature and education policy documents are given in Chapter Eight. Issues affecting the research process and results are discussed and suggestions for future areas of research are outlined.

Mā te mōhio, ka mārama
Through awareness, comes understanding

Chapter Two

2.0 Introduction to Ako: Literature Review

A great deal of what goes on in a mathematics classroom is that students from different backgrounds are determining for themselves, in relation to the classroom community, what it looks like for someone like them to learn and do mathematics. (Nasir, Hand, & Taylor, 2008, p. 200)

Practices consistent with the traditional Māori concept of ako contribute to an effective pedagogy, responsive to the culture of Indigenous Māori learners (Hāwera, Taylor, Young-Loveridge, & Sharma, 2007; Saunders, Averill, & McRae, 2018). The main focus of this literature review is the examination of the concept of ako, as a component of a culturally responsive pedagogy, with a purposeful focus on student, parent, and teacher stakeholders in education. An assumption made in this research study is that incorporation of teacher practices that can be seen as consistent with ako will help improve learning experiences and outcomes of Indigenous Māori mathematics learners.

First, this chapter provides an overview of the literature regarding ako in teacher practice, thereby introducing the main literature used to inform this project (Section 2.1). Next, an exploration of ako as part of a culturally responsive teacher practice in response to the cultural mismatch between teachers and learners is presented (Section 2.2). Then, the framework describing how ako was used in this study is described (Section 2.3). This chapter will conclude with a summary of the gaps in the literature on which this study will focus (Section 2.4).

The factors that help constitute an ‘ako-rich pedagogy’ include a range of actions where the teacher facilitates reciprocal teaching and learning interactions with students and the students’ parents, holds high expectations that all students will succeed, and takes responsibility for their own learning (Sections 2.2 and 2.3). In order to capture most fully the aspects of ako for consideration in this study, all found in the literature and used to inform the development of the data-gathering tools for this study (Chapter Three) are presented here.

Some aspects appear in the discussion of this chapter more than once due to their relevance to the various aspects under discussion.

2.1 Overview of Key Literature on Ako

The key literature used to inform this study included empirical studies and landmark authoritative texts. The empirical New Zealand and international studies that informed this study (Appendix 2) include a seminal New Zealand study by Bishop et al. (2003). This study was focused within early secondary school classrooms, providing alignment with this thesis study, but investigated effective teaching practice for Māori learners across *all* curriculum areas. This project resulted in a professional learning project initiative for English-medium schools, known as *Te Kotahitanga*, which included an Effective Teaching Profile (Bishop & Berryman, 2009) (Section 1.4.2).

Bishop et al. (2003) held individual and group interviews of 70 Year 9 and Year 10 Māori students, 80 teachers, four principals, and 50 parents across four urban and rural town English-medium secondary schools. The study found reciprocal learning to be critical for the academic success of Māori students at Years 9 and 10:

Literally meaning to teach and to learn, [ako] metaphorically emphasises reciprocal learning, where the teacher does not have to be the fountain of all knowledge, but rather a partner in the “conversation” of learning ... One implication of this principle is that active learning approaches are preferred because in this way the processes of knowledge-in-action can be brought to the interaction, indeed for the interaction. This means that students can participate, using sense-making processes they bring to the relationship, and share these with others, as of right (p. 13).

Bishop et al.’s (2003) study was neither designed to investigate the importance of such aspects of teaching practice for non-Māori students, nor expressly focus on the curriculum area of mathematics. Findings of their study indicate an effective, culturally responsive, teaching profile for improving the academic outcomes for Māori students (Bishop & Berryman, 2009). The success of the programme led to the study findings informing professional development implementation programmes and resources utilised in schools

where students other than Māori also attend. Therefore, it is important to include non-Māori students (and parents) and to include a purposeful focus on mathematics teaching and learning to build on Bishop et al.'s (2003) investigation. It should be noted that there have been some criticisms of this study for its, for example, over-simplistic conclusions, and a failure to provide adequate control groups, which may compromise the results of the attribution of increases observed in student achievement to the programme (Openshaw, 2007). Following an examination of literature for this study review, much reflection and revisiting on and of previous iterations of the five phases of *Te Kotahitanga* by the researchers involved was evident. Furthermore, evaluations were carried out focusing on the effectiveness of the programme undertaken by external researchers (Alton-Lee, 2015; Hynds, 2014; Meyer et al., 2010) and entities, for example the New Zealand Association for Research in Education and World Innovation Summit for Education. The results of such reflection and evaluation show that the *Te Kotahitanga* programme is robust in design, and significantly effective in improving Māori student outcomes. Along with the similarities in the ages and roles of Māori participants in the New Zealand context with this study, *Te Kotahitanga* is therefore suitable to inform this research.

The seminal theoretical work by Pere (1994) explored the place and practice of teaching and learning from a Māori perspective, and showed the timeless applicability of Māori approaches, including *ako* for the effective teaching and learning of Māori learners. Comprehensive literature reviews by Alton-Lee (2003) and Anthony and Walshaw (2007) synthesised the main messages surrounding effective pedagogy in New Zealand settings from literature, in cross-sectoral contexts from early childhood to secondary school, while reflecting inclusivity for a diverse range of Māori, Pākeha, and other non-Māori learners. The key messages from these reviews showed the importance of teacher actions in structuring opportunities within learning environments, resources, and classroom interactions in facilitating a range of rich learning-focused exchanges between learners and their tasks, resources, peers, and teachers. In such exchanges, the teacher and learner frequently take reciprocal roles as teacher and learner, and in doing so demonstrate the critical nature of the centrality of the co-construction of knowledge and

meaning between teachers and learners, and between learners and learners. For example:

- Teachers learning from students in exchanges of ideas can enable monitoring student understanding, which in turn guide the teacher's choice of examples and explanations to suit what students know and what they still need to learn;
- Student collaboration effectively facilitated by the teacher can increase student engagement and outcomes; and
- Teachers who position themselves as active mathematics learners in the classroom can make a positive difference to student learning.

These types of exchanges fit within the concept of 'ako' in terms of the literal meaning of ako being 'to learn as well as teach', as defined in *Ka Hikitia* (Ministry of Education, 2013). Milne (2009) questioned whether the report on Alton-Lee's (2003) review (commissioned by the Ministry of Education) (see Section 2.2.1) might reflect an overall focus on quality teaching in best practice, rather than placing Māori culture at the centre of best practice (Section 1.1). Furthermore, Milne (2009) asserts that the report does "little to specifically name the inherent Eurocentrism of our education system and does little to challenge Pākehā teachers to address power relations in their classrooms" (p. 22). Alton-Lee's (2003) report continues to inform this study as it does not *exclude* Māori culture, while acknowledging other cultures (e.g., Pākehā), as does this study.

In addition to discussing ako as being reciprocity in classroom teaching and learning, Averill et al. (2015) add the dimension of whānau as stakeholders in student education to their description of this concept. The key messages of McKinley's (2000) study were noted to show parents being crucial participants in ako-based interactions; she explored this idea in some depth. McKinley identified the concerns and aspirations that Māori parents held regarding their children's teaching and learning and explored barriers to reciprocity in education in terms of Māori parents' involvement in their child's education, along with positive affordances. The study findings were reached through her interviews with primary and secondary students, students' parents, and Māori and Pākehā teachers (Section 2.3). The three Māori researchers involved in conducting the interviews were

responsible for carrying out all the interviews in the particular schools to which they were assigned. This factor added familiarity between interviewers and interviewees, which was a factor critiqued as missing in the *Te Kotahitanga* study (Section 1.4), and furthermore provided an opportunity for deep insight into the issues being examined within each school. The participants of McKinley's study included a range of participants, some of whom were like those in this thesis study and therefore its findings are appropriate for informing this study.

Other literature used to inform the research reported in this thesis includes a range of writing on ako, culturally responsive pedagogy, student–teacher relationships, and parent–teacher relationships (Appendix 3). In particular, Russell Bishop has written widely about effective teaching of Māori learners in English medium contexts and on inequitable knowledge and power relations between Pākehā and Māori in education (see Bishop, 1998; 2010; 2012). Other key texts informing this study included Smith (1997), Mutch and Collins (2012), Bull et al. (2008), and Macfarlane, Glynn, Cavanagh, and Bateman (2007), which collectively present and draw from a range of research and theoretical literature regarding culturally responsive interactions between teachers with students and parents. Work of Gay (2010), Ladson-Billings (1995; 2014), and Villegas and Lucas (2002) has also been considered, as this work holds key thoughts and findings of numerous researchers and theorists to convey messages about culturally responsive pedagogy, where teachers build on children's cultural capital in their teaching.

2.2 The Contribution of Ako to a Culturally Responsive Pedagogy

[Ako] is both the acquisition of knowledge and the processing and imparting of knowledge. More importantly ako is a teaching-learning practice that involves teachers and students learning in interactive, dialogic relationships. With ako, teachers use strategies that promote effective teaching interactions and relationships with their learners; teachers can learn from students just as students learn from teachers. It is in contexts like these that *co-construction* of knowledge is likely to occur (Bishop, 2010, p. 60).

In this section, the influence of cultural mismatch (Section 2.2.1) on the disparity in educational outcomes in mathematics (Section 2.2.1.1) and parental involvement in education (Section 2.2.1.2) will be described. Then, the ways that an ako-rich practice can respond to the issues created by cultural mismatch are introduced (Section 2.2.2).

2.2.1 Culture and cultural mismatch in education

Cultural understandings (Section 1.1) are the result of socialisation practices in the home and community, and as such are internalised by individuals as they develop within a culture, until such practices become second-nature (Au, 1998). As noted by Nuthall (2001) this internalising of culture can prove to be a challenge when individuals attempt to recognise their own culture; individuals may inadvertently be blind to what their own culture represents (Averill, 2013; Banks, 2019; Gay, 2010; Macfarlane & Macfarlane, 2012). It is when individuals from different, or ‘mismatched’, cultural groups come together that misunderstandings and tensions may arise, despite genuine intentions from all parties (Metge, 2014). Minoritised Indigenous students worldwide experience difficulty learning in school when instruction is mismatched to their culture, and when their education follows the cultural values and standards for behaviour of the dominant culture rather than the values of Indigenous students themselves (Au, 1998; Graham, Meyer, McKenzie, McClure, & Weir, 2010). Most services available to citizens in New Zealand, including education, are built upon a foundation of principles, research, and values of the Pākeha culture (Penetito, 2010; Smith, 2012a). Furthermore, those running such services are often mainly Pākeha (Section 1.2.1) who vary widely in their knowledge of other cultures (Metge, 2014).

Much has been written of the persistent ‘achievement gap’ reported between Māori and Pākeha students in New Zealand (Bishop & Glynn, 1999). Similarly, much has also been written about the gap that has persistently been observed in education in the United States, between African-American, Latino, and Indigenous Native American students and white American students (Flores, 2007; Ladson-Billings, 2006, 2014) and other contexts where Indigenous learners are marginalised in an education system where teachers and

students are often culturally mismatched (such as the Canadian and Australian education systems) (Dreise & Thomson, 2014; Russell & Chernoff, 2013).

The majority of New Zealand schools provide instruction underpinned by standards for behaviour linked to cultural values of Pākeha colonisers (Anderson et al., 2010; Graham et al., 2010; McMurchy-Pilkington, Trinick, & Meaney, 2013; Smith, 2003). Therefore Māori students can struggle to find ways to engage and participate in learning while 'being themselves' in English-medium classrooms (Glynn et al., 2010; Macfarlane & Macfarlane, 2012; Savage et al., 2011). It is of critical importance that cultural differences are acknowledged and valued by educators. To ignore such differences and attempt to deny Māori students to learn in their own culture and insist that they assimilate into Eurocentric education is damaging to Māori identity. To make an assumption that 'sameness' of culture is acceptable "can lead to trivialising and disrespect for the knowledge bases, languages, preferred pedagogies and lived experiences of Māori New Zealanders" (Glynn & Bevan-Brown, 2007, p.25). In her study, McKinley (2000) found that English-medium schools appeared to foster feelings where Māori were more aware of themselves as Māori, and more often in a negative than a positive sense. Furthermore, Māori children and their parents were significantly more positive about primary than secondary school.

In reference to the achievement gap between Māori and Pākehā, Mason Durie (2003) asked "what is the benchmark against which Māori should gauge progress?" (p. 202). Durie proposes that a comparison between Māori with Pākehā, "presupposes that Māori are aiming to be as good as Pākehā when they might well aspire to be better, or different, or even markedly superior" (p. 202). As Durie discusses that assuming such comparisons provide useful information about Māori progress are likely to be misleading, any potential achievement comparisons between study students will be carefully considered (Section 3.4.5; Chapter Five). Also considered, however, was that the involvement of the Ministry of Education in the initiation and implementation of Māori education policy and practice developments ensures such initiatives are designed with Westernised academic achievement goals in mind (Tomlins-Jahnke, 2008), and therefore comparisons could potentially be useful to an extent.

2.2.1.1 Student disparity in the context of mathematics

The disparity in achievement based on traditional measures (such as teacher questioning of students and formal written assessment) has been attributed to the production and use of mathematics by Indigenous peoples in an unfamiliar way to the Eurocentric viewpoint (that is, when there is cultural mismatch) rather than to any lack of mathematical ability (Russell & Chernoff, 2013). A lack of ability (or participation) in a 'one-size-fits-all' approach may be attributed to Indigenous learners by non-Indigenous educators through application of deficit theorising: "when equality of opportunities is available, students are seen as being at fault for failing to make the most of these opportunities" (Meaney et al., 2013, p. 236).

Deficit theorising rationalises Māori cultural experiences and background as being something that is other than the norm; "by inference, a deficit and, therefore, an impediment to Māori achieving educational success" (Macfarlane, 2015, p. 179). This type of deficit theorising has endured in New Zealand, and moreover has been used to justify the assimilation of Indigenous peoples worldwide into the dominant culture's way of education 'for their own good'. This attitude is still held by some educators, despite Indigenous peoples having longstanding ways to "express the exchange, sharing, transmission, building and creation of knowledge" (Edwards, 2013, p. 70), including that involved in displaying the knowledge of complex mathematics (Meaney et al., 2013; Russell & Chernoff, 2013; Walshaw & Anthony, 2008). 'Macfarlane (2015) supports this, stating that 'Eurocentrism has tended to describe and organise 'other' communities according to the notion that there is one central and ideal form of society that predetermines the direction that progress should take' (p. 178).'

In the New Zealand context, Māori student achievement in mathematics, in comparison to non-Māori student achievement, mirrors that of Indigenous students in the USA, Canada, and Australia (Section 2.2.1). The persistent underachievement of Māori students on traditional measures (Section 1.2) is being increasingly understood as a consequence of Eurocentric classroom pedagogies that are not responsive to Māori cultural identities, worldviews, and lived

experiences (Bishop et al., 2003; Bishop & Glynn, 1999). Teachers operate in a complex set of influences that the prevailing systems exert on their teaching, therefore exploration of how teachers operate around these influences that may or may not be beneficial for Indigenous students, is valuable. 2.2.1.2 Disparity in parental involvement in education

There is much international and New Zealand evidence-based literature showing that parental involvement in their children's learning can positively influence student achievement (Averill, Metson, & Bailey, 2016; Desforges & Abouchaar, 2003; Education Review Office, 2018; McKinley, 2000; Mutch & Collins, 2012; Rubie-Davies, Peterson, Irving, Widdowson, & Dixon, 2010). Of concern within the secondary school context is that parents of *all* ethnicities have been found to become less involved in their child's schooling as the child progresses through school and are least involved when their children are at secondary school. Furthermore, parents who identify as Māori and other ethnic minority heritages are among those least likely to be involved in their child's schooling at all levels (McKinley, 2000). In the New Zealand context, educational policies and programmes set an expectation that schools will promote such involvement, particularly in relation to Māori learners (such as *Ka Hikitia and Tātaiako*) (Berryman et al., 2018; Ministry of Education, 2013; New Zealand Teachers Council, 2011). The Ministry of Education acknowledges that there are challenges in engaging and involving parents and recognises that many educators are unsure how to go about establishing learning partnerships with Māori parents (Ministry of Education, 2013) (Section 1.2.4).

2.2.2 Culturally responsive pedagogy in response to educational disparity

Culturally responsive pedagogy supports students to feel secure within their own identities in school (Bishop & Glynn, 2003; Gay, 2010; Ladson-Billings, 1995) and recognises that student learning and sense-making are influenced not only inside classrooms, but also by students' worlds outside of school and by their family cultural heritage (Banks, 2015; Durie, 2003; Glynn et al., 2010; Ladson-Billings, 1995; Macfarlane & Macfarlane, 2012; Nasir et al., 2008; Vygotsky, 1980). Starnes (2006) states that

“Whether the relevant approach is referred to as “culturally responsive”, “Māori-preferred” ... a plethora of studies is available worldwide to illustrate that when Indigenous minority students’ culture is acknowledged, tapped into and infused in the classroom context and content, it “build[s] a bridge to school success.”

Therefore, an authentic, culturally responsive pedagogy must be effected through classroom learning experiences that are meaningful to students through contexts that incorporate learning activities related to their interests and experiences outside of school. These activities must be presented in familiar social contexts (such as in relation to power relations, cultural practices, and social interactions) while promoting strong connections between schools and parents (Au, 1998). Responsive factors drawn from New Zealand literature (Averill, 2020; Averill et al., 2016; Berryman & Ford, 2017; Bull et al., 2008; McKinley, 2000; Mutch & Collins, 2012) that were found to encourage Māori parental involvement in their child’s primary and secondary student learning, in mathematics and in general, include communications that are:

- respectful, and use processes that fit well with family practices;
- personalised, regular and welcoming;
- culturally inclusive and sensitive to family lives and commitments;
- timely and honest, easy to understand: celebrations are important; concerns should be raised early before they are ‘out of hand’, with all parties working together for a solution; and,
- detailed, with specific suggestions about how the parents can help their child: mathematics homework was of concern to many minority parents.

These and further actions that promote parental involvement by overcoming barriers to parental involvement (Sections 1.2.4 and 2.3.2.2) (Anthony & Walshaw, 2007; Averill et al., 2016; Lange & Meaney, 2011; McKinley, 2000; Mutch & Collins, 2012) need to be explored; including whether any cultural understandings teachers are required for engaging with parents regarding their children’s mathematics learning.

Summary

Culturally responsive teachers draw on the culture of students *and* their families, in order to enhance culturally-based, responsive learning and engagement (Bishop et al., 2003; Macfarlane & Macfarlane, 2012). In traditional Māori society, ako can be defined as an educative process that is integral in the creation, conceptualisation, transmission, and articulation of Māori knowledge (Pihama, Smith, Taki, & Lee, 2004a, p. 13). More recently, the concept of ako features in some of the New Zealand educational policy and literature within which both Māori and non-Māori educators alike seek to highlight and reduce the disparities in Māori academic achievement, promoting positive educational outcomes for Māori learners. Next, the role ako plays in creating positivity and success in learning environments (Section 2.2.2.1) and the importance of the teacher's role in facilitating the ako-rich environment (Section 2.2.2.2) are discussed. Then, some background of ako in Māori- and English-medium schools is presented (Sections 2.2.2.3 and 2.2.2.4, respectively) before a brief summary concludes this section.

2.2.2.1 Ako promotes student engagement and positivity in their learning

Many emotions are apparent in classrooms; some are positively linked to achievement whereas some are implicated in being negatively linked to achievement (Pekrun, 2000). To function well and feel safe in and around school, “pupils should experience schools as secure and safe places where they can establish continuous learning progress” (Mooij & Fettelaaar, 2013, p. 1241). By embracing the principle of ako, teachers are enabled to build positive classroom environments of caring and inclusive learning communities where each person feels that their shared contribution is valued and that they can participate to their full potential (Ministry of Education, 2009a).

International literature indicates that classroom engagement is a key indicator of student motivation, learning potential, and the eventual probability of persisting to high-school completion (Côté-Lussier & Fitzpatrick, 2016). This association between engagement and beneficial learning outcomes is thought to be especially important for academically at-risk students (Dotterer & Lowe, 2011). In the New Zealand context, the importance of an education where each individual stakeholder's cultures are valued for increased student engagement is highlighted by Glynn et al. (2010) (Section 2.2). These authors found that

when students continually experienced little of their culture and valuing of their knowledge being reflected classroom pedagogy (Walker, 1973), such as in the absence of ako-rich practices, “there is a concern that they might experience the classroom and school as alien, uncaring and unsafe places, where they do not belong, and for these feelings to be reflected in their challenging or disruptive behaviour, and truancy” (p. 119). Conversely, Glynn et al. (2010) were also able to show how positive changes occurred in science teaching and learning when Māori and Pākeha teachers enacted ako into their practice to understand the backgrounds of Indigenous students and incorporate something of this understanding within their teaching practice. Similarly, Averill (2013) found that teaching in responsive ways that cater for, and respond to, students’ ways of being and knowing is important not only for student engagement, but also for maximising students’ positivity about their learning.

International literature reporting studies that encompassed several hundred Indigenous and non-Indigenous students in early secondary school across Canada, the United States, and Australia, found relationships between positive emotions (such as happiness and safety), a motivation to learn, and observed engagement in class (Côté-Lussier & Fitzpatrick, 2016; Reschly, Huebner, Appleton, & Antaramian, 2008; Weber, Wagner, & Ruch, 2016). A New Zealand study (Maxwell, 2015) concluded that positive dispositions such as motivation and perseverance were recognised in middle-school student learning when students were enjoying their mathematics learning (such as experiencing happiness). It was found that teachers of middle-school students can assist students’ mathematical competency through incorporating an enjoyment disposition into their programmes by taking a keen interest in the culture of the students. For example, (Glynn, Berryman, Loader, & Cavanagh, 2005) found that Māori students have a need to feel respected and proud of who they are as Māori; a key process in this is teachers learning about tikanga¹¹ Māori from the students. Another New Zealand study (Macfarlane et al., 2007) revealed a definition of ‘safety’ from a Māori cultural viewpoint, where safety is

¹¹ Generally taken to mean “the Māori way of doing things”, it is derived from the Māori word tika, meaning ‘right’ or ‘correct’.

perceived to mean students having the freedom to be who they are, as Māori (individually and collectively).

2.2.2.2 Influence of teacher practice on student outcomes

In a synthesis of many international and New Zealand studies, Hattie (2003) identified the teacher as having the largest influence on student outcomes (approximately 30%). He concluded that “it is what teachers know, do, and care about which is very powerful in this learning equation” (p. 2) and that: “The answer ... lies in the person who gently closes the classroom door and performs the teaching act – the person who puts into place the end effects of so many policies, who interprets these policies, and who is alone with students during their 15,000 hours of schooling. I therefore suggest that we should focus on the greatest source of variance that can make the difference – the teacher” (Hattie, 2003, p. 3).

Hattie (2011) states that it is teacher excellence in delivering effective teaching practices that is the single most powerful influence on student achievement. Critiques of Hattie’s work exist, suggesting that figures indicating the size of influences of the various educational factors reported in his work may be subject to inaccuracies due to averaging of findings through his meta-analysis of meta-analyses, and prioritising of trends rather than empirical data (Rømer, 2019; Slavin, 2018). However, findings that appeared to align with the suggestion that the teacher effect is the largest on student outcomes were reflected in *Te Kotahitanga*, where Māori students, parents, school principals, and some teachers identified that the quality of the student–teacher classroom relationships and interactions had the most important influence on Māori students’ educational achievement. The fact that the teacher has the largest influence, rather than the size of the influence is most important in this study, as the degree to which the three main stakeholders in learning and achievement (student, teachers, and parents) believe they are responsible for learning outcomes is an important consideration and component in student success (Peterson et al., 2011, p. 1). In their study in three large urban secondary

schools, Peterson et al. (2011) found marked differences among the stakeholders during discussions on where responsibility for student *failure* lies; teachers were more likely to attribute failure to students and parents, similar to findings of other New Zealand studies (see, for example, Bishop & Berryman, 2006). New Zealand studies by (Lingard, 2002) and (Mitchell, Cameron, & Wylie, 2002) also showed that a teacher's classroom practice had the most influence on students' learning. While there are documents and programmes guiding teacher practice (Section 1.4), it is critical that teachers, with their significant influence on student success (or failure) addressing their own cultural deficit theorising by reflecting on "how they themselves might participate in the systematic marginalisation of Māori students in their own classrooms" (Bishop et al., 2009, p. 6).

Māori students shared perspectives on issues and solutions within their own learning experiences, clearly and in detail, during the co-construction of the Effective Teaching Profile developed from findings of the *Te Kotahitanga* study (Bishop & Berryman, 2009; Bishop et al., 2009). The ability of students to articulate their own education solutions has been documented in international and New Zealand literature (Bishop, 2010; Bland & Atweh, 2007; Freire, 1972). Teacher actions in the Effective Teaching Profile shown to engage Māori students were found to not be dependent on the ethnicity of the teacher but rather on the nature of teacher actions and interactions with students. This is reassuring for the suitability of the notion of teachers taking responsibility for the learning of Māori students, as most Māori learners are taught in English-medium schools by non-Māori teachers (Section 1.2.1).

2.2.2.3 *Ako in Māori-medium schools*

The development of Māori-medium options in preschool, primary, and secondary contexts has been one New Zealand intervention that has shown great potential for addressing educational disparities between Māori and Pākeha students. These schooling options were developed by Māori, for Māori from the 1980s in response to their concern with the loss of Māori knowledge and culture (Macfarlane, 2015; Smith, 2013). There are four levels of immersion of Māori-based education; level one, where students are taught the curriculum in Māori language for 80–100% of the time, is termed as Māori-medium for the

purpose of this thesis (Alton-Lee, 2008; Bishop, Berryman, & Richardson, 2002; May & Hill, 2008). The mainly Māori students who choose this option are provided with an education in a Māori language and culture-based setting in which the practice of ako is embedded (Pihama, Cram, & Walker, 2002; Smith, 2012b). In the Māori language, ako is a verb that means both to teach and learn; for Māori, the processes of teaching and learning are interrelated, with no clear distinction between these two Eurocentric-derived educational terms (Harrison, 2005). In a detailed study of Māori medium schooling at primary level, Graham Hingangaroa Smith (1997) identified the notion of reciprocity within the concept of ako as one of the fundamental principles that embodied culturally responsive teacher practice. In their study into effective teaching and learning in Māori-medium education (Bishop et al., 2002) emphasised the importance of, and mutual benefits provided by, creating a classroom learning environment where the role of the teacher and learner were interchangeable. These authors found that, by using the Māori-defined process of ako, Māori medium teachers had set themselves apart from the pedagogical positioning of most teachers in English-medium settings who used the teacher-as-expert model, rather than the more equal power-based model of teacher–learner reciprocity (Herbert & Ausubel, 1969). Within Māori-medium schools, evidence from the New Zealand Qualifications Authority (NZQA) shows positive academic achievement of Māori students has been reported (Bishop, 2010; Bishop et al., 2010; Pihama et al., 2002). Messages such as these, consistent with those drawn from education research carried out for the benefit of Māori (Section 2.4), have therefore been extended into English-medium school settings through programmes such as *Te Kotahitanga* (Berryman et al., 2018; Bishop, 2003), *Ka Hikitia* policy (Ministry of Education, 2013), and professional practice documents such as *Tātaiako* (Ministry of Education, 2011) (Section 1.4).

2.2.2.4 Ako in English medium schools

Policy and professional learning documents (Section 1.4 and Section 2.2.2.2) promote messages consistent with those from ako in Māori-medium classrooms into English-medium classroom contexts. The contents of such documents are intended to assist English-medium teachers to enact the theory and the wisdom of Indigenous

stakeholder voices within, into their classroom practice (Hetaraka, 2019; New Zealand Teachers Council, 2011). Despite these documents being introduced into many schools in the English-medium education system, associated changes within schools vary in terms of positive improvements in teacher practices, Māori student outcomes (Hetaraka, 2019; Hynds et al., 2013; Meyer et al., 2010; Savage et al., 2011), and parental involvement (Averill et al., 2016). In a study by Savage et al. (2011) examining the uptake of effective uptake of *Te Kotahitanga* in English-medium schools, the highest percentages of low implementation occurred in the curriculum area of mathematics (16%). Berryman et al. (2018) acknowledge that the process of learning to engage within such a bicultural relationship within our schools (that is, applying a power-sharing framework in collaborative ways where shared understandings are iteratively developed, and shifting practices away from the traditional hierarchical model where the teacher is the expert) is a challenging process, which in an iterative context will continue to develop as more voices become part of the conversation. The teaching and learning of mathematics is particularly susceptible to ‘traditional’ teacher practices where lessons are teacher-led, with minimal student interaction (Vale, Atweh, Averill, & Skourdumbis, 2016).

Summary

The literature provides common themes regarding the importance of establishing ako-based relationships conducive to culturally responsive learning where reciprocity is at the heart of teaching and learning, with a move away from traditional top-down teaching where the teacher is the ‘expert’. Teachers must take responsibility for not only the students’ learning, but for their own learning, including learning about marginalisation of Māori students that may be occurring in their practice. Such marginalisation serves to perpetuate the dominance–subordination model inherent in many English-medium classrooms, which is detrimental to the success of Māori learners.

2.3 The Ako Framework for this Study

In this section, the literature regarding elements of ako in teacher practice are drawn together to construct a framework that is in essence a deconstruction of the practice of

ako in a classroom, for the purposes of exploring teacher practice (Section 2.3.1). Then, the separated elements will be grouped somewhat and discussed under three aspects of ako, signalling a partial reconstruction of ako as a holistic practice (Section 2.3.2): teachers valuing student knowledge (Section 2.3.2.1); teachers sharing student information with parent stakeholders (Section 2.3.2.2); and teachers holding high expectations of student learning and behaviour (Section 2.3.2.3).

2.3.1 The ako-based teacher action framework

In a review of literature written by Māori and non-Māori authors about ako, I identified seven separate teacher practice behavioural indicator elements that, when used together, would help in the development of an ako-rich classroom learning environment (Saunders et al., 2018). For the purposes of this study, the separate behavioural elements representing ako were drawn together (in no particular order) to form a framework labelled as the 'ako-based teacher action' (ATA¹² framework; see Chapter Five). The ATA framework reflects the traditional Māori translation of ako; a process integrating all aspects of the provision of an education based in Māori knowledge (Pihama et al., 2004b) and is used predominantly in Chapters Three, Five and Seven. The seven elements are listed below, along with a short explanation of their meaning:

1. Teachers acknowledge and value students' prior knowledge; students bring prior knowledge into learning process, which is acknowledged and valued by their teacher(s) (Bishop, 2003; Glynn et al., 2010);
2. Teachers value current knowledge students share with them; teachers learn from students and vice versa in conversations where teachers show appreciation of the sharing of student knowledge (Alton-Lee, 2003; Bishop, 2003; Glynn et al., 2010; Ministry of Education, 2013);

¹² The Māori word 'ATA' is particularly suited as the name for this framework, as the process of both constructing and using the framework reflects the Māori meaning of 'ata', which stands before verbs to indicate care, deliberation, or thoroughness in carrying out an activity.

3. Teachers encourage students to teach and learn from one another; teachers purposefully facilitate and encourage peer-to-peer learning (Alton-Lee, 2003; Ministry of Education, 2009a, 2013);
4. Teachers track student progress and share this information with stakeholders; teachers and students discuss feedback and feed forward about student achievement and engagement, which is tracked and shared with parent stakeholders (Anderson et al., 2010; Averill et al., 2015; Ministry of Education, 2013);
5. Teachers co-construct learning based on deliberate, reflective, research-based decisions; teachers co-construct learning processes with students, to suit the needs of students, with deliberate, reflective, research-based decisions being the responsibility of the teachers for making improvements to their classroom practice (Bishop, 2010; Bishop & Berryman, 2006, 2009; Ministry of Education, 2011, 2013);
6. Teachers encourage representation of student culture and identity in the classroom; student cultures are represented in the classroom and students feel comfortable expressing their culture and identity in the classroom and in their learning (Glynn et al., 2010; Harvey & Averill, 2012; Ministry of Education, 2013); and
7. Teachers convey high expectations of student conduct; teachers convey high expectations of student learning behaviour and conduct, when learning is teaching and occurring in classroom (Averill et al., 2015; Bishop & Berryman, 2009; Cameron, Berger, Lovett, & Baker, 2007; Savage et al., 2011).

While the framework above has been constructed for the purpose of this study, it is acknowledged that traditional Māori concepts merge into each other, rather than standing alone, as described by Pere (1994) in her description of ako as an educational framework based in Māori knowledge (Section 6.2.1; Appendix 12). Therefore, attempting to

describe ako is difficult and, furthermore, there is no clear separation between ako and other Māori cultural concepts (Appendix 12). Ako was determined by, and is dependent on, Māori epistemologies, values, knowledge, and constructions of the world (Pihama et al., 2004a, p. 12). To describe ako in a comprehensive way would require simultaneous explanations of many other Māori concepts, as it was the interconnections and fusion of Māori cultural notions that furnish ako with meaning.

Anō me he whare pūngāwerewere

Behold, it is like a spider's web

Furthermore, concern has been expressed regarding the ways that traditional Māori knowledge and information has been appropriated and reshaped (Salter, 2000), for example by non-Māori. The limitations of the framework determined for this thesis research is acknowledged by the author.

2.3.2 Aspects of ako in teacher practice

An ako-rich practice is holistic in nature (Section 2.3); however, for the purposes of exploring the detail of teacher practices that represent ako, seven separate elements were deconstructed for use as a lens in the form of the ATA framework. In this section, the elements of ako in teacher practice are (re)grouped under the three broad aspects that partially reconstruct ako yet maintain some separation between the elements to expedite further exploration in this study: teachers valuing student knowledge (ATA framework elements 1, 2, 3, 4, 5, and 6); teachers involving parents in their child's learning (ATA framework element 4); and teachers holding high expectations of students (ATA framework element 7).

2.3.2.1 Teachers valuing student knowledge

We all interpret behaviours, information, and situations through our own cultural lenses; these lenses operate involuntarily, below the level of conscious

awareness, making it seem that our own view is simply "the way it is" (Delpit, 1995, p. 151).

The pervasive transmission style of content and pedagogy in the New Zealand education system has promoted representations of history, culture, and achievements of Pākeha, in a context of mono-cultural and mono-logical knowledge, while marginalising and misrepresenting Māori knowledge (Salter, 2000). When teachers seek to position themselves as learners, purposefully reflecting and inquiring into their own learning, and valuing knowledge shared with them by students, they have the opportunity to learn to view the world from multiple perspectives. This multiethnic and multilogical knowledge can then be used to engage diverse learners (Darling-Hammond, 2008). Encouraging students to share information with teachers, who then value what is shared, is critical in motivating students to learn.

Dialogue within responsive pedagogy requires relationships in which risk taking is encouraged, where there is no shame in being a "not knower" and where it is understood that everyone brings with them knowledge, ways of knowing, and experiences of value to share (Berryman et al., 2018, p. 7).

Encouraging student learning requires teachers to have an understanding of what individual students in the classroom believe about themselves, what they care about, and what tasks are likely to give them enough success to encourage them to work hard to learn (Darling-Hammond, 2008, p. 91). International and New Zealand literature shows valuing shared student knowledge can provide teachers with the opportunity to inspire greater achievement for students, as to inspire such greatness teachers must be able to:

- identify the strengths of each learner while addressing their weaknesses; measure student prior and current knowledge to identify the starting point for instruction and guide students accordingly (Anderson et al., 2010; Bishop et al., 2009; Dewey, 2011; Timperley et al., 2008; Van de Pol, Volman, & Beishuizen, 2011);
- connect students' knowledge with information that allows them to explore ideas, acquire and synthesise new information, and solve problems in a framework that

meets individual learning needs (Anderson et al., 2010; Bishop, 2012; Bishop & Berryman, 2009; Darling-Hammond, 2008);

- utilise different teaching strategies and various methods for evaluating students' knowledge and evaluate the suitability of students' approaches to learning (Cowie, Jones, & Otrell-Cass, 2011; Darling-Hammond, 2008; Håwera & Taylor, 2008);
- know how to best encourage collaboration between students so that powerful shared learning can occur (Anderson et al., 2010; Bishop et al., 2009; Darling-Hammond, 2008; Hill, 2018; Te Maro et al., 2008);
- work with parents to learn more about their children and to shape supportive experiences at school and home (Averill, 2020; Bishop, 2012; Darling-Hammond, 2008); and
- investigate the effects of their teaching on students' learning; read literature to gain from what other educators have learned so as to become attuned to variations in teaching and learning, and more aware of what works for what in their own context, by displaying passion for teaching through motivation and time spent on refining and continuously reflecting on practice, making improvements (Bishop, 2003; Darling-Hammond, 2008; Fickel, Abbiss, Brown, & Astall, 2018; Mart, 2013).

Cultural knowledge, including knowledge that teachers can gain from students, is central to effective teaching and learning (Bishop et al., 2009; Bland & Atweh, 2007; Fickel et al., 2018). Students are able to share knowledge that can provide teachers with valuable insights into students' prior and current knowledge, along with their achievement progress and preferred methods of teaching (Bishop, 2012; Freire, 1972). This enables teaching and learning to be paced and pitched appropriately for students in the classroom. Students can share ways in which the teacher can share information about their learning with their parents (ATA framework elements 1, 2, 4, and 5). Moreover, students can share their preferences for facilitating effective student–student learning interactions and share what they are comfortable with to teach another student (ATA framework element 3). Students can also share valuable knowledge with their teacher about their culture, and level of comfort of, and ideas for, enabling them to feel more comfortable expressing their identity in the classroom (ATA framework element 6).

2.3.2.2 Teachers sharing student information with parent stakeholders

The school's role is to work with parents and whānau and respond to the child's educational needs to help them achieve to their potential (Bishop et al., 2003, p. 24).

Much international and New Zealand evidence from research and syntheses shows that involvement of parents in their children's school learning can positively influence outcomes for all students (Alton-Lee, 2003; Averill et al., 2016; Berryman & Ford, 2017; Biddulph et al., 2003; Bull et al., 2008; Education Review Office, 2018; Jeynes, 2003; McKinley, 2000; Meaney et al., 2013; Ministry of Education, 2013; Reynolds, 1992) (Section 1.2.4). Literature also shows that the better the engagement between parents, families, and schools, the greater the positive impact on student learning (Mutch & Collins, 2012, p. 168). Prior to 2000, there seems to have been little research to substantiate the positive influence on Māori parental involvement on student outcomes; however, more recently such involvement has been found to be integral to students' success (Durie, 2006). Māori parental involvement in education occurs on various levels: parents holding an interest in their child's schooling; and parents themselves being educators within the home environment, carrying out a foundational role in the transmission of culture, knowledge, values, and skills to their child (Durie, 2006; Webber, McKinley, & Rubie-Davies, 2016).

Although there are a number of terms in use to represent parental *involvement*, for example 'engagement' and 'participation' are also used throughout the literature (Bull et al., 2008), the term 'partnership' drawn from *Ka Hikitia* (Ministry of Education, 2013) will be included in the analysis phase of this thesis (Chapter Six) where a parent-teacher positive (PT-PP) partnership typology is predominantly used. The purposeful use of the aspirational term partnership will indicate a desire that parents and teachers as stakeholders in education will share equal influence in a reciprocal dialogue, both contributing to students' educational success (Anthony & Walshaw, 2007; Averill et al., 2016; Bull et al., 2008) (Appendix 12). This desire reflects the Crown's (and the researcher's) commitment to partnership with Māori communities represented in the Treaty of Waitangi (Sections 1.2 and 3.1.1). In the sense of such a partnership, the inclusion of students' parents in their child's learning is mandated in education policy, *Ka*

Hikitia, and incorporated into behaviour indicators in *Tātaiako* (Ministry of Education, 2011; 2013).

Productive partnerships, one of the guiding principles underpinning *Ka Hikitia*, are described in the policy document as a two-way, mutually respectful relationship that “starts with the understanding that Māori children and students are connected to whānau and should not be viewed or treated as separate, isolated or disconnected” (Ministry of Education, 2013, p. 17). In a resource aimed to encourage people to share experiences and views around early childhood education practice, the Ministry of Education (2009b) reported on this culturally significant student–parent relationship. In this resource, where information was underpinned by Māori ways of being, the inseparable nature of children was described as teachers consulting with parents as important “in order to support the child’s understanding of the many relationships they have with their grandparents, their marae,¹³ and the places from which they come. These relationships contribute to ways in which the child views their place in the world” (p. 14). The child is not viewed as coming to education alone, but with their family and ancestors around them, as the “child is part of the whānau and the whānau is part of the child. One cannot be separated from the other. The child learns within the context of whānau, which is a real-life context” (Ministry of Education, 2009b, p. 22).

Authentic relationships with students’ parents are a critical lever for positive changes in education (Rubie-Davies et al., 2018). Such positive changes occur in students with benefits observed including increased motivation to learn, enhanced achievement, and positive effects on attendance (Anthony & Walshaw, 2007; Averill et al., 2016; Biddulph et al., 2003; Bull et al., 2008). Schools have a responsibility to encourage parents to feel comfortable in becoming involved in their children’s learning, by providing appropriate opportunities for this to occur. In *Ka Hikitia* an association between ako and parental involvement in Māori education is made; “ako is grounded in the principle of reciprocity and also recognises that students and their whānau cannot be separated” (Ministry of Education, 2013, p. 16). Furthermore, in the context of mathematics learning, Raymond

¹³ A marae is a fenced-in complex of carved buildings and grounds that belongs to a particular iwi (tribe), hapū (sub tribe) or whānau (family).

(1997) and (Barton, 1993) assert that parent beliefs about their children and mathematics learning are among the factors outside of the classroom (such as cultural background, home environment) that influence the way students perceive and learn mathematics (Section 2.2.2). Parent perspectives, goals, and aspirations, alongside teacher experience and knowledge, and also student knowledge, are required in combination to create successful pathways for student achievement (Ministry of Education, 2013; Mutch & Collins, 2012). Teachers cannot assume that the strategies that facilitate collaboration and connections with non-partnerships with non-Māori families will also work for Māori parents. Educators must acknowledge that by operating from a traditional Eurocentric position, from a Pākehā worldview, may be marginalising “the meaningful experiences, valid questions, and legitimate concerns of our Treaty of Waitangi partners” (Berryman et al., 2018, p. 24). The ideals of the treaty are yet to be fully realised; however, education policy and research in New Zealand are increasingly seeking to ensure that the treaty ideals are honoured (Vale et al., 2020). Teachers must take the time to get to know and understand Māori parents’ interaction preferences (Berryman & Ford, 2017). New Zealand policy professional guidelines and professional development projects (Section 1.4) recognise the requirement of authentic parental involvement and expect schools to facilitate these types of interactions by co-creating learning pathways, particularly in relation to Māori learners (Durie, 2006; Education Council, 2017; Ministry of Education, 2013). However, despite such imperatives and professional development projects, parental involvement has proved challenging to embed within many English-medium school settings (Averill et al., 2016, p. 109; Mutch & Collins, 2012; Webber et al., 2016).

Although two-way, reciprocal communication is the desirable outcome for positive parent–teacher partnerships (Education Review Office, 2018; Ministry of Education, 2013), barriers to parent participation exist (Sections 1.2.5 and 2.2.2). These barriers include variations in perspectives of the purpose and nature of parental involvement; cultural mismatch between parents and teachers; and varied parent confidence in assisting learning at home due to their own lack of mathematical ability (McKinley, 2000). Furthermore, for many Māori parents their contact with school only occurs when there is a negative issue with their child. This can place parents in a defensive position, which can then lead to negative interactions with teachers and schools. As stated by Durie (2006)

“while it is important that parents are kept informed of difficulties, it is more important that parents are also able to work with schools to identify potential and then to jointly construct pathways that will enable promise to be realized (p. 10).

Where barriers to parent–teacher partnerships exist, parental involvement may negatively influence student learning, so careful planning is required in how teachers engage with parents (Averill et al., 2016; Rubie-Davies et al., 2018) (see Chapter Six). Positive parent feelings facilitated by teachers within parent–teacher interactions have been implicated as a factor facilitating reciprocal interactions between these two stakeholders in student education (see, for example, Bull et al., 2008; Sections 2.2.2 and 6.1). For productive parent–teacher partnerships to be formed successfully, there must be an *ongoing* exchange of information (Ministry of Education, 2013).

Some important factors associated with teacher behaviours in successful partnerships between teachers and Māori parents (Bull et al., 2008) include effective communication, shared parent–teacher decision making, student engagement in the classroom, high commitment of teachers to their teaching role, and teacher approachability (Averill et al., 2016; Bull et al., 2008; McKinley, 2000). When communicating with parents, teachers must be respectful (Biddulph et al., 2003; Bull et al., 2008) and interact through methods that suit the parent community (Education Review Office, 2008, 2018) (Section 2.2.2).

In their study of the integration of Māori language and culture into mathematics lessons in Māori-medium schools, Meaney et al. (2013) found for *student* equity in learning to be achieved in mathematics, their *parents’* aspirations for education must be sought. This is an important message for English-medium schools in New Zealand, as parents’ aspirations and expectations that they hold, and convey, for their children’s learning outcomes have a strong relationship with student achievement (Hattie, 2009). However, some parents “struggle to comprehend the language of learning and thus are disadvantaged in the methods they use to encourage their children to attain their expectations” (Hattie, 2009, p. 70). Parents can be involved in the child’s learning in other ways, for example questioning, showing interest, and supervising homework; however, these factors were less positively associated with student achievement than parent aspirations were found to be (Hattie, 2009; Webber et al., 2016).

In summary, the literature indicates that the inclusion of parent perspectives on their child's learning must be sought, as it is critical to student success. Furthermore, educators must ensure parents receive the information they need to hold appropriately high expectations and aspirations for their children's learning. One way this can be done is by providing parents with information about the language of schooling (such as curriculum and assessment). These requirements can be facilitated in an ako-rich environment (ATA framework element 4).

2.3.2.3 Teachers holding high expectations of student learning and behaviour

To put it simply, if we think of other people as having deficiencies, then our actions will tend to follow this thinking, and the relations we develop and the interactions we have with these people will tend to be negative and unproductive. That is, despite our being well-meaning, with the best intentions in the world, if students with whom we are interacting as teachers are led to believe that we think they are deficient, they will respond to this negatively (Bishop, 2010, p. 58).

When teachers' expectations are reflected in their classroom practice, these expectations are related to cognitive changes in students when student and achievement effects are controlled for (Bevan-Brown, 2000). While high teacher expectations have positive effects on student outcomes, low teacher expectations are one factor that contributes to a lack of student success (Alton-Lee, 2003; Bishop, 2010; Rubie-Davies et al., 2010).

International and New Zealand research shows that ethnicity is a critical contributor to teacher expectations, with lower and more negative teacher expectations observed for Indigenous and minority group students than for students of European heritage (Gay, 1997; Turner, Rubie-Davies, & Webber, 2015). New Zealand research has revealed that teacher expectations for Māori students are lower than expectations held for other ethnic groups (Alton-Lee, 2003; Bevan-Brown, 2000; Rubie-Davies, Hattie, & Hamilton, 2006); reflective of persistent disparate Māori achievement levels (Section 1.2).

In their large New Zealand study Bishop et al. (2009) found that the weak student-teacher relationships experienced by Year 9 and 10 Māori students were a factor that had a

significant negative impact on their underachievement at school. Furthermore, such weak relationships were often intensified by low teacher expectations and an unwillingness by some teachers to take responsibility for students' learning. A study by (Rubie-Davies et al., 2006) had shown similar findings in the New Zealand context; ethnicity appeared to be a factor in forming teacher expectations.

It is critical that teachers hold, and convey, high expectations of student learning and take responsibility for the learning of students. These teacher practices can be enacted in an ako-rich environment (ATA framework elements 5 and 7).

Summary

In summary, the literature informs us that to provide an ako-rich environment, teachers must position themselves as the learner alongside their traditional role as a knower; acknowledging, valuing, and increasing students' and parents' knowledge about education. The diversity and individuality of the students in their classes must be respected, and student culture must be incorporated into the teaching and learning. The teacher must hold and convey high expectations for all students, which are shared with parents.

2.4 Discussion

There is ample evidence that ako-rich pedagogy is vital for positive learning experiences and the literature that informs this study offers much to help describe the types of behaviours that demonstrate ako in teacher practice. The consistency and connections across the studies, reviews, policies, and authors, and across different ethnicities in different contexts and that have been passed through many generations, suggest that the most salient aspects of ako-rich teacher practices may be stable across context and time. However, what is missing are studies that describe ako as experienced by mathematics students, and their parents, in particular Māori students in localised contexts. Furthermore, many of the policy and professional development documents available for teachers do not focus specifically on mathematics classrooms. Mathematics is a

gatekeeper for educational and social success. Therefore, it is very important to explore how teachers of mathematics can enhance students' participation in mathematics by describing what assists with enacting an ako-rich classroom environment.

Chapter Three

3.0 Methodology, Method, and Implementation

This chapter begins with the description and justification of theoretical and methodological perspectives drawn on during the study design (Section 3.1). Commentary on the development of data-gathering tools follows (Section 3.2), then ethical considerations and the study participants (Section 3.3.) are outlined. Next, data collection and participant feedback are discussed (Section 3.4) before the chapter concludes with a discussion on the approach to data analysis and a placement of findings within an ako-based framework developed as part of the study (Section 3.5).

3.1 Study Design

A sociocultural epistemological stance was selected for this study (Packer & Goicoechea, 2000). Research carried out within this stance privileges the notion that learning and understanding “originate on the social plane, in social interactions, in language, and/or in enculturation” (Lerman, 2006, p. 356), thus providing a framework suitable for research such as this study, which investigates issues of educational equity. The research questions for this study (Section 1.6) are situated within a classroom context where stakeholders’ (student, parent, teacher) perceptions of a teacher’s ako-based actions and interactions will be investigated (Chapters Five and Six). The intended outcome was the generation of a scaffold of ako-based teacher behaviour indicators drawn from literature and policy, to assist participants in the identification and organisation of discrete elements demonstrating ako-based teacher actions. A research-drawn scaffold of teacher actions contributing to positive parent–teacher partnership interactions was another intended outcome. With the applicability to researching issues of equity, a sociocultural framework is very suitable for viewing learning environments as a space where students and parents are invited to participate in the co-construction of knowledge. This adds to make this selected stance even more appropriate as an epistemological basis for the study design (Kozulin, Gindis, Agueyev, & Miller, 2003).

A thorough and insightful investigation into the perspectives of study participants to generate useful study findings requires a researcher to spend considerable time within the study context (Pirie, 1998). Researcher immersion within the research space as an active participant was planned to give first-hand and first-person perspectives of the participants; the researcher assumed the role as the study teacher (Section 4.4). Considering the study design requirements, the first decision made was to select some elements consistent with action research to help guide the design process for this research. Other teachers have adopted this research approach in order to develop theory from the context of their own classroom teaching (Kember et al., 1997). Two key features of action research important to its selection for this study are the participation in all aspects of research by people participating within the context setting, and the orientation of the research toward making improvements in practices and the setting by the participants (Kemmis, McTaggart, & Nixon, 2013) (Section 3.1.1). Action research is particularly useful for exploring specific local issues faced in schools (Lewin, 1946; Stringer, 2013), and is based on the close interaction between theory, practice, and change (Bresler, 1995).

In keeping with the need to combine different worldviews and perspectives in order to fully understand the social context of the study, a pragmatic approach was adopted within the study design (Creswell, 2017; Morgan, 2014). As pragmatism embraces research as a human experience based within the beliefs and actions of researchers, it forefronts the analysis and consequences of actions to determine real world practice-based solutions within the study. Furthermore, the intended iterative (weekly, annual) nature of this study fits this approach, which endorses both the theory that informs effective practice, and the continual improvement of past understandings: improvements fit into the world where the researcher is operating; the researcher is engaged in actions; and the knowledge gained is useful to guide actions (Goldkuhl, 2012). Moreover, this approach is suitable for this study as it is explicitly value-oriented toward research derived from cultural values, including the notion of equity within the school classroom setting.

Post-positivism, naturalism and advocacy/participatory approaches were also considered for this study, based on several relevant and potentially useful aspects they hold

(Creswell, 2017). These approaches were rejected, however, due to this research being concerned with reaching a deeper understanding and guiding practices previously reformed. The intention of the researcher was to influence actions in the setting, creating a likely strong relationship between data and contextual factors, and having no purpose within the research to initiate a political debate (Table 3.1).

Table 3.1

Reasons for Rejection of Potential Paradigms

Knowledge Claim (Creswell, 2017; Johnson & Christensen, 2012)	Main reasoning for rejecting claim for this study
Post-positivism	Theory was not being tested or refined, instead understood and investigated. Empirical data was deemed not well suited to this study, as it was likely to be highly influenced by the context in which it was gathered.
Naturalism	While participants were in their natural environment, the researcher intended to purposefully use knowledge from interim findings in real-time to improve teaching and learning.
Advocacy/Participatory	Although collaboration, and an awareness of avoiding domination of participants with an approach of ‘with’ participants was important, the research was not emancipatory in nature, with no political debate to initiate change sought.

The research design decisions described so far integrate requirements for investigating and making sense of multiple participants’ perspectives about a teacher’s actions within a sociocultural context where the researcher was also the study teacher and not purely an observer. Furthermore, space for the intended iterative improvement of teacher practice to increase ako-based interactions in the classroom via the knowledge generated has been established. With a study focus of understanding many ako-based interactions in a busy classroom from multiple perspectives, the study design now turns to selecting

methodology approaches that could be utilised to integrate flexibility and responsiveness into the processes of data collection and analysis.

Ethnography (Creswell, 2017; Johnson & Christensen, 2012) was selected as the primary methodology for this action study, as it is fitting to the sociocultural (Pirie, 1998) and pragmatic (Hammersley & Atkinson, 2007; Kivunja & Kuyini, 2017) approaches. Ethnographic methodology allows a researcher to be an active participant over an extended time, with a focus on intact context-based groups in their usual setting (Creswell, 2017). These factors make ethnographic methodology highly appropriate to answer the research questions in this study (Section 1.6). Moreover, the fluidity and responsiveness of an ethnographic approach provides researchers with a facility to collect data as needed, and to respond to foreseen and unforeseen challenges such as those that may occur in a school context (such as time constraints and timetable alterations) (Hammersley & Atkinson, 2007; Johnson & Christensen, 2012) (Section 3.3). Case study and phenomenology were also considered as alternative approaches to ethnography, as they both allowed for the collection of many perspectives to fully understand individual experiences within a classroom context. Both approaches could have been a suitable fit; however, they were rejected as the specific focus of ethnography regarding “culturally defined standards about what is good or bad or desirable or undesirable” (Johnson & Christensen, 2012, p. 389) was seen as a better fit with the research questions.

Grounded theory, particularly suited to the study of behaviour (Goulding, 1998), is a potential means of bridging the education theory–classroom practice divide with the study findings (Breckenridge & Jones, 2009) (Section 1.5). This study did not begin with a theory to prove from findings, the intent was to generate theory from the data and so it is a suitable study for using elements consistent with grounded theory, including data from an interview being iteratively compared to the data already collected from previous interviews, and using terms to describe the interesting instances that emerge from the data (Johnson & Christensen, 2012). Grounded theory involves the researcher capturing the “worlds of people by describing their situations, thoughts, feelings and actions and by relying on portraying the research participants' lives and voices” (Charmaz, 2006, p. 30). Responsiveness to data and flexibility in the design is afforded by this methodology, which

involves continual comparison of data emerging from many sources over time (such as participants, literature, advisors, researcher reflection) to inform the developing theory (Creswell, 2017). Additionally, this theory allows for some control over the phenomenon being studied by the researcher, which fits with the study teacher-as-researcher role. The requirement for grounded theory to be clearly stated and understandable to practitioners in the field of research was also a very desirable characteristic of grounded theory methodology in regard to its potential use by practising teachers (Section 1.1). Maximising the usefulness of the research findings by increasing the likelihood it would be used to benefit society, outside of the specific research context, was a study intention (Johnson & Christensen, 2012).

Qualitative methods can enable rich descriptions of the phenomenon being investigated, in the search for meaning and understanding of data collected (Johnson & Christensen, 2012; Merriam, 2002). A qualitative approach was initially selected for this study. Limitations of generalisability in this study exist for example, due to a relatively small sample size of participants involved. In response to this limitation, a quantitative method were added in the form of a Likert scale based survey (Appendix 9), and a second survey where participant selections were able to be quantified (Appendix 10). Quantitative methods allow many points of data to be collected at the same time from many participants, aiding in understanding the phenomena of interest in order to answer the study questions (Ritchie, Lewis, Nicholls, & Ormston, 2013) The combination of these two methods led to a mixed methods approach being employed (Johnson & Christensen, 2012).

Determining a suitable combination of qualitative and quantitative data to collect was explored using a typology of research purposes, which when linked with suitable methodologies, seeks to increase the credibility of study findings and implications (Newman, Ridenour, Newman, & DeMarco Jr, 2003). The research purposes of this study most closely matched the second and third of the general purposes for research in social science: to “add to the knowledge base”; and “have a personal, social, institutional, and/or organizational impact” (Newman et al, p. 176). The traditional paradigms for these purpose sets are quantitative and qualitative, respectively (Newman et al., 2003). Both

sets provide the opportunity for mixed methods research to be employed, with qualitative methods aiding the development of theory and quantitative methods used to test hypotheses related to the social values that are specific to the context of this study. Mixed method research emerged relatively recently, sitting on a continuum between qualitative and quantitative research as a third paradigm (Creswell & Plano Clark, 2017; Johnson & Onwuegbuzie, 2004). It is an approach that combines standpoints of qualitative and quantitative research, attempting to consider multiple viewpoints, perspectives and positions (Johnson, Onwuegbuzie, & Turner, 2007; Tashakkori & Teddlie, 2010). Advocated last century by its philosophical pragmatic positioning partner (Johnson & Onwuegbuzie, 2004), this approach is concerned with prioritising 'what works' in the researcher's particular situation to answer the research questions, and to prioritise social justice (Johnson & Christensen, 2012), insofar as keeping with the study design.

This thesis assumes the idea that recent education policies in New Zealand (Section 1.4) can be seen as attempts to make education less unequal. As asserted by Power (2012), "the ways in which this is to be done embody different assumptions about what counts as a socially just education system and the obstacles which prevent this from being realised" (p. 474). Nancy Fraser (2008) believes that overcoming injustice means dismantling the institutionalised obstacles that prevent some people from participating on a par with others on an equitable level in social interactions. Using Fraser's (2008) analyses of social injustice (Section 3.1.1.1) to approach consideration of policy will provide a lens for examining the contribution of this thesis' findings in terms of interrogating relationships between education policies, inequalities in student outcomes, and social justice.

For this study, qualitative methods were selected to gather the greatest part of study data allowing in-depth data to be collected from participants in an attempt to understand participant views, perspectives, and meanings, in keeping with the sociocultural approach (Johnson & Christensen, 2012). Non-experimental quantitative data (Johnson & Christensen, 2012) formed a minor part of data collected for the purpose of enabling a closer examination of a larger number of student participants' thoughts and feelings in order to assist in generalising findings to other contexts (Creswell, 2017) (Table 4.3). Drawing on method strengths in order to minimise their weaknesses through the

triangulation of the quantitative and qualitative approaches, the incorporation of mixed methods in a study can address limitations within research, enhancing the convergence and generalisability of findings (Denscombe, 2009; Onwuegbuzie & Johnson, 2006) (Sections 3.1.2.1 to 3.1.2.3).

In summary, a sociocultural stance with a pragmatic approach to combining methodologies was chosen for this study. With a qualitative approach guiding most of the data-collection methods from an ethnographic standpoint, a mixed research method framework allowed the inclusion of some quantitative data to support the emerging grounded theory for the purposes of increasing finding convergence and generalisability. The next methodological decision was the most challenging and arguably the most important in the research design. The following two sections describe the potential influence of the researcher's own Eurocentric-based educational background (Sections 1.1 and 4.4) on knowledge generated from data shared by Māori participants in this study and how attempts to mitigate these effects were planned into the study design. . The use of a methodology drawn from rich and longstanding Indigenous knowledge goes some way to assist mitigation of potential effects (Section 3.1.1). In addition to its utilization in examining thesis findings (Chapter 8), Nancy Fraser's (2008) theory will be drawn on to help attend to and interrogate limitations inherent in a Pakeha researcher using KMT in a Māori knowledge context (Section 3.1.1.1)

3.1.1 Kaupapa Māori theory

This section will state the motivation behind drawing on elements of this theory for this study design and review the place of kaupapa Māori theory (KMT) in the context of education research. The fit of the intentions and the nature of KMT within the study will be presented, along with an acknowledgement of a challenge from some Māori commentators in regard to a Pākehā researcher using this theory. Finally, I present the justification for my approach used to incorporate KMT within the study design.

The motivation to incorporate a KMT approach in the design of this study was to acknowledge potential epistemological racism that may exist within the predominantly

Eurocentric study design. KMT was intentionally drawn on to design a study to better serve Māori in acknowledgement of the Treaty of Waitangi (Section 1.2). New Zealand has an enduring history of Western-based approaches (Section 2.2.1), with research into Māori people's lives traditionally having addressed the interests of the predominantly non-Māori researchers. Accountability to Māori participants and their data, along with the knowledge generated from the research, has often been based in the researchers' own worldview (Bishop, 1999). However, in contrast, KMT is a research approach that is culturally relevant to Māori and is attentive to customary obligations and practices under the guidance of Māori advisors. Therefore, this Indigenous theory provides intervention elements across various social contexts and reflects a perspective that knowledge is socially constructed (Section 2.2.2).

KMT is most relevant to one of the two main purposes of this study: to have a personal, social, institutional, and/or organisational impact (Section 3.1). To clarify the interpretation of this purpose within the study, emancipation and politicisation of the study participants' situation was not an intended outcome. The specific outcome linked to this purpose was an intention to work alongside the participants to improve their outcomes while promoting equity in mathematics education. Although a temptation to state a bold emancipatory goal existed due to the researcher's high levels of commitment to the participants (Section 1.3), the view presented by prominent commentators in the field of Indigenous education that for a group of people to be "liberated by the (non-Indigenous) oppressor" is contradictory, was upheld within the context of this study (Berryman, Egan, & Ford, 2016; Eketone, 2008; Freire, 1972; Smith, Hoskins, & Jones, 2012).

Māori-centred views, rather than through Western-centred research approaches, hold answers to the (re)development of social policies and practice, including in the context of education, to better serve Māori (Bishop & Glynn, 2003). KMT has been increasingly described in literature, and taken up in education research designs, with a move toward Indigenous-aligned research approaches *for* and in cooperation *with*, rather than *on* or *about* Māori people (Bishop, 1998, 1999; Bishop & Glynn, 1999; Singh & Major, 2017; Sleeter, 2001).

Distinct from western-based approaches, KMT questions, challenges, and critiques Western-based theory dominance in a study, opposing the traditional Western research stances. However, KMT neither excludes nor rejects Pākehā culture. Cram, Phillips, Tipene-Matua, Parsons, and Taupo (2004) suggested innovative research strategies may emerge from a growing capacity among Indigenous people to generate methodologies and methods, or in using those that are “imported into a Māori worldview” (p. 16). For this study, it was appropriate to combine KMT with the Western-based theories within the spirit of the pragmatic and mixed methods methodologies selected. This allowed the study design to draw on overlapping methodological strengths; KMT would guide the use of traditional Western-based research methods selected for this study due to their known strengths in educational research, so that they would be fit for the purpose of enhancing the responsive gathering and responsible use of Indigenous participants’ data.

It is of importance to acknowledge that a debate exists regarding whether or not, and if so then how, non-Māori educational researchers such as the Pākehā author of this study may engage with KMT (Durie, 2012; Hotere-Barnes, 2013; Jones, 2012; Tolich, 2002; Walker, Eketone, & Gibbs, 2006). The notion of non-Māori researchers as partners in the Treaty of Waitangi having an obligation to support Māori research has been presented as a possible path of engagement for Pākehā researchers. The treaty as a model and metaphor for the power-sharing and change can not only provide a pathway for engagement of non-Māori researchers explicitly engaging in KMT research, but furthermore these researchers may be viewed as potential allies and useful colleagues in research (Bishop, 1995; Bishop & Glynn, 2003; Smith, 2013). For this study, KMT was drawn on, on the basis of the Pākehā researcher taking a stance as a partner in the Treaty of Waitangi, and as a non-Indigenous teacher and parent committed to the improvement to Māori education outcomes (Section 1.3). Open to ontological shifts which could emerge, the researcher acknowledged that Māori sense-making and knowledge generation is valid, and could challenge Western-based positioning through a process of conscientisation following iterative research processes of reflection and action during this study (Berryman et al., 2016; Freire, 1972).

To account for the researcher's novice status in KMT research and limitations to deep implementation of KMT research due to her non-Indigenous status, a structure was required for the process of reflection and action within data collection and analysis processes to deliberately facilitate KMT being incorporated. The structure would assist in upholding the respect and desires of the participants. Frameworks accessible to the researcher were searched to scaffold questions to be asked of the processes when including the use of the Treaty of Waitangi alongside an awareness of sensitivity to cross-cultural research (Table 3.2). A scaffold for following treaty principles was drawn from the framework presented in a paper outlining the construction of culturally safe Māori health research (Wilson & Neville, 2009). Then, a cross-cultural Māori educational research framework was found within a school-based qualitative project focusing on raising Māori educational outcomes, in an English-medium context, where one of the researchers identified as a Pākehā (Carpenter & McMurchy-Pilkington, 2008). The cross-cultural framework used by these two New Zealand researchers was originally drawn from the work of prominent Māori and Pākehā educational researchers such as Bishop and Glynn (1992); Jahnke and Taiapa (2003); Smith (1999); and Spoonley (1999). The central concerns of Carpenter and McMurchy-Pilkington's (2008) research were reframed as questions that were considered against the research processes: "who should be involved in the research process, how the project should be undertaken, why particular processes should be used, and what happens to the findings" (p.185). These questions were adapted slightly, to better fit this study design.

Table 3.2

Questions Asked of Processes to Consider Kaupapa Māori Theory

The Treaty of Waitangi (Wilson & Neville, 2009)	Cross-cultural (Carpenter & McMurphy-Pilkington, 2008)
PARTNERSHIP: researcher is required to create a space where the building of meaningful and ongoing relationships with those being researched can be established and maintained throughout the research process.	WHO should be involved in this phase of the tool design or analysis
PARTICIPATION: key members of the researched are included throughout the research, from early planning through to data interpretation to obtain advice and guidance with regard to participants. Participation should be a product of negotiation. Research methods should be carefully considered to be fit for purpose.	HOW should the tool be used, or the data analysis be undertaken
PROTECTION: participants and their data are not exploited, portrayed in negative depictions or explanations. Key traditions, beliefs and knowledge are respected. Research decisions are ethical, where the right thing is done by the participants.	WHY is this tool or analysis method being used
POWER: researchers must critically reflect upon the epistemology of the knowledge base they use and the discourses that pervade the dominant research cultures. Views alternative to those in the Western world should not be negated. Researchers should employ a 'power with' rather than a 'power over' approach with participants.	WHAT happens to the findings of this phase

Note. Table constructed from ideas drawn from Wilson and Neville (2009), and Carpenter and McMurphy-Pilkington (2008).

In summary, KMT was drawn on as a methodology that would challenge the traditional dominant discourse of educational research in New Zealand. The researcher's stance as a Pākehā partner in the Treaty of Waitangi would be the point of access for the use of

KMT in this study. By influencing the research design to result in a study where the researcher 'works with' participants, the researcher's Western-based background was made forefront, highlighting points where deliberate design decisions to incorporate cross-cultural research requirements existed. A set of questions would assist the deliberately mindful incorporation of KMT preferences in data collection and analysis processes (Table 3.2). A reflection on the questions asked within this table exposed limitations in the study design - most notably in the cross-cultural column regarding what happens to the findings of the research phases. This limitation is underpinned by the degree of cultural competency that is appropriate to be achieved by a researcher, in that matters of the researched group can lead to reinforcement and maintenance of dominance by the researcher (Berryman et al., 2013). To help mitigate this possible perpetuation of Euro-centric dominance, culturally responsive theory was considered however it was rejected as the study design did not meet, for example, the requirement for participants to co-construct the ways that they engaged with research they were participating in.

3.1.1.1 Fraser's framework

Nancy Fraser's (2008) analyses of social injustice, has been used as a framework for examining non-Indigenous researchers researching Indigenous contexts in education (Power, 2012) generally and within mathematics (e.g., Meaney, Edmonds-Wathen, McMurchy-Pilkington, & Trinick, T. (2016); Vale et al., 2016). Fraser's theorisation is drawn from three areas of social injustice: economic (deprivation), cultural (domination, non-recognition and disrespect), and political (marginalisation and misrepresentation); characterized by Fraser's notions of justice in terms of redistribution, recognition, and participation. The division of injustices into distinct domains has been contested (e.g., Young, 2008), however Fraser acknowledges that these domains do not exist alone in their pure forms, asserting that there are experiential advantages in examining them separately if the match (or mismatch) in the domains are to be understood (Power, 2012).

Fraser's (2013) three element model which examines social justice in terms of redistribution, recognition and participation has been used to better understand how

privileging of some groups over other groups occurs, and to identify this occurrence within the teaching and learning of mathematics connected to Indigenous learners (Meaney et al., 2016). This research will utilise these three elements in the way they were used by Meaney et al., (2016) in their evaluation of Australian and New Zealand research connected to Aboriginal and Māori learners of mathematics. The first element, redistribution, includes ways social goods, mathematics education in the context of this research, are distributed to Indigenous groups. The distribution of teachers of Indigenous students and non-Indigenous teachers and the impact of expectations for Indigenous learners in classrooms (Rubie-Davis & Webber, 2015) could restrict mathematics learning delivered to Indigenous students due to deficit theorising by teachers (Section 2.2.1.1). The next element, recognition, includes learners' cultural backgrounds positively recognised as useful in their mathematics learning. Furthermore, this element highlights the recognition that it not only learners who are expected to change, but contexts and assessment methods must also be made more culturally appropriate. The non-essentialising (Berryman et al., 2018) of Indigenous student achievement is necessary to avoid all Indigenous students being recognised as low achievers in mathematics (Section 6.2.1.1). The final element, representation, includes Indigenous communities being involved in decisions about what is taught in mathematics, and how it is taught in classrooms.

In the discussion and conclusion chapter (Chapter 8) of this thesis ways in which research findings have contributed to advances in mathematics teaching and learning for Indigenous students, explored by a non-Indigenous Pakeha teacher- researcher, will be providing using the three elements of Fraser's framework as a lens.

3.1.2 Data collection methods

Classrooms are complex environments where many individuals with a variety of different life experiences, learning needs, perspectives, biases, and priorities gather to participate in teaching and learning (Shulman, 1991). A classroom is just one of many, often overlapping, social contexts that are set up in a school where individuals are grouped together for various purposes. Many interactions occur in a classroom; they can be

fleeting and can occur rapidly and simultaneously, making detailed observations difficult to carry out in real time. Moreover, interactions inside a classroom are affected not only by factors within the classroom, but also by those external to the classroom.

Methods and tools used in data collection must be suitable for the purpose of the study (Denscombe, 2009; Pirie, 1998; Wragg, 1999). While a pragmatic approach to ‘what works’ was selected for this study (Section 3.1), a good understanding of the two approaches at either end of the mixed methods continuum was required so that the research decisions are clear, and pragmatism did not signal an excuse for lack of adherence to a carefully thought out research design (Feilzer, 2010). Researcher bias amelioration and the compilation of a more comprehensive set of data resulted from drawing on dual methods drawn in this study; these were mainly qualitative methods, supported by some quantitative methods (Table 3.3). Exploring and cross-checking data between alternative method approaches and data sources is important as findings are strengthened when corroboration is noted during analysis of one phenomenon from two or more methods (Denzin, 2007; Jick, 1979; Teddlie & Tashakkori, 2003a). Different methods have inherent strengths, weaknesses, and practical constraints within each study context, in relation to answering research questions. Using alternative data collection methods combines overlapping methodological strengths, thus lessening weaknesses present within the study design using ‘triangulation’.

Table 3.3

Summary of Data-Gathering Methods

Data-collection method <i>Participants</i> (Year of experimental phase in which method was used)	Trialled in pilot phase? (Table 3.4)	Purpose for collection	Data Type (Main thesis section)
Literature review <i>Teacher</i> (Year One and Two)	Yes	To define ako in a way that can be used to construct an indicator framework for identifying then organising ako-rich teacher behaviour	Qualitative (Chapter Two Section 3.4)

Video recording of classroom lessons <i>Students and Teacher</i> (Years One and Two)	Yes	To collect examples of ako (or contradictions) in: <ul style="list-style-type: none"> • teacher practice • teacher–student interactions • student–student interactions 	Qualitative (Section 3.1.2.1)
Interviews – Cogens <i>Students and Teacher</i> (Years One and Two)	Yes	Students and teacher to: <ul style="list-style-type: none"> • examine teacher-selected video clips for examples of ako in the classroom (Year 1 only) • identify teacher actions demonstrating ako 	Qualitative (Section 3.1.2.2)
Interviews – semi-structured <i>Student and Teacher</i> (Years One and Two)	No	Students and teacher to: <ul style="list-style-type: none"> • discuss ako-based actions that are a positive influence on student learning • discuss responses on survey questionnaire forms in detail (Year 1 only) 	Qualitative (Section 3.1.2.2; Chapter Five)
Interviews (one-to-one) Semi-structured <i>Parents and Teacher</i> (Years One and Two)	No	Teacher and parents to: <ul style="list-style-type: none"> • discuss teacher behaviours that parents feel encourage student learning and encourage parental–teacher interactions and parental involvement in students’ learning 	Qualitative (Section 3.1.2.2; Chapter Six)
Reflective journal <i>Teacher</i> (Years One and Two)	No	For teacher to: <ul style="list-style-type: none"> • reflect on practice • justify decisions made • record classroom observations 	Qualitative (Section 3.2.2; Chapter Five)
Cultural advisors and critical friend memos <i>Teacher</i> (Years One and Two)	Yes	For teacher to: <ul style="list-style-type: none"> • seek advice on decisions through external lens 	Qualitative (Section 3.2.2)
Ako in teacher practice (ATP) survey <i>Students</i> (Year One)	Yes	For students to: <ul style="list-style-type: none"> • rate levels of ako in the classroom, their experience of the classroom, learning, their own and teacher behaviours 	Quantitative

		For the teacher to gather data on: <ul style="list-style-type: none"> • student perception of teacher practice • shifts in student perception of teacher practice 	(Section 3.1.2.3; Chapter Five)
Enjoyment and Engagement (E&E) survey <i>Students</i> (Year One)	Yes	For students to: <ul style="list-style-type: none"> • provide information about on their enjoyment and engagement in the current week of learning 	Quantitative (Section 3.1.2.3; Chapter Five)
Progressive Achievement Test (PAT) (Fogarty, 2007) <i>Students</i> (Year One)	No	To collect: <ul style="list-style-type: none"> • baseline academic achievement and shifts in achievement 	Quantitative (Section 3.4.5; Chapter Five)

Data Type	Qualitative	Quantitative
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This study design utilised concurrent triangulation (Creswell, 2017) to integrate both qualitative and quantitative methods and data, used in parallel and together to inform analysis and reporting, demonstrating ‘methodological triangulation’ through the use of multiple research methods. The collection of data from multiple sources at different times demonstrated ‘method triangulation’ (Denzin, 2007; Johnson, 1997). Multiple sources of data allowed crosschecking of participant perceptions of the classroom language and actions, by allowing a deeper exploration and description of participant thoughts and feelings in a triangulated approach to data sources. Not only does triangulation allow cross-validation, but it also captures different dimensions of one phenomenon. This type of approach involves using more than one method to collect data on the *same phenomenon* as a way of assuring the validity of research (such as through different methods, at various time points, from multiple perspectives). The study design overview (Table 3.4) presents the original plan for these two different types of triangulation, across time in the study phases. It also signals some modifications that were made to the study in Year Two (Section 3.3).

Table 3.4

Study Design

Timing				
<i>Prior to study</i>	Year One		Year Two	
<i>Pilot Phase</i>	Experimental Phase		Experimental Phase	
<i>Term Three</i>	Term One	Term Two	Term One	Term Two
Study Participants	Study Participants		Study Participants	
<i>Pilot students, teacher</i>	Year 9 study students, teacher, parents		Year 10 study students, teacher, parents	
Methods	Methods		Methods	
<i>Literature review</i>				
<i>Cultural advisors</i>	Cultural advisors		Cultural advisors	
<i>Critical friends</i>	Critical friends		Critical friends	
<i>Teacher Journal</i>	Teacher Journal		Teacher Journal	
<i>Lesson video recordings and teacher analysis</i>		Classroom observations (video recorded)		Classroom observations (video recorded)
<i>Cogens and semi-structured interviews (video recorded)</i>		Cogens and semi-structured interviews (video recorded)		Cogens and semi-structured interviews (video recorded)
		Semi-structured interviews with parents (video recorded)		Semi-structured interviews with parents (video recorded)
		Student journaling		
	PAT	PAT	PAT	PAT
<i>ATP and E&E questionnaires</i>	ATP and E&E questionnaires	ATP and E&E questionnaires	ATP and E&E questionnaires	ATP and E&E questionnaires

Key	Qualitative data	Quantitative data	Intended data collection that did not occur due to unforeseen circumstances
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Note. No data was collected during the pilot phase or until full ethical approval was gained.

School Term Two was chosen for the majority of data collection during both study years. This choice afforded the researcher sufficient time during Term One to collect baseline data on students, introduce the study, invite participation, and gain informed consent of

participants in time for focus groups to be formed. Relationships with participants also had time to become established; the significance of this for data validity will be described in Section 3.1.2.1. Term Two was typically less interrupted by routine school administrative and sporting fixtures than Term One; therefore, the likelihood of being able to adhere to a regular data collection plan was promising. Such interruptions that occurred would be dealt with at the time, on a case-by-case basis within the flexibility of the ethnographic and pragmatic approaches underpinning the study design. In Year One, interruptions prevented the planned weekly data collection in two separate weeks of Term Two (such as school fixtures involving participants, requiring them to be out of class in Weeks 1 and 6).

Table 3.5

Sampling Time Points in Year One of Study

Time Point (TP) of data collection event	0	1	2	3	4	5	6	7
Week of Term Two, Year One	Final week of Term One	2	3	4	5	7	8	9

While collecting large amounts of data over a relatively short time was a potential disadvantage within this study design; this was balanced through the use of theoretical sampling to introduce efficiency in the next types of data. Iterative informing of data collection meant data collected was more likely to be relevant to answering the research questions.

Theoretical sampling is often used within a grounded theory approach, as an iterative process whereby each stage of theory development informs the next round of data collection (Creswell, 2017; Pirie, 1998). From a whole-study view, a single term data-

collection timeframe introduced manageability in regard to the researcher working full-time as a mathematics teacher. School terms three and four were available to examine the data, read the current literature, and seek advice from advisors before informing the process for the following year (Saunders et al., 2018). Therefore, theoretical sampling was utilised in this study so that all useful information from literature, advisor discussions, and interim findings were used to inform further data collection within a single study year. The approximately weekly scheduling of data collection increased the probability that student absences will be best controlled for, as in the researcher's experience few students were noted as absent for more than one week of consecutive schooling; if a student was absent during a week, they were unlikely to be absent in the following week, maximising the inclusion of their contribution to the data. Useful information that was gained from data collection in one week (observation, interviews, and questionnaires) was used responsively to inform subsequent weekly rounds of data collection.

Specific examples that illustrate how the study design supported a process of data collection informing subsequent collections are:

- questionnaire responses informed semi-structured individual student interview questions carried out during the same week;
- focus group interviews informed teacher practice, and specific interactions that would be of interest to explore; and
- parents' responses in semi-structured interviews in Year One, and student focus group responses in Year Two, informed the parent semi-structured interview questions and issues to explore, in Year Two.

Validation of individual data-collection methods has been enhanced by combining the strengths of methods using triangulation, and by informing their development through theoretical sampling. The focus in this part of the discussion has been on the complementary relationship *between* individual methods. Next, the three predominant data-gathering methods within the study design (observation, interviews, and questionnaires) will be discussed in turn to describe methodological strengths and weaknesses *within* these methods. Presented alongside will be further rationale for their

inclusion and mode of use. Measures employed after the data had been gathered that promote validity in a study, such as reflexivity, participant feedback, and peer review, will be also be presented in terms of how they have been employed to enhance validity within these individual methods (Creswell & Miller, 2000; Denzin & Lincoln, 2011; Johnson & Christensen, 2012; Merriam, 2002).

3.1.2.1 Observations

Qualitative observation is a primary form of research data usually carried out in a natural setting where all action is observed, in order to capture whatever will be relevant to the research questions (Johnson & Christensen, 2012; Merriam, 2002). A strength of qualitative observational data that fits within this study design is that it provides rich and descriptive information about teacher practice and student experiences, which can be used in an ethnographic approach to developing theory (Pianta & Hamre, 2009). Participant qualitative observation was planned, whereby the researcher intended to spend extended time with a group that was aware the observation would be taking place. The time-consuming nature of this method is a potential weakness; however, the extended time spent in the field is a strength, as it increases the likelihood of gathering enough depth in the study to understand the complex interactions taking place (Johnson & Christensen, 2012). When participants are aware they are being observed, they may act differently in the presence of the observer. In this study, the students were used to the researcher taking the role of the teacher rather than appearing as purely an ‘observer’ as the student–teacher relationship was established during Term One, lessening the effect of the researcher as participant.

Time-interval observation sampling was not appropriate for data collection for this study, as entire lessons would be recorded with relevant portions of video recordings identified and selected afterwards. Event sampling, where observations are made after a specific event has occurred, was not appropriate in its pure form (Denscombe, 2014; Johnson & Christensen, 2012); however, as the researcher purposefully practised ako-rich behaviours in the recorded lessons, these actions could essentially be termed as an event (Table 3.4). Extended time in the field, divided over two years, provided opportunities for

the researcher to be present to gather feedback from the participants to mitigate observer bias and interpretation error that can arise (Denscombe, 2014; Johnson & Christensen, 2012; Wragg, 1999). Observer bias was minimised through the lesson recording continuing throughout an entire lesson, as this allowed real-time data to be captured in full, thereby enhancing the data by addressing researcher bias of selected observations being made. Furthermore, as the recordings and written data could be examined in detail later, descriptive validity was strengthened, as checking the factual accuracy of accounts with participants was possible during the extended time the researcher spent in the field. Considering researcher bias and descriptive validity is particularly important when there is only one researcher acting as an observer (Johnson & Christensen, 2012). Recording approximately one 55-minute lesson per week ensured sufficient observations for ako-based teacher and student behaviours to be apparent, and recorded.

3.1.2.2 Interviews

As in the case of observations, interviews can be used to collect data to specifically address research questions (Merriam, 2002). A qualitative in-person style of interview was selected to gather in-depth information from participants about their thoughts, beliefs, knowledge, and feelings associated with the study teacher's classroom practices and interactions (Johnson & Christensen, 2012; Patton, 1987). Interviews can be time consuming and so can be viewed as a method weakness; however, the considerable time investment in this type of interview was deemed worthwhile in exchange for the strength enabled by the depth of data collected. The in-person interview format provided an opportunity to reflect KMT within the study design, as this format provides participants with the sense of honesty and truth about research intentions (O'Carroll, 2013). Interviews carried out face to face show a commitment to the kaupapa Māori process by promoting researcher accountability to communities who are part of the research (O'Carroll, 2013; Pihama et al., 2002).

He kitenga kanohi, he hokinga mahara

To see a face is to stir the emotions

Where there is trust and rapport developed, especially over time, the interviewees can feel comfortable in sharing privileged information with the researcher (Johnson & Christensen, 2012). A semi-structured approach was chosen to conduct interviews, where a list of points for the researcher to cover with the interviewee was prepared while some flexibility for participants to speak about points of interest was retained within this conversational-type discussion (Denscombe, 2009; Merriam, 2002). Open-ended questioning allowed the elaboration and clarification of participant perspectives, ameliorating interviewer bias and misinterpretation. Recording interviews allowed the interviewer to give full attention to the interviewee and the process, without the distraction of note taking. A disadvantage to carrying out the one-to-one interviews was that only one perspective was gathered during the time spent on the process. A focus-group format was added to the study design where up to six student participants were interviewed at one time. While this format was particularly useful to complement other data-collection methods, a disadvantage of this format is that more than one voice may be heard simultaneously in the recording (Johnson & Christensen, 2012). As all interviews were recorded, the recording could be listened to repeatedly, and with the researcher spending extended time in the setting there were opportunities to ask the participants for clarification where there were deciphering difficulties.

Focus groups are normally relatively homogeneous. While homogeneity in such groups results in fewer unproductive alliances forming, the range of perspectives is restricted, so for this reason a single homogeneous focus group would not be suitable to be relied on for this study. Two to four groups are often used (Johnson & Christensen, 2012); however, this was considered to be an unrealistic inclusion to the study design on an almost weekly basis (Table 3.5). Different viewpoints could be presented in a more heterogeneous focus group, where the social context of a group situation would also see participant reflection on the views of other participants (Denscombe, 2014; Silverman, 2016). Power struggles are more likely to develop in heterogeneous groups, which can discourage more passive participants from sharing within the group. Trust between the researcher and participants is therefore a key factor to the success of group interviews, so that participants feel comfortable in expressing their perspectives and are confident that information they share

will remain confidential. When group dynamics of comfort and trust are met, and multiple and diverse perspectives are successfully shared and discussed, the data is likely to contain reasoning behind opinions expressed, rather than just the expression of opinion (Denscombe, 2014). Adding to the richness of the data in this way was desirable within the study design.

Elements consistent with cogenerative dialogue (cogen) was selected as the particular method to carry out student focus group interviews. Cogen has been used both internationally (Shady, 2015) and in New Zealand (Higgins & Bonne, 2014), to gather heterogeneous student group perspectives in research focusing on the impact of teacher practice. The use of cogen addresses the balance between a realistic number of focus groups, and the breadth of perspectives desired in the data. This method sets explicit rules around comfort and trust of the participants, along with turn-taking behaviour, so that all perspectives may be expressed, promoting participant inclusivity (LaVan & Beers, 2005; Tobin, 2014). While it is suggested that trust is built through cogen groups that are static (Tobin, 2014), there is flexibility within the format to allow for focus groups to evolve in terms of total participant number and combination of individual participants. This component of flexibility is highly appropriate for the classroom environment and the planned pragmatic and ethnographic approaches to this study (Shady, 2015; Wassell, Martin, & Scantlebury, 2013). Elements of cogen that were adopted in this study included the teacher being clear that they were stepping out of the teacher role and into a curious participant role, a focus on all voices being represented when there was a desire to participate, and respect to be shown to contributions during these discussions (Appendix 5). As the researcher often began discussions with interview-type questions which could emerge from previous meetings (Appendix 5), it is not claimed that the element of equality in these contexts were met in a way which met all expectations of pure cogen.

The plans for the researcher as study-teacher being personally involved in an interview, and sharing their feelings and experiences with the interviewees, can be viewed as unconventional (Denscombe, 2014). However, there is a comfortable alignment with cogen and action theory where the researcher conducts and designs the research in their own setting, and furthermore is *required* to be highly involved in the study in their role as

teacher-as-researcher. The notion of a researcher conducting research *with* study participants in this way contributes in one way to the honouring of equity notions expressed in KMT. In an approach where the researcher is to remain uninvolved, distance (such as in power and position) between the researcher and the participants is reinforced and does little to create a sense of empowerment in the interviewees. If a research aim includes the desire to help or empower the people being researched, rather than dispassionately learn from them, then the approach of the interviewee will need to alter accordingly, showing emotion and feelings and engaging in true dialogue (Denscombe, 2014; Oakley, 2013). This personal involvement requires confidence on the part of the researcher, and an assuredness that the participants both understand and endorse the approach (Denscombe, 2014). Therefore, a cogen-aligned style was selected to guide the interview format where the researcher set out to take less control over the direction of group discussion than what occurred in the semi-structured interviews (Figure 3.1).

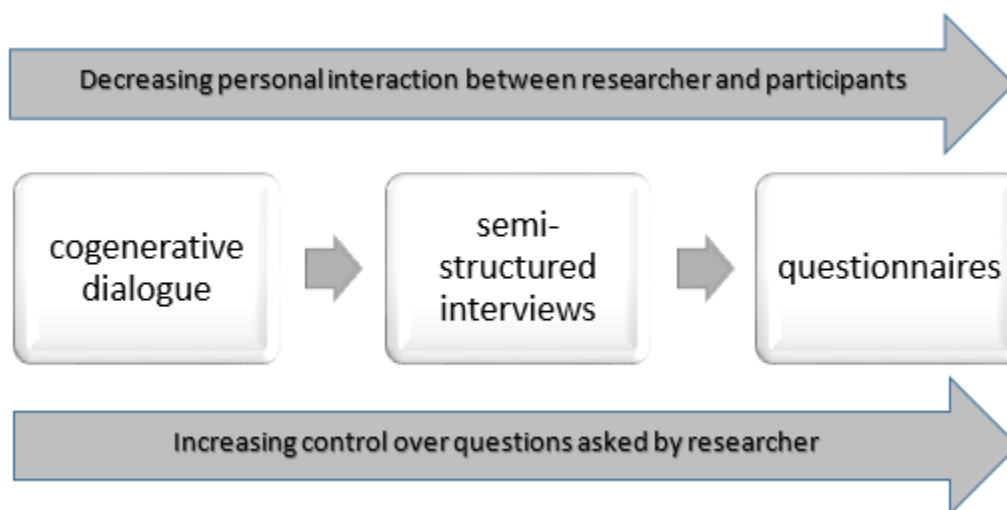


Figure 3.1. Researcher interaction and question control dynamics in some data collection methods.

Using a methodological stance of working with participants in research (Siry & Zawatski, 2011) asserts a KMT methodological preference within this study design. Cogen has been used to explore ways to work within hierarchical school structure, and around it, when working with students who are used to the teacher establishing and maintaining control

(Bondi, 2013; Tobin, 2007). In New Zealand, there has been an historical 'preoccupation' of educational researchers to remain distanced from participants in an approach of neutrality and objectiveness. Māori people have as a result been kept somewhat detached from "participation in the construction, validation and legitimation of knowledge" (Bishop, 1999, p. 2). In a critique of hierarchical power, cogen addresses 'kaupapa', the collective philosophy principle (Smith, 1997), primarily through its collective commitment to social wellbeing and shared responsibility of the group (Tobin, 2014). A cogen-aligned method is a very suitable fit for this study, as it will be used to go some way to challenging traditional methods and school systems that perpetuate researcher control over participants. Furthermore, the data it will generate will be used to investigate how a preferred Māori pedagogy can be promoted in a classroom, to make a social change that rejects forms of teaching and learning that perpetuate failure and inequity based on ethnicity (Tobin, 2007).

3.1.2.3 Questionnaires

Questionnaires are a useful data-collection tool in mixed method research when gathering information about many different participant characteristics, thoughts, perceptions, and behaviours (Johnson & Christensen, 2012). A strength of questionnaires is that they can be used to collect a large amount of survey data efficiently in a relatively short time in comparison to interview methods (Denscombe, 2014). The types of questionnaire chosen for this study were of self-completion format, presenting questions on which participants work completely independently from the researcher to answer. Taking the time to read mainly closed questions and record their own answers allows participants the time to provide a considered response to each question. Furthermore, this format ensures that there is no influence from the way questions are asked due to standardisation of the questionnaire presentation and interviewer distance (Denscombe, 2014; Wragg, 1999).

Although the researcher has complete control over the research questions (Figure 3.1), questionnaires that provide useful data can be difficult to construct (Denscombe, 2014). Longer responses are generally less detailed than those collected through interview methods; however, an entire classroom of students can be surveyed simultaneously,

which promotes inclusion of all participants, including those who did not participate in the interview sessions. The wide representation of perspectives collected in classroom questionnaires were reviewed on a weekly basis, and were used to inform the researcher of salient issues and emerging trends that informed subsequent interviews (Merriam, 2002). The questionnaires themselves remained unchanged throughout the study.

Issues of participant truthfulness (validity) and low response and completion rates are issues to which questionnaires such as those used in this study can be susceptible. Both study questionnaires (Appendices 7 and 8) were able to be anonymously answered by participants, with the one questionnaire containing an option for the participant to identify themselves for the purpose of participation in a subsequent interview, to further explain their responses. Care was taken to maximise the validity and usefulness of the questionnaires, using principles for good questionnaire design and a successful questionnaire as a guide during their development (Pomeroy, 2011). Moreover, the questions considered most important were placed first in the survey, with demographic questions last, which has found to benefit survey response and completion rates (Johnson & Christensen, 2012).

3.2 Development of Culturally Responsive Data-Gathering Tools

This section describes the rationale and rigorous processes undertaken to develop data-gathering tools used in this study, ensuring that each was fit for their intended purpose within the study approaches and methods selected (Section 3.1). The importance of cultural advisors, critical friends, trial classes, student groups, and drawings from literature will be presented with a particular foci on cultural responsiveness; and the fully immersed study teacher's background, beliefs, culture, and experiences that affect research decisions and directions, in response to their interpretations of the classroom context and data gathered (Section 1.1).

Researchers undertaking qualitative research set out to record their own observations accurately, revealing meanings participants bring to their life experience within the

research context. Viewing their own behaviour from perspectives of others is the only way researchers can gain a full view of the 'self'. A researcher's personal beliefs and perspectives can affect data collection and analysis, introducing bias before findings are drawn and, as such, individuals are generally unable to provide full explanations about their own actions in their normal context (Banks, 2019; Hamilton, 1998). As stated by Denzin and Lincoln (2008). Any gaze is always filtered through the lenses of language, gender, social class, race, and ethnicity. There are no objective observations, only observations socially situated in the worlds of—and between—the observer and the observed (p. 12).

Moreover, data gathering is complex in classrooms when the participants come from many different ethnic, cultural, and social backgrounds. Through their experiences and socialisation, the individuals within the research context participate in and make sense of their world, from different perspectives. Furthermore, these types of participant group contain individuals with differing ways of behaving and of interpreting behaviour (Banks, 2019).

'Positionality' describes ways in which personal and cultural characteristics of researchers influence the knowledge they construct from data (Banks, 2019). Researchers may be positioned within a range of levels in their own and society's dominant and less prominent cultures, in dynamic and complex cultural groups. A researcher can be positioned inside or outside of their own, and the participant's norms, switching between these positions dependent on specific interactions (Table 3.6).

Table 3.6

Researcher Positioning

Context	Characteristic/theory of interest	Position as a Pākehā & relative to Māori participants
Role in the classroom	Teacher	Outsider
	Researcher	Outsider
Knowledge truths	Western approaches	Insider
	Kaupapa Māori Theory	Outsider
Culture	Gender, age, interests, etc. Pākehā	Insider and outsider

Cross-cultural bias presents challenges within research projects, and both insider and outsider positions have complementary strengths and weaknesses, and are legitimate ways to understand data (Banks, 1998; Merriam et al., 2001). Positions of researchers contributing to the construction of knowledge and the inclusive representation during cross-cultural research processes were examined by Merriam et al. (2001). Researcher power, knowledge of what constitutes truth, and researcher culture were the focus of a review of several studies where these factors were found to influence knowledge construction. An example of classroom research interpreted differently by observers of cultures outside of their own is presented in a study of Australian and Taiwanese classrooms (Aldridge, Fraser, Taylor, & Chen, 2000). Despite using different culturally sensitive methods (such as in-depth interviews, researcher narratives) to capture data, it was found that researchers interpreted observational data differently. ‘Active participation’ by students in the classroom held a different meaning between the Australian and Taiwanese observers. So, strategies must be incorporated into a study design to acknowledge and minimise cultural bias (He & van de Vijver, 2012). These include that recognising researcher backgrounds can influence perceptions of events and the use of

methods that directly draw data from participants. Strategies employed to mitigate researcher bias, further to approaches already presented in the study design, will now be offered, along with justifications for their use.

To provide perspectives additional to the participant views, several people external to the research context were consulted throughout the study: cultural advisors provided local cultural knowledge; and critical friends provided perspectives from outside the study context location (Tables 3.3 and 3.4). Māori cultural advisors were included based on the recommendation by Banks (1998) that researchers “work with people indigenous to the community who can provide them with an accurate knowledge of the perspectives, values, and beliefs within the community” (p. 15). Furthermore, research involving cultures other than the researcher’s own was enhanced through seeking cultural advice to inform the research design and implementation (Bishop & Glynn, 1999). Seeking cultural advice aligns with KMT approaches (Section 3.1.1). Closely associated with action research, critical friends provide alternative perspectives on tool design and implementation (Coghlan & Brydon-Miller, 2014; Kember et al., 1997; Rallis & Rossman, 2000). Action research can be inward-looking for the highly involved researchers, so critical friends provide a lens from an outsider perspective. Through questioning and discussions, balances were reached in decisions made with advisors, during the study development and implementation, and beyond (Foulger, 2010; McNiff, 2013; Schuck & Russell, 2005).

Tools used in this study were drawn from literature and the researcher’s experience in the first instance, followed up by advice from cultural advisors and critical friends during the first round of tool refinement (Appendices 7 and 8). Pilot studies were then performed in classroom trials with student groups using the tools (Tables 3.3 and 3.4), and further refinements that purposefully integrated many people’s knowledge were subsequently made. These pilot, mini-versions of full-scale studies (Baker, 1994) were carried out in Term One (Year One) to highlight problems within tool design and implementation, allowing time for modifications to be made prior to the data-collection stage commencing in Term Two (Tashakkori & Teddlie, 1998; Van Teijlingen & Hundley, 2001).

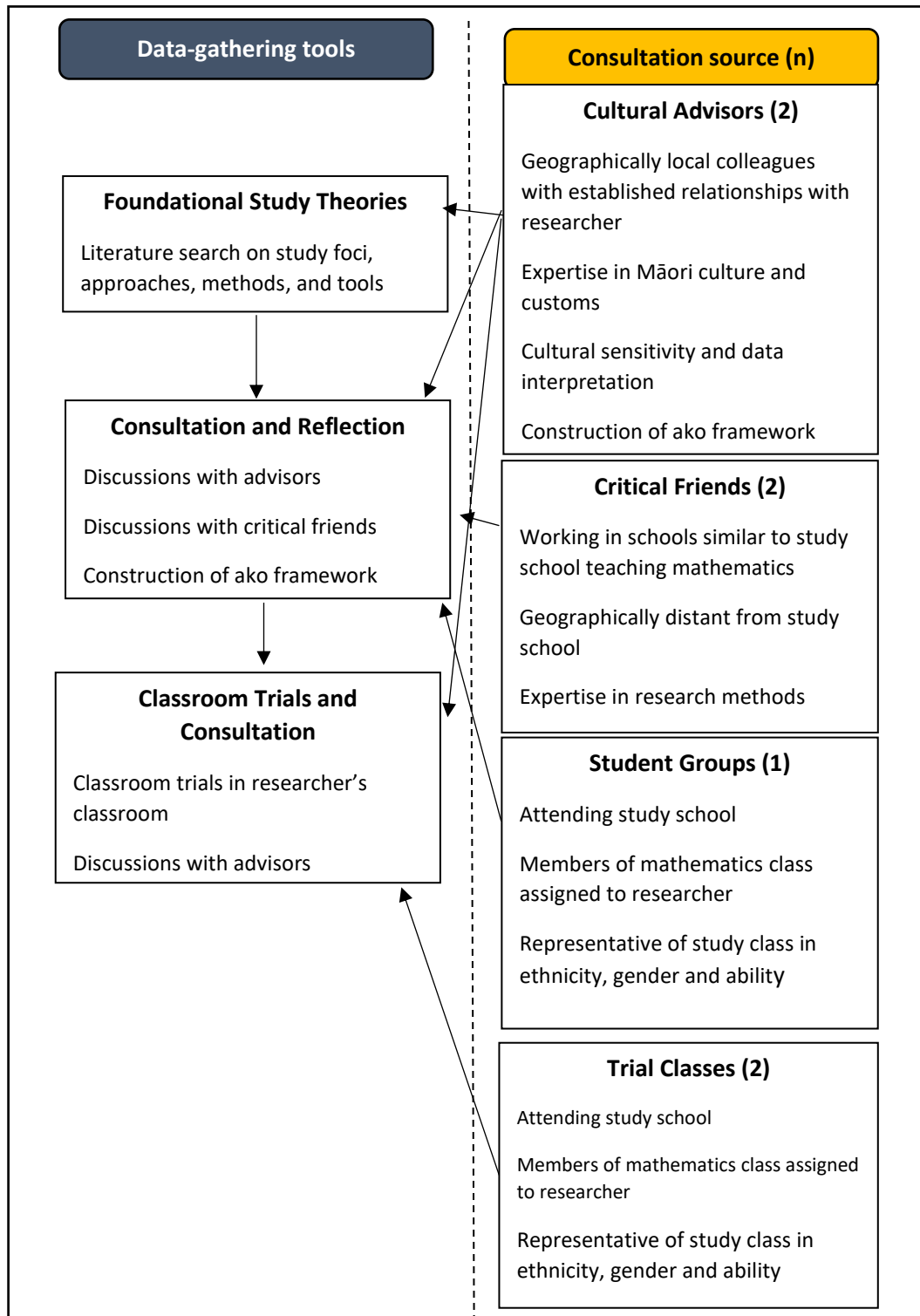


Figure 3.2. Data-Gathering Tool Development Process. Adapted from Averill, (2009).

Advisors were selected to capture three external perspectives: cultural; other researchers; and students. The advisory group consisted of three cultural advisors, two other teacher-researchers as critical friends, seven students in each of two pilot focus groups, and two trial classes (14 students in total). Cultural advisors were sought for their locally situated expertise within Māori culture and customs, experience in Māori- and English-medium education, and their cultural heritage. In keeping with the notions of trust and relationship building as part of the methodological approach of this study, the pre-existing collegial relationship between the researcher and each cultural advisor was seen as a strength. Each advisor was recognised in the local education setting and wider community for their cultural status and leadership. Critical friends were sought for their knowledge of mathematics education, and related contextual research skills. They were employed, and resided in, areas geographically distant to the study site.

The student advisors were volunteers from the researcher's classes where whole-class trials were also taking place (Tables 3.3 and 3.4). The students were similar to the study students and had pre-existing relationships with the researcher as their regular mathematics teacher. When trials of tools and methods were carried out at the study school by the researcher, student advisors were selected to be like the intended study participants. To minimise the impact on the eventual student study participants, trials were carried out in the two years in which any potential participants were not yet attending the study school. Eventual participants were attending primary schools during the period of this study comprising the Pilot Phase (Tables 3.3 and 3.4).

3.2.1 Consultation

Initial drafts of the ATA framework, surveys, and the interview questions were compiled using key ideas distilled from a broad range of literature (Chapter Two). Then, consultation about the data-gathering tools was carried out with all advisors. Cultural advisors were consulted mainly on researcher interpretation of Māori terms, data interpretation, and cultural practices. Critical friends provided consultation about the tool

design suitability for purpose drawing from their research experience, focus group composition, and data interpretation. Student advisors trialled the tools, providing practical suggestions for ease of use, and ensured alignment of the student interpretation, and researcher meaning of questions. Trial classes participated in the lessons where video recording was trialled, generating observational data for use in pilot focus group interviews to trial the cogen-type format (Appendices 4 and 5).

Advisor feedback on tool development and implementation was collected through informal semi-structured interviews and email communications. Summaries of the core ideas from each dialogue were shared with advisors verbally or in written form, to check the researcher's interpretations, and then further discussion was invited. Including cultural advisors throughout this study from the initial planning stage was a deliberate action in response to concerns expressed by Indigenous communities. These concerns spanned the inability of researchers to recognise the influence of cultural difference, how cross-cultural research is conducted, and the interpretation of knowledge that emerges (Hudson & Russell, 2009). Engaging a cultural advisor required clear and genuine statements of intention and commitment to the research and to the participants on behalf of the researcher, from the project outset.

Being involved as a cultural advisor in your research was a risk. But I think you deserve my time and my energy. It's about trust and integrity. If I didn't have faith in you I wouldn't give the time of day. Whether it [the research] is good or bad it's going to reflect on everyone you're connecting with, and their ancestors. You now have with you everything I have from my years and years of involvement in the Māori world (Cultural Advisor).

These comments from a cultural advisor set a foundation for a beneficial outcome of the project due to the increased probability of Māori participants engaging with the research, if it was seen to be culturally sound due to the involvement of a well-known Māori community leader. Indigenous advisors have provided guidance to cross-cultural researchers internationally (Hudson, 2004) and in New Zealand (Averill, 2012; Smith, 2013). Cultural advice contributed to the development of the ATA framework, data collection tools, and their implementation. Advice was also sought throughout data

collection and chapter analysis, creating multiple opportunities for cultural advice to inform the study.

The ATA framework was to be used by the teacher and student participants during cogent interviews as a scaffold, where teacher and student behaviours were assigned to one or more elements of the framework. Key advice on tool development was provided by cultural advisors during the construction of the ATA framework, specifically to advise on the alignment of the ako-based teacher behaviour actions with the Māori definition of the concept of ako. The ATA framework was not only central to interview data collection, but it would also be used to organise the study findings. The importance of the oral aspect of Māori knowledge was forefront in discussions with cultural advisors to this study. An illustration of the critical nature of oral communication was provided during a discussion with an advisor, following the researcher's provision of the ako behaviour indicator framework in written form, to the advisor:

After all of that viewing the written framework and we were agreeing, I did ask for you to articulate your definition of ako verbally. I had seen your writing, but I wanted to hear your verbal definition. I made the point because we come from an oral culture I wanted to hear you talking about it. It was only then that I felt 100% confident in your use of the term "ako". I didn't want my respect for you as a colleague to influence the feedback on your academic study. I knew you had high ethics and care for Māori students after two years of discussions as a colleague, but I wanted to make sure that for me to be the best [cultural advisor] I needed your explanation to be part of this process, and not to assume that you knew. Or that you just had an academic interpretation, as we [Māori] are an oral culture (Māori Cultural Advisor).

Student advisors were consulted next and were first asked to read through the ATA framework, then discuss their interpretation of the meaning of each indicator with the researcher. Student understanding was consistent with the researcher's intended meaning. One student suggestion for an alteration to the framework was made, and resulted in the word 'dialogic', which the students were unfamiliar with, being replaced by 'back and forth' in the description of one of the indicator elements. To the student advisors

this replacement phrase suggested an ongoing conversation, rather than a teacher direction, and was therefore a suitable meaning for data collection purposes.

The ako in teacher-practice questionnaire (ATP) (Appendix 9) was designed specifically for this study and was based on the student engagement questionnaire previously validated for use in New Zealand secondary schools, developed by Pomeroy (2011). The design incorporated most aspects of, and was guided by, the ATA framework. After a discussion with critical friends about potential complexities of assessing student achievement from non-standardised study-school constructed assessments, a second questionnaire to measure student engagement and enjoyment (E&E) (Appendix 10) of mathematics was designed to survey students' *perception* of their mathematical progress, in place of summative assessment data from non-standardised assessment tasks routinely administered to junior mathematics students at the study school. The purpose of the additional survey was to iteratively measure student perceived engagement and enjoyment in mathematics, which may have an association with one another and with achievement (Sections 2.2.1). This survey questionnaire had an additional purpose to serve as a structure for one-to-one interview questions relating to student mathematical progress, during interviews with students opting into interviews by indicating their willingness to do so, on the questionnaire. To check that student understanding of initial drafts of the questionnaire items aligned with what the researcher intended and address confusing or ambiguous items on the questionnaires, student advisors were asked to complete the first iteration of the questionnaires using the 'think-aloud technique' (Johnson & Christensen, 2012). Comments were considered, and items altered in response to student suggestions. Consistent understanding of items in the questionnaires to ensure a valid measure of ako in teacher practice was found in the second iteration of the think-aloud approach. No changes appeared necessary, so none were made to the questionnaires.

Focus group interview tools regarding the conduct guidelines and the structured questions were drawn from literature describing the cogen-type approaches. Cultural advisors' suggestions led to food being provided in the focus group interviews with students.

In all encounters my culture would force me to share food, you can't separate it from coming together. I need to do that like you need to breathe, its mankitaangata. (Cultural Advisor)

Student advisor responses were consistent with this suggestion, requesting that food and drinks were provided to supplement their lunches. The use of food in this way was later found documented in literature as a way to improve participant comfort (Wassell et al., 2013).

3.2.2 Trials and crosschecking

Trials of the working drafts of tools carried out in the study school during the Pilot Phase to highlight and address any practical difficulties with the use of the tools (Tables 3.3 and 3.4). Cultural advisors, critical friends, and student advisors continued to be involved, with the addition of a trial class that was the source of observational data in the form of video recordings of several lessons.

The position of the video camera was trialled in class and it was found that placing the camera on a shelf at the back of the room, as planned, was unsuitable. Voices of the students at the front of the room could not be heard on playback. Student suggestions saw the camera placed on the teacher desk at the front of the room, pointed toward the whiteboard, which was found to be best for capturing teacher-led lesson openings. The camera could then be moved to various positions in the class, closer to where teacher–student interactions were occurring (if camera distance would potentially prevent clear recording of participant voices). This improved the quantity of classroom interactions captured, along with the usability of the data. It introduced some observer-bias with the researcher shifting the camera; however, as it was not possible to capture all interactions on the camera from one position, it was decided that capturing teacher–student interactions would take priority.

A key trial point where cultural advice was sought was regarding researcher identification of examples of ako in her own practice. To do this the researcher viewed trial class

observational data and noted timestamps of where ako was reflected in practice. Notes accompanied the examples, explaining the rationale for their identification. At a later date, the same data along with the explanatory notes were viewed by the cultural advisor. A discussion followed with the advisor, noting full alignment between the researcher and the advisor perspectives on this task in each of the four iterations of this process.

A trial interview with a focus group was carried out in year two of the Pilot Phase. In a separate meeting before the interview, the researcher met with the volunteer students to explain the purpose of the study and the cogen-type group approach guidelines (Appendix 5). The semi-structured interview questions were also explained (Appendix 5). The group was then shown the ATA framework, and some examples of advisor-aligned teacher actions for several behaviour indicators. Students reported that the guidelines and questions were clear and suitable for students 'like them'. In a trial interview held the following week, the group viewed two examples of ako-rich teacher practice from trial observational data, which were then discussed using the interview questions to guide discussion. In this lunchtime meeting, the time allocated was sufficient for the group to comfortably view and discuss two video segments. No amendments to the process were required, so the working guidelines and questions were printed and laminated as final drafts. Students suggested that they could make notes on the laminated sheets with dry-erase markers while watching the video clips, to track their thinking and decisions to bring during the video segment viewing, thus allowing them to better focus on analysis by recording their perceptions rather than holding ideas in their minds, awaiting discussion. This suggestion was adopted from this point on.

Following trial interviews with students, interview transcripts were prepared. The researcher assigned codes to student comments that reflected specific teacher behaviour indicators based on the ATA framework elements (that is, element 1, element 2, and so on). A cultural advisor carried out the same process, and a discussion with the researcher followed. Full alignment between perspectives were noted:

The element codes you attached to the transcript made complete sense to me
(Cultural Advisor).

Furthermore, this advisor commented on the cultural suitability of the cogen-type interview format, for gathering student perspectives:

Powerful information is coming out of the conversations, the kids were telling you that relationships you had with the kids made them feel confident and brave enough to ask questions during the lessons in your classroom. That came from the kids' voices (Cultural Advisor).

Examples of ako-related teacher behaviours coded within the interview transcripts were subsequently transferred to the ATA framework, according to the assigned element code. Both cultural advisors viewed the examples placed within the framework and were in agreement with the researcher's data placement decisions. A similar process was carried out with transcripts from parent interview transcripts.

The working questionnaires were completed by the trial class, in two iterations, one week apart. Surveys were completed in under three minutes on both occasions, satisfying the design plan for less than three minutes' completion time, as participants may lose interest or give unconsidered responses when questionnaires take a long time to complete (Johnson & Christensen, 2012; Pomeroy, 2011). Critical friends were consulted once again on the ATP questionnaire. They suggested the removal of the neutral option in the ako questionnaire five-point anchored rating scale. In response, before the final version of the ako survey was printed, the anchored rating scale was altered to include six points: three negative and three positive. This was to eliminate the temptation for students to choose the neutral option if they did not want to put in effort to choose an answer, or to choose a neutral option to decrease the impact of wanting to choose a negative answer (Garland, 1991; Weijters, Cabooter, & Schillewaert, 2010). The inappropriate selection of neutral options would have decreased the meaning of the data collected.

Originally, an online representation of the ATP questionnaire was considered to collect students' responses in an electronic pre-sorted form, thus avoiding manual entry of survey responses by the researcher. A computer was made available in the classroom so that computer access would not limit participation. A version of the working survey was uploaded to Survey Monkey, and several students from the first trial class completed the

questionnaire. The time required for a student to load and complete a questionnaire was too long for the whole class to participate in the survey within one mathematics lesson. It was not acceptable within the study design for questionnaires to be completed at a later date, as the results each week would be looked at holistically, as well as compared individually in order to inform data collection in the next week(s). Furthermore, the researcher wanted to avoid questionnaires being filled in at different time points during a lesson due to a limitation of the number of suitable electronic devices, which would further decrease the comparability of responses. In order to maximise participation for students wishing to complete questionnaires and to ensure that all participants had experienced a similar period of time during a lesson before receiving a questionnaire, a paper copy per student would be the sole mode of questionnaire representation for both the ATP and E&E surveys.

Parent interviews were not trialled during the tool development phase. It was intended that the questions would be informed by the student-drawn data, and that the first round of interviews would retain flexibility in timing and location, to accommodate potential participants' personal and family needs at the time.

Structured questions were trialled at the start of the teacher reflective journaling process to maintain research focus while familiarity and confidence in journaling was developed (Zuckerman & Rajuan, 2008). Several journaling entries were shared with research supervisors and critical friends for feedback. Suggestions were made to separate ideas into bullet points rather than journaling in paragraphs, so that tracking ideas would be more efficient during data analysis, and to journal electronically so that the text was searchable.

Once trials were complete, a cross-check was carried out to ensure that data relevant to the key areas of study were being gathered across at least two perspectives, and at least two different methods (Table 3.7).

Table 3.7

Data Collection Perspectives in Study Design

	Observation	Assessment PAT	Interviews			Questionnaires		Reflection	
			Focus	1 to 1	Parent	ATP	E&E	Teacher	Student
Actions for ako framework	✓		✓	✓	✓	✓	✓	✓	✓
Parent engagement	✓		✓	✓	✓	✓	✓	✓	
Student engagement and achievement	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key	Teacher	Student	Parent
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Consistency of coverage was confirmed, and provided confidence required for having drawn on multiple perspectives in cross-cultural research (Bishop, 1999; He & van de Vijver, 2012), and triangulation of methods (Denzin, 2007).

3.2.3 Discussion

The changes made to the data-gathering tools and processes in response to advice sought and trials carried out demonstrates the importance of drawing on a range of sources to inform their development to ensure suitability for use within cross-cultural research. The process of incorporating cultural, technical, and practical advice in order to

further develop and improve initial drafts designed using researcher knowledge mainly drawn from literature, enhances the credibility of the study findings. Inviting advice from stakeholders at several points throughout the development, and trial processes, further increased confidence that a rigorous process had been engaged. Seeking cultural advice from the outset of the design of data-collection tools was of particular importance for the credibility of the study in contributing knowledge towards Indigenous culture education.

The investment of advisor time and resources at this stage of the study was significant, with the process carried out across two years. This time period allowed observation, interview, and questionnaire data collection tools to be iteratively improved until conditions were satisfied that the investigation would allow the relevant data to be captured in culturally responsive ways.

3.3 Ethical Considerations and Study Participants

This section describes the ethical considerations of the study design, method implementation, and participant selection. Full ethical approval was granted by the Victoria University of Wellington Human Ethics Committee. Due to the inclusion of Māori participants, methods were consistent with Māori-centred research (Cunningham & Durie, 1998) and the Treaty of Waitangi (Hudson & Russell, 2009), with a particular emphasis given to:

- involvement of cultural advisors at all stages of the study;
- selecting a central person, outside of the study but known to students, to disseminate participation information and consent forms. Provision of a drop off box at the school office for the return of consent forms;
- recognition of status of all participants as equal;
- inviting participant questions about the nature and details of the study;
- acknowledgement of the importance of building relationships between researcher and participants;
- acknowledging the importance of face-to-face interviews;

- providing options for students and adults to sit out of shot during video recordings;
- measures taken to ensure participant confidentiality, data security, and an option for participants to withdraw their data;
- sharing and dissemination of data with participants, and with teachers and teacher educators to inform and benefit the teaching and learning of mathematics for Māori students; and
- provision of food in focus group meetings, in addition to appropriate cultural practice, will remove lack of sufficient food eating as a barrier to participation.

Prior to the Pilot Phase (Table 3.4), the study was explained to the study school's Principal and Head of Mathematics. Information sheets were provided for their review and an invitation to request consent forms was extended and subsequently accepted. The researcher requested that the Year 9 mathematics class assigned to her during study Year One was of 'mixed ability'. Mixed ability students ranged from below the expected literacy and numeracy curriculum levels, to average ability in these areas. The study school streamed Year 9 classes based on standardised assessment data collected by the school when students were in Year 8 and visited the study school for pre-enrolment testing. Mixed ability classes were selected for this study over high ability classes to provide diversity in data, and to focus research on students who were more likely to benefit from any resulting increase in achievement in preparation for readiness for future formal school qualifications (such as National Certificate in Educational Achievement (NCEA)).¹⁴ The class assigned to the researcher according to best-fit of student and teacher timetable as arranged by school administrators using the KAMAR timetabling program was therefore essentially randomly assigned. The researcher requested of the administrators that the class assigned in study Year One was re-assigned to her in its entirety as a Year 10 class for study Year Two. This request was re-submitted during the Year 10 class assignment to teachers and was approved; however, this was subsequently

¹⁴ See <https://www.nzqa.govt.nz/ncea/>

overlooked by the administrators, which required an alteration to ethics and the study design (Sections 3.1 and 3.4).

The researcher explained the study and consent process to students in the study classes and asked if any of the students had heard about the project or had discussed it with students from previous study phase(s). Excepting the three students in Year Two of the Experimental Phase who were re-assigned in the researcher's class from the year before, the answers all indicated that none of the study class students had already heard about the study. The study information sheet was read through with the class, so that the students could take it home and explain it to their parents and caregivers (Appendix 6). The teacher highlighted that consent was voluntary, and that non-consent would not be a disadvantage to the students in any way. A colleague of the researcher was identified as the contact point from whom consent forms (Appendix 7) could be uplifted. It was explained that completed consent forms could be posted in a closed box, located in the school office; however, some students chose to return the consent forms directly to the researcher. The rate of return was 96% in Year One (23 out of 24), and 76% in Year Two (16 out of 21). Students from whom consent was not received did not participate in interviews or fill in ATP questionnaires. If requested by the student, an E&E questionnaire was provided to them, with the understanding that the researcher would view it for the benefit of the student's learning; however, their responses would not be included in the research data sets. Observational data did not identify non-consenting student responses or behaviours.

Parents of students who were regularly participating in focus group interviews were contacted personally by the researcher by phone where possible, or email in other cases, and invited to participate in interviews themselves. Parents' non-participation was highlighted to have no impact or disadvantage to their student's learning. Students were given information forms to take home for their parent member, and consent forms were then given to the student to take home if requested by the parent member who indicated an interest in participating. A post-paid envelope was provided with the consent forms, addressed to the researcher at the school to facilitate the return of the forms. All forms were returned directly (not by post) to the researcher or to the school office. In Year Two,

when parents themselves approached the researcher and requested to participate in interviews (Table 4.4), for example if their child was not part of the study class, the researcher gave them an information form to read, and invited questions. The consent process was explained, and upon request a consent form was offered to the parent along with the offer of a post-paid envelope for returning the form. These participants all preferred to fill the form in at the time, and hand it directly to the researcher.

Six student participants for the first focus group in study Year One were selected to obtain diversity within the group in regard to ethnicity, gender, and mathematical ability based on Progressive Achievement Test (PAT) (Fogarty, 2007) data in combination with gender and ethnicity information disclosed by participants upon their enrolment at the study school. Advice sort from critical friends regarding the suitability of these six students in regards to diversity, to ensure researcher bias regarding for example any preference for including or excluding a student based on their classroom behaviour, was mitigated. Students eligible for extra learning assistance from the school Language Resource Department were not selected for the initial focus group, as these students were removed from lessons on a weekly basis to a specialised supported learning venue. This meant that they were often absent during the observation lesson, which was a requirement for participating in the the focus interview. Students not in the interview group would be given the opportunity to fill in a voluntary survey about ako in my teacher practice, if they had been present in class during the same week.

3.4 Data Gathering

This section describes the administration and implementation of the data collection methods. No data was collected until full ethical approval was gained, therefore no data was collected during the pilot phase of the study. Firstly in this section, an overview will be presented of the data collection carried out in Year One and Year Two (Tables 3.3 and 3.4). Next, the details regarding each method will be presented in turn.

For the study class in Year One, data was gathered by means of:

- 10 lesson observations;
- 115 (ATP) and 129 (E&E) total student questionnaires for survey data-collection time-points (Table 3.5);
- 10 sets of focus group interviews as cogen-type discussions (some weeks the same observational data was viewed by two different focus groups) involving 22 individuals;
- five individual interviews with students;
- one running teacher reflection;
- 21 student running reflections;
- three individual parent interviews; and
- two time-points of an identical Progressive Achievement Test.

For the study class in Year Two, data was gathered by means of:

- six focus group interviews as cogen-type discussions (lunchtime, as planned);
- two spontaneous sets of cogen-type discussions during lessons;
- one running teacher reflection; and
- 14 individual parent interviews, 10 during Term Two, including four follow-up interviews at the conclusion of the term (a total of nine parents were interviewed in Year Two).

The total data set included 10 lesson observations, 19 cogen-type discussions, five individual student interviews, 244 student questionnaires, 21 student running reflections, 17 parent interviews (involving 12 individuals), and one teacher running reflection.

The 76% consent rate in Year Two, along with six students expressing that they did not wish to be video recorded in observational data collection, necessitated a change to the study design. No lessons were recorded in Year Two. It was decided that questionnaires would not be used, due to this small sample size being unsuitable to maximise comparability of data across the two years. As there were no video recorded lesson observations to use in cogen-type discussions, a focus was placed on gathering student perspectives of ako in teacher practice from open ended discussions about ako-related

classroom events of interest to student participants. This was thought to enable exploration of potential similarities and differences between Year 9 and Year 10 students, and to gauge if saturation of data was reached regarding student perspectives on ako-rich classroom practice. A second focus was arranged, on parent perspectives of teacher practices that encourage their engagement with mathematics teaching and learning processes, linking home with school. Following several requests from parents who did not have a child in the study class to participate in the interviews (Section 3.3; Table 6.1), an alteration to the ethical approval was sought, and granted.

Methods will now be discussed, in turn, to illustrate ways they were used that enhanced the validity, reliability, and consistency of the data including:

- repetition of the questionnaires and interviews over a term
- triangulation of data collection methods (Chapter Three)
- incorporation of multiple perspectives.

3.4.1 Observations

The study plan for once weekly recording of a lesson to collect observational data (for discussion stimulus in student discussion) was adhered to, with the exception of weeks 1 and 8 (Table 3.5) when normal lessons were not held due to multiple interruptions caused by combinations of school fixtures, a region-wide teacher-only day (both unforeseen), and a public holiday (foreseen). Two lesson recordings were made each in weeks two and nine, to account for there being two fewer weeks available than had been planned, for observational data gathering.

To gather this data, a video recorder was set up on the teacher's desk, directed toward the front of the room, capturing classroom interactions at the front area of the room on the video, and most of the whole class interactions on the audio. Whenever possible, the recorder was in operation before the students entered, and remained on until the end of the lesson. The camera was moved around the classroom at times to ensure that teacher interactions with students were at least captured on audio. Recordings were saved in full

in a password-protected file to be viewed by the researcher later the same day. Notes of observed interactions to discuss with a focus group were made, with timestamps alongside for ease of future location of behaviours of interest. The video recordings themselves were not analysed in their entirety.

3.4.2 Surveys

Survey questionnaires were generally offered near the end of the lesson that followed the video recorded lesson. Carrying out questionnaires was avoided during the observed lesson, so that lessons could be viewed in their entirety, including the end of the lesson to capture student departure. In one case, due to school-based constraints, the questionnaires were carried out at the end of the observed lesson. In two cases a researcher constraint, then a school-based constraint, meant questionnaires were not carried out in weeks 1 and 6. Questionnaires were available for the final 10 minutes of lessons so as to not disrupt the students' learning, but still providing students approximately twice the time allowance that was usually required for completion of the two questionnaires. Students collected the questionnaires from the teacher's desk, filled them in independently with no requests for assistance or clarification, then returned them to a box located on the teacher's desk. Student questionnaires were stored in a locked cupboard in an office neighbouring the classroom, after being scanned and then saved in a password protected file.

3.4.3 Interviews

Student focus group interviews using the cogen-type format were held during one-hour school lunch breaks, so as not to interrupt classroom learning, and to allow an extended period of time for the interview. The group convened approximately 10 minutes into the school lunch break, giving interviewees time to attend to personal needs before the interview. Student-requested light snacks and drinks were available right throughout the

interview, so that eating time was student led and not restricted by the researcher within this natural and routine meal break. Group guidelines were shared at the start of each session, for the benefit of both existing and new members. Structured guiding questions, and the (cleaned) laminated ATA framework (Section 3.2.2) and a whiteboard marker, were distributed to each member. A short lesson observational video footage clip (under one minute in length) was shown next. The clips were viewed several times, until no further examples of ako in teacher practice were generated within the group. A maximum of two clips were shown and discussed in each session, which were then discussed using the guiding questions (Appendix 5). The discussion was then opened up to student participants to raise topics of discussion. Throughout the term in which these discussions were held, students began to bring up examples of ako in teaching and learning from their own experiences both in and outside of the study classroom; therefore, video clips were not always used for discussion starters. These student-led examples were however still discussed using the structured questions (Appendix 5). At the conclusion of the interview, members of the group summarised the group's agreed-upon actions to be implemented in future lessons.

Once three cogen-type discussions had been conducted, the male students in the group requested to meet separately from the female students. This request was accommodated, and in the fourth round of weekly interviews, one session was run for each sub-group based on gender. For the remaining weeks of Term Two (Year One), the female group met separately to the male group; the female group met every week, and the male group met some weeks (Appendix 4). After the gender division of the groups, other students joined in the groups in a manner retaining the gender homogeneity. The groups became more fluid in number, and participant composition from that point (Appendix 4). Necessary and natural changes in the participant groups in iterative data collection is a feature accommodated within the flexibility of cogenerative dialogue (Higgins & Bonne, 2014; Shady, 2014). Spontaneous interviews occurred in Year Two of the study, where students would initiate a discussion with the researcher. This happened when there was a topic of interest to the student(s). Following a discussion being initiated by a student participant, the researcher would ask if anyone else wished to engage in a discussion.

For purposes of manageability and student comfort, these discussions were held at desk groupings, with the researcher moving around the groups and stopping to engage in a discussion if this was invited. The significance of the desk groupings selected for these interviews was that the students had self-selected the members of their desk groupings, based on the group feeling comfortable working together (Sections 3.1.2.2).

All student and parent participants in one-to-one interviews requested that the video camera was directed away from them, and as a result it was placed near the participants and used to capture data in the format of an audio recording. Recordings were saved in password-protected files, and fully transcribed at a later date. Where there were researcher difficulties in deciphering speech, or where there was a response ambiguity, this was checked and corrected as necessary with the participant viewing the original recording or transcript. Five strategies to maximise the quality of this type of interview data were used to encourage interviewee comfort:

- The interviewee chose a one-to-one or group format. All members of groups were familiar with one another, and guidelines regarding respect of individuals and their perspectives were in place;
- Structured questions were shared before the first interview, so the types of questions likely to be asked were known;
- Care was taken by the researcher to point out that when responding to questions, it was the interviewee's own opinion or thoughts that were being asked for. This was particularly important in the parent interviews, where parents were conscious that they were not necessarily aware of their student's perspective and did not want to speak for them;
- The importance of giving open and honest answers was linked to the quality of the findings that could potentially benefit the teaching and learning of mathematics in the study school and beyond; and
- Confidentiality was assured in the reporting of findings.

Student one-to-one interviews were carried out during class time. Students signalled their interest in participation by selecting the option on their E&E questionnaire, or by directly

approaching the researcher (study teacher). The semi-structured approach began with questions linked to those on the questionnaire, with ways teacher or student actions might improve learning outcomes. These interviews were short, typically no longer than two minutes. To avoid interrupting student learning, wherever possible interviews were carried out at a time when there was a natural break created (such as at the completion of a learning activity, or at transition points).

Parent interviews were held at times and locations negotiated between the researcher and the parents. Interviews were carried out between the researcher and one parent participant at a time, except in one case when two parents (a couple with two children) attended an interview together. Interviews were held at the school in most cases, and at the interviewee's home in three cases. At the conclusion of interviews involving parents, the researcher extended an invitation for participation in a follow-up interview at the completion of school Term Two, which, when arranged, was conducted in the same location as their initial interview.

3.4.4 Teacher reflections

Structured teacher reflections were carried out in Year One in a format for tracking the research activities and teacher perspectives. Structured reflections focused on planned classroom activities, and on researcher interpretations, feelings, and decisions that were made during and after lessons. Less structured teacher reflections included emails and memos composed to cultural advisors, critical friends, and research supervisors. Discussions with these advisors were summarised in e-mails, and sent to the discussion participants for checking and further comment. All teacher reflection data (including advisor responses) were stored in a password-protected file.

3.4.5 Summative assessments

Progressive Achievement Tests were administered according to the guidelines provided by the New Zealand Council for Educational Research. Test 6A was administered to Year 9 students, and test 7A to Year 10 students. Students were given 40 minutes to complete the test, without the assistance of a calculator as per testing guidelines. The tests were then marked using a marking grid supplied with the tests. The tests were multiple choice, with only one correct answer accepted for any question; therefore, researcher bias was not involved in test score judgement. There was only one instance where an assessment was administered to a study class, outside of the study school's regular mathematics course regime: the second PAT administered at the conclusion of Term Two, Year One. Grades for both PAT assessments were entered into KAMAR (the school-wide student management system) in the appropriate password-protected electronic mark book. If a student was absent for an assessment, a catch-up session was provided so the student could either take the assessment in another mathematics teacher's classroom assessment lesson. This ensured that the assessment was carried out within the Mathematics Department guidelines, under the supervision of a trained mathematics teacher.

3.4.6 Participant feedback

On the participant consent forms for this study, all participants (and non-participating parents, co-consenting with a student) were asked to provide an email address if they chose to receive feedback in the form of a written summary, at the completion of the project. All participants opted to receive this feedback.

Additionally, student participants were given feedback during lessons and interviews through the researcher in ways that included:

- discussing trends noted on student generated data;
- sharing of a journal article about the study during a lesson; and
- sharing conference presentation summaries.

The latter two methods of feedback demonstrated the researcher's commitment to sharing participant data for the benefit of students and teachers outside of the study site. Furthermore, the researcher reiterated their appreciation of participant sharing of information, in order that these activities were possible. All identifying information was removed from data during discussions, writing of journal articles, and summary emails.

Student interest in feedback ranged from none, through moderate, to fairly high. Students involved in the Experimental Phase of the research would check in one and two years after the Experimental Phase in which they participated. This occurred at a rate of one to two students per week, with enquiries about, for example, where the research had been shared recently, the progress of thesis completion, and how the study was progressing in general. A discussion would follow, where the researcher would provide the level of detail to satisfy the student enquiry, without divulging personal details of any participants.

3.5 Data Analysis and Description

Representation and legitimisation are the two predominant rationales when conducting analysis of data drawn from a mixed method approach (Onwuegbuzie & Teddlie, 2003). Representation refers to retrieving sufficient information from the study data, enhanced in mixed method research through five purposes (Greene, Caracelli, & Graham, 1989): triangulation, complementarity (one method clarifies the results of another method), development (results from one method inform another method), initiation (new perspectives of frameworks), and expansion (different methods used for different components of the study, extending the breadth of inquiry). 'Legitimation' is the term assigned to *validity*, trustworthiness, and credibility of the data, and the confirmability and transferability of the findings within mixed method research studies (Teddlie & Tashakkori, 2003b). Legitimation can be enhanced through descriptive, interpretive, theoretical, and evaluative validity and generalisability of the findings. This can be problematic when methods are mixed, as "both the quantitative and qualitative components of studies bring into the setting their own problems of representation and legitimation, likely yielding either

an additive or a multiplicative threat” (Johnson & Onwuegbuzie, 2004, p. 52). Therefore, methods were integrated with reference to a (continually emerging) framework for mixed method research legitimisation, proposed by Onwuegbuzie and Johnson (2006).

Both “variable-oriented” and “case-oriented” approaches were used in the data gathering and analysis (Teddlie & Tashakkori, 2003a, p. 363). This combination enhanced the understanding of specific ako-based teacher behaviours and interactions, while maintaining a holistic perspective of teacher practice. Informal reflective summaries of data were recorded throughout the study and informed the formal analysis (Chapter Seven). Data types were not fully mixed during the collection, or formal analysis stages. The separately collected qualitative and quantitative data were analysed in a way where neither built on the other during the analysis phase, maintaining the integrity of the individual method and subsequent assumptions. Consolidation was not carried out until the data interpretation stage, when a “meta-inference is drawn which integrates the inferences made from the separate quantitative and qualitative data and findings” (Onwuegbuzie & Johnson, 2006, p. 53) (Chapters Five and Seven).

Analysis within educational ethnographies uses a classification scheme where categories and subcategories are derived from the data themselves from words used by the participants, or constructed by the ethnographer (Merriam, 1998, p. 157). This approach intended for the study analysis, as a benefit to using ‘insider terms’ that are distinctive to the participants, particularly when generating grounded theory, is the potential for drawing distinctive perspectives from participant worldviews from the data (Boulton & Hammersley, 1996). Data is arranged into the categories until saturation is reached, and no further changes to categories occur. Relationships in the data can be displayed in, for example, diagrams, flow charts, grids, or any suitable way created by the researcher, in order to create a ‘cognitive map’ (Werner, Schoepfle, & Ahern, 1987) (Chapter Seven). Categorisation of study data was carried out after all data were gathered. The source of framework and typology used in the categorisation process were inductive and, respectively, categories were constructed from pre-existing concepts (Onwuegbuzie & Teddlie, 2003; Patton, 2002). Once categories were developed, they were checked for two criteria: internal homogeneity and external heterogeneity, in other words how well

they blended as a framework or typology together in a meaningful way, and how clear the differences are, respectively. An indication that these criteria are met, will be a minimisation of unassigned or overlapping data (Patton, 2002). Investigative approaches were used to organise new understandings emerging from the data into the ATA framework (Section 2.3.1; Appendix 1) (Saunders et al., 2018). An interpretive approach was taken to the PT-PP typology (Section 2.3.2.2; Appendix 12) assembled during analysis (Section 6.2). The overall intention of this study was to integrate the ATA framework and PT-PP typology into one holistic model: an inductive framework, based on an iterative process of teacher actions (Section 1.1; Chapter Seven).

Leech (2012) provides a summary of different writing styles for presenting mixed methods research approaches. While the traditionally used Linear-Analytic style is well known, it can limit complexity and creativity in report writing. Non-traditional formats for presenting mixed methods research according to a time- or an event-based order are alternatives to the linear model (Sandelowski (2003). Several suitable presentation formats for studies were carried out with qualitative method dominance (i.e. QUAL + quan¹⁵), with both method types used concurrently (Table 3.8). These include narrative (event timing/subject/chronological), perspective, and conceptual (sensitising the reader to concepts linked to study-drawn framework and typology) writing styles (Creswell & Plano Clark, 2017). The timing style was generally appropriate, as Year One qualitative data would appear at the forefront, with the support of quantitative data collected concurrently, in order to answer the first research question (Section 1.6). However, a conceptual style was perhaps more fitting, as an idea that emerged during Year Two in the new participant sample highlighted the need to re-explore and re-analyse the Year One data to draw links to the ATA framework, and between data gathered from Year 9 and Year 10 participants. The Year 9 and 10 samples were incorporated, but not fully integrated, so a time-based chronological approach was therefore deemed not suitable for describing the study findings with clarity.

¹⁵ QUAL represents qualitative data, and the capitalisation shows this is the predominant method; quan represents quantitative data, the lower case shows this is the minor method.

Table 3.8

Main Data Types, Analysis Methods, and Thesis Locations, Theoretical Foundations of Analysed Data

Type of data	Main method(s) of analysis	Analysis and results location	Theoretical model underlying analysis
Observations	Qualitative analysis using inductive coding types to organise within new framework created in this study	Chapter Five	Saunders, Averill and McRae, 2018
Student Surveys	Quantitative analysis to triangulate with observations and student interview data	Chapter Five	Saunders, Averill and McRae, 2018
Student interviews	Qualitative analysis using inductive, then deductive coding, to link to survey, inductive, then pre-existing framework	Chapter Five	Saunders, Averill and McRae, 2018
Parent interviews	Qualitative analysis using coding linking to investigative typology	Chapter Six	Ministry of Education, 2013

To address the unsuitability of a chronological approach, but maintain a loosely time-based style, a researcher/narrator time-based order, suitable for ethnographic approaches, was selected (Van Maanen, 2011). The researcher/narrator time-based order approach is one in which the researcher presents the findings from their perspective, in the order that they drew insights into the phenomenon being studied (Leech, 2012). In order to best describe the links between the inferences from this study

to, and between the investigative and interpretive frameworks, derive concepts from existing theories to develop new theory and create an iterative teacher-practice process, accessible to and useable by teachers, the conceptual style was selected to guide the study presentation. The conceptual presentation was to be nested within a knowledge development-based framework, aligned with a Māori proverb or 'whakataukī' that illustrates the researcher perspective of phenomenon discovery (Kingi et al., 2017) (Table 3.9).

Mā te rongō, ka mōhio

Mā te mōhio, ka mārama

Mā te mārama, ka mātau

Mā te mātau, ka ora

Table 3.9

*Thesis Chapters and Chapter Purposes Aligned with Researcher Perspective
Phenomenon of Discovery*

Chapter location in thesis	Traditional/familiar purpose of this chapter	Māori proverb fitting the stage of researcher perspective of discovery	English translation¹⁶ of the proverb
Chapter One	Motivation	<i>Mā te rongō, ka mōhio</i>	<i>Through perception, comes awareness</i>
Chapter Two	Literature Review	<i>Mā te mōhio, ka mārama</i>	<i>Through awareness, comes understanding</i>
Chapter Three	Methodology		
Chapter Four	Study setting and participants		
Chapter Five	Data analysis	<i>Mā te mārama, ka mātau</i>	<i>Through understanding, comes knowledge</i>
Chapter Six			
Chapter Seven	Model integration and Discussion and Conclusions	<i>Mā te mātau, ka ora</i>	<i>Through knowledge, comes wellbeing</i>
Chapter Eight			

¹⁶ In translation from Māori to English, some richness of meaning is lost; there are alternative translations of this whakatuaki. For example, in some versions, perception is replaced with listening and in other versions knowledge is replaced by wisdom.

This research study began with an awareness that I could do something more to attend to the disparity in education. During the process of compiling the literature review, I began to understand the aspects of traditional English-medium teacher practices that were contributing to the disparity. The main purpose of the data-gathering phase was to develop an understanding of the participants' perceptions, by positioning myself as a learner and valuing the knowledge the participants shared with me. In the final stage of this study it was hoped that through awareness, understanding, and knowledge the study outcome would be a feeling of safety and wellbeing for all participants.

Wherever possible quotes have been presented directly from the data, in their original form. Where editing of a quote was necessary (such as for clarity and coherence), this has been signalled using square brackets. Identifying features have been withheld to maintain anonymity; all names throughout the data are pseudonyms or generic references, and percentages drawn from data have been rounded.

Chapter Four

4.0 The Study Context

Context is a key to understanding the complexity of classroom practice (Alton-Lee, 2003, p. 9).

Environmental factors within a school can impact on teachers' practices, so although the focus of this study was only on developing an ako-rich practice within the study teacher's mathematics lessons, the school environment must be considered when analysing the study classroom interactions (Alton-Lee, 2003). The prevailing across-school perspective can assist classroom teachers (or not), when interacting with different student cultures and parents in order to support student learning through influencing the classroom focus on achievement; inclusivity; opportunities that diverse students have to learn; and the strength of school-home partnerships (Alton-Lee, 2003; Banks, 2015; Epstein, 2018).

This chapter describes the data-gathering context and provides an overview of the 48 unique study participants. As part of this study is concerned with student cultural identity within a mathematics classroom, it is important to consider how the school reflects student identity, particularly for Māori students. Information was drawn from the Education Review Office (ERO) school review reports, school information, and the perceptions of cultural advisors and the researcher in compiling this chapter. Firstly, the prevailing school perspective will be described (Section 4.1). Then, the information about the study classroom and mathematics lessons will be presented (Section 4.2), followed by the study students' and parents' characteristics (Section 4.3).

4.1 The Study School

The study school context will now be described to provide an overview of the whole school perspective. Kikorangi College (a pseudonym) is a large, mid-decile, co-educational New Zealand state secondary school situated in a large town with a predominantly

Pākehā/New Zealand European population. Drawing approximately 1000 students, from Year 9 to Year 13 from surrounding urban and rural communities, Kikorangi College has a student ethnic profile that is less ethnically diverse than the nationwide profile for state secondary schools (Fig 4.1). The student gender profile statistics revealed an almost equal proportion of females to males.

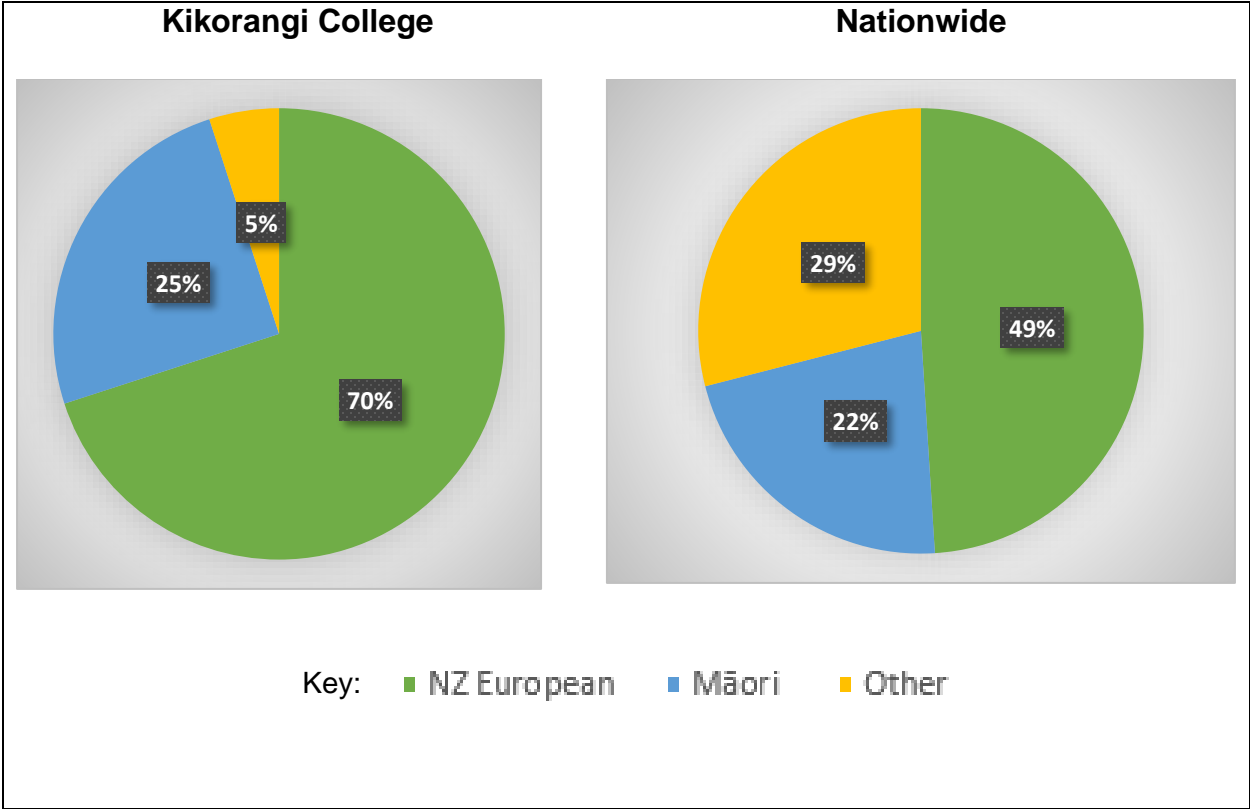


Figure 4.1. Ethnic Profile of Kikorangi College and New Zealand-wide Secondary Schools.

The predominant ethnicity selected by residents in the 2013 census was New Zealand European (approximately 85%), followed by Māori (approximately 18%). Multiple selection of ethnicities was allowed; therefore, the percentage totals exceeded 100%, so these values are indicative only.

During audits, school information was collected by the Education Review Office (ERO) for the purpose of a school review in 2014 (immediately preceding the study Pilot Phase) and again in 2017 (during Year One of data collection) (Tables 3.3 and 3.4). Contextual information about the school environment provided by the factors within these reports regarding Māori dimensions of teaching and learning, achievement, parent communication, and the curricula, are pertinent to this study (Table 4.1). The school review reports are not referenced and have been paraphrased in this thesis, as per ethical guidelines regarding participant confidentiality (Section 3.3).

Table 4.1

ERO School Review Report Comments for Māori Dimensions at Kikorangi College

Māori Dimension	Paraphrased ERO school review report comments	
	2014	2017
Culturally responsive teaching	Increased understanding of the relevance of Māori language, culture, and identity in students' learning and success as Māori is required in strategic planning, curriculum, and teaching	Build on areas noted in 2014 to better support Māori student engagement and outcomes
Curriculum structure and delivery	Significant numbers of students achieving below expectation, consider guidance via a Ministry of Education-funded initiative	More effective promotion of learning is required consistently through the teaching, and curriculum planning
Year 9 and 10 measureable achievement tracking and goal setting to accelerate literacy and numeracy achievement	Need for development of shared planning, implementing, and reviewing strategies to promote educational success for Māori at senior leadership level	A school-wide approach for improving outcomes for students at risk of not achieving success needs developing into a more robust form
Kapa haka group	No	Developing
Māori parent group	No	Initial planning for implementation
Reporting to parents on Year 9 and 10 curriculum progress	Requires strengthening	Reporting and informing is the main focus of school-home communication
Māori NCEA achievement compared to non-Māori peers		
NCEA Level 1	Significantly lower	Māori results are lower than for New Zealand European, disparity is larger than national average
NCEA Level 2	Similar	
NCEA Level 3	Significantly lower	

ERO review reports show that, although there were positive improvements made between 2014 and 2017 regarding the school systems in place for teaching Māori learners, incorporating te ao Māori into activities and engaging and reporting to parents remained actions that were not yet strongly embedded. Furthermore, while there were a number of Māori students successfully gaining NCEA levels one to three, the ERO reports show there were many more Māori students who were not gaining this qualification; disparity between Māori and non-Māori gaining this award is larger at Kikorangi College than the national average. My observations outside of the scope the thesis research would suggest that the comments contained within the ERO reports regarding the need for strengthening culturally responsive strategy, curriculum, and teaching practice at Kikorangi College are aligned with students' and parents' sentiments shared in conversations with me. I noted that with colleagues often referred to Māori students as 'them' or 'they' in conversations.

There was a general feeling of student 'unhappiness' within the Year 9 and 10 cohorts at Kikorangi College. This was reflected in the results of the 2016, 2017, and 2018 NZCER 'Me and My School'¹⁷ surveys. The Me and My School survey is a research-based student engagement survey, designed for New Zealand students in Years 4 to 10, offering a snapshot of the learning culture in a school. The survey is anonymous and asks students to report their level of agreement with a series of statements regarding affective, behavioural, and cognitive aspects of engagement. Standardised data enables progress to be tracked over time and enables a nationally referenced gender, ethnicity, and year-level comparison between schools. The 2017 and 2018 surveys occurred in Year One and Year Two of this study, and they showed that between 60% and 70% of Year 9 and Year 10 students reported that they disagreed or strongly disagreed with the following statements:

- Most mornings I look forward to going to school; and
- Most of the time being at school puts me in a good mood.

¹⁷ See <https://www.nzcer.org.nz/tests/me-and-my-school>

The school's overall student engagement data showed that at least half of Year 9 and Year 10 students were not engaged in their learning, with lower engagement noted among students who identified themselves as Māori than those students who identified themselves as non-Māori reported.

4.2 The Study Classroom and Mathematics Lessons

This section describes the classroom and lessons regarding the physical environment, the mathematics lesson timetable, the whole-class's characteristics, and the interpersonal relationships between participants prior to the study (see also Section 1.1.1 for study teacher characteristics).

Junior classes (Year 9 and Year 10) at Kikorangi College received mathematics tuition during four 55-minute lessons per week. The order topics were taught cohort-wide was set by the Head of the Kikorangi College Mathematics Department. The topics covered during the study were Year 9, Measurement and Geometric Reasoning (study Year One); and Year 10, Linear Algebra and Measurement (study Year Two). The classroom where mathematics teaching and learning took place was well lit with natural light, and was colourfully decorated with student work, photographs of students participating in school activities, and with accessories that mainly included New Zealand, Māori, and Pasifika iconography. The teacher's desk was near the entrance to the classroom. The whiteboard was centrally positioned at the front of the room, with printed resources stored in colour-coded storage boxes in shelving units on either side of the board. Pens, rulers, calculators, and other stationery items were available for student use in dedicated storage units near the teacher's desk. There was an open-door policy, with teachers from neighbouring classrooms often coming into the classroom to, for example, share resources, discuss marking, or seek advice on mathematical problem solving.

The Year 9 and Year 10 study classes were comprised of 24 and 21 students of mixed abilities in English and mathematics, respectively (Section 3.3). Generally, students who scored below the expected year level curriculum level (stanine 4 or below) (Hills, 1983) were placed in 'mixed ability' groups based on the data gathered through Progressive

Achievement Tests (Fogarty, 2007) administered by Kikorangi College. Once identified as belonging to the mixed-ability grouping, these students were predominantly randomly assigned to classes; consideration on class placement is open to further manipulation based on the suitability of student combinations and/or student-teacher combinations, based on a student's academic and behavioural history as reported by year-level managers, the school counsellor, their previous classroom teachers, and learning support staff.

The class rolls remained almost static throughout the study's data-collection periods; the only change was one student (female, Māori) leaving the Year 9 class during the study. The Year 9 class was described by the study teacher as being similar regarding ability in her experience of mixed-ability classes at Kikorangi College. During three-weekly meetings, student progress in this class was monitored and discussed by their six regularly timetabled subject teachers and a year-level manager. During these meetings, the class was often described as fairly challenging behaviour-wise, and there was ongoing concern due to 40% of the students in that class achieving below, or well below, the expected curriculum level in Progressive Assessment Tests (Fogarty, 2007) (Appendix 8). Most of the Year 10 class also comprised students described by the researcher, other subject teachers, and year-level managers during regular meetings as per the Year 9 context, as typical in regard to behaviour and ability compared to other Year 10 mixed-ability students at Kikorangi College. Six students in the Year 10 class were described as an atypical group of students as they were identified through specialised testing as having challenging issues (such as anger management issues, Attention Deficit Disorder, general and specific hygiene challenges, or mental and physical health issues) and very diverse learning needs (such as auditory and visual processing disorders, dyslexia, and dyscalculia). As these students were often removed from the regular lessons to receive learning support, their data was not collected during the study interviews; however, they were included in class discussions when they wished to participate.

The study teacher had no prior relationships with any of the Year 9 class students. Three students in the Year 10 class had been part of the Year 9 study class (Table 4.1), and

along with one other student in this class were previously known to the teacher. The study teacher placed importance on getting to know the students upon meeting them at the start of the school year, with a short exercise gathering students' learning and subject preferences, feelings about mathematics, personal interests, and future career aspirations carried out during the first lesson of school term one. During the first week of the school year, the study teacher contacted students' parents via email to provide course information and to invite parents to communicate with her regarding questions, concerns, or comments about their student's mathematics learning.

4.3 Student and Parent Characteristics

The Ministry of Education uses the Statistics New Zealand definition of ethnicity for statistical recording purposes: Ethnicity is the ethnic group or groups that people identify with or feel they belong to. Ethnicity is a measure of cultural affiliation, as opposed to race, ancestry, nationality or citizenship.¹⁸

When enrolling in New Zealand schools, students and caregivers can self-select up to three ethnic groups that the student identifies as belonging to. For the purposes of collating statistics on school characteristics, however, the Ministry of Education requires that only one of these ethnic groups is reported in statistical data. Where multiple ethnic groups are identified, the ethnicity recorded for the Ministry of Education is determined through a priority recording system,¹⁹ aligning these Ministry statistics with standards set by Statistics New Zealand. The most relevant feature of the priority system in assigning a 'main' ethnicity to students also utilised for this study, is that Māori becomes the recorded ethnicity when selected alongside any other ethnicities.

Student participants were asked to identify their ethnicity and were notified of the ranking system. All participants except one chose a single ethnicity; therefore, the ranking process was carried out once (Table 4.1). All student participants reported their ethnicity to the researcher exactly as recorded upon their enrolment. This fact was established by

¹⁸ www.educationcounts.govt.nz

¹⁹ https://www.educationcounts.govt.nz/_data/assets/pdf_file/0010/193492/2019-School-Roll-Return-Guidelines1803.pdf (p. 40).

cross-checking student ethnicity as reported in the study, with the ethnicity (and gender) in the school student management system (KAMAR). The range of students' ethnicities included Māori, New Zealand European, other European, Pasifika, Asian, and Indian. Where there were fewer than three participants in one ethnic category, these categories were combined into a category labelled 'other'. This was done in the interests of maintaining individual student anonymity when ethnicity was recorded against data (such as student quotes and assessment results) as the total number of participants in this study was relatively small. The category labelled 'other' combined students identifying as other European, Pasifika, Asian, and Indian. Due to the anonymity afforded by the combining of categories, student ethnicity was reported against results and student quotes representing student voice where the researcher felt a student's anonymity would not be compromised as a result. Parent participants were invited to share their ethnicities in the same way as the students had been. All parents selected a single ethnic group, with Māori and NZE being the only two categories self-selected.

Table 4.2

Participant Ethnicity and Gender Identification; By Participant Category

Ethnicity <i>Gender of students within each ethnic category</i>		Participant Categories						TOTALS	
		Year 9		Year 10		Parents			
Māori		8		5		5		18	
<i>Male</i>	<i>Female</i>	3	2	2	3	3	2	8	10
New Zealand European		12		8		7		28	
<i>Male</i>	<i>Female</i>	6	6	3	5	6	1	15	13
Other		3		3		-		6	
<i>Male</i>	<i>Female</i>	3	-	1	2	-	-	4	2
Participant category TOTALS		23		16 ^a		12		51 ^b	

Note: ^aThere were 13 unique students to Year 10, as three of these 16 students had extended their consent from the Year 9 study class into the Year 10 study class. ^bThere were 49 unique participants, due to three Year 9 study students being re-assigned to the Year 10 study class.

The ethnic profile of each of the study classes was similar to each other (Table 4.2). The ethnic profiles of the study classes were more diverse than the whole school profile. It would be reasonable to assume that fewer NZE students, and a greater percentage of Māori and Pasifika students in the mixed-ability classes where students were achieving

below the expected curriculum level, reflected the disparity in achievement in New Zealand where Māori and Pasifika students are over represented in the lower achieving groups of students (Section 1.1).

Table 4.3

Ethnic Profiles of Study Students

Student Ethnicity	Nationwide (%)	Kikorangi College %	Year 9		Year 10	
			Study class	Study class consenting participants	Study class	Study class consenting participants
Māori	22	25	25	26	28	30
NZE	49	70	60	56	60	50
Other	29	5	15	18	12	20

The ethnicity of participants in culturally based research is important, so pseudonyms were assigned to participants based on their ethnicity (Tables 4.3 and 4.4). To simplify signalling ethnicity and participant role concurrently, parents were assigned pseudonyms containing more than five letters, whereas student pseudonyms all contained exactly four letters. Participants identifying as Māori were assigned pseudonyms beginning with the letter 'M', those identifying as New Zealand European were assigned pseudonyms beginning with the letter 'N', and pseudonyms beginning with the letter 'O' were assigned to students of other ethnicities. Pseudonyms were only assigned to students who participated in interviews, or if the student's name was mentioned in a parent interview comment that was included.

Table 4.4

Study Year One and Two Student Characteristics

Study Year One (Year 9 Students)			Study Year Two (Year 10 Students)		
Ethnicity	Gender	Pseudonym	Ethnicity	Gender	Pseudonym
Māori	Female	Maci	Māori	Female	Maci
Māori	Female	Mali	Māori	Female	Mady
Māori	Male	Mark	Māori	Female	Maya
Māori	Female	Mave	Māori	Male	Maui
Māori	Male	Maxx	Māori	Male	Mika
Māori	Female	Mere	Māori	Female	Mimi
Māori	Female	Mila	NZE	Male	Nash
NZE	Female	Ness	NZE	Male	Nate
NZE	Female	Neve	NZE	Female	Nell
NZE	Male	Nick	NZE	Female	Nepa
NZE	Female	Nita	NZE	Male	Noah
Other	Male	Otto	NZE	Female	Nova

Table 4.5

Study Parents' Characteristics

Parent			Parent's child		
Pseudonym	Ethnicity (Gender)	Number of interviews	Pseudonym	Ethnicity (Gender)	Is student in a study class?
Margaret	Māori (F)	2	Maci	Māori (F)	Yes (Both Years)
Maryanne	Māori (F)	1	Mere	Māori (F)	Yes (Year One)
Mitchell	Māori (M)	1	-	Māori (M)	No
Marshall	Māori (M)	1	-	Māori (M)	No
Matthew	Māori (M)	1	Mick	Māori (F)	No
Nerissa	NZE (F)	1	& Miri	Māori (M)	No
Nicolette	NZE (F)	2	Mady	Māori (F)	Yes (Year Two)
Natasha	NZE (F)	1	Mack	Māori (M)	No
Nettie	NZE (F)	1	Mali	Māori (F)	Yes (Year One)
Nathaniel	NZE (M)	1	Mimi	Māori (F)	Yes (Year Two)
Nataleigh	NZE (F)	1	Neve	NZE (F)	Yes (Year One)
Noella	NZE (F)	2	Nate	NZE (F)	Yes (Year Two)
Noreen	NZE (F)	1	Nova	NZE (F)	Yes (Year Two)

4.4 The Study Teacher

With English as my first and only fluent language, I identify as Pākehā. I was educated and trained in English-medium schools and universities. Formally trained in molecular biosciences before entering teaching, I fit within the age range of 40–50 years old, having gained approximately 12 years of secondary school teaching experience prior to the commencement of the study. I had experienced the school environment previously as a student (in the 1980s) and as a parent of current students, in addition to the current role as a full-time teacher of mathematics. As a full-time classroom teacher of mathematics students from Year 9 to Year 13, I held high expectations for student achievement.(Section 1.3). At the outset of this study, teacher reflection shows that I felt my main teaching practice goals, in the context of a culturally responsive ako-based approach, included a desire to demonstrate the following traits:

- Friendly, welcoming, and inclusive;
- Open to student questions about learning;
- Operating within in a well-managed classroom environment;
- Attentive to student physical comfort and their emotional comfort;
- Determined to never give up on students; and
- Open to interacting with students' parents.

These elements of practice were the starting point from which the deconstruction, development, and reconstruction of a purposefully ako-rich practice began (Chapters Five and Six).

4.5 Summary

A mixed research method framework will see mainly qualitative data, with a smaller amount of quantitative data supporting a grounded theory emerging from the analysis of the perspectives of 36 students, 12 parents, and one teacher. The prevailing school perspective where Māori students' culture and identity required more robust inclusion, Māori students were achieving significantly lower than their NZE peers, and parent–

teacher communications were one-way with a focus on reporting and informing, signalled the appropriateness of KMT guiding the thesis research. The specific outcome linked to KMT for this thesis was an intention to work alongside student and parent participants to improve outcomes while promoting reciprocity and equity in mathematics education. The results chapters (Chapters Five and Six) analyse participant perspectives, to distill ways in which an ako-rich teacher practice achieved this outcome.

Mā te mārama, ka mātau

Through understanding, comes knowledge

Chapter Five

5.0 Student Perspectives on Ako-based Practices in a Mathematics Classroom

Thirty-six, Year 9 and Year 10 students (Section 4.1) shared their perspectives of the study teacher's ako-based practice (Table 5.1). These students also shared their perspectives about the classroom practices of other teachers at the study school. This chapter presents findings from the analysis of qualitative and quantitative data collection, used to gather students' perspectives during Term Two, across both years of the study (Tables 3.4 and 5.1). This chapter mainly responds to research question one (Section 1.6).

First, student perceptions of teacher practices collected during interviews are described in Section 5.1, using the 'ako-based teacher action' (ATA) behaviour indicators framework (Section 2.3), supported by data from the 'ako in teacher practice' (ATP) survey (Appendix 9). Then in Section 5.2, students' perceptions of their mathematics achievement are presented using a portion of the data drawn from the 'engagement and enjoyment' (E&E) survey (Appendix 10), supported by standardised Progressive Achievement Test (PAT) data (Fogarty, 2007) (Appendix 8). A summary of key themes from the findings concludes this chapter (Section 5.3). Cultural advisors assisted with confirming the suitability of the ATA framework as a lens for analysing study data, and with informing the development of the overall discussion, and then with the conclusions of this chapter (Section 3.2). To understand teacher practices that appeared to reflect Māori students' preferences, analysis drew from examples highlighting teacher cultural responsiveness, and lack of cultural responsiveness to Māori learners (Section 2.2)

Data shared by students connected with the study school have had features removed the data that may result in identification of the study teacher and other teachers, such as references to gender, time, and schools so teachers' identities are protected. In some places where the students referred directly to purposeful actions carried out by the study teacher, identifying details have been not been removed.

Table 5.1

Summary of the Data Analysed for Chapter Five

Study Year	Participants (n)	Data-gathering Tool	Planned Timing in Term Two (Total events)	Section of this Chapter
One (Term Two)	Year 9 students (23)	Lesson recordings	Weekly (9)	5.1
		Student interviews	Weekly (11)	5.1
		'Ako in Teacher Practice' (ATP) survey completed by students	Weekly, eight time points (115 individual questionnaires)	5.1
		'Engagement and Enjoyment' (E&E) survey completed by students	Weekly, eight time points (129 individual questionnaires)	5.2
		Progressive Achievement Tests	Pre Term Two (1) Post Term Two (1)	5.2
Two (Term Two)	Year 10 Students (16)	Student interviews	Weekly (7)	5.1

Note. Year 10 students' total includes three participants carried through from the Year 9 study class; see Table 4.1 for more detail.

Data Type	Qualitative	Quantitative
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The main finding of the analysis presented in this chapter is that a Pākehā mathematics teacher was able to develop an ako-based classroom practice that was perceived positively and similarly, by Māori and non-Māori student participants (Section 5.1; Saunders et al., 2018).

5.1 Student Perspectives of Ako-rich Teacher Practices

Section 5.1 is divided into seven sections, each based on one element of the ATA framework (Appendix 1). Elements of the ATA framework were used to analyse ako-based teacher action data, in a deconstructed 'linear' format (Section 2.3). The linear framework analysis in this section is offered in order that it will contribute to the formal reporting of study findings in Chapter Seven. In the formal part of the analysis, it is intended that the seven ATA framework elements will be (re)arranged in a process form, supported by analysis from Chapter Six, to make the findings directly useable in real time by classroom teachers wanting to develop ako in their practice (Section 1.1).

In this analysis, data are discussed within the most relevant ATA framework element section. Students' perceptions of other teachers' actions that often seemed contradictory to the cultural responsiveness inherent within ako, were also organised within this framework. Therefore, I refer to myself as the study teacher in this chapter, distinct to references of the students' 'other teachers'. In student quotes I am often referred to as 'you' by the students. Student quotes are not attributed to particular participants where there was agreement throughout the interview groups, unless an illustrative conversation involved several students. In these cases, the individual participant contributions are identified by way of pseudonym (Section 4.3; Table 4.3).

5.1.1 Teacher acknowledges and value students' prior knowledge

Students described the study teacher's actions that demonstrated the teacher acknowledging and valuing their prior knowledge. The reasons students appreciated this element of practice are discussed here, alongside ways this element was demonstrated. First, two categories of students' prior knowledge that were *acknowledged* by the study teacher are discussed. These categories frame the first part of the discussion, organised according to the teacher acknowledging students' prior knowledge carried over from (i) their previous year(s) of mathematics education; and (ii) their more recent learning during study class lessons. In the second part of this discussion, interactions where the study

teacher demonstrated *valuing* of students' prior will be presented. Two interaction-type categories frame the second part of the discussion, which is organised according to the teacher valuing students' prior knowledge through (iii) student–teacher interactions and (iv) student–student interactions.

(i) Acknowledging students' prior knowledge from previous year(s)

At the study school, students were expected to have carried mathematical knowledge over from previous year(s); however, this was not always the students' reality:

I don't always remember the stuff from last year, it was ages ago.

I wagged lots of classes last year so I didn't get the earlier stuff.

The study teacher evaluated students' past prior knowledge at the start of units of learning by using vocabulary-based mathematics activities, including those requiring students to create 'wordle'²⁰ posters and title pages:

Writing out the wordle was good because it told us how many algebra words we actually already knew.

This comment indicated that students felt positively about such activities ('was good'). Teacher reflection showed that as students worked to complete these activities, discussions of their prior mathematical vocabulary knowledge were triggered with the teacher, and between students. These activities took from 10 to 50 minutes to complete, depending on the amount of relevant prior knowledge students could contribute to the activity.

Through these vocabulary-based activities, some students recognised that their prior mathematics knowledge was weak, and shared this evaluation with the teacher. A Year 10 student commented that variations in the thoroughness with which teachers at the study school had covered the expected mathematics knowledge in previous years could be one reason accounting for variations observed in the prior knowledge evaluations carried out by Year 10 study students:

²⁰ A visual depiction of vocabulary words.

When you were talking about volumes and areas yesterday, some of the class said that you were giving out lots of new information. I think that was because there are only three of us in here this year from your last year class. The others said their teachers didn't teach them all that. For us three it was revision because you taught us that last year (Maci).

This finding highlights that when selecting a starting-point for units of learning, rather than assuming that students' other teachers had previously covered the prescribed topics *and* students had learnt them, a teacher must evaluate all students' prior knowledge. This action enabled the study teacher to acknowledge students' prior knowledge weaknesses and strengths, relative to their present prescribed learning pathway (Section 4.2).

Students' weak past prior knowledge seemed to be ignored, rather than acknowledged by other teachers at the study school:

Some teachers talk about stuff and if you don't know it, they start yelling and they say "well you should have learned it last year".

Teachers say, "well you should have been listening when you were taught this last year", and that's really annoying.

If I ask a question and the teacher thinks I should know it already, they just keeps walking past me and doesn't help me.

Study students reported negative feelings associated with non-acknowledgement of their weak prior learning (such as 'annoying', 'doesn't help', 'yelling'). In contrast, study students felt positively about their prior knowledge weaknesses being acknowledged and attended to by the study teacher (such as 'if I don't know what I'm doing then you come over and you help me', 'when we get an answer wrong you explain to us', and 'you check with us first'):

You don't expect us to know stuff and if I don't know what I'm doing then you come over and you help me rather than just be like "oh well you should have learned that last year".

You don't pick on us and when we get an answer wrong you explain to us about what we should know.

If I can't do the Year 9 stuff, I can't do the Year 10 stuff and I'd just fail so you check with us first.

These comments show that the students appreciated the study teacher evaluating what they already knew (such as 'you check first', 'you don't expect us to know stuff'), then acknowledging the evaluation outcome. Although seemingly positive in intent, the student comments above were negatively worded (such as 'you don't pick on us'). This could be students signalling the nature of their enculturated expectations of teacher practices at the study school (Section 4.1).

Students seemed to prefer to begin new units of learning by accessing their prior knowledge from previous years. Through actions triggering vocabulary knowledge pertaining to assumed prior knowledge at the study school, the study teacher practised this student preference by acknowledging students' prior knowledge, especially gaps in this knowledge, carried over from previous years.

(ii) Acknowledging students' recent prior knowledge

Students reported the study teacher acknowledged their more recently attained prior knowledge by explicitly sequencing the delivery of mathematical concepts within their present prescribed teaching plan. Students appreciated the gradual building upon their mathematics knowledge, when their recent learning was linked to their new learning:

We get the basics right today and then move on. We don't go straight to the hard stuff because I know if we don't get the first stuff, then we fail the rest.

You start simple with stuff we already know then jump to the harder stuff so we build on the easy stuff, it makes me get confident.

A teacher reflection from Time Point One (TP1) (Table 3.5), showed the study teacher's belief that the practice of acknowledging students' recent prior learning by linking it with their new learning, should be explicitly shared with students:

I'm not sure students were aware of links between the last two lessons this week. From today I'll be clear that they are going to be using learning from the last lesson to do the next bit of learning.

The following student comment reflects that the study teacher was explicit in highlighting such links ('when you tell us'):

When you tell us we've done this learning yesterday, I get a feeling of confidence.

This explicit action of acknowledging recent prior learning appeared to give students a sense of confidence in their ability as mathematics learners. Most of the ATP survey data responses show that the students were aware they had used their prior knowledge to help them learn new concepts (that is, 113 out of 115 individual positive responses to Question 1(i); Appendix 9). In addition to *acknowledging* students' prior knowledge, an ako-rich teacher practice requires a teacher to *value* students' prior knowledge and this will be discussed next in terms of two types of stakeholder interaction.

(iii) Teacher valuing student past and recent prior knowledge in student-teacher interactions

Students perceived that the study teacher valued their prior knowledge, by responsively adjusting the pace of their lessons in line with the prior knowledge evaluations they shared with the teacher. The sharing of recently learned prior knowledge evaluations occurred mainly during polling-type activities. One way students were polled was via a 'popular vote' activity. This voting was carried out by students indicating (by placing a tick next to) required skills they felt needed (re)strengthening. Skills were indicated on a list created on a single large sheet of paper taped to the whiteboard. The students' indications would guide the pace of prescribed content coverage in the following lesson(s). Another polling method used was written student reflection, shared via students' individual 'reflection notebooks'.²¹ In contrast to the previously described whole-class popular vote polling activity, a student's reflection notebook entries were shared mainly with the study teacher. An entry in a student's reflection notebook (Figure 5.1) illustrates how the ongoing

²¹ 3B1, 32 leaves, 165 x 100mm (hxl).

discursive nature of this written discussion-type format enabled student prior learning to be shared. In this example, one student shared that they held strong prior knowledge relevant to a new unit of learning. The study teacher valued this student's prior learning strengths by responsively providing them with activities to enable a faster pace on their learning pathway than that which was responsive to the rest of the class's needs.

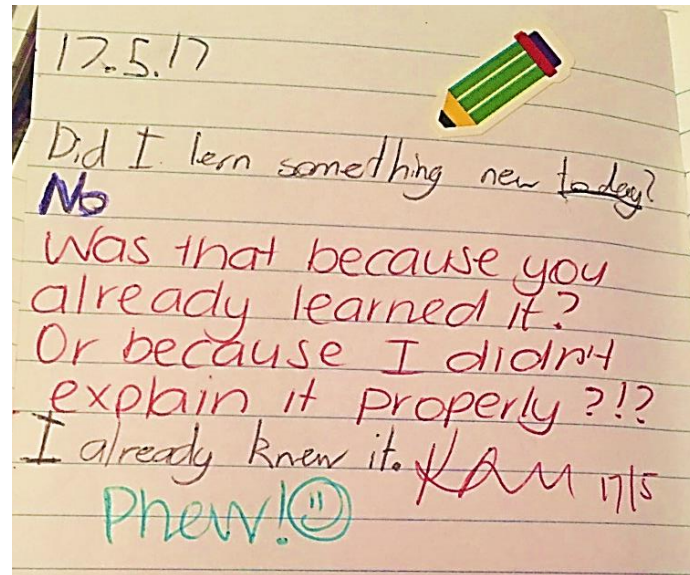


Figure 5.1. A student's reflection notebook entry about their learning, with subsequent teacher and student entries.

Another example where the study teacher's actions demonstrated value for students' prior knowledge shared during student-teacher interactions saw their teacher walking around the class, gauging student progress on a learning task through student-teacher discussions. Students who appeared to lack the required level of prior knowledge to participate fully in the task were invited by the study teacher to participate in targeted mini spontaneous catch-up lessons (the class termed these 'pop-ups'). Students could opt into pop-ups to strengthen their prior learning until they were confident to re-engage with their learning activity. In this way, the pop-ups enabled the study teacher to respond to student prior knowledge weaknesses, in small targeted groups. At the same time, the other students in the class were able to proceed without delay, also demonstrating value for

these students' prior knowledge by not slowing them down unnecessarily. Students appreciated the autonomy afforded by pop-up lessons (see also Section 5.1.5):

Nell: We should do more pop-ups.

Teacher: OK, do they help your learning?

Maci: Yeah, because we have a little bit more of a say about what we need in it and not just what you say we should already know.

Pop-ups enabled the study teacher to show value for students' prior knowledge by responding to students' varied and different learning needs, concurrently (Section 5.1.1.ii).

Students appeared to feel positively about the above student–teacher interactions that facilitated responsively paced lessons (such as 'feel smart', getting 'the basics right at the start', 'respected', and 'saves time'):

It saves time so we can focus on what we need to do to get to the next grade in our test, rather than waste time going over what we already know. It also finds out if you don't know the basics then we can ask for help.

We get to work on what we need to work on with you instead of going over and over the same easy stuff. You're not talking at me and telling me stuff I already know. It makes feel smart and respected when you say I can move on because I know it already.

A responsive pace saw students positively engaging with their learning (such as 'then we have time to *do it properly*', and 'then I don't have to panic so I can *get it all done*'). In contrast, students shared some instances and their feelings about other teachers appearing *not* to value their prior knowledge, and failing to adjust the pace of lessons accordingly:

Going over the easy stuff all the time just because one person asks a question and [the teacher] stops everyone and makes us all listen is such a waste of time.

So, if we're working on questions and most of us are on question eight, say, and then somebody is on question two and they ask a question about that, she will go

back to the start. It's like "aarrgggh" because I've already done it and I get annoyed and frustrated.

These comments show that students can experience negative feelings (such as 'aarrgggh', 'frustrated', and 'waste of time') if their learning is hindered by working at too low a level (such as 'easy stuff all the time', 'I've already done it'). The next comments show that when students perceived the pace of learning to be too fast, they could also experience negative feelings (such as 'anxious', 'not smart', 'rushed', 'stressed', and 'give up'):

When a teacher goes as fast as the fastest or smartest kids in the class or assumes that we know stuff already, I feel rushed and I give up on the learning. Because I feel like I'm not smart.

There isn't much point in working because I'm not going to get it finished anyway because I don't get enough time. I feel stressed and anxious when we go too fast. The class is all treated as if they know the same stuff already.

Students perceived that they were often assumed to have the same learning needs, at the same time, by other teachers. The four previous quotes illustrate students may experience negative feelings when their other teachers appeared to treat the class as if they all had the same prior knowledge. This demonstrated the teacher not valuing individual prior learning and could result in students' learning moving too slowly or too quickly.

(iv) Teacher valuing student prior knowledge in student-student interaction

Students also identified that the study teacher appeared to value their prior knowledge through facilitating student–student interactions when encouraging peers to teach and learn from one another (such as sharing their mathematical thinking skills with another student who was struggling). This sharing of knowledge between peers was usually done in small groups of two to six students, seated at desk groupings (see also Section 5.1.3). Student–student sharing could also occur through their ‘thinking aloud’ while contributing to a whole-class discussion during a problem-solving activity, for example during an activity the teacher termed the ‘Fast Four’. The Fast Four activity saw the teacher writing four basic vocabulary and/or skill questions on the whiteboard, drawn from expected past and recent prior knowledge. Through solving these questions on their own or with others, students were able to evaluate their prior knowledge, share the results with their peers, and seek help (see Section 5.1.3.i).

Findings in this section show that positive feelings were experienced by study students who perceived that their teacher acknowledged the student–teacher sharing of their evaluation of their past and recent prior knowledge. Prior knowledge weaknesses and strengths could then be valued through responsive teacher actions such as setting a responsive pace for each student’s learning pathway or encouraging students to share their knowledge with their peers. In the next section, ways the study teacher demonstrated value for another type of student knowledge are discussed.

5.1.2 Teacher values current knowledge students shared

Students described the study teacher’s actions that contributed to the practice of a teacher demonstrating value for two forms of current knowledge students shared. These forms will frame the first part of this discussion, describing reasons students appreciated the teacher valuing current knowledge they shared about their (i) mathematical thinking (‘doing maths’); and (ii) lives and world (such as interests, culture, family events). The second part of the discussion will describe ways the study teacher demonstrated valuing the two forms of shared student knowledge, organised according to actions that facilitated three types of two-way stakeholder interactions (iii–v).

(i) Students sharing current knowledge about their mathematical thinking

Student comments indicated that they perceived the study teacher showed value for their current mathematical thinking knowledge, by taking time to listen and respond to their learning needs:

You listen to how students think they are confused about something and find out how they got the wrong answer so you can actually help them.

Positive student feelings appeared to be associated with the teacher's practice of investing time to allow the students to share their knowledge ('listening to'), followed by valuing their knowledge with responsive teacher assistance ('then helping'). The student comment above highlighted that the study teacher practised this across the study class ('students', 'them', 'they'). The study students also provided contradictions to the positive example shared above, drawn from their negative experiences during lessons with other teachers. Negative student experiences could result in students expressing negative feelings (such as hate). Negative feelings appeared to be due to students perceiving that a teacher did not value their knowledge by way of demonstrating a lack of teacher responsivity; in other words, when teachers were not investing their time to listen to students who wished to explain their current mathematical thinking, during student–teacher interactions:

Students can explain their own way to work something out that is different to how you showed us. There are teachers who don't let us do that and they are dickheads. They start yelling if you don't do it their way. I hate that.

The next student exchange illustrates how study students typically indicated they might conduct themselves in other classrooms when experiencing such negative feelings resulting from a lack of teacher responsiveness:

Mere: When a teacher won't listen to me I feel like I'm not that important to them.

Mady: I feel like I don't need to do what the teacher says because if they aren't willing to listen to me or help me, then too bad to them.

Nova: Yeah, it makes me feel stropky.²²

These comments highlight the contribution of the student-preferred teacher actions of '*listening to, then helping*' students in the classroom, towards facilitating a cooperative classroom environment. The above student exchange indicated that students directed their negative feelings towards their other teachers ('to them'), and felt consciously inclined to respond to teachers' practices they perceived negatively with uncooperative classroom behaviours (see also Section 5.1.3). The association of students' negative feelings, such as those indicative of student frustration (such as 'I hate that', 'mad', 'stropky') manifesting as uncooperative classroom behaviour is consistent with other research findings (Section 2.2.2; Bishop et. al., 2009).

Several other interview comments suggested that students also made conscious choices to adjust their classroom behaviour *positively*, for example after viewing the study teacher's practice in a positive light:

You listen to us so we listen to you.

You work with us so we work with you.

You're not mean to us, so we aren't really mean to you. Well, not too mean.

In these examples, students showed appreciation of the study teacher's practice, and reported that they had chosen to reciprocate in-kind to positively viewed teacher actions, with cooperative classroom behaviours ('so we', 'so we aren't'). Teacher reflection at study Time Point Six (TP6) (Table 3.5) shows that cooperative student behaviours were being increasingly observed class-wide. This was indicated by a pattern where the number of students displaying consistently cooperative behaviours during a lesson gradually increased as the study had progressed (Figure 5.2). Up until approximately TP6, lessons scheduled in period five of the timetable (noted in the example as P5 and being the final

²² Bad-tempered and argumentative.

lesson of each school day) had been typically more unsettled than lessons held earlier in the day.

16 June	Today was the easiest lesson so far. [Male student] was more engaged than ever. He was zooming. [Another male student] was a changed kid, polite respectful and well behaved, even though everyone was doing their "own thing", and I wasn't up the front of the class. The classroom felt so positive today.
19 June	Period 5: Easy going lesson, no behaviour issues at all. Students all "just got on with it". Just a bit of reassurance needed that they could do the learning. The class feels like it is running itself. It has taken 7 weeks to get to this point, no wonder I would give up on my new things I was trying when they looked like they weren't working for me!
20 June	Period 5: I've realised that P5 lessons don't feel like P5's with the study class at the moment. So positive again in the feeling in the class.

Figure 5.2. Teacher reflection entry at TP 6 (Year One) indicating an increase in cooperative student behaviour.

This section has shown that when students perceived that a teacher had not listened to their knowledge they had wished to share about their mathematical thinking, they could feel frustrated. Students' feelings of frustration could manifest as uncooperative classroom behaviours. However, increasingly cooperative study-class student behaviours were observed by the study teacher, which were possibly indicative of a decrease in feelings of student frustration. The decrease in frustration was thought to potentially reflect an increasing trend in ako-based teacher actions being demonstrated by the teacher and being recognised by students. By responding to student voice, such as that collected during interviews and lessons, the study teacher's practice was becoming more aligned to the student preferences (see also Tables 5.2 and 5.17, and linked analyses). To illustrate a potential association between teacher action and student cooperation, a source of student frustration revealed during student-teacher mathematical thinking knowledge sharing will now be discussed. Then, later in this section, the study teacher's response to this student frustration will explain how an ako-based teacher practice might have contributed to a mitigation of such negative feelings, and led to an increase in the frequency of cooperative student behaviours (see also Sections 2.2.2.1.1, 5.1.2.iii and iv, and Section 5.1.3).

Study students articulated that in some conditions they lacked confidence to share knowledge with the study teacher, even though they were aware their teacher valued their current knowledge regarding their mathematical thinking (see also Sections 5.1.3). In particular, study students struggled with a lack of confidence when sharing about their mathematical thinking required them to ‘speak up’ in front of their peers:

Mere: When I get a question wrong and I’m struggling with the maths I don’t really speak up and ask how to actually do it so I get more puzzled.

Mave: That’s a struggle with me, too.

Teacher: So when I’m at the front of the class and I say “is everybody okay and does anybody need any help with their learning”, there are people who don’t feel confident to say they got them wrong?

Mazz: Mmmhmm. Right.

The above exchange illustrated students’ reluctance to openly ask the study teacher for learning assistance. Moreover, this exchange highlighted that despite the study teacher’s purposeful student-preferred action to offer the learning assistance to students who were struggling (by *listening*, then *helping*), this action in itself was not responsive *enough* in terms of aiding students to experience feelings of comfort they required in order to ask for mathematical help in front of peers in the first place. The lack of confidence students felt when asking for help in a ‘public’ manner was accompanied by feelings of frustration (such as ‘puzzled’, ‘struggle’). The next quote is indicative of study students’ awareness that this lack of confidence was a disadvantage to their learning, when this lack resulted in them feeling unable to share their knowledge of their mathematical thinking, in order to convey their learning needs with a teacher:

If you aren’t confident to ask the teacher for help then you would never know the answer and that’s not helping your learning.

The study teacher’s practice was subsequently responsively altered to minimise this student learning disadvantage. Ako-based actions were employed to mitigate the feelings of frustration accompanying a lack of student confidence in accessing teacher assistance,

which seemed to result in students not having their learning needs met (see Sections 5.1.2.iii and iv).

Findings in this section indicate that students appreciated their teachers listening to their knowledge about their mathematical thinking. Students perceived that when a teacher listens to them, they can access responsive teacher assistance with their learning. However, while students recognised that requesting such assistance is beneficial to their learning about mathematical thinking, a reluctance to share their learning needs in front of other students was revealed. This reluctance was accompanied by student frustration, which could manifest as uncooperative classroom behaviours. Actions that encourage student confidence to share their knowledge about their learning needs with the teacher may be a key to enabling responsive teaching practices, which in turn could contribute to an increasing trend of cooperative behaviours by students in the classroom (see Sections 5.1.2.iii and iv).

(ii) Students sharing personal knowledge about their own worlds

Similar to the positive feelings students could experience when sharing their current knowledge of their mathematical thinking with their teacher in order to have their learning needs met, students expressed that sharing knowledge about their lives with the teacher could also be a positive experience. Again, students appreciated the study teacher investing time to listen to their knowledge, in doing so demonstrating value for the knowledge they shared. For example, a student's knowledge about a situation causing her to experience feelings of stress seemed to be somewhat reduced when this knowledge was shared with the study teacher. The student perceived the teacher had valued the knowledge she shared regarding her personal world concerns, by listening in a non-judgmental manner:

I let my stress out by talking to you first and then I can learn. It's like therapy because you don't try and act like you are better than us when we are talking to you about our stress.

Students who mentioned that they sometimes felt stressed, unhappy, or unwell in class due to events outside of the classroom or indeed outside of school, voiced that while they are experiencing such feelings they might conduct themselves apparently uncooperatively in the classroom. In such cases, students perceived that the teacher should take the time listen to the student's explanation for their uncharacteristically uncooperative behaviour:

It literally takes two seconds to listen to a kid.

Teachers should bother to find out what is wrong if someone is having an off day 'cos we can't be feeling all good 24/7.

Students perceived that when their behaviour was uncharacteristically uncooperative, they might be able to provide the teacher with an explanation, if given the opportunity to do so (that is, their teacher 'listening'). The following student comments illustrate contradictions to this student preferred ako-based action that they had experienced with other teachers:

Speaking the truth because lots of my friends, well they've all got different teachers and they said all of their teachers are not interested in their life.

They [teachers] always say to "talk about your problems", but if we talk then they say "shut up" and it holds in our stress.

Perceiving that they have not been listened to when attempting to share their personal and world knowledge can result in negative feelings indicative of frustration ('holds in our stress'). An implication of this finding suggests that listening to students' explanations about their lives has the potential to enable responsive 'helping' actions by a teacher. This seems to align with the student-preferred teacher practice of a 'listening then helping' process students expressed in the discussions about practices, which facilitated in the sharing of their current knowledge about their mathematical thinking with the teacher.

In this second part discusses categories of stakeholder interactions by which the study teacher demonstrated valuing the two forms of students' current knowledge that were shared with her. Deliberate focus will be placed on ways the students suggested the study

teacher had, or could have, used ako-based actions to mitigate the negative feelings they had associated with their reluctance to openly share their knowledge. This discussion is framed according to the three categories in which students' mathematical thinking and personal knowledge were shared and valued in two-way interactions facilitated by the study teacher between: (iii) a student and the teacher; (iv) the students' parent(s) and the teacher, and (v) a student and another student.

(iii) Students' current knowledge valued in student–teacher interactions

The mitigation of negative feelings students could experience when sharing mathematical knowledge, in order to request learning assistance was discussed in several interviews. In the following exchange, Year 9 students shared their knowledge about easing their own, and other students', negative feelings associated with asking their teacher for learning assistance:

Teacher: So what would help students to feel confident to share knowledge about their questions with me?

Otis: Well first of all we got to get the person to ummm.

Mazz: Ahhh to speak up.

Mali: You could have an anonymous questions box we could put notes in with things that we're struggling with.

Neve: And we could do it anytime in class and then you could help us the next lesson if we put our initials on the notes.

Teacher: Great idea! We will start that from next lesson. I'll ask the Year 10 guys from maths last year to build us a box in Tech class.

The student knowledge shared in this interview exchange *about* student knowledge was able to be demonstrably valued in two ways: the teacher's verbal comment ('Great idea!'); and the subsequent responsive implementation of the 'questions box' (Figure 5.3). The implementation of the questions box showed the teacher demonstrating responsive adjustments to classroom practises following students sharing their knowledge of their preferences for doing mathematics. Through the action of listening to and then helping

the students, the study teacher provided a means for students to improve their own learning experience through their influencing of classroom practices.

Following the implementation of the questions box, teacher reflection shows that in response to students' written requests for learning assistance, face-to-face verbal student–teacher interactions were initiated during the following lesson. Teacher reflection also shows that after several weeks of having the questions box available, it was repurposed by the students who began to leave positive comments for the teacher, rather than posting their learning questions (Figure 5.3).

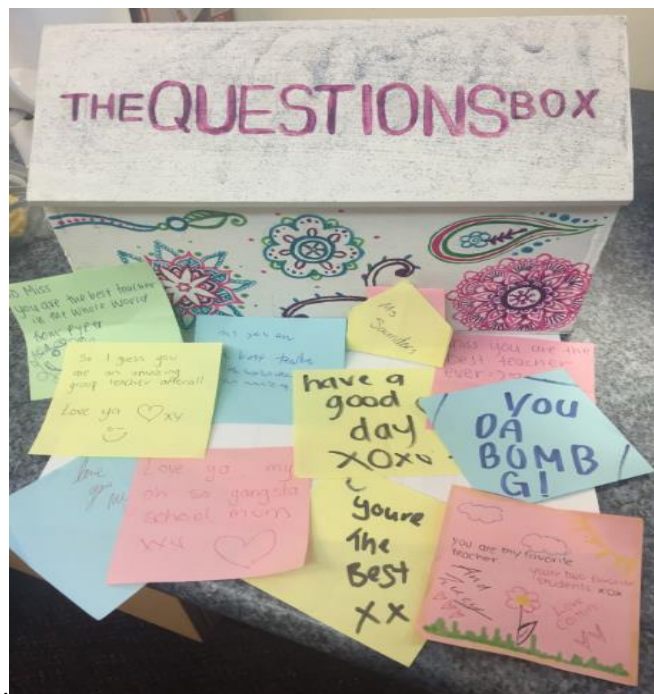


Figure 5.3. Questions box and examples of students' notes posted for the teacher.

Students' reflection notebooks were implemented in the same week as the questions box, providing another place where students were able to discreetly share their mathematical thinking knowledge with the study teacher in a written format (Figure 5.1, Section 5.1.1). The following student comments highlight how writing to their teacher via their notebooks contributed to the mitigation of student discomfort that could be felt when openly asking for the teacher's learning assistance in front of their peers:

Otis: We don't have to worry about like anybody else knowing what we want to ask the teacher.

Nick: You don't feel like you can ask out loud but you can ask what you really want to ask in the notebooks and not be embarrassed.

Nell: If you say your question out loud it's kind of shame, if you write it down it's just between you and me.

The comments above show benefits of the notebooks in terms of cultivating students' positive feelings of emotional comfort in the classroom when asking for learning help. The next comments indicate how students' perceptions of these positive feelings associated with writing in the notebooks could positively benefit their mathematics learning:

Nell: At the end of the lesson you can reflect back on what you have and haven't learned in the notebooks

Otto: Then it makes you know what you did wrong and what we need to still work on.

Nate: 'Cos if you're like struggling with something and lots of kids put it in their notebook, when you read it you go over it with the whole class so then we know it. And it isn't embarrassing for us.

Mady: Yeah, other times we just got told we should just know it and we must have not been listening so we didn't get to learn it. But you like us telling you stuff like that.

Mady's comment indicates that she was aware that the study teacher valued the students' knowledge they shared with her ('you like us telling you stuff'). The two student reflection notebook entries below show how students signalled their requirements to the teacher for learning assistance, via their notebooks. The study teacher's typical written responses illustrated that she valued the sharing of their mathematical thinking knowledge about circle geometry by reading ('listening') and giving praise, which could appear alongside an offer of assistance ('helping') (Figure 5.3) (such as 'thank you' and 'let's do some of these together 😊').

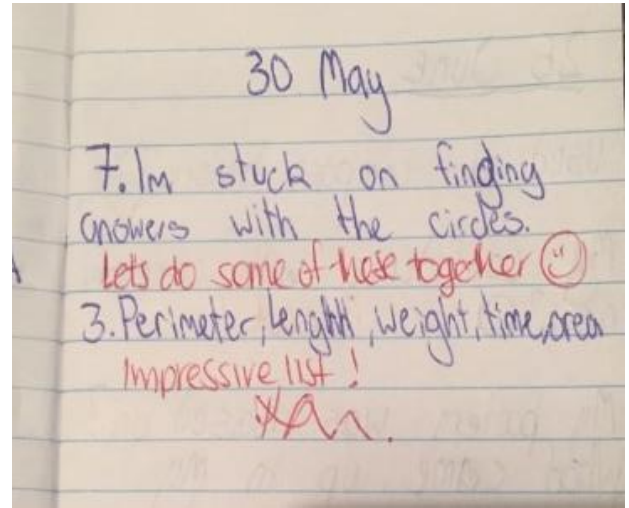
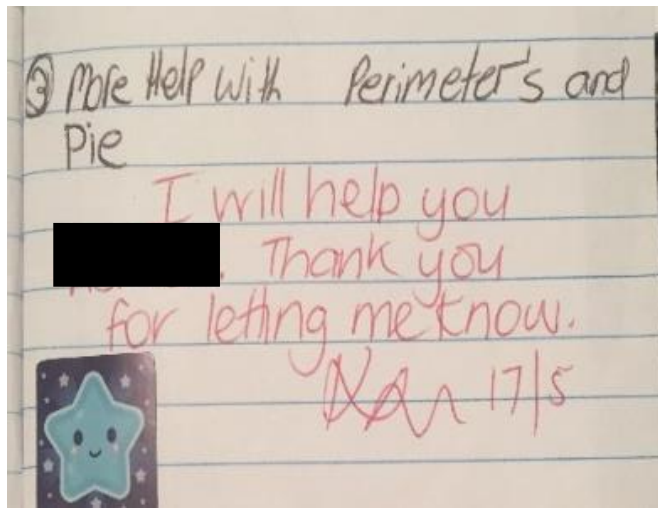


Figure 5.4. Student reflection notebook entries sharing knowledge about their mathematical thinking with their teacher. The first reflection comment in each example was regarding a concept the student required assistance with. The second comment in the right-hand side example was indicating concepts the student felt confident about.

Study students became increasingly able to share specific details about their own mathematical thinking strengths and weaknesses (confident and not confident) with the study teacher over time. Furthermore, students devised their own notations for sharing this knowledge with the teacher, as illustrated below in three examples of students' notebook entries (Figure 5.5).

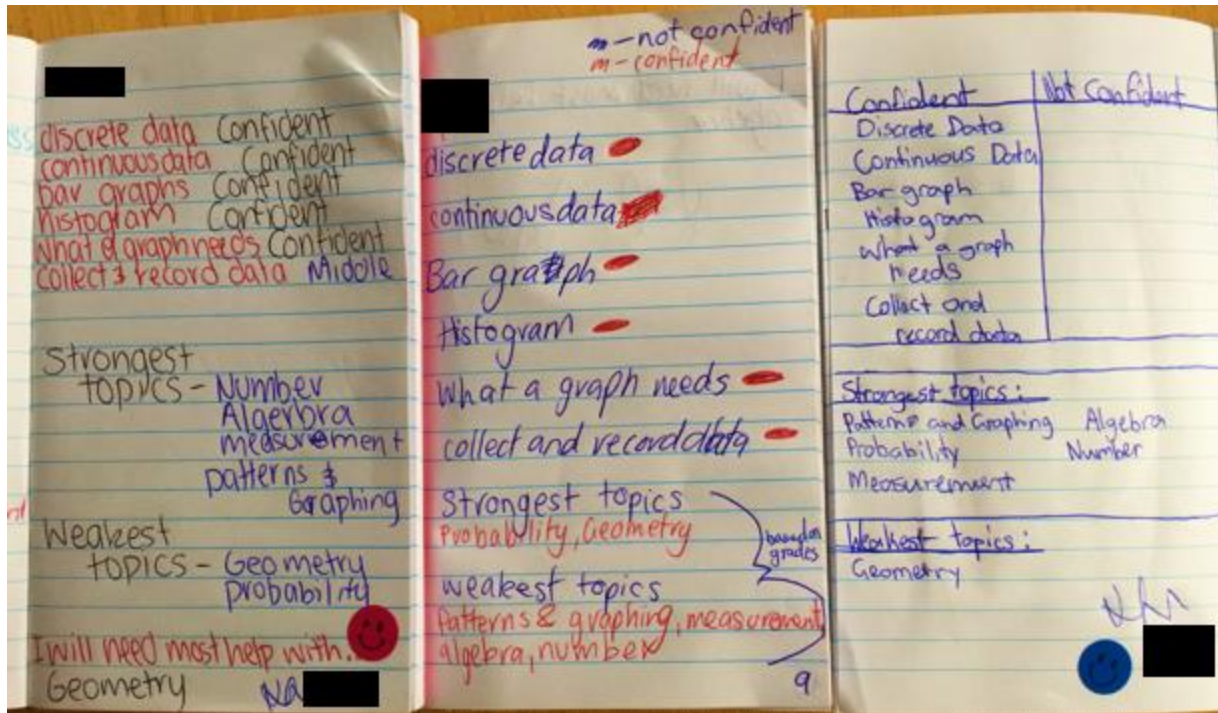


Figure 5.5. Examples of students tracking their learning progress to share with the teacher in their reflection notebooks. These three reflections were made by three individual students, following a single lesson.

Teacher reflection showed that due to students' ability to specifically identify their knowledge about their learning needs, increasingly efficient responsive teacher assistance was possible. For example, a student specifically requesting help with finding the 'formula for the volume' of a shape, in contrast to non-specifically asking, for example, to 'help me because I don't get measurement', was a level of students' valued knowledge about their own mathematical thinking, more efficiently attended to by the busy classroom teacher (Figure 5.6). This efficiency most likely resulted in students' learning needs being met with increasing frequency, by the teacher.

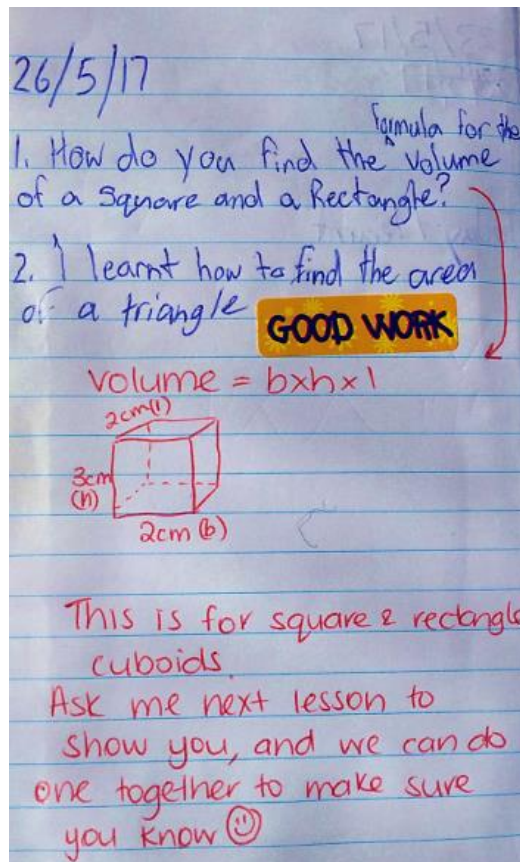


Figure 5.6. Example of a student requesting specific learning assistance in their reflection notebook.

As with the written 'questions box' questions, the written format of student knowledge shared with the teacher in their notebooks was often followed up with face-to-face student-teacher discussion during the next lesson (Figure 5.6). Teacher reflection shows that students increasingly requested assistance; verbalised requests began to be made more often than written requests (see also Section 5.1.3).

Student-responsive methods for sharing knowledge about their learning (that is, written format for sharing current knowledge of their mathematical thinking with the study teacher) were suggested at TP1 and implemented in the study classroom at TP2. ATP survey data shows an increase in positive responses to student-teacher knowledge sharing about doing maths, immediately following implementation of these methods

(Table 5.2). There was an approximate inversion of the negative versus positive response data of the two previous time-points, at TP2. As the number of survey respondents was small, the use of percentages is for indicative purposes only of trends in the data. Claims based on these percentages asserted throughout the rest of this chapter, acknowledge this.

Table 5.2

Student Responses to ATP Survey Question: My Teacher Learned Something From Me About Doing Maths Today

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative responses	Positive responses	14	5	13	4	3	7	8	7	8	6	4	10	7	6	3	10	60	55
Number of responses		19		17		10		15		14		14		13		13		115	
Percentage of respondents (Rounded to nearest %)		74	26	76	24	30	70	53	47	57	43	29	71	54	46	23	77	52	48

From TP3 onwards the percentage of positive survey responses regarding their teacher learning something about their mathematical thinking during a lesson ranged between approximately equal, to three about times greater than the negative responses.

The increasing verbalisation of student knowledge, namely their knowledge about their mathematical thinking and associated learning needs, may have developed due to the increase in face-to-face student–teacher interactions when the study teacher followed up students’ written questions. The initial increase in written student questions via the questions box and reflection notebooks naturally led to an increase in face-to-face student–teacher interactions. Face-to-face follow-up interactions occurred openly during class time and could involve several students at once. The increasingly regular student–teacher face-to-face method of attending to learning needs possibly normalised this format. Further study could explore this tentative association, as this was not investigated as part of this study. As findings stand, considering the observed gradual student transition from written to verbal student–teacher knowledge sharing, it would be prudent

that teachers initially provided students with opportunities to share their mathematical knowledge with the teacher, in written format(s).

As well as perspectives about sharing their mathematical thinking with the teacher, student voice in this section has shown that they appreciated student–teacher interactions occurring in the study classroom when time was set aside by the teacher to demonstrate valuing their knowledge they shared about their own lives. Sharing knowledge about student worlds occurred in the study class informally during lessons, but also more formally during what became known as ‘story time’; a time set aside for this purpose approximately once per week, usually near the end of a lesson:

I like having story time now and then, where you finish a bit early and just have a yarn.²³

I love when we have story time because I relax and because we can express who you are and have a funny story with the teacher.

The practice of setting aside a formal time to share stories was instigated by the study teacher to limit the non-mathematical conversations students were increasingly wishing to engage in. The study teacher hoped that by formalising this time, it would be a signal to the students that this sharing was important, however, not at the expense of their mathematical learning. Story time appeared to demonstrate the study teacher valued student knowledge gained about students’ lives, resulting in positive student feelings (such as ‘express who you are’, ‘funny’, ‘love’, and ‘relax’). Some students also shared knowledge about their lives with the teacher through their reflection notebook (such as sharing that a relative was in hospital, a grandfather had passed away, or a trip was taken with family).

Like the observed increased practice of students sharing knowledge about their maths thinking with their teacher (Table 5.2), an increasing trend of positive responses to ‘my

²³ To have a chat, a discussion, generally very informal.

teacher learned something about my life today' in the ATP survey was noted throughout the study (Table 5.3).

Table 5.3

Student Responses to ATP Survey Question: My Teacher Learned Something About My Life Today

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative responses	Positive responses	17	2	13	4	3	7	10	5	11	3	5	9	8	5	5	8	72	43
Number of responses		19		17		10		15		14		14		13		13		115	
Percentage of respondents (Rounded to nearest %)		89	11	76	24	30	70	67	33	79	21	36	64	62	38	38	62	63	37

An increase in positive responses was again noted at TP2, perhaps reflecting the implementation of written format techniques via which students were able to share their knowledge with the teacher (Table 5.2). Following TP3, the percentage of students sharing knowledge about their lives with the teacher increased in a long-term trend but showed seasonal (weekly) fluctuations, perhaps reflecting the intermittent nature by which the study teacher purposefully demonstrated this action during the study survey period. Reasons for such intermittent practice were found in teacher reflection notes. Following the lessons coinciding with TP5 and TP7, two-thirds of the students felt the teacher had gained knowledge about their world. During these lessons students were helping one another with their learning; student behaviour was cooperative. The teacher believed that these two factors freed up instruction and discipline time, allowing more 'spare' time to chat to students about non-mathematical topics. In contrast, in lessons where there was a concerted effort by students to independently complete an assignment

in preparation for an upcoming assessment (TP4), the teacher perceived less spare teacher time to engage in non-mathematical student–teacher conversations. The student perspective of their appreciation of sharing knowledge with the teacher about their lives will be discussed in more detail regarding aspects of student culture and identity (Section 5.1.6).

Another way students described the teacher valuing their knowledge in student–teacher interactions was through her verbal and written comments of praise directed following any answers to mathematical problems they openly offered in class discussions. To illustrate teacher praise for students’ answers, an excerpt was drawn from a video recording of a lesson on the topic of ‘measurement’ (Year 9 participants, study Year One):

Teacher: Thanks for your answers everyone, it was great how we could respectfully disagree with the parallelogram answer which wasn’t quite correct. There were some right answers and some nearly right ones there. So, with that one fixed, I think we got them all right?

Student: I think so.

Student: I think that too.

Teacher: Thank you very much to everyone who contributed, please see me for a [school-wide reward scheme token] card at the end of the lesson.

The following exchange is drawn from the interview discussion that followed students viewing the above video recorded lesson excerpt. This interview discussion centred on whether a teacher demonstrating valuing of students’ mathematical thinking knowledge led to improved student engagement and learning:

Mazz: Because if you like get it wrong and the teacher respectfully says thank you and then they disagree with your answer then it would probably make us more confident to say an answer again.

Otto: And then you [teacher] could explain it more to us.

Teacher: Did I show I valued all their answers?

Mazz: Yeah.

Mave: Yeah and you gave them a card.

Neve: You said thank you for doing that.

Mali: A card. Yeah, like a reward. Even like if it's not a card you still do it.

Mave: So I reckon that will make people want to get up there.

Mazz: Yeah.

Mave: It's like they'll start to be confident.

Mazz: Yeah.

Neve: They'll get their confidence.

Mave: But it doesn't always have to be a reward like a card though, you can just say thanks to them.

Neve: Yeah because if they don't get valued they might not be confident to write the answers up because they'll be scared that it's wrong.

Teacher: I wonder if people feel like their answer could be wrong and it would still be alright if they put it up?

Mazz: Yep, it is.

Teacher: Are you sure?

Neve: Yep because I got the answer wrong today and it was okay 'cos then I learned how to do it right.

Mali: Now it's like it's so fun, you can put your opinion, whatever you think it is.

This interview discussion indicated students' perceptions of an association between a verbal or tangible reward from the study teacher (signalling valuing of their mathematical knowledge), and an increase in student confidence to offer answers their answers in front

of the class. This increased confidence seemed to be so, whether their answer was correct, or not. Students provided with ways of sharing their mathematical thinking in student–teacher interactions that were responsive to their needs for comfort and confidence seemed to experience positive feelings (such as ‘fun’). Positive feelings led to students feeling more confident to openly offer their mathematical thinking. This sharing subsequently saw gaps in their knowledge attended to, which was perceived by the study students as a benefit.

(iv) Students’ personal knowledge valued through sharing in student-student interactions

The second of three categories of teacher-facilitated interactions identified by students to demonstrate the study teacher valued their knowledge, involved student–student interactions. Students reported that they felt the teacher valued their knowledge of their mathematical thinking when they were encouraged to use their current knowledge to teach other students in the study class by being a ‘learning helper’ (see also Sections 5.1.1 and 5.1.3). Students’ preparedness to be classroom learning helper was self-signalled in two ways. One way was by raising their hand to visually identify themselves as able to assist other students. For example, during a mathematics lesson where isometric cubes were being manipulated, some students shared with the teacher that they were concurrently learning isometric drawing in Technology. Students who felt confident in this skill via their Technology lessons were asked to raise their hands and were identified as ‘learning helpers’ by the study teacher. Another way students could indicate knowledge about their own learning to identify themselves as a learning helper was to complete a teacher-generated skills-based grid sheet, to indicate their skills-based confidence as they progressed through a mathematics revision task (Figure 5.7).

SKILL	Do I know what this is? Yes/No	How I feel about solving them		
		Very or Quite Confident	A bit confident	Not at all confident
Angles on a straight line	Y	✓		
Angles at a point	Y			✓
Angles in a triangle	Y	✓		
Angles in a quadrilateral	Y		✓	Not at all confident
Vertically opposite angles	Y		✓	Not at all confident
Alternate angles	Y		✓	
Corresponding angles	Y		✓	
Co-interior angles	Y		✓	
Plan views	Y	✓		
Isometric drawing	Y	✓		

Figure 5.7. Example of a student skill tracking sheet in a reflection notebook.

Through student–teacher discussions prompted by this tracking sheet, which could be updated by the student as they progressed, the teacher was able to identify different ways individual students were approaching the task and match learning helpers with peers who were evaluated as requiring support with their mathematical thinking. Positive student feelings, such as those reflecting confidence and comfort were reported following the teacher action of encouraging student–student teaching and learning interactions (see also Section 5.1.3).

(v) Students’ personal knowledge valued through sharing in parent–teacher interactions

The third and final category in which students reported in that their teacher showed she valued their current mathematical thinking knowledge involved parent–teacher interactions. Unlike the two previous teacher-facilitated interactions, these interactions occurred beyond the mathematics classroom, between the teacher and the students’

parents. Students reported their teacher showed she valued their knowledge when communicating 'positive news' about their mathematical thinking in terms of effort and achievement with their parents. The class termed this 'contacting home'. Year 9 students expressed that their teachers contacting home with positive news could result in their family also valuing their learning efforts and achievement, which could encourage positive parent–student discussions at home, and perhaps a tangible reward:

Mere: I'd feel that the teacher and my mum would be seeing how much hard work I'd been putting into maths and not just coming to maths and mucking around, actually learning.

Nita: Well yeah, because my family would be so pleased.

Mazz: And they'd start talking about it at dinner getting involved.

Mali: And my family would be saying how proud they are of me. And I might get five bucks.²⁴

ATP study data showed that the Year 9 class associated positive feelings with the study teacher contacting home with positive news, and were aware that their teacher was demonstrating this action. Year 9 students' responses to the ATP survey statement '*my teacher spoke to, or emailed my family/whānau about my learning in the last week*', indicate that the Year 9 students were aware that parent–study teacher interactions were occurring regularly throughout the study (Table 5.4).

²⁴ Dollars.

Table 5.4

Student Responses to ATP Survey Question: My Teacher Spoke to, or Emailed My Family/Whānau About My Learning in the Last Week

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative responses	Positive responses	7	12	5	12	4	6	7	8	6	8	7	7	4	9	4	9	42	73
Number of responses		19		17		10		15		14		14		13		13		115	
Percentage of respondents (Rounded to nearest %)		58	42	29	71	40	60	47	53	43	57	50	50	31	69	31	69	37	63

Relative positive peaks in student awareness of their teacher contacting home occurred at three points TP1, TP6, and TP7, reflecting weeks where the study teacher emailed all students' parents with information about an upcoming unit of learning, an assignment, and a summative assessment, respectively. These emails contained a positive comment in regard to students' engagement, conduct, and/or progress. In contrast to the Year 9 students' broad positivity about their teacher contacting home, Year 10 students voiced negativity associated with this teacher action. Year 10 students were generally concerned that if the teacher contacted their home for any reason, their parents would likely assume their child was misbehaving at school and they would consequently be 'in trouble' at home. Year 10 students associated negative feelings with the thought of the study teacher suggesting her action of contacting home, even with positive news:

No, do not email my parents because if you do the parents will think that it is bad and I'll be in trouble.

Initially, Year 10 participants indicated that the teacher should avoid home contact completely. Following a further spontaneous discussion in which the whole class participated, Year 10 students were able to suggest ways the study teacher could contact their parents with positive news about their mathematical knowledge *and* in doing so avoid students experiencing negative feelings:

Teacher: Do you think that there would be a way that I could let your parents know that I valued the maths knowledge you've shared in this classroom, without your parents thinking it was bad and it being a problem for you?

Mark: Yeah by telling them that I'm not in trouble, first.

Teacher: What would it be important that parents know?

Nova: That we'd tried hard to do our work.

Mimi: Yeah.

Nepa: That we had done our homework if we had it.

Mady: Mmhmm, yeah.

Maci: That we weren't in trouble or anything.

Nova: It would freak me out if my mum said that you just called her.

Upon further discussion with the class to clarify the reasoning for Nova's comment, 'It would freak me out if my mum said that you just called her', it was revealed that none of the Year 10 students (who had not participated in the Year 9 study class; Section 3.3) had experienced their previous teachers contacting home in a positive light. This student perspective of a dearth regarding teachers at the study school making home contact was consistent with parents' perspectives shared in the study regarding home-contact (Section 6.2.1.4).

Although Year 10 students initially drew negative associations with thoughts of their teacher contacting home, these students also articulated that they thought their previous teachers *should* have contacted home to inform their parents about the struggles they had previously experienced with their mathematical thinking. It was important to the study students that a teacher should contact home about their learning struggles, in combination with offering suggestions for how their learning could be supported both at school and at home (see also Section 5.1.4). Upon considering this finding in reflection following the discussion, students' reflection notebooks were subsequently used as a space where students could share knowledge about something they would like the study teacher to share with home during a parent-teacher interaction.

Findings in this section highlighted a difference between the perspectives of Year 9 and Year 10 students regarding parent–teacher interactions, where the teacher demonstrated valuing of the students’ knowledge. Year 10 students emphasising the importance of the teacher explicitly noting in parent–teacher communications that the comments made about the student were positive was the only difference found between student participant groups in the analysis of ako-based teacher practice elements for this chapter. This finding may have reflected a negative enculturation of Year 10 students who had attended the study school for five terms prior to Year Two of the study commencing. These students were unable to recall experiencing positive home contact being made by their other teachers in the past. Conversely, Year 9 students who had attended the school only for one school term prior to the commencement of the study had experienced the study teacher contacting home regularly, which they broadly viewed as positive, perhaps influencing positively enculturation of Year 9 students in the study context (see also Section 6.2.1.1). Support for this notion of enculturation contributing to the Year 10 reaction to teacher–parent interactions being due to the general nature of teacher practices as the study-school practice was indicated in a teacher reflection entry. The entry noted that senior mathematics students (Year 11 to 13) informally polled by the study teacher in response to the discussion referred to above, regarding their feelings about their teachers contacting home, showed increasing resistance to this teacher action with year level progression.

Further investigation into this potential link from the student perspective could be carried out, with explicit questioning to explore perhaps how the Year 9 and Year 10 students arrived at their perceptions of the impact of parent–teacher interactions on their feelings. It would have been interesting to have investigated whether the Year 9 students became similarly enculturated to the Year 10 students, when they were themselves in Year 10. This was not possible due to unforeseen circumstances requiring adjustments to this study (Section 3.3). The parent perspective of the teacher initiating positive ongoing parent–teacher interactions was indeed explored directly with parents of study students as planned, however, and is presented in Chapter Six.

This section has shown a key to encouraging students to share their knowledge mathematical or personal knowledge with the teacher is the provision of opportunities for students to do so in a way that facilitated positive feelings, reflecting student comfort and confidence. Listening to each student's current mathematical and world knowledge, then offering help by way of responsive actions, was a teacher practice that was important to the study students. The help discussed was most frequently related to students' learning or personal struggles (that is, frustrations). Responsive ako-based teacher actions and positive student feelings appear to be associated and may contribute to a cooperative classroom environment. This association was signalled by students indicating that they consciously respond to negative feelings about a teacher's practice (such as frustrations) experienced in other classrooms with negative conduct. However, the opposite situation was true when students felt positive about their teacher. Findings show study students were aware their teacher could show value for student knowledge through practices including providing verbal and written comments of praise within student–teacher interactions; encouraging students to share their knowledge by teaching one another in student–student interactions (see also Section 5.1.3); and sharing positive comments about students' knowledge and learning behaviours in parent–teacher interactions (see also Sections 6.2.1.3 and 6.2.1.4).

5.1.3 Teacher encourages student–student teaching and learning

In the previous two sections, teacher actions contributing to the study teacher's practice of encouraging students to participate in student–student teaching and learning interactions were discussed in terms of the study teacher valuing students' mathematical knowledge. In this section, teacher actions that encouraged student–student teaching and learning interactions are discussed in terms of the benefits students perceived this practice had on learning. The reasons students appreciated the learning benefits from this element in the study teacher's practice are discussed first, alongside ways that seating plans facilitated (or impeded) such student–student interactions to occur on terms that were acceptable to the students. Negative feelings in the classroom are linked with

lack of motivation and engagement (Chapter Two; Section 6.1.1), so, as in the previous section, there will be a focus on teacher actions that students indicated to have contributed to the mitigation of negative feelings (such as feelings experienced when openly sharing their knowledge with the teacher; Section 5.1.2). Then, in the second part of the discussion, two categories that reflect juxtaposed perspectives are used to present findings specific to students when they were assuming the role of: (i) a learner, and (ii) a teacher, within a student–student interaction. Finally, this section will conclude with a summary of how the study teacher’s actions pertaining to this ako-based element of practice of encouraging student–student learning and teaching interactions may have contributed to the increasingly cooperative classroom environment observed (Section 5.1.2) during the study.

The following interview exchange provides a brief review of study students’ typical experiences, where they reported feelings of discomfort when openly requesting learning assistance (such as ‘questions’), from teachers (from Section 5.1.2):

Neve: I can't speak up about my questions in front of the class, it's embarrassing.

Mere: Well I don't really like it either, it's shame.

Mave: It depends for me.

Mazz: Yeah, it depends for me too on who is around me when I say it.

Nita: Exactly. It depends on who's around me.

Words such as ‘embarrassing’ and ‘shame’ indicated that students could experience negative feelings when they asked the teacher a learning question in front of their peers. These feelings could entirely prevent students from asking the teacher questions about their learning. Students shared that they disliked leaving their learning questions unanswered (such as ‘the worst’):

Neve: Going away with unanswered questions is the worst. If you have a question and you don't know it means and then you just like leave it.

Teacher: Why do you leave it?

Mere: Well we wouldn't walk up to a teacher and say I don't get this. I'd never do that.

Teacher: Really? Wouldn't you do that?

Maya: No. If a teacher is at their desk and everyone is working and you don't get something you'd just keep carrying on and skip it because you don't want people to hear you ask for help.

It appears that avoiding the negative feelings brought about by not having their learning questions answered did not consistently provide students with enough motivation to 'speak up' in front of at least some of, their peers ('it depends'). Students articulated that asking their nearby (such as 'beside', 'sit with') peers for learning assistance instead of their teacher, was a way they could be comfortable openly asking for learning assistance during their mathematics lessons ('feel comfortable', 'without it being shame'):

If you can talk about the work to your friends you can like ask your friend you're beside questions about maths without being shame.

We talk and do work and talk and more work, if we feel comfortable about who we sit with and they're people we like.

A condition ('if') of engaging productively in this student–student teaching and learning interaction was a feeling of emotional comfort involving students feeling positive about their physical seating arrangements in terms of the other students around them. This condition is perhaps mostly so on behalf of the student assuming the role of the learner, as only the students specifically referring to their role as *learner* in this interaction context referred to their comfort. Students were aware that sitting with their friends as they preferred to do for their comfort, could tempt them to participate in off-task conversations that could raise classroom behaviour management issues. These issues could arise when the teacher perceived the students helping one another as behaving inappropriately (Johansen, Little, & Akin-Little, 2011). Students shared that their other teachers often responded to their apparently uncooperative behaviour by moving them away from their friends, into a teacher-directed, behaviour-based seating plan:

Mere: Well the teachers just move you away from your friends if you are talking too much when you should be working.

Student participants expressed negative feelings (such as 'punished') about these types of seating plans, when they felt isolated from their friends (such as 'blocked'):

Neve: I don't like seating plans; it makes me feel like I'm being blocked from people I like.

Mere: Like blocked from your friends.

Neve: Yeah and like I feel punished to have to sit there or something. Even if you weren't the one misbehaving.

The negative feelings students associated with teacher-directed seating plans could manifest in students consciously behaving uncooperatively (see also Section 5.1.2):

Mimi: We rebel against seating plans. They can separate us but it doesn't work. Other teachers hate us because our class is so crazy.

Maci: I don't care when they move me cos I just yell across the classroom anyway. You're going to talk wherever you are.

Mady: And you'll just communicate across the classroom to your friends because that's more like fun.

Maci: And that's even more distracting to the kids. That's what I do, and I like to do big hand signals across the room to my mates if I get blocked from my friends.

The findings in this section have revealed a student awareness of how seating plans can influence their classroom learning behaviour and conduct, in both positive and negative ways. Findings also indicate that students understood reasons why teachers, including the study teacher previously, had implemented seating plans (such as for classroom management). The study teacher's implementation of seating plans will now be discussed.

Students in the study class were required to sit as per a seating plan implemented by the study teacher at the beginning of the school year. This was a directive from the Head of

the Kikorangi College Mathematics Department. During the several weeks preceding Year One of the study commencing, the teacher had reflected that although her implementation of a teacher-directed seating plan during the first few weeks of the school year had appeared to facilitate a more settled classroom, this seating plan had required frequent adjustments. The adjustments were made when the plan was perceived by the study teacher to no longer be fit for purpose, and didn't seem to 'be working'. Moreover, with frequent requests from students made to the teacher to negotiate a change to their assigned seating position, seating plans were troublesome to monitor. In response to this, at TP3 the study teacher changed the physical desk arrangement in the classroom from paired-desks in rows, to groupings of six desks spread around the classroom. Students were permitted to select a position within their preferred desk grouping, where the teacher intended they would remain for at least the duration of term two. The proviso for the student-selected facet of the new seating arrangement was that students were asked to choose a position that would positively benefit their learning. The study teacher noted increasingly cooperative student behaviours following TP3 (Sections 5.1.2 and 5.1.7; Table 5.2). A reduction in purposefully disruptive student behaviours such as shouting and hand signalling across the room was not unexpected (see student comments in the above exchange), and the reason behind this reduction in disruptive behaviours was explored:

Teacher: You are sort of in a seating plan in our classroom which you've said you rebel against, so why are things going so well?

Mere: Well I don't mind too much about a seating plan if it helps me and makes my learning easier.

Mere: Yeah, we like the ones in here so we don't mind.

Teacher: Why? What is the difference?

Maci: Well we got to choose them and sit with our friends.

This exchange suggests that students were perhaps willing to act cooperatively in seating plans if they had some say in the arrangements. Students were also asked to share their

perspective on why sitting with their friends in the study class was not resulting in the temptation to participate in 'too much' off-task talking:

Well you monitor our seating choices and if it's not working we have to sort it out between us, or we know that you might ask us to choose another spot.

This student comment indicated that the students were aware of the teacher's high expectation; they held the responsibility for ensuring that their self-selected seating plan was productive in terms of their learning. The teacher holding these high expectations of student learning behaviour and conduct will be discussed further in Section 5.1.7. Next, benefits of students participating in interactions where students assist one another with their learning will be discussed according to two roles students assumed within this interaction.

(i) Benefits to the student assuming the role of a learner

The following three interview excerpts help illustrate benefits students perceived they gained when assuming the learner role, in a student–student teaching and learning interaction. Benefits were described in terms of acts of the learning, and of the emotional feelings students experienced when they were 'working with people they like':

Excerpt 1:

Teacher: Why does it help you when you are the learner and another kid steps up to be your teacher?

Mazz: Because it helps with the way they explain stuff.

Neve: It's kind of like they are giving you the things you need instead of the teachers.

Mali: They put it all into kid language.

Mazz: Yeah.

Neve: It's like sometimes I'm not understanding the questions too.

Mazz: Yeah cos some words might be a bit complicated.

Mali: Like the word circumference.

Mazz: Yeah stuff like that.

Excerpt 2:

Teacher: You've said you like me encouraging the class to ask the students they sit by for help, does that help your learning?

Mady: Yeah because they understand the question in a way that we would.

Mimi: Yeah so they can explain it to you in a way that you would understand it.

In terms of their learning, students appreciated that other students could understand and explain mathematical vocabulary and mathematical problems in a similar way that they themselves would. This seemed to be related to the vocabulary students used with each other, during this interaction (that is, uncomplicated terminology). The next excerpt illustrates emotional benefits to the student assuming the learner role:

Excerpt 3:

Mere: In here [the study class] we get to sit with our friends rather than sitting with people who we don't like and it motivates us to learn because when we sit with people we like we can say what we think about the learning. You know other people might have got it wrong too and that makes us feel OK.

Nell: We don't feel stink if we're happy with asking students we like for help cos they might have got it wrong too. That makes us feel better about ourselves.

In terms of their emotions and feelings, students appreciated that they could freely share their learning struggles with other students, particularly those they perceive may have also struggled with the same concept. This sharing opportunity appeared to ease feelings of shame and embarrassment previously associated with publicly asking the teacher for help. It seems that such positive feelings may be associated with students productively engaging in their learning ('it motivates us to learn'). Positive feelings enhancing engagement in learning is consistent with literature reviewed in Section 2.2.2.1.

Students were asked to share their ideas about considerations teachers should make when designing seating plans, in terms of facilitating students being positioned to maximise productive student–student teaching and learning interactions. Students stated that while it was important to sit with their friends, sitting with students who could benefit their learning was also important:

It helps more if you're not as smart as the others in your group.

Well it's actually better to have people who are smarter than you 'cos they can actually help you so it's worth it.

If you are the same level as other people at your table it won't help you get anywhere.

This section indicates that students-as-learners were aware of physical and cognitive criteria that needed to be met in order for their interactions with other students to be productive, so that they gained learning benefits. ATP survey results indicated that students in the study class were receiving learning assistance increasingly often from one another, as the study progressed (Table 5.5). This survey data was examined in combination with teacher reflection to highlight teacher actions that may have coincided with any observed positive response shifts.

Table 5.5

Student Responses to ATP Survey Question: Another Student Helped Me With My Learning Today'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	9	10	9	8	5	5	5	10	5	9	3	11	2	11	4	9	42	73
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		47	53	53	47	50	50	33	67	36	64	21	79	15	85	31	69	37	63

At the start of study week four (TP3), there was a shift from almost equal frequency of positive and negative responses regarding students learning from other students, to a case where the number of positive responses was at least double the number of negative responses. This shift coincided with desks in the study class desks being moved into groupings of six. This physical change in the desk arrangements seemed then to contribute to students being located in ways that increased productive student–student learning interactions, reflecting the students’ preference to sit with their friends whom they felt comfortable asking for learning assistance, ‘talking and working’ with people they liked.

(ii) Benefits to student assuming the role of a teacher

Throughout the study, students were asked to identify skills from their current knowledge that they could teach another student, and then record these in their reflection notebook (Figure 5.8; Sections 5.1.1 and 5.1.2).

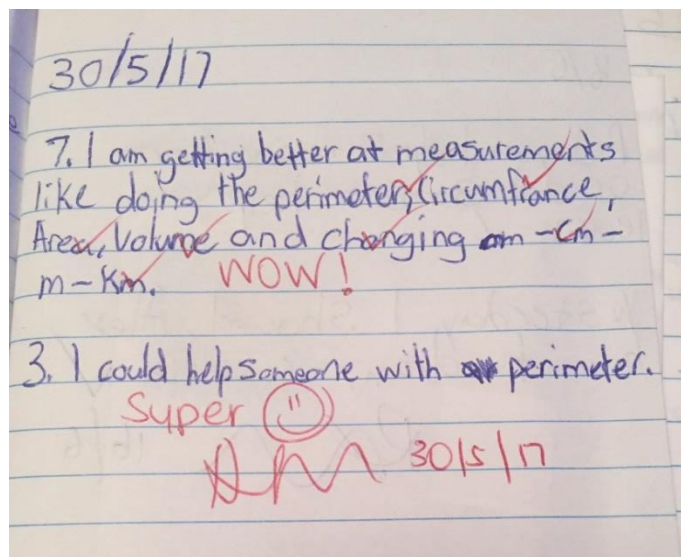


Figure 5.8. Student entry in reflection notebook to identify a skill they felt able to teach to another student

Students were encouraged to share this knowledge with someone at their desk grouping, or to move around the class to participate in this type of interaction with a student who was not seated nearby them. Students shared the benefits of the teaching role following a lesson where students wrote their learning questions on sticky Post-it® notes they stuck on the whiteboard to signal to class 'learning helpers' (Section 5.1.2) that they required assistance. The use of sticky notes was a student suggestion that was subsequently implemented:

Mali: Nita's question was a bit of a tricky question that nobody else could answer by themselves.

Neve: It was kind of a group thing, like us as a group helped her.

Nita: And like, so the people that helped somebody in our group, well they learned something too about how someone else did it.

Students recognised that, by cooperatively solving a mathematical problem, where students contributed according to their ability, students assuming the teacher role were actually learning alongside the students acting as 'learners'. Another benefit of assuming the role of the teacher was highlighted during the same interview where Mazz shared her experience of contributing to the above example of cooperative teaching of a mathematical concept, to Nita:

Mazz: Yeah well I learned something today!

Teacher: Mazz, what did you learn from being a learning helper?

Mazz: I learned that I didn't actually know how to do that question.

Teacher: Did you think you knew how to do it before you tried to show Nita?

Mazz: Yes.

Teacher: How did realising that when you were teaching Nita help your learning?

Mazz: Well I learnt it because we both got confused and asked you for help and you came over and we went through it together.

Mazz had attempted to teach a concept to her friend, Nita. In the process, Mazz became aware that her own learning was not yet at the level required for her successfully to assume the teacher role in this interaction. This awareness was a learning benefit to Mazz, as the students involved in this interaction then requested and received appropriate help from the study teacher. In doing so, both students strengthened their mathematics knowledge ('I learned it when you came over'). Further exploration of this finding could investigate whether students working in groups were more likely to openly request teacher assistance, compared to students working independently either through their own seating selection, or teacher directed seating.

Students assuming the role of the teacher, however, this time teaching the whole class by explaining their mathematical thinking aloud while writing their solution to a Fast Four problem in the whiteboard, also perceived learning benefits from this activity (Section 5.1.1.iv):

Well when [male student] was telling us all how to do the triangle [area], he forgot to halve the answer at the end so [female student] stepped up to be his teacher. It's like getting feedback on your thinking as you go.

In this case, a student who had partially mastered a skill was assisted to full mastery by another student, following the real-time sharing of his mathematical thinking in a student–student interaction involving the whole class.

ATP survey results showed students-as-teachers were increasingly providing learning assistance to other students, as the study progressed. (Table 5.6). This increase could reasonably be expected to be a culmination of the teacher practice actions discussed so far in this chapter (Sections 5.1.1–5.1.3), for encouraging students to teach one another.

Table 5.6

Student Responses to ATP Survey Question: 'I Helped Another Student With Their Learning Today'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	9	10	9	8	6	4	4	11	3	11	4	10	4	9	3	10	42	73
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		47	53	53	47	60	40	27	73	37	63	29	71	31	69	23	77	37	63

As in Table 5.5, there was a positive shift in students teaching other students. For the first three weeks of the study there was an almost equal frequency of positive and negative responses; then from TP3, when a student-selected seating arrangement was

implemented, the positive responses are at least double the number of negative responses. As students teaching and learning from one another included those observed to occur interchangeably, particularly highlighted in the previous three student exchanges and comments, the similar survey results observed in Tables 5.5 and 5.6 were not unexpected.

As discussed so far in this chapter, teacher reflections noted that classroom management was becoming less time consuming. This trend was indicated by the decreasing frequency of teacher interventions occurring in response to off-task, or otherwise uncooperative, student behaviour. The teacher also noticed that this seemed to coincide with students engaging in student–student teaching and learning interactions more often than they had before the study commenced, and prior to TP3 (Tables 5.5 and 5.6). The following student–teacher exchange with the Year 10 study class lends support to this coincidence:

Maci: I care about the other people in the class helping other kids learning.

Teacher: Do you want everyone to be learning?

All: Yes.

Teacher: Why is that?

Nell: Because if there's one person who isn't learning and they start talking about other stuff that's not maths and then you get interested in it then you get off track and you don't learn.

Nova: Some teachers say “hurry up and do your work, you need to get onto your work so stop talking”. But we only talk because we don't know how to do the work. They should help us instead of growling.

Mady: Some teachers don't let us talk and we get a growling but we are just asking for help and not being naughty. You let us help each other and don't mind us talking about our work.

Following this exchange, the study teacher asked the whole class for their perspective of students teaching one another, and their off-task behaviours. This was carried out via a spontaneous polling-type activity:

Teacher: Can I get a show of hands, say you were off task...

Mika: We would never [be] off task, Miss!

[laughter from the teacher and students]

Teacher: True, OK well let's just *pretend* then, if you ever were off task which I know would never happen, Mika, would it be because you don't know what to do next on your maths learning?

[All students raised a hand]

Teacher: Do you behave and focus better if you sit where you want to sit?

Nell: Yeah because we're not shouting out heaps across the room because we hate seating plans.

Maya: Yeah that's what happens and then we get even noisier than before.

Teacher: Do you mean that it's a benefit to all students if everyone can help each other? Does that mean they can stay on track?

Nell: Yeah because you can't talk about other stuff to someone if they are engaged in their work. So if I want to talk and waste time I can't talk to them because they're doing their learning cos they aren't going to talk back and like get off task with me. So I have no choice but to do my learning.

From these comments, it would seem that student engagement leads to further student engagement, which then apparently tends to contribute to an increasingly cooperative and learning-focused classroom.

This section has indicated that students-as-learners were able to position themselves in relation to other students in the classroom, to meet their preferred physical and cognitive criteria for productive learning. These criteria included sitting with students they felt comfortable with, and who held mathematical knowledge they could draw on, respectively (see also Section 5.1.2). Students were able to cooperate with the teacher to have these criteria met; this cooperation included student input into a seating plan, in which their teacher placed the responsibility for making it 'work', if the students were to retain their preferred position, on the students themselves. The teacher demonstrated this through actions of high expectations of student conduct (see also Section 5.2.7). By learning from

another student, students benefited from student perspectives of problem solving offered; by teaching another student, benefits included an opportunity to monitor, reassess, and increase their own mathematical understanding. The role of teacher and learner appeared not to be mutually exclusive, but rather fluid at times, within an interaction where students assumed interchangeable roles of teacher and learner.

The study teacher's actions contributing to encouraging students to teach and learn from one another appeared to result in fewer students' off-task behaviours, compared to the situation at beginning of study. This increasing student cooperativeness with the teacher in turn appeared to have facilitated increased learning focused behaviours among the students. Further associations between cooperative student behaviour being demonstrated have been implicated in previous sections of this chapter, and these associations have been implicated in previous studies (Chapter Two). For example, this student behaviour–teacher actions association has been noticed where a teacher's practice sees students experiencing learning that is relevant and delivered at an appropriate pace (Sections 5.1.1 and 5.1.2). Another teacher action associated with student cooperation and learning engagement is the provision of quality teacher feedback to students (Prochnow & Macfarlane, 2011). The study teacher providing feedback to students will be discussed next, as a teacher action contributing to the element of ako-rich practice presented in Section 5.1.4.

5.1.4 Teacher tracks and shares student progress information

In an ako-based teacher practice, information about student progress is gathered by the teacher during feedback and feedforward conversations with students. This information is then shared with education stakeholders, namely the study students and parents in the context of this study. The study teacher's actions that appeared to facilitate the tracking and sharing of student academic information are presented here under two types of stakeholder interaction categories. These stakeholder interaction categories will frame the discussion, which is organised according how students perceived the study teacher (i) gathered, tracked, and shared students' academic achievement information with them;

and (ii) shared this academic achievement information with their parent(s). Parent perspectives and expectations of teacher–parent sharing of students’ tracked information are presented in Chapter Six.

(i) Teacher sharing of teacher-tracked student achievement information with students

In this study, students’ academic progress was tracked and shared during feedback–feedforward conversations where information was gathered to inform students’ next steps in their learning pathway (see also Section 5.1.5). These ‘conversations’ could be verbal or written and involve the whole class or individual students (see Section 5.1.2). Specifically, student–teacher *feedback* conversations were held first to track and share information that provided a picture about students’ achievement to the present time. Then, in *feedforward* conversations the previously gathered feedback information was used to outline and plan the students’ future learning pathway steps. Study teacher actions that demonstrated tracking and sharing of students’ mathematical progress information during feedback and feedforward conversations spanned three consecutive stages encountered during a unit of learning: the beginning stage where a topic is introduced and prior knowledge is evaluated; the middle stage where most of the new content is taught and learned and current learning is gauged; and the final stage where student knowledge is measured using revision activities and summative assessments. These three stages did not have sharp demarcations and will therefore be presented together in this discussion. Actions by which the study teacher provided students with feedback and feedforward are highlighted.

At the beginning of a unit, students’ prior mathematical academic knowledge was evaluated, shared with, and tracked by the study teacher during polls, student–teacher discussions, and reflection notebook entries. Feedback regarding students’ academic achievement included the acknowledgement of students’ prior knowledge they had carried over from previous years and more recent lessons. Feedforward then involved student–teacher discussions where students’ prior knowledge was valued through teacher actions demonstrated by a student-responsive lesson pace to progress the students’ learning pathway, teacher attendance to individual students’ weaknesses in

knowledge identified during knowledge sharing, and encouraging students in sharing knowledge strengths with one another, to strengthen required knowledge (see also Section 5.1.1).

During the main body of a unit of learning, students' academic achievement was tracked via the student–teacher sharing and teacher valuing of students' current knowledge in several ways (such as tracking sheets and reflection notebook entries, teacher polls and observation, and student–teacher discussions). Feedback was gathered regarding the concepts and activities students were confident or not confident about (such as Figures 5.5–5.7). Feedforward then involved student–teacher discussions about areas where student knowledge needed to be strengthened through requests for learning assistance and identifying knowledge that students could share to assist other students (and, in doing so, assist their own learning). Students' achievement was praised by the study teacher and shared during parent–teacher interactions. Year 10 students required their teacher to make communications with parents overtly positive, otherwise the students could experience negative feelings (see also Sections 5.1.2 and 5.1.3).

At the end of a unit of learning, student progress was tracked using revision activities that preceded a summative assessment. Summative assessment tracking information was shared with students' parents. This end stage of a learning unit will form the rest of the discussion within this student–teacher interaction stakeholder category (5.1.4.i).

Students' academic achievement progress was tracked prior to summative assessment through revision activities such as skills worksheets and assignments, students testing one another using revision flashcards, and by creating summary posters. During these revision activities, students gathered information to reflect areas of learning confidence and uncertainty. This evaluation information was shared with the study teacher during feedback interactions. These interactions occurred verbally or in written formats (Sections 5.1.1 and 5.1.2; Figure 5.5):

Nate: I think the notebooks are a good idea to tell you about what I still need to learn when we are nearly finished a whole topic.

Nash: Yeah. It's more simple to write it down than say it or remember it all.

Noah: It gets you to really think about what you need to learn for the test and then we can ask you stuff.

Mika: It helps to write it down because paper isn't as jumbled as your brain, you know?

Students found the written format most helpful to organise their feedback information to track their knowledge, in order to share it with the study teacher. In terms of students tracking their own learning, most ATP survey data (108 out of 115 responses) show that students in the study class were aware of how successful their learning had been during lessons (that is, information they could discuss in feedback student–teacher conversations) (Table 5.7).

Table 5.7

Student Responses to ATP Survey Question: 'I Know How Successful I Was With My Learning Today'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	2	17	3	14	0	10	1	14	1	13	0	14	0	13	0	13	7	108
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		11	89	18	82	0	100	7	93	7	93	0	100	0	100	0	100	6	94

Study students articulated their high expectations of the timeliness of their teacher's actions, following revision and then the formal assessment around summative assessment tasks. Students articulated that they expected their teacher to share the summative feedback tracked at the final stage of a unit of learning, in a timely fashion. The ways this timeliness could be demonstrated include prompt marking of assessments, followed quickly by verbal acknowledgement and discussion of their grades, and then the prompt entry of their grades into the student management system. When the teacher was providing information about grades during a feedback discussion it was important to the

study students that these feedback–feedforward discussions were judgement-free, and that student questions were welcomed:

You don't roast²⁵ us when we ask a question about it. You talk to us about what it [the assessment grade] looks like we still need help with and how to improve and there is no judging.

The types of feedforward information that study students expected at this stage of a unit of learning included ways in which they could improve on their grade, the next time they studied this topic.

Feedforward conversations occurred throughout units, and the majority of ATP survey data (103 out of 115 responses) show that students in the study class were aware of how they could improve on their learning in future mathematics lessons (Table 5.8). This data could indicate that the verbal and written feedforward provided to the study students by their teacher was fit for the intended purpose of informing students how they could improve their mathematics learning. Specific details of the process by which students learning pathways were co-constructed during feedforward conversations will be discussed in Section 5.1.5.

Table 5.8

Student Responses to ATP Survey Question: 'I Know a Way I Can Improve My Learning Next Time I Have Maths'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	2	17	5	12	1	9	2	13	1	13	1	13	0	13	0	13	12	103
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		11	89	30	70	10	90	13	87	7	93	7	93	0	100	0	100	10	90

²⁵ To criticise someone harshly, bringing up their flaws and their shortcomings.

(ii) Teacher sharing student achievement information with students' parents

Student interview data confirmed that study students were aware that their parent(s) were interested in receiving information about their child's mathematics learning:

My parents always ask about my maths.

My mum [is] always interested in my maths learning.

My mum and dad are constantly always asking about all my work at school and I talk to them about maths.

Furthermore, students shared the *types* of information parents would like to have shared with them, regarding their child's mathematics achievement:

Well my mum and dad would ask about what I could work on and how I can improve anything better.

They always want to know my grades and stuff.

ATP survey data showed that at least half of the students who completed the survey at each time point responded positively to a statement indicating that their family had asked them about their mathematics learning during the surveyed week (Table 5.8). The family initiated sharing of mathematics achievement information remained fairly constant throughout the study.

Table 5.9

Student Responses to ATP Survey Question: My Whānau/Family Asked Me About My Maths Learning in the Last Week'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	7	12	7	10	2	8	4	11	5	9	4	10	3	10	4	9	36	79
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		37	63	41	59	20	80	27	73	36	64	29	71	23	77	31	69	31	69

Students identified two types of interaction in which their study teacher demonstrated the sharing of students' academic achievement information with their parents. This next part of the discussion is organised according to teacher actions that facilitated the sharing of student achievement information with parents, followed by student appreciation of these teacher actions. The two types of interactions discussed involve interactions between: (a) students and their parent(s); and (b) the teacher and the students' parent(s).

(a) Teacher facilitated sharing of student achievement information, by students communicating with parents

In student–parent interactions, the study teacher encouraged students to share positive information about their tracked mathematics knowledge, such as mastery of a mathematical skill. One way such positive information was shared was through interactive homework tasks. These homework tasks included the student sharing a skill with their family, such as identifying right angles around the house. They also included students sharing their summative assessment grades, along with perhaps sharing one way they know they could improve their summative grade 'next time', with a family member. ATP survey data showed that on average, around 70–90% of respondents indicated that they talked to their family about their mathematics learning during a school week (Table 5.9).

Table 5.10

Student Responses to ATP Survey Question: 'I Talked to My Whanau/Family During the Last Week About My Maths Learning'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	5	14	5	12	1	9	3	12	4	10	4	10	2	11	2	11	26	89
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		26	74	29	71	10	90	20	80	29	71	29	71	15	85	15	85	23	77

(b) Teacher facilitated sharing of teacher-tracked student achievement information, by the teacher with students' parents.

Students' appreciation and expectations of their teacher sharing their academic progress information directly with their parents will now be discussed. Students reported that when positive information about their learning was shared with family members, following tracking by their teacher, they felt smarter than they did before the sharing occurred:

It makes you feel smarter than in the last lesson.

I feel like I'm smarter and because I actually taught my family something that I they found out I knew.

These comments indicate that students perceived sharing of their teacher-tracked knowledge at home was a benefit to their self-confidence as a learner.

(b) Teacher facilitated sharing of teacher-tracked student achievement information, by the teacher to students' parents.

During this part of the discussion, the Year 10 students' preferences shared in the second week of Year Two for teacher actions when contacting home are assumed to have been responsively incorporated into the study teacher's practice (Section 5.1.2.v). Student

participants were able to articulate benefits ('acknowledged', 'hope', 'parents say they are proud of me') they perceived for themselves, when the teacher shared their academic progress information with parents:

It makes you feel better and acknowledged.

It makes my parents say they are proud of me.

It gives you hope you might pass the year if you and your mum know you are doing well with learning.

Students stated that, while their parents would probably want to speak directly to the teacher, busy lives meant this may not be possible during the day:

My parents might not be able to see you during the day because my sister sleeps at lunchtime.

My parents would like to see you but they are really, really busy.

There's certain days that my mum and dad won't be able to talk to you because my mum works in Wellington. She can't come in [to school].

Students perceived that their parents' childcare and work commitments might prevent them from speaking with the teacher, at least during the school day. Consistent with data gathered from parents, most students said that their parents would most likely prefer an email from the teacher to report their progress (Section 6.2.1.2 and 6.2.1.4). Two students stated that their parents did not often check their email. These students stated that a phone call to their parents would be most preferable.

Findings also suggested that students were aware of the types of information their parents would appreciate from their teacher. Furthermore, students were able to state their perspective of the specific details of types of information teacher communications to their parents should include:

Nova: It's like on the emailed reports, the teachers just copy and pasted everything and I think they just changed the name each time.

Mady: Yeah, I looked at Mere's and it was exactly the same as mine, just the name was different.

Teacher: What do you want to see in your reports that get emailed home then?

All: The truth.

Nova: Details.

Maci: I don't want "she could progress in math" for example. I want what type of math, like algebra.

Nova: Another time we didn't go to parent teacher interviews. Mum just emailed all our teachers because I don't think they actually even knew who we were last time when we went.

Mady: Yeah same. My teacher didn't know what my name was after three terms.

Mimi: Teachers should use my full name as well. My dad hates when my name gets shortened.

Nepa: Real important to use my name, because then it's like the letter is personally for you.

Mika: Real important to use my name so the parent knows who you are talking about. They might have other kids at the school or you might live with your Aunty or something.

This exchange highlights that students perceived honest, individualised, personalised, and specific information about their learning was desirable and useful for their parents to receive (Sections 6.2.1.1 and 6.2.1.4). Teacher honesty was a theme that students raised specifically in discussions about parent–teacher sharing information about students' mathematics grades:

Well my mum and dad wouldn't say they want me to get all Excellences in maths. They want how I can do better in maths, but in a fair way so I got what I deserved to get so I know what to do next.

Even if it is disappointing me and my mum will be glad we know my grades because you know how I used to get Achieves in maths? We know that and then I come up to you and asked you what I needed to do to get a Merit.

The two previous comments show that students expect their teacher to report their grades honestly in feedback conversations, so that students and their parents can be made aware of means to improve their child's learning. Students specifically articulated that they want their teacher to let their parents know if they were struggling in mathematics, sooner rather than later:

A teacher should contact the parents when a kid is struggling. Early, maybe the second time that you are struggling. Tell the parents what the kid is struggling in so they can get you help.

Most students were aware that their parents were unable to assist them with their mathematics learning if they were struggling (such as 'they can *get* you help'). Further comments stated this more explicitly:

My mum knew that I was doing like an assignment because you'd told her that I'd started it in your email. So when I went home and I was stuck on things I asked my parents and they knew nothing about it, and I was like "you learned maths as a kid so you should know", but they didn't.

I asked my parents to explain it to me and they were like, "What? Oh my God!"

I hate it when you go to ask your parents something about maths and they go "the maths has changed since I was little" and it's like, well that doesn't help me.

Due to a lack of student-perceived parental mathematical ability, students expressed that that some advice from the teacher on how their parent may assist them would be welcomed:

If you're stuck on something and your parents can't help you then perhaps they could email you.

The teacher should tell the parents how we need help. Like maybe getting you a tutor.

Students perceived that teacher honesty about student struggles was required for their parents to be aware that some learning support is required, and furthermore could be arranged or provided collaboratively, with the teacher. However, honest teacher communication about students' learning struggles with suggestions for help were not the usual experience of the participants with other teachers:

I was struggling another time in maths and my mum didn't get an email or anything. If they knew they could have tried and figured something out with that teacher or got me a tutor or something.

Another time I was doing really badly but my teacher said I was doing fantastic when he talked to my dad. It was pretty funny really, but it didn't help my learning.

Another time I told my parents I was struggling but the teacher told them that I wasn't but I kept failing my tests though. The teacher said heaps of random stuff and it wasn't helpful. They should have told my parents I couldn't do my work and told them ways to help me.

Students felt that other teachers may withhold honest feedback about their grades, to not appear to be doing their job poorly:

Teachers should tell my parents that I'm failing but they probably wouldn't if they know that I'm struggling and they hadn't done anything to help me in time.

I've had a teacher that tried to make herself look like a real good teacher but half the class were failing and she said everyone was like passing.

Teachers lie to make themselves look better but it makes the kids feel bad.

Moreover, students indicated that they perceived if the teacher was not honest about student grades that the teacher did not care about students' learning and so the teacher 'gave up' on them:

Teachers don't want to look bad 'cos they haven't taught you properly. If they actually cared and wanted to help you learn they wouldn't need to lie.

If they say that I'm doing fine but I'm not even passing then there's no point in even trying because they don't care so I just do nothing in class and I get away with it.

If the teacher doesn't care about my learning getting better then why should I try?

When students perceived that another teacher did not care about their learning, they seemed to be more likely to become unmotivated and disengaged in their learning (Averill & Clark, 2006).

ATP survey data showed that the study teacher appeared to demonstrate care for students in her practice, from the outset of the study (Table 5.11).

Table 5.11

Student Responses to ATP Survey Question: 'My Teacher Showed She Cared About Me Today'

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	4	15	6	11	2	8	1	14	0	14	0	14	0	13	0	13	13	102
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		21	79	35	65	20	80	7	93	0	100	0	100	0	100	0	100	11	89

Between TP0 and TP3, 65–80% of respondents perceived the teacher showed care for them. Positive responses increased to 100% from TP4 onwards, indicating that teacher care for students was more frequently demonstrated. This teacher care could be in the context of their learning, or their personal lives; this distinction was not made in the survey. Further study could provide this distinction. The notion of care for the learning component of this demonstrated teacher care could perhaps be further highlighted, however, by ATP survey data in Table 5.11 (see also Section 5.1.6). This data showed that the study students perceived the study teacher did not give up on their learning (112 out of 115 responses were positive). As teacher care is implicated in this study and others (see, for

example, as facilitating students to ‘care’ about their own learning, the similar findings in Tables 5.11 and 5.12 are not unexpected. A student-drawn definition of their teacher not giving up on their learning would allow further exploration of this finding.

Table 5.12

Student Responses to ATP Survey Question: ‘My Teacher Did Not Give Up on My Learning Today’

Survey time point ATP Qn 2 (i)		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	1	18	2	15	2	8	2	13	1	13	0	14	0	12	0	12	3	112
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		6	94	12	88	20	80	13	87	7	93	0	100	0	100	0	100	3	97

Study students appeared to be aware of their mathematical progress through their own tracking, which was shared with and then also tracked by their teacher during feedback conversations (see also Sections 5.1.1–5.1.3). Teacher-facilitated sharing of student progress at home, by students, resulted in positive student feelings (such as ‘acknowledged’, ‘smarter’). An awareness that their parents were interested in their learning was apparent among study participants; however, most students were aware that their parents were unlikely to be able to help them with their mathematics learning. Students expected teachers to provide them and their parents with honest and timely feedback, specific to individuals, which also included feedforward on how the student might be assisted to progress their learning. Students expressed that their teachers should be responsive to their parents’ busy lifestyle and communication preferences when contacting home. Students perceived that, when teachers took the time to assist them to progress with honest feedback, their teacher cared and as a result the students were more inclined to engage and make an effort with their learning.

Student awareness of their progress information tracked and shared provided the study students with a knowledge of specific ways the teacher could attend to their learning

needs (Sections 5.1.1–5.1.3). This awareness was used as the foundation to co-construct their learning with the teacher and is discussed next (Section 5.1.5).

5.1.5 Teacher co-constructs learning

In an ako-rich classroom environment, students' learning pathways are navigated with consideration of deliberate, reflective, research-based decisions made by the teacher, alongside student (and parent; Section 2.3.2; Chapter Six) input. Teacher–student feedback conversations appeared to help facilitate tracking of student progress (Section 5.1.4) and provided information that could be used to contribute to feedforward, a practice that resulted in the co-construction of students' learning pathways. The purpose of the co-construction was to responsively set the direction of the 'next-steps' of students' learning pathways. Student–teacher co-construction of learning pathways consisted of the following study teacher actions: teacher-gathered *research* based on classroom feedback evidence; *reflective* consideration of students' current knowledge; then, *deliberate* teacher decisions for how learning pathways could proceed (feedforward). The three italicised teacher-action components of this ATA element of co-construction organise the discussion of this element, according to reasons the students appreciated in co-constructing their learning pathway, and ways this element was demonstrated within the study teacher's practice.

Through conducting research, teachers can gather information to inform their reflective practice in several ways. Classroom sources of information include student voice (such as reflection notebook entries, discussions), summative assessment data, and teacher observations of students (Sections 5.1.1–5.1.4). Sources of research outside of the classroom include reading journal articles, attending professional learning sessions and conferences, and sharing information with colleagues. This discussion will focus on the types of research the teacher drew on, gathered via student voice.

The study teacher purposefully practised the action of holding learning conversations with students to gather research information on learner needs, from the learners themselves

(Sections 1.3 and 2.2.2.2). The increasing occurrence of these discussions was reflected in ATP survey data (Table 5.13).

Table 5.13

Student Responses to ATP Survey Question: ‘I Had a Conversation About My Learning With My Teacher Today’

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	10	9	11	6	4	6	6	9	5	9	3	11	0	13	3	10	42	71
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		53	47	65	35	40	60	40	60	36	64	21	79	0	100	23	77	37	63

During the first two time points surveyed, the negative responses outnumbered the positive responses. Following the implementation and development of student-preferred ways of sharing their learning with the teacher during TP2, the positive responses became more frequent (Section 5.1.2). Students reported that when they had a learning conversation with the study teacher, they could feel encouraged to share their view on her practices, making suggestions to make their learning more responsive (such as ‘what they like’):

You ask the class, “what would be most helpful for us to go over today”, and “what do you want to do next time?”

Asking "is it me" when the class is off task or feeling flat. You ask what you or us need to do to get back on track and then you change it up.

We decide together when the assessments should be within the assessment week like around our other courses, time of day, events going on already at school. And our assessments coming up in other classes.

Students showed an awareness that the teacher took their suggestions into account, and altered her practice reflexively (such as ‘then it can change’, ‘you change it’):

I reckon it's a good idea to ask us about our learning because then it can change how we do our learning. It's hard to explain but if I say I don't like the learning then you do something to make it fun and better. And I think it's a really good idea to be honest.

Well I reckon we are happier in here because you talk to us and you know how we like learning and what we don't. If we say we don't like something then you change it.

You know what we are thinking about in here and what would we want to do. I don't even like maths that much but I like being in here because you make our learning fun.

Students reported positive feelings as a result of the teacher aligning her practice with their suggestions (such as 'fun and better', 'happier in here', 'like being in here'). Co-constructing their learning pathways with the teacher appeared to portray a sense of sense of student–teacher sharing of decision-making power in the classroom, according to the students. This practice appeared to encourage student engagement and facilitated a classroom environment where students made conscious decisions to cooperate with their teacher:

With you asking if people want to do a type of learning activity or task again or not, it helps us because if some people don't think it's what they like to do then they won't do it and stay on track.

It's not just you standing up at the front being the boss. You ask us what we want and we work together. You work with us so we work with you.

However, co-constructing learning was not an element of teacher practice that the students experienced in classes with other teachers at the study school:

In other classes they don't talk to you and they just do what they think instead of what we want.

Teachers just sit up at their desk have the sheets on their desk and sit there and say this is what you're doing. Full stop.

If I don't like the subject or the topic or something I will tell the teacher and they just say "but that's the curriculum and you have to do that", so not much changes

in the other classes. But you say “just finish it off and we'll talk about it and do something different later”.

Study students could experience negative feelings when perceiving that other teachers did not share the decision-making power in the classroom, for example when the teacher does not appear to involve students in co-constructing a response for lessons (such as ‘anxious’, ‘hate’, and ‘rushed’) (see also Section 5.1.2):

It makes me feel anxious when we are rushed and I freak out.

Those boys are so rowdy because they are smart and they've already finished, then everyone just gets rowdy and we feel like we have no time left because the other teachers will just say well they are finished so why aren't you and then the teacher moves on. They expect everyone else to be finished at the same time and we are not finished so we give up.

I hate feeling rushed. I think well stuff this, then I muck around and zone out. We all do that.

These negative feelings seemed to result in student disengagement from learning (such as ‘give up’, ‘muck around’, ‘zone out’). Furthermore, students shared that they could consciously act uncooperatively in other classes where they were not part of the decision making, which saw them viewing teachers’ practice in a negative light (see also Sections 5.1.2 and 5.1.3).

Positive student feelings have been implicated in increased student engagement and cooperation observed in this chapter (see also Section 5.1.2 and 5.1.3). Study students observed as acting in increasingly cooperative ways articulated why co-constructing their learning with the study teacher had facilitated their positive feelings:

In here we have time to relax about our learning and it isn't stressful. We get no breaks in the other classes and they treat the whole class like they are the same.

I am slow but you help me when I need it so I feel OK.

In here I'm relaxed about it and I have enough time to absorb and process what you tell us, and I can actually think.

We feel relaxed in here because we have time to listen and process. Other teachers put up slides or writing really fast and they say note this down, jot this down. I don't know what I'm even writing down and I'm so stressed.

When you let us have control over how we learn I feel confident and on top of my learning. I understand where I am at and you let us focus on one thing at a time.

These comments highlight that sharing control over, or co-constructing, their learning, could result in students experiencing positive feelings in the mathematics classroom (such as 'confident' 'isn't stressful', 'relaxed').

Students shared ways they perceived that the study teacher made her reflective practice overtly deliberate in nature to them:

You explain how many lessons we have for a unit, how many you'll spend on learning each thing and the assignment and assessment so that we know what we are doing and why.

By explaining why the order is [that you present a unit it] 'cos it might be different to what my friends are doing in other classes for the same course. But then we know why.

If I don't see the point of what we are doing in a topic or a subject my attitude isn't that good to the teacher.

Students appreciated knowing what the teacher had deliberately planned, and why those plans were made. This section has showed that when students perceived that they had input into the learning pathway, and therefore some control over classroom practices, they were inclined to be positively engaged in their learning and behave in a cooperative manner. This section focused on the teacher considering students' self-knowledge of their learning preferences: their cognitive self. The next section will focus on ways the study teacher made reflective and deliberate decisions about learning pathways through her research of another aspect of students' self-knowledge: their personal identity, including their ethnicity.

5.1.6 Teacher encourages representation of student culture and identity

A student's culture was defined as the combination of aspects such as their ethnicity, personal characteristics, and interests (Sections 1.2 and 2.2.1). Students' perspectives of the study teacher's practice of representing their cultures in the classroom are presented in this section. There will be a focus of including how this ako-based element in a teacher practice can convey teacher care (see also Sections 5.1.4 and 6.2.1.1), promoting positive feelings for students and parents. First, teacher actions that facilitated the representation of student cultures will be discussed. Actions which seemed to facilitate a feeling of student comfort in expressing their culture and personal identity in their learning will also be discussed. The reasons these actions were appreciated by study students will also feature. Then, in the second part of the section, a focus will be placed on ways students perceived the study teacher could respectfully represent the *ethnic* dimension of their culture(s) in the classroom.

Students reported that they felt comfortable 'being themselves' in the study class. This was articulated in student comments such as:

You don't have to pretend to be someone you're not in here.

In here you let people just be themselves.

Students expressed their appreciation of being able to share their feelings about 'anything' with the study teacher, due to being able to 'be themselves':

Nova: You make it feel like we can talk to you or ask about anything because you won't judge us or anything which is good.

Mady: Or maybe she just doesn't judge us out loud!

[laughter from group]

Maci: Cos you give this vibe and it's like you care about us and it's not fake.

Mimi: I think it's because you understand us as well, more than the other teachers.

Teacher: What do you mean by 'us', because you're all quite different.

Mimi: Teenagers.

Nova: Yeah I don't know how [a[another teacher] is, that teacher understands us, I think.

Teacher: They're about my age.

Nova: Oh Miss, that's quite young!

[laughter from group]

Teacher: Wow! thanks, Nova!

Nova: You're just like another mum to us. Our school mum.

Maci: You're not putting on the whole "I'm going to be nice to you so you help me", you really want to do this effort for us.

Mady: If the teacher cares about you then you'll sort of, well, like the subject more.

In this exchange, the study teacher's honesty and effort were linked to an ethic of care for students. This finding is aligned with the parent perspective discussed further in Chapter Six. In the continuation of the above exchange, students revealed that one way the teacher demonstrated a classroom 'effort' was by representing student identities through the action of displaying their work on classroom walls:

Nova: I think you're the only teacher that puts any effort into their classroom if I'm honest.

Mimi: It's just makes your classroom happy.

Mady: And it's not depressing.

Maci: Not just a blank wall or a closed curtain to look at in here

Teacher: So do you mean that you like having your work displayed in our physical environment? How does that affect your learning?

Maci: It just makes you like have a happier vibe.

Mady: And it makes you want to actually do the work for the day.

Mimi: Yeah.

Maci: Yep, so where's my artwork up there?

[turns around smiles and points to her work on the classroom wall, the other students look too]

Maci: Rather than just walking in and it's just boring right from the start and I just think I don't want to be here.

These students articulated how physical displays of their work contributed to their increased engagement in their learning, due to the positive feelings they experienced (such as 'happy') when they felt their classroom was visually bright and interesting, which included the contribution to these factors that student work made.

A list of other ways students perceived their teacher encouraged them to express their culture and identity in the classroom was synthesised from interview data:

- Accept students sometimes use humour between each other that the teacher does not find funny;
- Allow students to ask for help quietly and privately about learning;
- Allow students to choose contexts for learning where their hobbies and interests are the theme (such as ethnicity, school sporting codes, or hobbies);
- Allow students to tell you about something they are proud of from home or another class;
- Enquire about students' sporting or cultural activities;
- Recognise what is important to the students at each life stage (such as parties, relationships, licenses, banter, sport, after school jobs);
- Share a joke with students;
- Set aside time to hear stories about students' lives (Section 5.1.2);

- Understand and respond with flexibility if someone is upset, unwell, anxious, having a bad day (Section 5.1.2); and
- Use pronouns and names students prefer (such as gender diverse, full names and nicknames).

ATP survey data had indicated that most students (70 to 90% of respondents) perceived that the teacher valued their culture, and this remained relatively consistent throughout the study (Table 5.14).

Table 5.14

Student Responses to ATP Survey Question: ‘My Teacher Valued My Culture’

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	4	15	2	15	1	9	4	11	4	10	4	10	4	9	2	11	25	90
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		21	79	12	88	10	90	27	73	28	71	28	71	31	70	15	85	22	78

However, despite actioning the valuing of student culture successfully, the positive responses indicating their teacher encouraged students to *use* their culture or ideas to understand their learning were low (around 35% at TP 0 and TP 1) (Table 5.15).

Table 5.15

Student Responses to ATP Survey Question: ‘My Teacher Encouraged Me to Use My Own Culture or Ideas to Understand Today’s Learning’

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	13	6	11	6	2	8	8	7	9	5	6	8	5	8	2	11	56	59
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		68	32	65	35	20	80	53	47	64	36	43	57	38	62	15	85	49	51

At TP2 there was a positive shift, with 80% of student respondents indicating the teacher had encouraged them to use their culture within their learning at that point. Upon examination of teacher reflection notes, it was noted that at TP2 the class had completed an activity where they used measurement skill to design their own bedroom or hobby room that would suit their needs in regard to personal interest. At the same time point, positive responses indicating students had indeed used their culture in their learning also increased at TP2 (Table 5.16).

Table 5.16

Student Responses to ATP Survey Question: ‘I Used Something From My Culture in My Learning Today’

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	14	5	16	1	3	7	9	6	11	3	7	7	7	6	3	10	70	45
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		74	26	94	6	30	70	60	40	79	21	50	50	54	46	23	77	61	39

Although this positive shift was encouraging, teacher reflection notes indicate that this positive shift was unlikely to have included responses regarding students' ethnic dimension of their culture. Next, a single lesson at TP7 targeted for the study teacher to attempt to place an intentional focus on encouraging students to use their cultural knowledge from an ethnic perspective, in a mathematical context, is discussed.

Outcomes of a one-off lesson will now be discussed with the help of data from the ATP survey, teacher observations, and two focus group interview discussions. This analysis was carried out in order to explore the influence of teacher actions on students' perceptions of comfort when using and sharing knowledge about their ethnicity in the classroom. The context of this target lesson was circle geometry. In the immediately previous lesson, the study teacher had noticed that about three-quarters of the study class students appeared to struggle to manipulate a compass to draw circles, when attempting to bisect angles. In response to learner needs, a lesson was planned where students would practise using compasses to create circle-based patterns, inspired by traditional Māori, Pasifika, Indian, Chinese, and Kiwiana²⁶ circle-based designs (see Figure 5.9). Examples of traditional ethnic patterns and Kiwiana designs were displayed around the classroom for student inspiration.

²⁶ Items and icons from New Zealand's heritage, such as rugby balls and kiwifruit.

Figure 5.9. Examples of ethnic-type circular patterns displayed to provide inspiration for students' circle-based patterns in the target lesson at TP7.



Following this pattern-themed activity, TP7 ATP survey data showed that 9 of 11 students responded positively to 'my teacher valued my culture'; 8 of 11 responded positively to 'I used something from my culture in my learning today'; and 9 of 11 responses to 'my teacher encouraged me to use my own culture or ideas to understand today's learning' were also positively responded to. The highest positive responses in Tables 5.14 to 5.16 were seen at TP7. Teacher observation showed that during the target lesson, Mere talked about her whānau involvement in primary school kapa haka²⁷ and mentoring of Māori youth. Mere reported that this was first time she had disclosed such information at school. She chose to share this information with students at her desk grouping (of Māori and

²⁷ The Māori activity of dancing and chanting in groups as an expression of cultural identity.

Pākehā students). In a student interview discussion following this lesson, reasons behind Mere's sharing about the ethnic dimension of her culture were explored:

Mere: I liked the lesson because like it made us think more about like cultural stuff in general like wanting to be motivated to actually do and choose different stuff to do than usual stuff.

Teacher: So did you feel comfortable because I think I heard you talking about kapa haka and how your family were involved?

Mere: Yep. And how mum used to teach us kapa haka for five years but she still does that at my old school cos she does it with my brothers too. She teaches kapa haka there. And she used to take this Māori group and stuff; that's what I was talking about in class.

Teacher: Had you talked about it in school before?

Mere: Nope.

Teacher: What made you start talking about that then?

Mere: You holding up all those pictures [traditional ethnic patterns] kind of like made me think about it more.

Teacher: Did you feel comfortable when you were sharing it?

Mere: Yeah, I loved it. It would be good to sit Otis next time we do this because he's from another country so I could learn more about that.

This exchange demonstrates the activity (using compasses for circle drawing) was a catalyst for students to learn about and from one another about cultures based in ethnicity. Further exploration was pursued about what, if any, teacher actions had contributed to Mere's comfort in sharing her ethnicity with other students:

Teacher: So what happened to make you feel comfortable?

Mere: Like it felt more loose, I guess. Especially seeing you holding all those pictures and stuff. And it was helpful. Like it felt like it was actually

good to talk about stuff like that. It was making it obvious that it was OK to talk about it. If that makes sense.

Teacher: Was there something I did to make you know that I thought it was good to talk about it?

Mazz: You were like real confident about it.

Mere: Yeah.

Mazz: You like came in like really happy and you showed you really wanted to learn our cultures and stuff.

Mere: Yeah.

Teacher: I see.

Neve: Like you were excited to do it.

Mazz: Yeah, and you are so enthusiastic.

Students seemed to appreciate the study teacher's confidence and enthusiasm, identifying these qualities as influencing their experience of positive feelings during the lesson in regard to sharing about their ethnicity (such as 'good to talk', 'OK to talk').

The level of 'teacher enthusiasm' that is acceptable to these students when delivering mathematics content in a Māori context was shared:

Teacher: Even though you guys enjoyed the lesson, I shouldn't try to force people to talk about this, as in make it compulsory to share about your culture should I?

Mere: No, no, no.

Mazz: No way.

Mere: I know most of us will feel comfortable doing it anyway. Because it's different in maths with you.

Mazz: Yeah.

Mere: Like cos lots of our other classes like we just really learn about subject stuff. In here it's different. In here it's like we feel more comfortable.

Mazz: Well maybe the other teachers are not particularly motivated, you know to care about our other stuff we do not at school.

Mere: Yeah they just teach us what they need to teach us to pass and that's it.

This teacher's actions appeared to contribute to students feeling comfortable sharing their culture with others; however, the motivation to share about their culture must initially come from the student (see also Section 6.2.1.1.iii). A deeper understanding of how a teacher could represent student ethnicity, with authentic enthusiasm in mathematical contexts, was shared in another interview, also at TP7:

Otto: It depends on if you actually want to do the activity with our culture in it or not.

Teacher: Me? Or the student?

Otto: No, you.

Teacher: Me. Ok. Would you be able to tell if I was being fake about wanting to incorporate cultures into our learning?

Mazz: If you didn't really put much energy in it maybe you'd look fake.

Mave: I suppose so. If you were sighing when you said about the activity and you didn't care.

Neve: Yeah all boring and flat talking.

Mazz: If you wouldn't show much emotion about it.

Mave: I can't see you being fake to be honest.

[laughter]

Mave: Because you're like the 'surprise lady.

Neve: You're a nice bubbly teacher. You care about us.

These students associated teacher enthusiasm and authentic interest in their personal ethnic identities as a way teacher care was demonstrated. Interestingly, at TP2 and TP7 where the students perceived high teacher value and encouragement to use their culture in their learning, there was a peak in students also perceiving that the study teacher enjoyed teaching them. This was indicated with 100% of the respondents positively answering the question 'my teacher enjoyed teaching me today' (Table 5.17). Teacher reflection indicated a growing enjoyment of spending time with this class (see Figure 5.2).

Table 5.17

Student Responses to ATP Survey Question: ‘My Teacher Enjoyed Teaching Me Today’

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	3	16	4	13	0	10	1	14	1	13	1	13	1	12	0	13	11	104
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		16	84	24	76	0	100	7	93	7	93	7	93	8	92	0	100	10	90

Further investigation into the teacher incorporating students’ ethnic identity dimensions into lessons was not carried out in the study Year Two, as originally planned (see Sections 3.3 and 4.3). However, representing students’ culture, teacher care, and students’ feelings of comfort could be explored with the parents of some Year 9 and Year 10 student participants (Chapter Six).

5.1.7 Teacher conveys high expectations of student conduct

The final element of the ATA framework, a teacher conveying high expectations of students’ conduct in their learning behaviour, will be discussed here. The study classes were perceived by the teacher as having become more settled and learning focused as the study progressed. This was supported by students sharing their willingness to cooperate with the teacher, as her practice of ako-based actions increased and actions in the classroom became more aligned to student preferences (see all previous sections, particularly Sections 5.1.2 and 5.1.3). The reasons this element in the study teacher’s practice was appreciated by students are discussed first. Then, a list of high expectations students held regarding their teacher’s conduct is presented.

Students reported that they wanted teachers to set and maintain high expectations of their learning. ATP survey data showed that the study students perceived that their

teacher held high expectations of their learning behaviour and conduct throughout the study (Table 5.18), indicated by 112 out of 115 positive responses to ‘my teacher had high expectations of my learning behaviours today’.

Table 5.18

Student Responses to ATP Survey Question: ‘My Teacher Had High Expectations of My Learning Behaviours Today’

Survey time point		0		1		2		3		4		5		6		7		TOTAL	
Negative response	Positive response	1	17	1	16	0	10	1	14	0	14	0	14	0	13	0	13	3	112
Number of responses		19		17		10		15		14		14		13		13		115	
% of respondents (rounded to nearest %)		11	89	6	94	0	100	7	93	0	100	0	100	0	100	0	100	3	97

Students indicated that along with the high expectations (such as firm boundaries) their teacher held, their behaviour was more settled and cooperative than in classrooms with other teachers:

With our other teachers our class is so rowdy, we are more well-behaved in your class. Other teachers have given up on us behaving but we know not to mess with you because you do something about it.

You have clear boundaries and we know where we stand, so no one tries to push the boundaries with you. Well they do sometimes but they don't get too far.

In other classes the teachers let us get away with anything, so we all do. The teachers have given up on us all. They think we are crazy.

Students reported that their learning progressed more in the study class than other classes, as the overall positive class behaviour enabled their engagement in learning (see also Section 5.1.3). Students reported that their other teachers who did not seem to enforce firm boundaries did not actively facilitate student engagement with their learning,

and students perceived this signalled that the teacher had 'given up on them' (see also Section 5.1.4, Table 5.12).

A student who shared that one of the study class were 'more settled' in the study teacher's lessons than elsewhere shared his perspective:

Otto: Our class are more settled in maths than in our other classes.

Teacher: Does it make a difference to how it feels in our classroom?

Otis: It makes me feel better in here.

Teacher: Why is that?

Otis: Because it's more fun when we are doing maths.

Teacher: Can you think of something that I could be doing to set it up so it's more fun?

Otto: Letting us choose who we work with.

This student associated the settled nature of the class, his 'better' feelings, and perception of mathematics being fun with the teacher action of implementing student-selected seating plans (see also Section 5.1.3). It was important to study students that the teacher communicated their expectations for behaviour and conduct to the whole class:

Only have a few rules so we can remember them and make sure everyone knows about them. We only have one in here so we can remember it.

The study teacher consolidated her high expectations of student learning behaviour and conduct into a single 'rule', which was intentionally stated in the positive: *students will conduct themselves in a way that allows everyone to learn, including themselves, all of the time.*

Students expressed that teacher expectations were most effective for classroom management when upheld consistently for all students, all the time (except when a student was unwell or upset; Section 5.1.2.ii):

Don't give out too many chances before you act on some bad behaviour.

Don't let some kids get away with stuff because you can't be bothered dealing with them, that makes them worse.

Students shared their preferences for teacher actions when students were not meeting teacher expectations:

Teachers shouldn't have a short fuse that blows too quickly. Give us take up time. We get punished for struggling with the expectations. If we think they are mean to us then we are mean to them. But you just give us a bit of take up time.

It makes me scared when teachers shout or be sarcastic at the class and I feel guilty like it was me who was naughty. That makes me feel wound up and then I don't want to do what they want me to do.

You stop things like our banter and humor and us moving around the class before we are going too far, and then you explain why it is important to get back on track with our learning.

Being a nice teacher is the most important thing. Not just "snap" if we do one little thing. You don't get all upset and yell over minor stuff like if we trip over on someone's bag or if I drop my pen. Other teachers yell about that.

You are strict but you are also relaxed and you remind us what we should be doing instead of yelling. But you do yell sometimes.

When teacher expectations were not being met, students appeared to prefer some tolerance (such as 'not just snap) and take up time adjust their behaviour. When teacher intervention was required, students appreciated the teacher restating expectations, calmly, with a neutral tone. By carrying out these actions, students expressed their willingness to reciprocate in kind, with cooperative behaviours.

Students shared that it was important that their cooperative behaviours were recognised by the teacher:

Mika: It was good Miss what you wrote in my [reflection] notebook.

Teacher: What was good about it?

Mika: Because I was actually focused yesterday for a change and you saw me.

Teacher: Did me noticing make a difference for you?

Mika: Yeah. It made me feel like I could be more engaged than I thought. Today I'm talking a bit too much to Mark, though.

Teacher: Let's talk about how you think you could get yourself back on track then like you were yesterday...

The conversation Mika initiated with the study teacher about his engagement illustrated a calm and neutral teacher-tone in response with some take up time when the student shared that he had recognised that his learning behaviours could be improved.

Students preferred teachers to hold high expectations of them about their learning and behaviour, and in turn students held high expectations of teachers' conduct. Ways that students perceived that their high expectations of teachers could be met, synthesised from student interviews, include:

- Be organised for class. Don't waste our learning time making us wait outside especially in the freezing cold;
- Encourage students to be respectful of other students especially when they make mistakes, so kids aren't scared to try;
- Expect us to have a go at the hard parts of tests even if we probably can't do them;
- Keep your classroom tidy and don't lose our books and work; and
- Know your topic, if you don't then say that you are unsure and don't pretend that you know something if you don't.

The final point in this list could be related to teacher honesty and authenticity, which has been implicated in the demonstration of teacher care (see also Sections 5.1.4–5.1.6). This point could also show the importance of the teacher positioning themselves as a

learner when they need to strengthen their current mathematical knowledge (such as that modelled in the open door policy of the study classroom, Section 4.2).

Next, quantitative survey and assessment data drawn will be presented (Section 5.2), providing further data to help discuss potential associations between positive student feelings and conduct observed in an ako rich classroom (Section 5.1.1–5.1.7) with increased student achievement.

5.2 Student Enjoyment, Engagement, and Achievement in an Ako-rich Mathematics Classroom

In Section 5.1, some tentative associations were drawn from the analysis of interview data between the increasing student-recognised ako-based actions in the teacher's practice (Tables 5.2 to 5.18), positive student feelings, and increasing cooperative behaviour observed, which students implicated as contributing to their positive classroom engagement. This has been shown in literature reviewed in Chapter Two as increasing student achievement (Section 2.2.2.1).

To collect data about student achievement, the Engagement and Enjoyment (E&E) survey questions were analysed for this discussion (Appendix 10). Some considerations and limitations apply to the analysis of this data. All students chose to write their name on their E&E survey, so it was apparent that not all students participated at every survey time point. Most students participating at TP0 responded positively to almost every question, and responses remained mostly positive throughout. The results of this survey did not appear to align with the results of the anonymous ATP survey or the interviews (such as a student who was struggling in mathematics had ticked all answers on the E&E survey at the level of 'strongly agree' for all questions each time she participated). Several students wrote notes on the survey that were complimentary toward the teacher, and several decorated the survey with icons such as hearts and stars. Several students ticked 'strongly disagree' to most questions at some TP then ticked 'strongly agree' at other TP. Some students enquired whether the teacher 'liked' their responses. A significant majority of positive responses and notes to the teacher throughout the duration of the survey may

be due to the non-anonymity of the questionnaire forms (Section 3.1.2). The E&E survey perhaps therefore did not add reliable and/or meaningful data to answer the research questions. The E&E survey question 'my learning is improving' was pertinent to question one (Section 1.6) and was able to be cross-checked with another form of data, Progressive Achievement Tests administered pre and post study. Therefore, this was the only data from the E&E survey included in this chapter analysis.

The E&E survey data in response to the question 'my learning is improving' is presented here, with each of the Year 9 students' initial and final perspectives noted from their participation in the survey (Appendix 8); the initial and final perspectives were not always TP0 and TP7, respectively. Survey data showed that 15 out of 22 students (68%) for whom E&E data was available at two time points perceived that, overall, their learning had improved during the study period. These students responded more strongly to this question at the time point coinciding with their final participation in the survey than they had in their initial survey. Six further students (27%) remained in agreement that their learning had improved, despite no change or a decrease in the strength of their agreement with the question. One student (5%) began by disagreeing that his learning was improving and remained with this same opinion throughout.²⁸

This survey data was able to be triangulated with pre- and post-study PAT data, available for 20 of the Year 9 student participants (Appendix 8). Out of these 20 students, 18 students' raw scores increased, one raw score did not change, and one raw score decreased by five points.²⁹ Standardised PAT data is most meaningful when scores are compared between Term One in a particular year, then with Term One in the following year. As this was not possible, due to unforeseen circumstances (Section 3.3), the PAT initial (pre-study, in Term One of the study year) and final (post-study, in Term Three of the same study year) comparison held limitations. The main limitation was that average progress on the PAT, which was the intended measure pre-study planning, was dependent on one entire year of learning. The time elapsed between PAT in the study

²⁸ No post-study PAT data was available for this student.

²⁹ It is not clear whether the pre- or post-study test, if either, was inaccurately representing the student's achievement.

was only one and a half terms (approximately 15 weeks). Accordingly, these scores were examined as an indication only of student progress; or more specifically for an indication of decrease or stagnation of achievement, which could have been due to participation in the study. Furthermore, there are limitations to the accuracy of the PAT data when a student scores stanine three, or below (G. Bemrose, personal communication, 21 July 2017). Ten study students were assessed at stanine three or below (Appendix 8). To address this limitation, it was recommended that students are administered a test at a lower level. The researcher ordered several tests that were fit for this purpose, intending to administer these in Year Two of the study. The opportunity to administer these more suitable tests was not available due to the unforeseen changes (Section 3.3).

Removing the option for students to record their names on the questionnaire form and dedicating more time and care to a rigorously thought out PAT testing regime would be advisable for future studies. Combining the reliable and repeatable standardised PAT data with the E&E survey indications shows that most students did experience progress in their achievement in the ako-rich classroom environment throughout the Year One study period.

5.3 Summary

Overall, this chapter indicates the importance of teachers acknowledging and valuing student knowledge, connecting with students' parents, and holding high expectations of students.

The study students had mainly similar priorities for what they wanted their teacher to know about their prior and current learning and their lives, how they felt their learning was valued, what they wanted their parents to know, how they wanted to contribute to their learning pathways, the types of feedback they required, and how they wanted their teacher manage the classroom. Consistent with the literature (Chapter Two), the results from this chapter indicate that students' engagement and achievement with their mathematics learning are likely to be enhanced by teachers knowing their students as

individuals and as individual learners, through acknowledging and valuing students' knowledge and engaging their parents in the learning.

Many students' responses regarding what benefits they perceive for their learning in an ako-rich classroom environment, reflected what students feel makes a culturally responsive learning environment for them. Many responses were given in terms of their teachers' acknowledgement and valuing of their individual strengths and needs, and care for their learning and their worlds through specific behaviours represented in the ATA framework.

The data indicated that the students' impressions of their teacher's capabilities as a class listener, helper, motivator, guide, counsellor, and manager (Chapter Five) are inter-related, with blending of these roles across the seven ATA framework elements. The lesson observations and interviews indicated that students responded to ako-rich teacher practices with cooperative behaviour when they were engaged in responsive learning that they were experiencing some control over and helping one another with. Quantitative ATP survey data was consistent with the findings from this qualitative data.

No differences in opinions were found across ethnicity; however, one difference was found between Year 9 and 10 students' views of their teacher contacting their parents. There could be many reasons why differences by year level occurred, including differences in attitudes due to the enculturation of Year 10 students regarding parent-teacher contact resulting in negative feelings. One possible interpretation of the negative feelings of teachers making home contact by Year 10 students could be that these students had experienced this teacher action mainly or only occurring when their teachers chose to raise a negative issue with students' parents. Students' parents' perspectives regarding their interactions with teachers are presented in Chapter Six.

Chapter Six

6.0 Parent Perspectives on Parent–Teacher Interactions

In this study, 13 parent participants shared their own and their child’s recent experiences of interacting with the study teacher (Section 4.3; Table 4.4). They also shared their experiences of interactions with other teachers they had encountered previously both within their own, and their child’s secondary school education. This chapter presents findings from analysis of qualitative data, which represented parents’ perceptions, collected over both years of the study (Tables 3.3 and 3.4). This chapter mainly responds to research question two (Section 1.6).

Data shared by parents connected with their own child as a student, or themselves as a student are presented as ‘whānau voices where this assists in upholding the ethics of confidentiality. By removing features in the data that may result in identification of other teachers, such as references to gender, time and schools, the referenced teachers’ identities are protected. In some places where the parents referred directly to purposeful actions carried out by the study teacher, identifying details have not been removed. First, the influence parents perceived student–teacher interactions had on children’s feelings about learning is discussed (Section 6.1). Then, parents’ perceptions about how their feelings as parents of a learner were influenced by teachers’ actions are added. Teachers’ actions that influenced parents’ experiences (both the positive and negative) feelings experienced by parents are organised using the ‘positive parent–teacher partnership’ (PP-TP) typology, drawn from *Ka Hikitia* (Ministry of Education, 2013) during this chapter analysis (Section 6.2; Appendix 12). Finally, this chapter concludes with a summary of factors that seemed to be barriers standing in the way of positive parent–teacher interactions (Section 6.3). Frequencies throughout this chapter analysis are given to indicate how many participants commented on each aspect. For clarity, I will refer to myself as the study teacher in this chapter, distinct to references of the ‘other teachers’. In parents’ comments I am often referred to as ‘you’.

Cultural consultation was undertaken in the preparation of this chapter at three check-points (Section 3.2.1). Advisors assisted with determining the suitability of the PP-

TP typology as a lens for analysing the data, and with informing the development of the overall discussion and the conclusions of this chapter. To understand teacher practices that appeared to reflect Māori preferences, analysis privileged examples highlighting teacher cultural responsiveness (Section 2.2.2).

The main finding of the analysis presented in this chapter is that the Pākehā study teacher was able to develop positive and ongoing interactions in partnerships with Māori and non-Māori parents, as stakeholders in the education of the mathematics learners in her classroom.

6.1 Parent Feelings Influence Interactions with Teachers

This section begins by providing an analysis of parents' perceptions around how their child's feelings about learning were influenced by interactions with teachers (Section 6.1.1; see also Chapter Five). Then, the parents' perceptions around how their own feelings were influenced by past and recent interactions with teachers are incorporated into the discussion (Section 6.1.2). This section concludes with a brief summary of findings.

6.1.1 Parent perceptions of key influences on children's learning

Parents were asked to identify a school-based factor they believed had the most significant impact on a child's mathematics learning (Appendix 11). Consistent with literature reviewed in Chapter Two, 11 parents identified teachers as this factor (see also Section 2.2.2.1.2).

Teachers have a huge influence about whether kids learn, or not. (*Nicolette*)

Of the other two parent participants, one (Māori parent of a Māori study student) chose not to make a comment. The other parent (NZE parent of a Māori study student) could not select a school-based factor and indicated that he exerted the most significant influence on his child's mathematics learning. Parents were also asked to describe classroom conditions that they perceived as important for children to positively experience mathematics learning at a school (Appendix 11). All parent participants referred to

feelings within their response. A child feeling 'happy' was the condition most frequently associated with learning (Section 2.2.2.1) in most parents' comments, as indicated using this positive feeling used alongside words such as 'learn', 'listen', and 'teach' (9):

If children are not happy, they're not going to learn. I know being happy will help them learn better actually (*Margaret*).

Other positive feelings (such as 'enjoyable', 'fun', 'humour', 'joke', 'laugh', 'welcoming') were mentioned in the rest of the parents' comments, when describing classroom learning conditions associated with positive learning experiences, for children (such as 'feel comfortable', 'wants to come to class', 'ready to learn') (4):

A teacher should be someone a child can have a laugh with and be taught at the same time (*Maryanne*).

I want maths to be enjoyable and fun so they want to come to class (*Nettie*).

If it's a welcoming environment, they can walk in and feel comfortable and they'll be ready to learn (*Nicolette*).

Parents appeared to place the responsibility for such positive experiences in learning in general, on the actions of teachers (as shown in phrasing such as 'if teachers', 'so that they are').

A teacher's goal should be that the kids love them so much and they are happy with the way that they teach them, so that they are really happy to come to their class (*Matthew*).

If teachers make their learning so they enjoy it, kids will take it more on board (*Nettie*).

Parent participants whose child had experienced learning mathematics with the study teacher all felt that their child experienced positive feelings while doing so (such as 'happy', 'friendlier', 'interested', 'love', 'very happy', 'wanting to be in your class'):

She really seems to love maths in your class this year (*Margaret*).

You are getting more out of the children because they are actually wanting to be in your class and wanting to learn. It's the most important thing to me, their wellbeing is at the centre (*Natasha*).

She is very happy in your class and she 'clicks'³⁰ with you, so she's interested and takes learning in better this year (*Noreen*).

I think that your classroom environment is a friendlier place for them to come into. They're not feeling on the backwards foot as soon as they get in the door, and they know that if they ask you a question you will do your best to answer it and help them (*Nicolette*).

In the parent examples above, positive student feelings experienced were explicitly associated with their child's positive learning experiences (such as 'getting more out', 'taking it in better', 'wanting to learn'). Parents also shared that they felt their children's mathematics learning was progressing more in the study teacher's classroom than they had observed in previous teachers' classrooms throughout their primary schooling (such as 'better this year'), exceeding parent expectations in some cases (Table 6.2; Section 6.2.1.3).

A concerning feature highlighted during data analysis was 11 parents reporting that either themselves or their child had experienced negative feelings, indicative of feeling *unhappy*, in previous mathematics classes (such as 'anxious', 'embarrassed', 'hate', 'horrible', 'ridiculed', 'scared', 'tears', 'uncomfortable', 'whakamā'³¹):

They had a little bit of anxiety, they were a bit whakamā, a bit embarrassed, and what I've learned is that they're actually quite scared to ask questions (*Mitchell*).

They can be embarrassed to ask the teacher questions (*Marshall*).

[X] was ridiculed by the teacher in front of the class so just didn't try. If it's too hard no one's going to help anyway so [X] just doesn't bother. You don't want a teacher who's going to make children feel uncomfortable (*Nicolette*).

I used to worry because [X] looks like they're working but is really sitting there quietly having no idea what to do for the whole time, but was too scared to ask the teacher. And then it was too late and the kid has already felt they can't do anything in maths (*Natasha*).

[X] was identified as being on the cusp of gifted. They weren't into maths previously because they wasn't getting the right support from his teacher. He

³⁰ To be understood or comprehended by someone.

³¹ Māori term for the feeling of shame.

hasn't really progressed further since. They've lost that passion for maths
(*Nerissa*).

These types of negative student feelings were associated by parents of both Māori and non-Māori learners perceiving that from their perspective, children had experienced decreased motivation to interact with their teacher and/or engage with their previous mathematics learning (such as 'can't do anything', 'doesn't try', 'hasn't really progressed', 'scared to ask questions'). Parents shared that their own interactions with teachers from the time that they themselves had been students were related to how they perceived their child's present secondary school education may be experienced (indicated by phrasing such as 'I just automatically think', 'I relate what I experienced').

All parent participants felt that if children were to positively experience mathematics learning, it was important that they experienced positive feelings during their mathematics lessons. Parents shared that positive feelings appeared to motivate children to learn. In contrast, parents also shared instances illustrating the negative feelings they had observed that children experienced were perceived as de-motivating for a child's learning. Moreover, most parents perceived that their child's teachers exerted the most influence over, and held the most responsibility for, the nature of a child's feelings associated with their mathematics learning (see also Section 2.2.2.1.1 and Chapter Five) (Bishop et al., 2003; Webber et al., 2016).

These findings show how significantly parents perceive that children's feelings are influenced by teacher actions; positive feelings are associated with engagement and learning. Study findings indicate that one way a teacher can facilitate a positive learning classroom environment for students similar to those in this study could be by including ako-rich actions in their practice (see Chapter Five).

6.1.2 The influence of parents' feelings on teacher interactions

In this section, parents' perceptions about their own feelings being influenced by teacher actions are discussed in relation interactions originating in three ways: (i) the parents'

own *participation* in parent–teacher interactions(ii) the parents’ *observation* of their child’s feelings following several one-to-one student–teacher interactions that had occurred during school time (to uphold confidentiality, distinction between these two types of interactions will not be made; and (iii) one parent’s *observation* of another parent participating in a parent–teacher interaction at a sporting event. To reflect the higher rate of negative emotions being reported during parent interviews (roughly 80% vs 20% respectively) more negative than positive examples follow. To protect the identity of any teachers who were referenced by parents in these comments, it will not be made clear within the data whether the teacher referred to was the study teacher, or not. Gender references will also be removed.

(i) Parents’ feelings originating from their participation interactions with teachers

In the following example, an interaction between a teacher and a parent was perceived positively (such as ‘on our waka’³²).

Once we got talking I thought [X] was someone I’d definitely like to talk to further.
It felt like “this [person] is on our waka” (*Matthew*).

The positive nature of this interaction appeared to increase the likelihood of the parent participating in further interactions with the teacher (such as ‘definitely like to talk further’). Experiences of interacting with teachers could also be perceived negatively by the study parents (such as ‘horrible’, ‘stress’, ‘struggle’) (11):

It was always stress, it was always struggle. There were tears and it was just horrible. It would have been nice to have been acknowledged when we emailed, instead of ending up feeling that you were yet another neurotic mother (*Noella*).

I felt like I was just another complaining bloody mother emailing the teacher. I thought, oh God, and I just don’t know (*Noreen*).

These comments showed that negative feelings relating to parent–teacher interactions can be felt strongly by parents (such as ‘bloody’, ‘neurotic’, ‘oh God’, ‘tears’). Moreover, the next two examples show that parents may direct the negativity they feel following

³² Heading in the same direction in the context of supporting students’ learning.

parent–teacher interactions back toward the teacher during future interactions. The first such example illustrates negative feelings Matthew experienced. Matthew perceived the language used by a teacher in an email communication regarding his child’s ‘chatty’ behaviour as insulting (such as ‘how shit my daughter is’):

This email my wife and I got from the teacher was awful, this is not a forum where they gets to tell me how shit my child is. I wanted to say all these nasty things back to [the teacher] (*Matthew*).

Following this interaction with the teacher, Matthew shared the desire he had felt to respond to that teacher in a similar negative manner (‘I wanted to say all these nasty things back’). In the next example, Maryanne shared she had felt frustrated for several months during an ongoing issue regarding her daughter ‘clashing’³³ with a teacher (Section 6.1.2.ii). Maryanne’s frustration arose as she felt this issue was not being dealt with by the teacher involved:

Just trying to get my point across, I felt like I wasn’t heard before. I was already a little bit frustrated when I got there and they obviously knew that (*Maryanne*).

Maryanne had been unable to hide the resulting frustration she felt toward the teacher during their parent–teacher face-to-face meeting (‘they obviously knew’). The two previous examples illustrate how negative parent feelings that emerged from parent–teacher interactions where parents perceived other teachers’ actions had been negative in nature, may contribute to the parent approaching future parent–teacher interactions in a negative way (such as by using negativity in parents’ choice of language or tone of voice).

Examples so far have illustrated the nature of parent–teacher interaction outcomes parents had experienced themselves in their role as a parent..

(ii) Parents observing their child’s feelings at home, following student–teacher interactions

³³ In conflict with each other; incompatible.

Parents' feelings that can influence how they respond during future parent–teacher interactions appear to not only originate from *participation* in teacher interactions (Section 6.1.2.i). Parents' feelings are also influenced following their observation(s) of their child's feelings, exhibited at home, following several one-to-one student–teacher interactions that child participated in at school. Parents did not observe the student–teacher interactions referred to here, in person.

When parents perceived through observation that their child had experienced positive student–teacher interactions with the study teacher (such as 'great relationship', 'you're always giving your time'), parents felt positively about interacting with the study teacher themselves (indicated by phrasing such as 'I'm doing this interview because you're...'):

I'm doing this [interview] because you're always giving your time to my child and to me. You believed in him. It's your great relationship with Mack I appreciate, and with me but with Mack particularly that makes me feel that way (*Natasha*).

In contrast, parents described that observing their children exhibiting negative feelings following student–teacher interactions with teachers (such as 'anxiety', 'harassed', 'irate'), had caused them to experience negative feelings themselves, as parents (such as 'awful', 'frustrated', 'gut wrenching', 'horrible'):

I actually felt like they harassed my child because she was saying to me, "I'm getting quite anxious because this teacher is coming to me every day and harassing me". And it went on for about two months and when I finally did come in and say "hey what's the story", I was already a little bit frustrated (*Maryanne*).

In the morning my child will go "oh no I've got maths today", not just maths but "oh no I've got [X]", naming the teacher and that's while we are still at home. She says she can't have a good day cos she's got maths. She came home and it was awful to watch. It lasted all the way home and we had a very irate Māori teenage girl, you know, which comes into the whānau³⁴ side of things (*Matthew*).

There was a bit of a feeling of what was the point because around that stage we knew that he was suffering quite a lot of anxiety in maths. There was the added stress of my child thinking "I don't think I'm learning this properly", but then there

³⁴ Māori term for family, immediate and extended.

was more added stress about him being tested. It was horrible. The teacher's report comment was gut-wrenching for us (*Noella*).

The examples above show that, through observing their child's negative feelings following student–teacher interactions with other teachers, parents could experience negative feelings even though these parents were not present to observe the actual student–teacher interaction.

The finding that a child's feelings can impact their parents' feelings through observation and can subsequently influence the nature of future parent–teacher interactions is one way the findings of this study may illustrate a critical concept of the inseparable connection between students and parents that underpins the productive parent–teacher partnerships principle in *Ka Hikitia* (Ministry of Education, 2013; Sections 1.5 and 2.3.2.2).

There appeared to be little difference in the experiences between parent groups regarding the types of interaction above (that is, parent–teacher or [parent-as-student]–teacher interactions originating from participation in interactions themselves, or observation of their child's feelings originating from student–teacher interactions); however, only Māori parents mentioned that these feelings were then potentially reflected in their future interactions with their child's teacher. Cultural advisors suggested that Māori parents are less likely than NZE parents to 'back off'³⁵ if a teacher at the study school appeared to be, for example, impolite (Section 6.2.1.i). In considering the data further, parents not backing down was thought to be particularly so if these parents themselves had experienced a feeling of injustice in their own education, due to a teacher's actions. For example, Matthew shared that this had been his experience ('I was just a seat in their classroom'). As this tentative ethnicity related data feature was analysed post Study Year Two, it was not explored further with Maryanne, or the other Māori or NZE parents during the study. This area of parents' enduring feelings from their own education experience influencing their future teacher interactions could be explored in further studies to examine if the differences observed in this study with a very small number of Māori

³⁵ Withdraw a claim or assertion in the face of opposition.

parents could in fact be linked to ethnicity. Another tentative cultural difference between parent groups based on ethnicity is highlighted next.

(iii) Parent observing another parent during a parent–teacher interaction

One Māori parent reported an example of how his feelings toward the study teacher were influenced through his observation of a ‘respectful’ parent–teacher interaction, originating in an exchange between the study teacher and another Māori parent at a sporting fixture:

Being a Māori myself and hearing you communicate with another Māori colleague of mine, I guess I felt that it was done in a respectful way with an āhua³⁶ about you so that I felt it was OK to approach you (*Matthew*).

Following an observation of a ‘respectful’ exchange between the unfamiliar study teacher and a Māori parent with whom he was familiar, Matthew approached the study teacher for the first time (‘I felt it was OK to approach you’). He wished to discuss his daughter’s mathematics learning at the study school in another teacher’s class with the study teacher. Matthew’s wife Nerissa also became involved in parent-study teacher interactions and both parents volunteered to become participants in this study. Their reason for becoming study participants was grounded in their desire to contribute to research that was positive for Māori (Section 3.1.1); Matthew shared he could ‘feel’ this study was positive for Māori learners at the study school:

You can move forward with confidence that you are doing the right thing because I can feel it (*Matthew*).

An ethnicity-based association was indicated by the explicit use of the Māori concept of āhua to describe the study teacher’s actions, which Matthew explicitly associated with his being Māori (‘being a Māori myself’). Since Matthew’s reference to āhua highlighted a potential ethnicity-related aspect of a parental cultural difference, all parent interview transcripts were re-examined for other such instances of any parents making use of their ‘sense’ regarding the study teacher. Two other instances where Māori parents mentioned

³⁶ Māori term for the nature, or way of being of, a person using ‘sense’ or ‘intuition’ to assess the study teacher’s intentions through non-physical means.

gaining a 'sense' that the teacher's intentions were sincere (such as 'genuine', 'trust'), were identified and subsequently analysed with assistance from cultural advisors:

Well, by talking to you now it seems like you are genuine. It seems like you care
(*Maryanne*).

You get a sense pretty quickly as to a person's make-up. You can just tell by the
demeanour and the way they speak. You can just pick up on things pretty quickly
so for me I had no reason not to trust our conversation (*Marshall*).

Cultural advice indicated that this difference between Māori and NZE parents' comments could have been linked to parent ethnicity, as, in the advisors' views, Māori people tend to rely on their 'sense' or intuition (such as 'get a sense', 'pick up on things', 'seems like') to a greater extent than Pākehā people. No similar instances were found in the data drawn from Pākehā parent perspectives.

Section 6.1 has shown that parents' feelings originating from their participation in, or observation of, interactions with teachers can influence their future interactions with teachers. Negative feelings experienced by parents due to participating in interactions with teachers can continue to exert a negative influence for some time. The finding that negative [parent-as-student]–teacher interaction experiences can endure and influence parents' future interactions with teachers is consistent with literature mentioned in Section 1.2.4 (e.g., Biddulph et. al, 2003 Mutch & Collins, 2012. Parents appeared to anticipate that their child's experience could mirror their own negative experience, which may influence their expectations for their child's mathematics learning outcomes (see also Section 6.2.2.3). If the nature of future parent–teacher interactions is to be positive and ongoing, as called for in Māori education documents (Ministry of Education, 2011; 2013) (Section 1.2.4), implications from findings of this study suggest teachers must ensure that their interaction practices consistently encourage positive feelings for both students, and students' parents. This finding may also suggest schools as a whole need to work strategically and consistently, to ensure positive interactions with all parents over time to help account for the residual effects of previous negative experiences, so that parents may be more likely to interact with teachers to support their child's learning. Further study into how schools could operationalise this school-wide support for positive parent–teacher

interaction could also be useful. Retaining a focus on mathematics, further study could include exploring whether parents with children at the study school who had experienced mainly positive [parent-as-student]–teacher interactions in mathematics might assume that their child will have a similarly positive experience. Anticipated and actual experiences of children in mathematics could be compared, from parent and student perspectives. A lack of positive examples in the study data regarding students’ and parents’ prior experiences with mathematics learning precluded such analysis within this study.

The majority of the study findings to this point have centred on the negative feelings that parents experienced through their participation and observation of past and recent interactions with teachers, other than the study teacher. These negative feelings experienced appeared to follow teacher actions presenting as barriers to positive interaction outcomes. Such barriers resulted in parents interacting with teachers in a negative way, with a reluctance, or ceasing these interactions altogether (Section 6.1.2). These barriers, hindering positive parent–teacher interactions, along with study-teacher actions that appeared to help overcome these barriers, are discussed next within the PP-TP typology (Appendix 12).

6.2 Teacher Practices Contributing to Positive Parent–Teacher Interactions

Parents’ perceptions of teacher actions that either hindered (that is, presented as a barrier) or facilitated positive parent–teacher interactions (that is, prevented or overcame barriers) are discussed here. To carry out this analysis, pertinent parent interview data were arranged under five PP-TP interaction typology key words (Sections 6.2.1.1 to 6.2.1.5). Each key word provides a label for elements of an ako-rich teacher practice that contributes holistically to positive parent–teacher partnership interactions (Ministry of Education, 2013). Such teacher practices are particularly relevant to the fourth element of the ATA framework (Section 5.1.5; Appendix 1). This section will conclude with a summary of barriers to positive parent–teacher interactions (Section 6.2.2; Table 6.3) and a brief discussion of the main findings (Section 6.3).

6.2.1 A positive teacher–parent interaction typology.

The PT-PP typology was constructed during this chapter analysis, as it was noticed during initial data coding that words appearing in the parent interview data appeared to reflect words from the passage of text used to describe positive parent–teacher partnerships in *Ka Hikitia* (Ministry of Education, 2013). Five key terms were selected (respect, understanding, shared goals, exchanging information, and contributing) from this text passage. Comments from the parent data were aligned with key words to build a coding framework associating meanings of parent comments with typology words that would be used to guide this chapter analysis (Appendix 12). Cultural advisors agreed with this alignment, and the key words appeared to be sufficiently different to one another (Section 3.5). Data was arranged in the typology until saturation was achieved. Cultural advisors agreed with the data arrangement, and no further key words were required. The PT-PP typology provides a linear and deconstructed analysis of the holistic nature of productive partnerships. Data are discussed within the most relevant typology section unless there were multiple consistencies, in which case a unique focus of the same data is emphasised in the separate discussions. Once again, details have been removed from the data in order that identifying characteristics of teachers are not included. To acknowledge the merging of the competencies found in *Tātaiako* (Section 1.4.3) with one another (Section 2.3.1), three of the other *Tātaiako* competencies (manaakitanga, wānanga, and whanaungatanga) were associated with ako, with assistance from cultural advisors (Appendix 12). The findings presented under each typology key word section are discussed in order, beginning with those most prevalent in the data (that is, ideas expressed by the largest number of participants). Tangata whenuatanga, the fifth competency from *Tātaiako* although acknowledged as an integral concept in culturally responsive pedagogy is considered to be out of the scope of this thesis.

This discussion is presented acknowledging the influence parents' feelings exerted on their future interactions with teachers, and the inseparable nature of the parent and student (child) (Section 6.1). The linear typology analysis in this section is offered in order that it will contribute to the formal reporting of study findings in Chapter Seven. In the formal part of the analysis, it is intended that the five PP-TP typology key words will be

(re)arranged in a process form, supported by analysis from Chapter Five, to make the findings directly useable in real time by classroom teachers wanting to develop ako in their practice (Section 1.1).

6.2.1.1 *Respect*

Five themes emerged during analysis of parent perceptions that indicated ways teachers and parents could demonstrate respect within their roles as stakeholders in supporting students' mathematics learning (Figure 6.1), which encouraged positive feelings for the parent directly, or via their child. Four of these themes involved respect shown to parents and their children through teacher actions that demonstrated: (i) care for students; (ii) passion for teaching; (iii) acknowledgment of students' culture and ethnicity; and (iv) acknowledgement of the power teachers hold within their classroom role. The fifth theme involved respect shown to teachers in parent actions that demonstrated (v) the acknowledgement of the role the teacher plays in educating students. 'Respect' being demonstrated by both teachers and parents highlighted the aspect of reciprocity critical for successful parent–teacher interactions (Section 2.3.2.2), and inherent in ako-rich practices (Chapter Two).

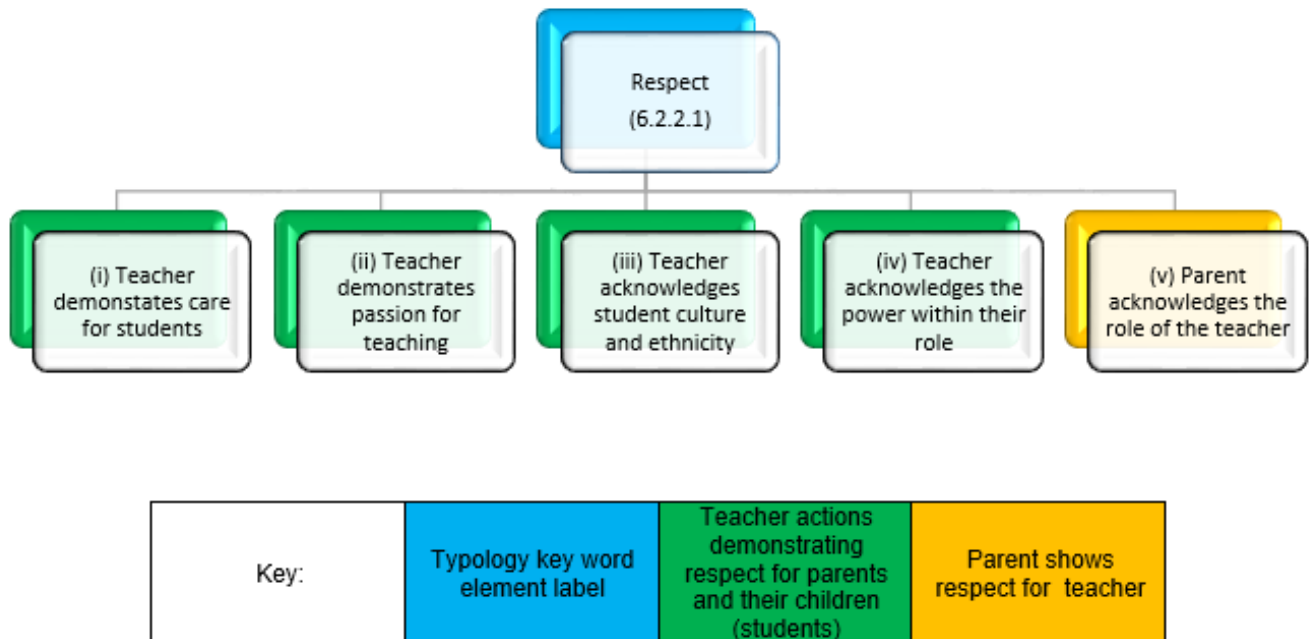


Figure 6.1. Themes that emerged under the PP-T typology key word ‘respect’.

Actions that appeared to convey the notion of ‘respect’ between stakeholders are discussed here.

(i) Teacher demonstrates care for students

Teacher respect was most frequently perceived by parents as a teacher showing care for their children, as learners (11):

Kids respond when they know they are dealing with a teacher who genuinely cares about them. Then you can start teaching them and talking to them about [learning] and they are open to receiving it (*Matthew*).

Sincere caring is key to your teaching (*Marshall*).

Teachers’ genuine and sincere caring approaches toward students were perceived by parents as an essential component in creating positive learning-focused experiences through student–teacher interactions. Marshall indicated that his child was also able to

detect teacher *insincerity* (such as ‘see through’), which would negatively impact on his son’s learning experience (such as ‘his learning is compromised’) (see also Sections 5.1.6 and 5.1.7):

I think, at the end of the day, my child will see through any teacher BS³⁷ but he won’t say anything and his learning is compromised. It’s compromised (*Marshall*).

Ways parents reported that the study teacher showed care (such as ‘support’) for the study students involved showing an interest in a student’s grasp of mathematical thinking and learning (such as ‘that he gets it’, ‘that Nate understands’):

It was amazing for his confidence in maths, yeah huge. The support he got from the teacher having a vested interest in the fact that he gets it and care that Nate understands what he is learning (*Noella*).

The study teacher taking an interest in ensuring Nate had grasped his learning was appreciated by Noella, who perceived that this teacher action had increased her child’s belief in himself as a learner (such as ‘amazing for his confidence’). Parents perceived that ‘being interested’ in a student’s grasp of their learning was shown by the study teacher investing ‘time’ in assisting students with their learning:

It’s that one-on-one time spent with him, it’s what he needs if he’s not grasping something (*Marshall*).

They have shown an interest in Mady’s learning. Being interested, wanting to teach the kids and wanting them to learn and understand, and that shows through in spending time with them. Her confidence is up and she’s willing to give things a try, she thinks she might be able to do it. I really appreciate that (*Nicolette*).

Mack was made to feel special, that the teacher was interested and that he was worth the teacher’s time (*Natasha*).

Parents reported their children experienced positive feelings following the study teacher’s investment of time (such as ‘it’s what he needs’, ‘she thinks she might be able to do it’, ‘made Mack feel special’); their child’s positive feelings were experienced positively by the parent (such as ‘I really appreciate that’).

³⁷ BS, an abbreviation for bullshit, a slang term for talking nonsense to (someone) in an attempt to deceive them.

In contrast to comments about the study teacher's parent-appreciated investment of time to ensure all students grasped their learning (11), seven parents perceived that other teachers may prefer to 'take the easy' way (such as 'only do what they have to', teachers thinking 'oh well') and only investing their instruction time in a 'few' high-achieving children (such as 'bright ones', 'excelling', 'smart ones'). Parents perceived that the high-achieving students would be 'easier to teach':

I still feel like a lot of the teachers are actually not interested in being there teaching the children. They only focus on the ones that are excelling and are easier to teach. The ones that are a bit hard to teach, well teachers only do what they have to (*Nicolette*).

Teachers should support all the kids. You know, rather than "oh well, a few bright ones in the class have got it so we'll just keep going" (*Noella*).

Parent participants mentioned that it was important that teachers invest their time generously in the learning of *all* students (such as 'all the kids') rather than only in some students' learning; particular mention here was made of the kinds of students who needed teacher time who were those not drawing attention to themselves (such as 'kids that are rolling through the middle') by, for example, displaying negative behaviour or achieving high grades:

The naughty kids are getting heaps of teacher attention; the kids that are really, really striving and getting ahead are getting attention. I think too that you always have to remember that you can't forget the kids that are rolling through the middle (*Matthew*).

The students 'rolling through the middle', were perceived by parents to be potentially, and perhaps purposefully, overlooked by their teacher(s) who were not ubiquitously generous with their time, or did not show care towards students:

If you aren't there for all the kids, and just there for the job, then you really don't care (*Nicolette*).

Both NZE and Māori parents reported that a genuine and sincere approach to supporting *all* students' classroom learning by giving generously of their time to every student was a way that teachers could demonstrate respect through caring actions. However, Māori

parents expressed a deeper expectation of teacher caring than NZE parents. Comments made by two Māori parents highlighted a potential cultural difference in the expectations of caring teacher practices by stating that teachers should treat students with the care that teachers would expect for their own child:

I believe that when my kids come to school, they are in the school's hands. The teachers there are basically like their parent so we expect them to respect them like that. But, we also expect the teachers to treat them like that as well, like they are their parents, and that means going beyond a face in a classroom (*Matthew*).

Talk to a child in your class that they were your own kid (*Mitchell*).

Cultural advice indicated that these comments appear to reflect a Māori concept of shared whānau³⁸ responsibility for the care of children, including within whānau-like relationships that may develop in a classroom (see also Section 5.1.6). Within this concept, respected individuals (such as teachers) are entrusted by a child's parents to be involved in the education and guidance of the child; with this respect given, the teacher should want the best for the child as their student, just as they would for their own child (Berryman et al., 2018; Cultural Advisor, personal communication, June 21, 2019).

All parents expected teachers to demonstrate care for their children as students and had similar perceptions of how teacher care could be demonstrated. Teacher care for students could be shown through the investment of teacher-time in ensuring every child was grasping their learning. Māori parents appeared to have the highest expectations of teacher care, in that the experience of students should reflect standards a teacher would expect for their own child's learning.

(ii) Teacher demonstrates a passion for teaching

Parents shared their desire that their child's teachers would demonstrate a passion for teaching (such as 'interested in helping the kids', 'not someone who is there just to do their job') (9):

³⁸ Māori word meaning extended family.

I want a teacher for Mack that's actually interested in helping the kids learn maths, not someone who is there just to do their job (*Natalie*).

If you aren't there for all the kids, and just there for the job, then you really don't care (*Nicolette*).

Parents perceived that the study teacher conveyed a passion for teaching, through actions within student–teacher interactions that demonstrated an interest in students grasping their learning (such as ‘want the kids to learn and understand’):

You want to be there and you want to teach, and you want the kids to learn and understand their maths, and that shows through (*Nicolette*).

Parents shared that teachers can also demonstrate a passion for their role as a teacher by going beyond their in-classroom duties, for example by interacting with parents in their own time (5): (Section 6.2.2.1.1.i):

Saying “hi” at the supermarket. Yeah, that's called going out of your way. You're not in work time then, so you've gone out of your way to show this whānau that, hey I teach your kids and I just want to say hello (*Matthew*).

In particular, the study teacher's purposeful action of sharing of positive information with parents outside of school time was received positively and appreciated by study parents (such as ‘appreciated’, ‘oh yay’) as teacher passion (such as ‘loves what she's doing’, ‘so much effort’) when the information shared was specific to their child (information such as a skill a student had shared in class, or a recent assessment result):

You've put so much effort into Mack's learning and it wasn't just the emails to me, but if I saw you on the sideline at rugby would have a quick conversation about how he was going and what he was doing in maths. One time you said that [he] had taught you some card tricks at the end of a class (*Natasha*).

I really appreciated our chat that evening when I saw you, because it was good for me to know that Neve had done a test, which you had already emailed me about anyway. It was good to hear her result was an Excellence and how happy you were with her result, that was good cos I thought “oh yay, here's a teacher who loves what she's doing”. It's really good, yeah it was really good (*Nataleigh*).

Teachers giving generously of their time to interact with students, and sharing specific ‘positive news’ about a student with the students’ parents, demonstrated teacher passion

for teaching and furthermore resulted in positive feelings being experienced by parents (see also Sections 5.1.2.v and 6.2.3). Māori and NZE parents appeared to have similar perceptions about teacher passion.

(iii) Teacher acknowledges student culture and ethnicity

Insight was sought through parent perspectives on how the Pākehā study teacher could demonstrate respect for students' cultures, particularly when presenting mathematics with a deliberate focus on te ao Māori contexts. The inclusion of aspects of Māori culture within mathematics teaching and learning was only explored with Māori and NZE parents of Māori learners, as at the beginning of this study the researcher perceived it was these participants who were likely to have a particular interest in this aspect of their child's mathematics learning. As there was a difference between the responses of NZE parents of Māori learners, and Māori parents of Māori learners as groups when discussing culture, the NZE and Māori parent perspectives will be discussed separately. The NZE perspective is presented first, as it was the most diverse and will be used to provide a contrast to the Māori parents' perspectives, which were less diverse.

The five NZE parents of Māori learners shared a range of perspectives regarding the inclusion of Māori culture in their child's learning, which was interpreted as being very important; important, but more so to the child's other (Māori) parent; important, but only if the child was happy to identify themselves as Māori; only important to the Māori parent; and, finally, not important to them or to their child. The following comment illustrates the mid-range of the parents' perceptions, signalling that Māori culture was somewhat important to an NZE parent:

My kids can't speak Māori which I think is quite sad. It's more of a priority for my [Māori] husband though. He takes care of that side of things (*Nettie*).

Their child's Māori ethnicity was perceived by NZE parents as just one aspect to be considered by a teacher responding to their child in the classroom (that is, 'I don't think it's just about ethnicity'). Furthermore, NZE parents of Māori learners shared that their child should not be 'put in the box' of being Māori, preferring instead that teachers recognise their child as a unique person:

[Teachers] need to look at every kid like they're different instead of treating them all like they are the same, in this little box. Teachers need to be aware of that diversity (*Nerissa*).

Don't assume about a child. I don't think you can just put people into groups. Sometimes when you say culture it gets my back up a bit because I don't think it's just about ethnicity. It's not recognised enough that culture is about the whole way we do things, like the culture of our families and our life (*Natasha*).

Two NZE parents explicitly stated their preference that teachers did *not* automatically respond to their child 'as Māori' even though the child was listed as Māori on school-based student management systems (that is, 'don't assume'). For these NZE parents, the perfunctory treatment of their Māori child 'as Māori', as a teacher response to ethnicity information entered in the study school's student management system upon their child's enrolment, was not necessarily viewed positively if ethnicity was to become the teacher's main focus of representing culture (such as, 'it gets my back up a bit').

Insight was gained into the critical nature of parent–teacher interactions in which parent knowledge is shared about students' unique cultural identification, thus enabling teachers to show respect for parent preferences and expectations through actions acknowledging student ethnicity. Teachers encouraging students to have autonomy over their ethnic identity was found to be a critical teacher action for encouraging positive interactions with NZE parents of Māori learners. Another critical teacher action for encouraging positive parent–teacher interactions was the adoption of a holistic view of each child's many personal characteristics when responding to each student as an individual. This view is consistent with messages about all students in literature reviewed in Chapter Two.

Four Māori study parents appeared to prefer that teachers recognise that both they, and their child, are Māori (such as 'the most important thing') (4):

[T]he most important thing was that the teacher knows that Miri's a Māori and she has a Māori father and that I am 100% behind her education (*Matthew*).

This preference for recognition as Māori seemed to be a contrast to the prevailing NZE perspective; however, similar to the NZE parents' perspective, Māori parents did not appreciate a reduction of the ethnic aspect(s) of their child's culture so that teachers were

'boxing' students into an ethnic group (such as 'being Māori), using an approach reflecting essentialism (Berryman et al., 2018):

Showing an interest in my child as an individual is really important (*Margaret*).

I think we make the mistake of boxing kids into Māori (*Mitchell*).

A teacher being respectful of the heterogeneity of Māori students' culture was signalled by Māori parents, who stated a preference that a teacher would not respond to all Māori students in an almost identical way, due to their 'being Māori' (Bishop, 2003; May, 2003; May & Sleeter, 2010).

In regard to the importance of including Māori concepts within the teaching and learning of mathematics, and in contrast with four of the five NZE parents of Māori learners, all Māori parents of Māori learners stated that this element of practice was important to them:

I'd love the culture to be in the teaching (*Margaret*).

Three parents perceived that Māori students would 'respond better' to their learning if the teacher incorporated aspects of te ao Māori into mathematics teaching and learning.

If each teacher incorporated some of the basic values, some of the fundamentals of Māori culture in their classrooms, in the teaching, Māori would respond better (*Marshall*).

However, Māori parents felt they were unable to offer examples of ways the study teacher could include Māori culture into their children's mathematics learning, during the process of the interviews. Parents reported that this aspect of mathematics teaching and learning had not been a particular consideration to them, prior to the interview:

I haven't to this day given any thought to how the culture should be integrated into maths. That's a challenging question, that one (*Marshall*).

Māori parents having not previously considered this aspect of their child's mathematics learning was viewed by the researcher to have potentially resulted in part from the enculturation of these parents in their own mathematics learning, and the previous experiences of their child at the study school. Cultural advisors perceived that most Māori parents at the study school held low expectations for teacher demonstration of respect and incorporation of Māori culture in their child's learning. This potential enculturation may

have developed following these parents' having observed a dearth of visible respect and cultural responsiveness at the study school (such as a larger disparity between groups nationally averaged; see also Section 4.1). Alternatively, parents may have been unaware of cultural responsiveness other teachers demonstrated in their child's learning. An absence of such awareness could occur due to reasons such as cultural values being compatible between cultures, or cultural responsiveness not being brought explicitly to the parents' attention prior to this study (Section 2.2.1). These possibilities were not explored further during interviews and would signal a direction for further investigation, for example about ways culturally responsive practices could be made more visible in ways genuinely appreciated by parents.

Parent responses indicated that demonstrating an authentic respect for things Māori, could be shown by the study teacher being open to student assistance with (that is, teacher as learner; student as teacher), for example, using the Māori language:

At least give te reo a try and if you're being corrected now and then, then let yourself be corrected. It's all good (*Mitchell*).

Or, by appearing to be genuine and sincere in their approach to improving the learning experience of Māori students:

It's about being sincere. What you're doing [this study] is very positive, you're trying to adapt by talking about Māori and how they learn (*Marshall*).

The study teacher's effort (such as 'give it a go', 'you're trying') to represent aspects of students' Māori cultures in the classroom was positively appreciated by parents ('good', 'very positive'). The unstructured part of the interviews then moved to explore the issue of the inclusion of Māori culture in learning contexts being perceived by parents as tokenism in teacher practice (Bishop & Berryman, 2006). The Pākehā researcher had limited knowledge and confidence in te ao and te reo Māori (Section 1.3), and acknowledged that attempts to present mathematics within Māori contexts therefore may be perceived as tokenistic, or insincere, by students and by students' parents:

It's funny you should say that because a lot of people worry that it's just tokenistic, but when I was at school we never got any of that [display of te ao Māori] so I see

that we Māori have to actually embrace and celebrate that we have moved forward on this (*Matthew*).

Again, an appreciation of teacher effort to display aspects of te ao Māori in the classroom was expressed by parents (such as ‘celebrate’, ‘embrace’). This parent perspective was noted to be similar to that shared by students regarding teacher effort in this context (see Section 5.1.6).

Although interviews showed that the visibility (such as ‘display’) and respect (such as using te reo) for Māori culture in mathematics teaching would be welcomed by Māori parents, they expressed that it was mainly the role of the child’s family and whānau to educate them about their Māori culture. They felt this role was not one expected of their child’s teacher (4):

I guess coming back to your question how can you ensure that they [Marshall’s own children] feel culturally safe in your class it’s never really been an issue for me because it’s done at home (*Marshall*).

The notion of family responsibility for developing a child’s Māori culture may provide another explanation for why Māori parents shared that they had not considered the aspect of Māori contexts being incorporated into their child’s mathematics teaching and learning.

Parents of Māori learners consistently reported that a ‘one-size-fits-all’ approach did not meet their expectations of teacher practices, in regards to teachers demonstrating respect for their child’s ethnicity through an appropriate level of acknowledgment and representation of Māori culture in the classroom. Exploring parents’ perceptions of their expectations for teachers attending to their child’s knowledge of te ao Māori could be carried out in further studies. For example, it could be determined if there seems to be an association between parents’ perceptions of a teacher’s knowledge of Māori culture, and parent expectations for teacher actions to incorporate Māori contexts into mathematics teaching and learning. Due to the researcher’s limited knowledge of Māori culture, this idea was not able to be explored in this study; however, cultural advice regarding parents expecting their child’s education in te ao Māori in Māori-medium schools suggests there may be benefits to this aspect being investigated further in English-medium education. In hindsight, the researcher acknowledges that the aspect of inclusion of Māori culture in

mathematics teaching and learning could have and should have been explored with the NZE parents of non-Māori learners as well, to gather data on perspectives of New Zealanders who as partners of the Treaty of Waitangi are of European descent. If this data is collected in another study, it could provide insight into differences and/or similarities between, for example, the views of NZE parents of NZE learners, and NZE parents of Māori, learners in New Zealand's bicultural context.

(iv) Teacher acknowledges the power within their role

Parental dependence on the teacher for assisting their child with mathematics learning, combined with the significant amount of time teachers spend with their children during week days, resulted in parents perceiving that teachers hold a position of power within parent–teacher interactions. Parents expressed negative feelings (such as ‘useless’, ‘hopeless’) resulting from feeling that they had ‘no idea’ how to assist their child with mathematics homework in student–parent interactions at home (10) (Lange & Meaney, 2011):

I have no idea (*Margaret*).

I am useless at maths (*Nicolette*).

I am hopeless at maths (*Noreen*).

I can't help with my child's maths (*Natasha*).

Parents felt dependent on the teacher for advice about advancing their child's education; however, they acknowledged that approaching a teacher for advice was sometimes difficult for parents to do (such as ‘hard’):

Parents are dependent a lot on what the teacher sees and can advise me (*Marshall*).

For some people it's very hard to approach teachers because they know everything (*Natasha*).

Parents also acknowledged the significant time their children spend at school with teachers (6):

Kids are here [at school] during the day more than they are at home with me
(*Nettie*).

You have our children for the majority of the day, plus the year really (*Marshall*).

Our kids are with them six or seven hours of the day (*Matthew*).

The apparent power imbalance appears to be in favour of the teacher (such as ‘hard to approach’, ‘dependent a lot’, ‘you have our children for the majority of the day’). Highlighting a possible cultural difference between NZE and Māori participant groups, Māori parents explicitly said it was important a teacher was aware of, and respected, this perception of teacher power parents held, and placed on them in their role of their children’s most significant mathematics educator (3):

Teachers have such a huge responsibility and play such a massive part in the development of our kids, especially at college and I think that some teachers just forget their responsibility. They [teachers] forget the power that they have in shaping these young people, our kids are with them most of the day. They’ve got to be mindful of the roles that they play out in that we are trusting them to do these great things for our kids, well we’re giving the power to you know, but if they don’t respect that power, then it’s being wasted (*Matthew*).

Māori parents expressed their respect for teachers’ (such as ‘trusting them’, ‘we’re giving the power to you’) in their classroom roles (such as ‘development of our kids’, ‘shaping these young people’). This group of parents expected teachers to acknowledge the power within their teaching position (such as ‘if they don’t respect that power’). Further discussion of perceptions of dependence on teachers for mathematical knowledge will feature in Section 6.2.2.2 (see also Section 5.1.4.b).

(v) Parent acknowledges the role of the teacher

An acknowledgement of, and an appreciation for, the role that teachers play in their child’s education was shared by study NZE and Māori parents, who shared their respect for the difficulty of a teacher’s role (such as ‘busy’, ‘demanding’, ‘the hardest job in the world’):

I think you as teachers have the hardest job in the world (*Marshall*).

Teachers have such a huge responsibility and play such a massive part in the development of our kids (*Matthew*).

Your job is hard, very busy and demanding (*Nathaniel*).

The respect for the difficulty of the teacher's role (such as 'hard'), appeared to be expressed in terms of the number of students that one teacher is responsible for in a classroom. Parents perceived this number of students in each classroom at the study school as high ('so many kids', 'so many students') (6):

[The thing my child needs] most is probably time and I know that [is] such a hard thing to do for a teacher with so many students (*Marshall*).

You've got so many kids, I don't know how you do it (*Nettie*).

It must be so hard for you I know. It's easy for me to say to take time to explain, but you've got so many children. But it is what they need, isn't it (*Noella*).

While parents held high expectations of teachers in regard to respect (Section 6.2.2.1.iv), in turn, they appeared to hold a respect for teachers' subject knowledge and complex classroom management role (such as 'I don't know how you do it') (Section 2.3.1.2).

An imbalance of power between parents and teachers can be perceived by parents due to the respect they held for the knowledge and classroom management role of a teacher, as well as the significant time students spend with teachers during a school day. This study finding confirms that the equivalent parent-teacher role in advancing students' mathematical learning would be unrealistic, (such as in relation to the provision of mathematical concept knowledge; see also Section 5.1.4). In their report on making classrooms a more equitable space, Bull et al. (2008) reported that parents and teachers do not need to fulfil the same role in order for power to be evenly distributed. The implication for teachers is that their practice must include actions that encourage parents to hold complementary roles where each partner's skills are used authentically to support the child's learning (Sections 2.3.1.2, 6.2.1.2, and 6.2.1.5). In this way it has been previously reported that equity can be facilitated, affording learning for students that neither partner alone could provide (Macfarlane et al., 2007). For parent and teacher roles to be combined productively in a complementary way, each partner's role needs to be

clearly understood by all, negotiated between parents and teachers through consistent and regular parent–teacher communication (Katyal & Evers, 2007) (Section 6.2.1.3).

6.2.1.2 Understanding

Three themes were identified to indicate teacher and parent actions demonstrating understanding within their roles as stakeholders in supporting students' education (Figure 6.2). Two of these themes involved understanding shown through teacher actions; one involved parent actions. These actions demonstrated the (i) teacher acknowledging that parents are busy (see also Section 5.1.4); (ii) parents acknowledging that teachers are busy (see also Section 6.2.2.1.v); and (iii) the teacher acknowledging that parents' mathematical ability may be limited (see also Sections 5.1.4 and 6.2.2.1.iv). 'Understanding' being demonstrated by both teachers and parents highlighted the aspect of reciprocity critical for successful parent–teacher interactions (Section 2.3.2.2), and inherent in ako-rich practices (Chapter Two).

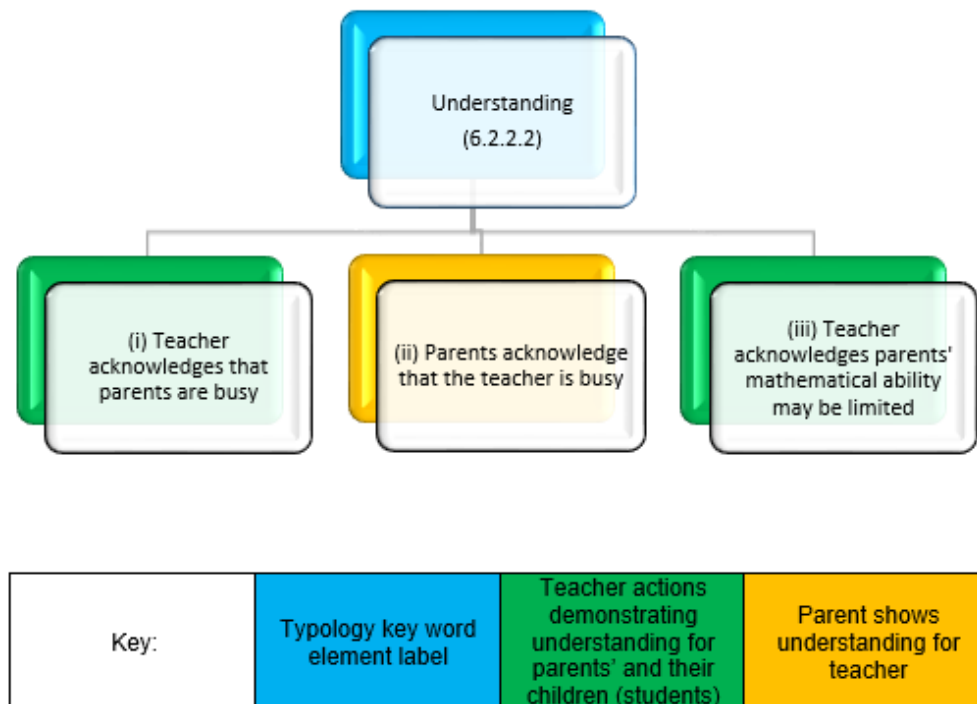


Figure 6.2 Themes that emerged under the PP-T typology key word 'understanding'.

Actions that appeared to convey the notion of ‘understanding’ between stakeholders are discussed here.

(i) Teacher acknowledges that parents are busy

All parents mentioned being busy, which they related to their employment and family commitments (see Section 5.1.4):

During the week, I’m pretty busy (*Marshall*).

We’re both quite busy with work (*Maryanne*).

Things get quite difficult, what with work and the distance we travel from home each day and everything (*Margaret*).

We are all busy and things take far too much time (*Nataleigh*).

Often when we’re so busy, I find I haven’t sat down and planned out the family calendar (*Natasha*).

Eleven parents reported that as emails were already part of their busy workday, this method of parent–teacher communication was their preferred option to receive contact from teachers, during the day:

An email is best (*Marshall*).

Email is most convenient (*Noreen*).

So email is fine. I’m happy with email because I’m forever using email, so much for work that I just have it open all the time (*Nataleigh*).

Emails were preferred as they could be attended to at a time the busy parents felt was convenient (‘read it later’, ‘read it or leave it’) (see also Section 6.1.2.4).

With email, I can read it or leave it (*Margaret*).

An email would be fine, I can read it later (*Noella*).

However, some busy parents also mentioned they were not reading emails from teachers at any stage (see Section 5.1.4). Although they acknowledged that they could read emails at a later time, due to receiving a large volume of emails (such as ‘50 a day’, ‘a lot of stuff’)

they were choosing to leave emails they received from the study teacher and from the school unread (5):

You get quite a lot of stuff so you start filtering it. Do you know what I mean? You get so much stuff, so I don't read any of it from the school (*Mitchell*).

I get about 50 emails a day, lots go straight through to the junk box. Yours do. I get another 20 emails a day for my business. I go through them once a week, 300 or 400 at time (*Nathaniel*).

Ways that teachers could make email communication relevant to parents, and therefore perhaps more likely to be read by busy parents, will be presented in Section 6.2.3.

Seven parents who felt they were 'too busy' to easily interact with teachers during their workday followed this statement with the qualification that they would, however, 'make the time', to interact with a teacher if such an interaction was a high priority (four Māori and three NZE parents, of Māori learners):

If I can get up here to the school to see you, I'll get up here (*Margaret*).

I'm very busy, often away but I'm very much family first. If there is something that you feel needs dealing with at school, I'll always make the time to do that (*Nathaniel*).

In the event of a teacher requesting a parent–teacher interaction regarding a priority situation (see also Section 6.1.2.4), these parents suggested this interaction would preferably involve a face-to-face meeting (7):

We would like to have more meaningful *kōrero*³⁹ with teachers and our *whānau* and that, but what that looks like I don't know, because I'm very busy and my wife is very busy too (*Matthew*).

However, there was an awareness among these parents that their own time constraints may make scheduling such meetings with teachers difficult to manage.

It's a hard thing because we're all busy and there's lots on after school. Life is really busy (*Natasha*).

³⁹ A talk or discussion; meeting.

Parents also reported that busy lifestyles extended beyond themselves, and placed limitations on their children's ability to complete learning tasks outside of the classroom (such as 'lots on after school') (9). These parents all signalled that they expected some teacher understanding, for example when negotiating due dates for completion of student work (such as 'be flexible'):

There's an assignment due next Friday but there's a school drama production on too. I think just hand it in on Monday. Be realistic and flexible (*Mitchell*).

Factors contributing to a situation where learning tasks have not been completed at home, may be beyond the student's influence (such as 'other stuff going on', 'pressure we put on them too, as parents').

There might be an easy reason you don't know about why Mady didn't hand something in. There's other stuff going on in their [student's] lives and just like everybody they have other things on their mind (*Nicolette*).

So even though Mack's mostly responsible for his time management it's not always like that. Sometimes it's the pressures we put on them too as parents (*Natasha*).

Parents could let you know about dramas going on in our lives because I guess you don't know what's going on for the kids at home, if they couldn't do their homework (*Nettie*).

Parent comments suggest that information contributing to a student being too busy to complete homework may be unknown to the teacher (such as 'parents could let you know', 'you don't know about') and furthermore could be communicated to the teacher in parent-teacher communications (Section 6.2.1.4).

(ii) Parents acknowledge that teachers are busy

All parents acknowledged the role of a teacher was 'busy'. Parents perceived the main demands on teacher time are large class sizes and having many tasks to carry out (such as 'class sizes are really big', 'lots of kids', 'you are everything', 'you've got a lot to do') (see also Section 6.2.1.1.v).

I really don't know how you do it. You are everything from social worker, to teacher, to parent, to all these hundreds and hundreds of students (*Marshall*).

You've got a lot to do and a lot of kids to do it for, and we all know the class sizes are really big (*Natalie*).

Parents demonstrated an understanding (such as 'I don't know how you do it', 'I understand it's hard for you', 'we all know') regarding the busy role of teachers:

You said happy for us to email anytime, even outside of work hours but surely you know that then you just be forever emailing. I don't want to be that parent to put extra stress like that on teachers (*Natasha*).

I understand it's hard for you to contact us because I can imagine how many kids you've got, but it was lovely to [receive] your letter about Mali with her name at the top (*Nettie*).

Parents indicated that their acknowledgement of teachers being busy included the awareness that a teacher may not be able to contact parents in ways parents may prefer (such as contacting parents outside of work hours, personalising e-mails), due to limits on busy teachers' time (see also Section 6.2.2.1.v).

(iii) Teacher acknowledges parents' mathematical ability may be limited

Ten parents indicated they felt unable to assist their child with mathematics learning at home, such as when their child was completing homework or revising for assessments. The other three parents did not comment on this aspect of their child's learning. Parents attributed being unable to assist in these areas to their own limited mathematical ability (such as 'don't understand', 'hopeless at maths', 'I struggle') (see also Sections 2.3.1.2 and 6.2.2.1.1.iv):

Talking for myself, I'm no mathematician (*Marshall*).

A lot of it I don't understand so it's over my head (*Nicolette*).

Negative feelings at times resulted from parents' own perceived lack of mathematical ability when helping their student (such as 'frustration', 'struggle', 'tears'):

There can be tears and frustration at home. As I said I don't understand maths and if I can't help Mady, then I'm saying well "you learned it in class", and she says "I don't get it", and well, I can't help (*Nicolette*).

I just seem to throw my hands in the air. I don't know. I'm hopeless at maths so I can't help you teach her (*Noreen*).

I struggle to help Mali with homework. Her father is more able to than me (*Nettie*).

Parents' comments seemed to indicate that they felt as though they were not participating in a partnership with the study teacher to support their child's learning (such as 'couldn't *teach her*', 'I can't *help* you', 'I struggle to *help*') (see also Section 6.2.2.1.iv).

Findings in this section on 'understanding' show that there is an opportunity for parents and teachers to acknowledge one another's challenges when interacting, with a mutual understanding of the limitations each other may experience in their role of supporting students in their mathematics learning. Study findings also provided insight into the limitations parents perceived within their parent–*student* interactions, where limitations on parents' mathematical knowledge appeared to lead parents to feel they were not participating in partnership with the teacher to provide support for the child's learning through parent–student interactions. The perception held by parents that teachers perhaps expect them to be able to assist with completing mathematical problems highlights an implication for teachers; teacher expectations must be clearly negotiated with parents to alleviate the negative feelings parents may experience due to this perception. The importance of teacher actions that clearly demonstrate ways in which parents can become authentically involved in their child's learning was therefore highlighted by the results in this section. Offering suggestions for ways parents can provide learning support for their child's mathematics, at home, which include but are not limited to help with mathematical concepts, is a teacher action that could encourage parents to become involved in their child's learning with confidence (Katyal & Evers, 2007) (see also Sections 6.2.1.4 and 6.2.1.5).

6.2.1.3 Shared goals

The future goals and current expectations that study parents held for their children's academic achievement in mathematics are discussed here (Sections 2.3.1.2 and 5.1.7). First, (i) the future goals (that is, hopes and desires) that study parents held for the ultimate outcome of their children's secondary school mathematics are presented and compared to those of the study teacher. Then, parents' perceptions of how they currently expected their child's achievement in secondary mathematics to *actually* progress are incorporated into the discussion. This will lead to the illustration of (ii) some mismatches between the levels of parents' future goals as compared to their current expectations. Finally, (iii) ways the study teacher's actions may have contributed to raising parents' future goals and current expectations (when both aspects were set at a low level) will be presented. These findings will be discussed in relation to parents' perspectives of their children's prior mathematics experiences and the parents' own mathematical ability (Sections 6.1 and 6.2.1.2).

(i) Overview of parents' future goals for their children's secondary mathematics learning in relation to those of the study teacher

The study teacher consistently held the goal that all students would attain the minimum of Level 2 NCEA. As future educational and job prospects can be limited for those who leave school without Level 2 NCEA (Scott, 2018), for the purposes of this study the attainment of NCEA Level 2, or higher (such as University Entrance (UE), the minimum requirement to go to a New Zealand university, and gained mainly through the attainment of Level 3 NCEA credits) has been defined as a high-level goal in this study. Interview data showed that some parents seemingly held lower academic goals for their child's mathematics achievement than the study teacher (such as 'I don't really have any hopes for her maths', 'I hope my son gets the basics', 'I've no expectations on her maths at all'). This finding indicated an apparent mismatch in the level of some parent- and teacher-held goals (8). Moreover, none of the study parents could recall having been previously asked to give information about their goals for their children's educational achievement by any teacher at the study school. These findings show the importance of teachers

inviting parents to give this type of information to create an opportunity for parent–teacher goals for students’ mathematical achievement to be *shared* (that is, aligned) (Sections 2.3.2.2 and 6.2.1.5).

Further analysis revealed differences between the specificity and diversity of goals articulated by NZE and Māori parents, as groups. Generally, the NZE parents’ goals for their child in secondary school mathematics included specific details related to NCEA (such as ‘I have no hopes for his NCEA’, ‘I want her to get NCEA Level Three’, ‘I only want him to pass Level One NCEA and then he’ll drop maths’), and/or tertiary study goals (such as ‘to attend a university’, ‘definitely to go to university’) (Section 2.3.2.2). The group of eight NZE parents’ aspirations for their children’s mathematics outcomes were relatively diverse, falling equally into two categories: ‘high level’ goals in terms of future employment and study opportunities signalled by parental goals for their child gaining at least NCEA Level 2 and/or UE (4); and ‘low level’ goals signalled by the parental goal for the child attaining NCEA Level 1, or no formal qualification (4). This finding shows that high-level goals for students were *shared* between the teacher and half of the NZE parent group. In contrast to the specifically stated and diverse goals reported by NZE parents, the group of Māori study parents stated their goals for their children’s mathematics achievement less specifically, and less diversely. Although all the Māori study parents expressed that they hoped that their child would succeed academically in mathematics, no reference was made to national qualifications or tertiary study using educational jargon by Māori study parents in their goal statements (such as ‘I want her to do her best’, ‘I want my child to do really well’).

Māori parents were subsequently asked if they had a particular academic outcome in mind that would signal to them that their child was for example, ‘doing really well’ or ‘doing her best’. All these parents stated that a successful outcome in secondary school mathematics for their child would be signalled to them, if their child continued to study mathematics through to Year 13 and gained UE. Based on this clarification made by parents, all Māori parents’ goals were assigned as ‘high level’. It seems that if Māori parents had not been offered an opportunity to expand on their own perception of success for their children, it may not have been clear to the study teacher that Māori parents’ goals

were of a high level and aligned with her own goals for their children (that is, were parent–teacher *shared* goals). Overall, Māori parents stated high-level academic outcomes for their children in greater proportion than the NZE study parents (5 out of 5 vs 4 out of 8, or 100% vs 50%, respectively).

The more generally stated type of aspiration from the Māori parent group was found to be consistent with other New Zealand research, which reports that many Māori parents have no specific academic goal in mind, despite their goals being similar to those of other parent groups including those of NZE parents (McKinley, 2000). This finding further highlights the critical nature of ongoing parent–teacher interactions where their goals for students are conveyed to one another. The nature of how the teacher asks the parents about their goals is also critical so that the teacher can accurately interpret parents’ hopes in terms of national qualifications being worked towards, for his or her own reference within the classroom context.

(ii) Mismatches between the future goals and current expectations parents held for their children’s mathematics achievement

Mismatches of another type were also found, this time between the high-level future goals some parents hoped their children would achieve in their overall secondary school mathematics education, and the low-level achievement outcomes the same parents expected they would actually observe during their child’s junior mathematics education. Such mismatches were observed exclusively within the group of Māori study parents (parents 1 to 5 in Table 6.1). Although all Māori parents held high future goals, they simultaneously held low current expectations. These low expectations (such as that their child would struggle, and would not reach their mathematical potential) seemed to align with the parents’ low self-evaluations of their own mathematics ability, and their children’s negative prior mathematics experience at the study school (Table 6.1; Section 6.1). Cultural advice revealed that, anecdotally, Māori parent stakeholders at the study school generally held low expectations of their children’s learning due to their observations of their children’s school-wide negative learning experiences (Section 4.1). This finding highlights the importance of further study involving the exploration of ways in which

teaching practices could help students experience mathematics positively (Chapter Five), so that Māori parents might generally perceive that their child is a more capable learner in mathematics than parents seem to expect (Section 2.3.1.2).

The next part of the discussion explores teacher practices that appear to have contributed to raising low NZE parent expectations and may provide an insight in relation to the student–teacher and parent–teacher interactions that could inform such further exploration.

Table 6.1 *Parent Future Goals and Current Expectations for Their Child’s Secondary School Mathematics Experience at the Study School*

Identifier	Parent ethnicity (Child ethnicity)	Student in study class	Student in study teacher's	Parent self-evaluation of mathematics ability	Secondary school goals for their child	Child's prior mathematics experience at the study school	Expectation for their child's mathematics at the study school
					Indicative quotes NB: data excludes student experiences in the study class		
1	Māori (Māori)	Yes		Low: 'I'm not a mathematician'	High: To gain University Entrance	N/A	'She has trouble with retention so may well struggle'
2	Māori (Māori)	Yes		Low: 'I'm not great at it'	High: To gain University Entrance	N/A	'Might do OK'
3	Māori (Māori)	No	Yes	Low: 'I'm no mathematician'	High: To gain University Entrance	'My son hates maths, and he hates the teacher'	'I only want him to be able to do the basic stuff, he's not a genius'
4	Māori (Māori)	No	No	Not stated	High: To gain University Entrance	'She hates the teacher, and lacks confidence'	'She will not achieve at her potential'
5	Māori (Māori)	No	No	Not stated	High: To gain University Entrance	'He has no support from the teacher, he has lost passion for it'	'The teacher will not get the best out of him this year'
6	NZE <i>Nataleigh</i> (NZE)	Yes		Low: 'I was useless at school maths'	Low: 'I just hope they don't hate maths but I have no academic goal'	N/A	'I have no expectations for maths at all'
7	NZE <i>Noella</i> (NZE)	Yes		Low: 'I can't help with maths'	Low: 'I don't think it will go well, I want him to leave'	'Anxiety and stress associated with maths'	'High grades not a priority but a new school is the only option to improve the situation in maths'
8	NZE <i>Natasha</i> (Māori)	No	Yes	Low: 'I am useless at maths'	Low: 'Only to Level 1 NCEA mathematics and then stop, he won't do Year 12'	'He has made little progress, he hasn't been supported'	'He has never been at the standard expected and doesn't do well in tests'

High (Aligned with teacher)

Low (Mismatched with teacher)

(iii) Students meeting and exceeding low-level parent goals and expectations

The comments of three NZE study parents showed that their low-level future goals and/or low-level current expectations for their children's mathematics enjoyment and achievement were exceeded when their children were learning mathematics in the study teacher's classroom. The perspectives of (a) Nataleigh and her daughter Neve; (b) Noella and her son Nate; and (c) Natasha and her son Mack (parents 6, 7, and 8 respectively in Table 6.1), will be discussed here. Their initial perspectives prior to the study will be established first, then positive shifts reported in what parents viewed their child as capable of achieving because of the study teacher's practice are presented.

(a) Nataleigh and Neve

Nataleigh shared that she 'hated maths' when she was at secondary school and was 'useless' at this subject. Her daughter Neve had not previously enjoyed this subject, and Nataleigh perceived that Neve was 'not very good' at mathematics. Nataleigh's goal for Neve in Year 9 was that her daughter would not 'dread maths', so that Neve would not experience mathematics as she had herself as a student (Section 6.1.2). Nataleigh held 'no expectations at all' for Neve's mathematics achievement. However, during the study, Nataleigh observed Neve expressing she was 'enjoying' mathematics in the study classroom (such as 'wanted to come', 'skipped cooking for maths'), and Neve performing well in her assessments (merit and excellence level grades):

Nataleigh: I've seen her as she is now in maths. She was not very good at it beforehand, but it was so good to see how far she's come with you teaching her. So it must be the way you're teaching is really good.

Neve: Yeah, I skipped cooking for maths because I had to cook at lunch and had dishes left to do and I have to do them at morning tea tomorrow because I wanted to come to maths.

Nataleigh: See? That kind of thing. She's looking forward to maths now, she is enjoying it which just amazed me, she's gone ahead in leaps and bounds with you.

Nataleigh's pre-study enjoyment goal for Neve 'not to hate maths' appears to have been exceeded ('she's looking forward to maths'). Her initial academic achievement expectations for Neve also appear to have been exceeded (such as 'it's amazed me', 'gone ahead in leaps and bounds'). Nataleigh attributed the positive changes in Neve's mathematics experience to the study teacher's practice (such as 'the way you're teaching', 'with you'). Neve was not placed in the study class in Year Two of the research; therefore, Nataleigh's expectations and goal for Neve in Year 10 mathematics were not explored to assess if her observations as a parent had resulted in a sustained positive shift in both or either of these aspects, as had been intended in the original study plan (Section 3.3).

(b) *Noella and Nate*

Noella stated that she felt she was unable to help Nate with his secondary school mathematics learning. His Year 9 learning experience prior to entering the study class in Year 10 was negative, and he had not enjoyed this subject. Nate had struggled with mathematics prior to joining the study class (such as 'it was all like gobbledygook', 'start from scratch every time') and had been 'failing his assessments'. Noella's initial goal was for Nate to change schools at some point in the near future to enable him to have a different mathematics teacher, as she expected that Nate would not enjoy mathematics in the study class. Noella did not expect Nate to pass his assessments in Year 10 mathematics. However, during the study Noella observed Nate was feeling less stressed, and 'a lot more confident' in mathematics, and performing well in his assessments ('an excellence grade'):

We felt like he used to bring those maths assignments home and not have a clue where to start, it was all like gobbledygook. And we had to start from scratch every time. It was so stressful. Now, with you he brings assignments and homework back, and you know, he can go "oh yeah I can remember how to do this" and the stress is gone. He's definitely feeling a lot more confident that he's doing maths right even. He got an excellence grade in his algebra test with you, it's so different to last year that he doesn't quite know what to think, in a positive

way. Before he got in your class I was trying to persuade Nate to move schools, but now I'm not because you've made all the difference (*Noella*).

Noella's pre-study enjoyment goal appeared to change positively, with her no longer hoping Nate would agree to change to a different school. This change seemed to be due to Noella's observations of Nate experiencing increased positivity (such as 'in the right') and achieving passing assessment grades ('excellence grade'). Nate's enjoyment and academic achievement both seem to have exceeded Noella's expectations. Noella attributed the positive change in Nate's mathematics experience to the study teacher's practice (such as 'you've made all the difference', 'with you'). As in the case of Nataleigh and Neve, a longer study of Noella's increased goals and expectations was not able to be carried out.

(a) Natasha and Mack

Natasha perceived she was 'useless' at mathematics and was unable to assist her children with this subject. Her son Mack had not previously enjoyed this subject and lacked self-confidence as a mathematics learner. Natasha perceived that Mack was 'always well below where he should be' in terms of academic achievement in mathematics and would continue to be so. Natasha's goal for Mack was to 'just pass' NCEA Level One and no longer study mathematics. However, after experiencing learning with the study teacher, Natasha observed Mack expressing confidence and self-belief as a mathematics learner (such as 'believe in yourself'), and exceeding expectations in his assessment grades (such as 'most successful year of learning'):

Mack and I were talking about his maths the other day and I asked him what he thought made the positive difference to his maths. He said. "It takes a teacher that believes in you and then you start to believe in yourself". I think that actually shows in your teaching and it's why the children are achieving like they are. I noticed a shift in his thinking, to one where he's a capable maths learner. Mack had his most successful year of learning last year with you, and I believe it is a direct result of your teaching (*Natasha*).

Natasha attributed her child's increasing mathematical achievement (such as 'a shift in his thinking', 'he's a capable maths learner') directly to the study teacher's practice

(shown by phrases such as ‘it is a direct result of your teaching’ and ‘shows in your teaching and it’s *why* the children are achieving’). Natasha reported that her goal for Mack’s secondary school mathematics had also increased:

My aspiration was for Mack just to pass Level One NCEA and then stop studying maths. But that’s changed now. He has said “I’m not dropping maths, I’m doing maths to Year 12 now.” I had never, ever going into school thought he’d ever go beyond the benchmark of where he had to be. He still believes that he can do it now, even though you won’t be his teacher. It’s changed the way he and I talk about his maths at home now. My message is you might not be able to do it yet, but you will get there (*Natasha*).

As a result of Mack’s increasing self-belief, the goal for his secondary school mathematics achievement now aligned with the high-level category used for this study. Natasha indicated that this increased goal appeared to be perceived by Nate and herself as if it would endure for the following two school years, regardless of whether or not the study teacher was involved in Mack’s learning.

Consistent with other research (see, for example, Biddulph et al., 2003), the study data shows that at least some parents’ low-level goals for their child’s mathematics learning were not fixed; importantly, parent comments indicated that their perspectives about their child’s future and current capabilities in mathematics could increase. Findings show that such increases seemed to occur in response to parents observing their child’s positive enjoyment and achievement experiences in the study classroom. Once their child began to experience positive feelings when interacting with the study teacher, parents appeared to become more aware of what may be possible in terms of their child’s mathematics enjoyment and achievement. There are limitations to conclusions that can be drawn from data drawn from just three parent–student pairs, and the question for further study remains whether increasing parents’ expectations could be sustained, and become a shared high-level visions for students held by parent–teacher stakeholders, and around the extent to which parent expectations affect student mathematics learning (Sections 2.3.2.2).

So far in this chapter, aspects of parent–teacher interactions and partnerships that could be considered relationship-based (such as respect, understanding, shared goals) have been discussed with a view to facilitating positive experiences for parents interacting with teachers about their children’s mathematics learning. Positive feelings experienced by parents during parent–teacher interactions have been implicated in studies, including this one, as a factor facilitating the likelihood of further parent–teacher interactions occurring (see, for example, Bull et al., 2008; Section 6.1). The next section discusses practical and task-based actions teachers can carry out to exchange information with parents about student learning to facilitate positive interactions with parents.

6.2.1.4 Exchanging information

Ways the study teacher facilitated positive feelings when exchanging information with parents in verbal and written forms are discussed here. Firstly, the importance parents placed on communicating with teachers for the purpose of exchanging information about their child’s learning is established (see also Section 6.2.1.2). Then, the parent-preferred methods and timing of these parent–teacher communications will be discussed, with a focus on aspects of such communications that could encourage parent responses.

All parent participants shared that they were interested in and liked to receive comprehensive information about their child’s mathematics learning from teachers (such as ‘I like to know’, ‘I’m interested’, ‘kept in the loop’, ‘like to know everything’, ‘know what’s going on’):

I like to know what's happening (*Matthew*).

I want to know everything about it (*Margaret*).

If it's to do with her learning, then I'm interested (*Maryanne*).

I like being you know, kept in the loop, and to feel like I know what's going on (*Nataleigh*).

Communication from teachers is really important (*Nicolette*).

I like to know everything about his learning, I'm quite nosey (*Noella*).

However, each of the eight parents with a child participating in the study class reported that the study teacher was the only teacher that had regularly communicated with them while their child had attended the study school:

I think you're the probably first teacher that I've come across that has bothered to keep us in the loop (*Noreen*).

If I didn't go to parent teacher interviews how would I know if Mali had done well in other subjects? I have absolutely no idea what Mali does here all day. I would have no other contact really, other than from you (*Nettie*).

Six of these parents mentioned that, due to an absence of communication from other teachers, they were unaware who their child's other teachers were:

I wouldn't have a clue who teaches our son (*Nerissa*).

I don't even know who Mack's teachers were last year (*Natasha*).

Five of these six parents mentioned that this lack of awareness of teachers' identities and knowing the teacher presented a barrier to informal opportunities for parent–teacher interactions to occur (such as in the 'street', or 'in town'):

We see them in town when I'm with the kids, but I don't know who they are. The kids point them out (*Noreen*).

If we knew who their teachers are so that if we were walking down the street we could say "kia ora, Karyn" and she would say "kia ora, Matthew", and "hey, I just wanted to while we're here to"... [share things about Miri's mathematics learning] (*Matthew*).

Parents mentioned it was important to them that their child knew that parent–teacher interactions were occurring (5):

Of course, the child being aware that our emailing about his learning improving should be going on as well, so there are no hidden agendas (*Marshall*).

I think would be good for the kids to know that their teachers are communicating with us (*Nerissa*).

New Zealand research indicates the visibility of parent–teacher interactions can improve student outcomes in the classroom, with students whose teacher and parents felt they

had a good relationship tending to score higher in assessments than those whose teacher had not interacted with their parent (Biddulph et al., 2003; Wylie, Hodgen, Hipkins, & Vaughan, 2009). While students in the study classroom were aware that their teacher communicated with their parents (Section 5.1.4), the survey that measured student awareness of parent–teacher interactions was anonymous and so any association between parent–teacher interaction students were aware of and student achievement was not explored in this study (Appendix 9).

Parents reported that they wanted to receive comprehensive information from teachers about their child’s mathematics learning, and to be aware of their child’s teachers’ identities. Parents felt it was important for their child to be aware that there was parent–teacher communication occurring. How and when parents preferred to receive communications follows.

Most study parents preferred email as the main method teachers used to communicate with them regarding general administrative-type matters (such as assessment dates, stationery requirements, and topics being covered in classroom learning) (11) (see also Section 6.2.1.2):

I like getting emails that tell me what's going on because I can read them and it makes me feel like I'm in the loop this is what's happening. I think email is totally acceptable, as email is how things are done these days (*Matthew*).

The reasons for this preference were two-fold; busy lives meant emails could be read when they had time and they were able to refer back to the administrative type of information again, at a later date (Section 6.2.1.2).

An email with the details when I'm busy, well it's gold. Then I can look at the schedule later (*Natalie*).

Two parents stated that email was not their preferred method of parent–teacher communication. One NZE parent (Nathaniel) mentioned he would prefer an initial phone call to exchange information, which could then be followed up with an email. The other, a Māori parent (Maryanne), said she would prefer emails to be printed and posted to her, as her email account was managed by her sister.

All parents conveyed that, rather than email, they preferred the verbal communication of a phone call from the teacher to communicate information about their child that was ‘more serious in nature’ than routine administration (such as ‘anything bad’, ‘something big’):

If it was something big, if things weren't going well, I'd expect a [phone] call
(*Mitchell*).

I would probably like a phone call more than an email I think if it's bad (*Natalie*).

The types of information parents considered to be more serious in nature, requiring a phone call from the teacher, included ongoing disruptive behaviour, failing assessments, being unusually upset, and struggling with a topic of learning:

So definitely get me by phone call yeah, if it's anything bad I would expect to be told by the person that involved (*Maryanne*).

Say, if it is struggling with maths then a phone call. Then if the call is followed up with an email, that is fine (*Nathaniel*).

I think it needs to be done personally by the teacher, in a phone call because if it's going to be that Mady's failing and that she really doesn't understand maths then I don't think that's an email message, it's a phone call for sure (*Nicolette*).

Furthermore, parents preferred that the phone call was made by the teacher who was raising the concern.

Study parents' perspectives of their preferred timing for various methods of parent–teacher communications and interactions throughout the school year in different situations were explored. Establishing and maintaining regular contact and importantly promptly replying to parent emails were other ways parents felt had resulted in their experience of positive parent–teacher interactions (Table 6.2). A teacher exchanging information with parents via email at the beginning of the school year was appreciated by all study parents, as they were then aware of who was teaching their child and how to contact them via email in the future. Consistent with previous research (see, for example, Mutch & Collins, 2012; Education Review Office, 2008), study parents preferred communications to be regular, where any teacher concerns about students learning are raised sooner rather than later (such as before it was ‘too late’ for parents to support their child’s learning).

Table 6.2

Summary of Parent Preferred Methods and Timing, Used for the Exchange of Information With Their Child's Teacher

Situation	Method of communication	Timing of communication	Parent comments representing how the <u>timing</u> of communication contributed to their appreciation of the teacher's actions, and their <i>positive feelings</i> (Section links)
Teacher introducing themselves to parents at the start of the school year	Email	In the first week of the school year	<ul style="list-style-type: none"> You contacted me <u>first</u> and it was <i>personally addressed</i> so I felt like I could contact you. I knew your email address in that <u>first week</u> in case I wanted to contact you which was <i>helpful</i>. (Section 6.2.3.i)
School open evening	Face-to-face meeting	Within the first two weeks of the school year	<ul style="list-style-type: none"> I <i>liked</i> meeting you <u>early</u> on. You were <i>good, enthusiastic</i> about the subject so I felt like I could contact you. It was <i>good</i> to put a face to the name <u>straight away</u> because over just email I have no idea who the person is. (Sections 6.2.2.1 and 6.2.3.i)
Upon the teacher receiving an email from a parent	Email	As soon as possible	<ul style="list-style-type: none"> You <u>replied</u> quickly, that was novel for our school so that was <i>great</i>. You <u>replied that day</u>, I think it was after hours and you <i>used our names</i> so you were putting an <i>effort into treating me as an individual</i> and not just as a sea of people you have to get through. You replied <u>really quickly</u> and it made me feel like you were <i>interested in what I said</i>, and that <i>my child was important</i> in your class. (Sections 6.2.2.1 and 6.2.2.2)
Teacher communicating general administrative information	Email	Twice per term, approximately start and mid-term	<ul style="list-style-type: none"> I <i>like to know</i> <u>a couple of times a term</u>, at the <u>start</u> and then <u>half way</u> through the term. It was <i>good</i> to see that she's on track for completing the things she needs to during the term. <u>A couple of times a term</u> is <i>good</i> so I knew he was <i>passing maths</i>. (Section 6.2.2.3)
Teacher communicating serious concerns regarding student behaviour or achievement	Phone call (Section 6.2.3)	At the time, or shortly after the concern arises	<ul style="list-style-type: none"> I <i>liked</i> how you made the <i>effort</i> to let me know <u>sooner rather than later</u> about stuff. I <i>liked</i> knowing when it's happening <u>at the time</u>, like if she is struggling because at the end of the topic it's a bit late. If I know, <i>I can help</i>. It's <i>good</i> to let me know <u>as soon as you can</u> so I can do something about it, because it's <i>not too late to step in</i>. (Section 6.2.3)

Most of the examples of teacher–parent communication involved information being directed from the study teacher to the parents (Section 1.2.4). Study parents were asked to share their perceptions of the study teacher’s written communications regarding any aspects that encouraged them to respond to study teacher communications in order *exchange* information, so that their own ideas were included in the planning of student learning pathways. The main way the study teacher encouraged parents to exchange their ideas with her was by explicitly inviting a response in her emails:

Well, you invite a response – you put at the end of your email something asking us “what do you think” as a way to get parents to say what would help their child out (*Marshall*).

You always invited me to continue to communicate with you any time if I needed to, so it wasn't just a cut off conversation. Your emails were written in a conversation way, it wasn't just to reply to me, there were questions and an invitation to reply. So it really felt like we were having a conversation (*Natasha*).

The reference to questions and invitations to reply facilitated parental feelings that they were engaging in ‘conversations’ with the study teacher, indicating the facilitation of an ongoing exchange of information between these partners in supporting student’s mathematics learning.

6.2.1.5 Contributing

Study parents shared that to contribute actions in support of their child’s mathematics learning they required information communicated to them by the teacher to be relevant to the needs of themselves and their child:

You've got to make it relevant to the people that you're talking with (*Nicolette*).

In order to be relevant, parents conveyed that information must be specific, honest, and solution focused (Section 2.2.2). Ways in which the information communicated to parents by the study teacher conveyed these three characteristics, resulting in positive feelings

for parents, are discussed here. Negative examples involving other teachers' actions are also discussed as a contrast.

When the content of written or verbal teacher communications was specific to their child (such as 'about Nate', 'card tricks', 'personalised'), parents reported experiencing positive feelings as a result (such as 'nice', 'turn this around', 'yay, yes', 'you knew my child'):

The email we got from you wasn't just like one of those other generic letters that you get, it was something different that stood out and it was about Nate and it felt like yay, yes somebody's actually there that wants to turn this around (*Noella*).

Your email was very personalised. It was more to do with Mali, and not generally the whole class which was quite nice (*Nettie*).

You and I would have a quick conversation about how Mack was going, what he was doing, and you said that [he] had taught you some card tricks once. So yeah, it felt like you knew my child (*Natalie*).

In contrast with the specific information and the associated positive feelings, parents shared that they had experienced negative feelings when written or verbal teacher communications were *not* specific to their child, communication perceived as generic in nature by parents (such as 'everything's the same', 'nothing custom'):

When you go to a parent teacher interview and you think is this what they say to all the parents that come in, 'cos everything's the same. There's nothing that's custom for your kid, there's nothing in that communication with us that tells us they're talking about our kid in particular, apart from a name (*Matthew*).

There was nothing just for Mack (*Natasha*).

This issue of generic information being perceived as a barrier to positive parent–teacher interactions appeared to be particularly relevant in the context of parent–teacher interviews at the study school (Section 5.1.4). This relevance could be due to parent–teacher interviews being the only form of interaction parents experienced with most of their children's teachers. Seven parents reported that at parent–teacher interviews they felt that the other teachers seemed to lack specific knowledge about their child (such as

students' names) and therefore did not provide information the parents could use to support their children's learning from home:

You go to parent teacher interviews sometimes and you actually wonder if all the teacher know who your child is (*Natasha*).

Some teachers don't really know who your child, that's what I've found, so what was the point of going anymore? (*Nerissa*).

I feel that a lot of the teachers aren't actually familiar with my child when I go to my interviews. My child had a teacher for three terms last year who didn't know what their name was and called them something else every time so I got nothing helpful out of the interview (*Nicolette*).

Half the time the teachers didn't even know which kid they were talking about. I'm not sure why I bother going (*Noreen*).

At parent teacher night and the teacher had no idea about my child's maths struggles (*Noella*).

Due to the absence of specific information about their child, these parents mentioned that they had questioned the worth of attending parent–teacher interviews in the future (such as 'not sure why I bother', 'what's the point'). Furthermore, four parents stated that they had since decided against attending parent–teacher interviews:

I'm not going to come to parent–teacher evening now anymore for Mimi (*Nathaniel*).

This finding shows information that was personalised and specific was important in encouraging positive feelings for parents during parent–teacher interactions. Positive feelings appeared to encourage future parent–teacher interview evening interactions, whereas negative parent feelings seemed to decrease the likelihood of future parent–teacher interactions in that context (Section 6.1). As parents reported that teachers had not already established communication with them before parent–teacher interviews, a pre-existing feeling of disconnection may have at least in part contributed to parents' negative feelings.

Parents appreciated honest information about their child's learning behaviour and academic achievement in mathematics (Sections 6.1 and 5.1.4). Celebrating positive events was 'important' to parents (10) (Section 2.2.2):

It's really important that we are making sure that we're celebrating the good things that are happening with our kids at school (*Matthew*).

We love to get feedback of how good she is (*Maryanne*).

If she's achieved something worth celebrating, then I think it's really important to celebrate their successes (*Nicolette*).

You sent a positive email home that Nate had an Excellence in algebra and that was great (*Noella*).

We got your postcard about her grades, she was very happy with that (*Noreen*).

While the study teacher providing parents with honest positive information about their child's learning appeared to foster positive feelings at home (such as 'great', 'happy', 'loves'), parents also wanted to be informed about issues of a concerning nature that the teacher identified regarding their child's learning and behaviour (10):

So I'd want to know if Mali was struggling at something. You know if she was falling behind so I could help. Because I suppose you generally wouldn't know that otherwise (*Nettie*).

If I know there's a problem, I want to try and help (*Natalie*).

I'd want to know if my child was being disruptive, because that's not fair for the other kids trying to learn (*Natasha*).

Parents expressed that they wanted their child's teacher to raise such issues of concern so that they could 'help' to improve both their child's and other children's learning experience. Parents appeared to appreciate the study teacher both informing them of issues, and taking an active role in attending to issues (Section 5.1.4):

You're so approachable and you seem to want to actually sort any issues that are happening out (*Noreen*).

However, some parents felt that other mathematics teachers had not taken similar responsibility regarding attending issues as the study teacher had (such as ‘fake’, ‘I don’t think there really is a problem’). These parents felt that the lack of honest information provided to them by other teachers was due to the teacher perhaps not wanting to take responsibility for student failure, nor an active role in attending to issues of parent concern (such as ‘doesn’t want to admit’, ‘say the right things’, ‘the kid that’s the problem’) (see also Section 5.1.4):

Some other teachers say it wasn't how me and my kid say that the issue is, they try and say it is just the kid that's the problem. I don't talk to those teachers anymore, because I felt like I was just another complaining bloody mother (*Noreen*).

I feel that a lot of the teachers don't want to take responsibility for my child failing? Is it that the teacher doesn't know my kid when we're at the parent teacher interview or is it that she just doesn't want to admit that she's not teaching her properly? Mrs [X] did not take any responsibility for why Mady didn't feel comfortable to ask questions in maths. I think that some of the teachers put on a fake persona when they put up against it by the parent coming in (*Nicolette*).

I have given ample times for honest feedback to happen. I emailed the maths teacher early on and explained Nate's worried and he's struggling and possibly needing a bit more time to comprehend things. I did get a reply but and the teacher said “oh you know, I don’t think there is really a problem”. I felt like it had just been “say the right things to her so she would stop complaining” and I gave up (*Noella*).

The implication of teachers avoiding giving parents ‘bad news’ during exchanges of information is that parents’ respect for the teacher might decrease, leading to a decrease or cessation of positive parent–teacher interactions (‘I don’t talk to those teachers’, ‘I gave up’) (Sections 6.1 and 6.2.1.1).

Along with specific and honest information being exchanged with them by the teacher, parents wanted teachers to provide solution-focused suggestions for attending to issues of concern that were raised about students’ learning or conduct:

Offer up some solutions for a start so we can talk about them and get learning struggles sorted out (*Mitchell*).

As long as the bad news is followed up with a solution, and not just telling me my child's been disruptive because I want to know what I can do about it to help, and how it's going to get fixed (*Natasha*).

For example, I would like to have some bad news about my child's learning followed up with "we're going to help your daughter this way". Not just that she is really struggling and the teacher thinks we should be doing something about it (*Nicolette*).

Parents expected solutions to issues to be suggested by teachers, who they viewed as having mathematical and teaching knowledge upon which they relied for knowing how they could support their child's education (such as 'know how this all works', 'teachers are the professionals') (Section 6.2.1.1):

Generally speaking, teachers are the professionals who know how this all works (*Mitchell*).

Yep, well talking from myself because I'm no mathematician (*Marshall*).

Maths is not my strong point and I don't know what to do about things because I'm not a teacher (*Nicolette*).

However, parents mainly conveyed their negative experiences where their children's other teachers had not provided the type of information parents felt was required in order for them to support their child and attend to issues raised by the teacher:

Nothing was offered to us first to say, here's how we can work on this so Nate's not struggling. We just wanted some solutions (*Noella*).

Six of these parents gave examples to show that, although they had been willing to work with the teacher to support their child's learning (such as 'we can work on this'), they did not receive teacher-offered solutions they found useful. Instead, these six parents perceived teachers to be non-responsive, supplying information of little to no use to them (Section 5.1.4):

Last year Mady has told me she was struggling and she didn't understand maths, but she didn't want to ask the teacher questions because she didn't want to be singled out in front of her peers. So I went to parent teacher interviews and said my concern but the teacher told me that Mady was doing fine and she had to have more confidence in herself and she should ask more questions if she didn't understand. Asking the questions was totally the issue in the first place, and she wasn't doing well. The teacher's not taking responsibility for why Mady doesn't feel comfortable in there. If she feels comfortable she will ask the question and she will speak up if she needs to. It had to start with the teacher making Mady feel comfortable to ask questions so I gave up (*Nicolette*).

Parents depending on teachers' expertise for suggestions on ways they could support their child's learning in collaboration with the teacher reported negative feelings (such as 'gave up') when teachers' suggestions were not responsive to their child's unique needs (such as 'asking the questions was totally the issue in the first place') (Chapter Five; Section 6.2.1.2). The implication of these negative feelings is that they may lead to a decrease in ongoing interactions, inhibiting parent–teacher collaboration, by not assisting the parent to contribute authentically to their child's learning ('so I gave up'). These findings suggest that teachers must attempt to provide solutions to issues of concern raised with or by parents. These solutions must be responsive to the student's and parents' unique needs, to maximise parents' willingness to work *with* the teacher to support students' learning (Section 6.2.2.2).

6.2.2 Summary of barriers to positive parent–teacher interactions

A summary of the nine barriers to positive parent–teacher interactions revealed during the PTP-P interaction typology analysis discussed in Section 6.2.1 is now presented (Table 6.3). Four of the five typology key words were aligned with contributing to overcoming more than one barrier ('shared goals' being aligned with a single barrier), which highlights the holistic nature of the typology. Teachers demonstrating 'understanding' within their interactions with parents appears to contribute to overcoming the two most frequently reported barriers (such as barriers *A* and *B*).

Table 6.3

Barriers to Positive Parent–Teacher Interactions

<i>Identifier</i>	Barrier	Location of teacher actions that overcome barriers to promote positive interactions	Frequency in data
<i>A</i>	Parents are busy	6.2.1.2 Understanding	11
<i>B</i>	Parent lacks mathematical ability to assist their child with mathematics at home	6.2.1.1 Respect 6.2.1.2 Understanding 6.2.1.4 Contributing	10
<i>C</i>	Parents hold different goals to the teacher for their child in mathematics	6.2.2.3 Shared Goals	8
<i>D</i>	Parents receive non-specific teacher feedback about their child's academic progress making it difficult for parents to support learning	6.2.1.1 Contributing	7
<i>E</i>	Parent perceives that their child's individual culture, including ethnicity, is not responded to in alignment with parents' expectations	6.2.1.1 Respect	6
<i>F</i>	Parent is unsure of teachers' contact details	6.2.1.5 Exchanging Information	6
<i>G</i>	Parent receives teacher feedback about their child's progress, which is not responsive to student or parent perceptions of the assistance needed	6.2.1.4 Contributing	6
<i>H</i>	Parent did not receive a reply to their attempts to contact a teacher	6.2.1.5 Exchanging Information	4

6.3 Summary

Literature reviewed in Chapter Two indicates that teachers working closely with both students and their parents is critical in promoting achievement motivation and academic success (Goodall & Vorhaus, 2011; Hattie, 2003; Webber et al., 2016). This chapter has shown how parents' feelings played an important role in influencing parent–teacher interactions, and it became clear that these feelings can be felt strongly by parents and can endure. Along with parents' own direct experiences of interactions with teachers, their child's experiences influenced the nature of parents' interactions, and the extent to which they interacted with teachers in support of their children's learning. Study findings discussed in this chapter indicate that teachers must view parents' and students' feelings as valid, real, and important factors in establishing and maintaining partnerships in the classroom and beyond. Parents' negative perceptions and experiences of teacher actions could lead to barriers standing in the way of positive parent–teacher interactions occurring in the future, and furthermore appeared to contribute to parents holding low-level goals and expectations for their child's learning. Importantly, parents' goals and expectations were not necessarily fixed, and may be lifted when students had positive mathematics learning experiences and when parents knew of these. The study teacher's practice was rich in ako-based actions (Chapter Five), and such culturally responsive teaching seemed to enhance parent–teacher interaction outcomes. Ako-rich practices that enhanced student–teacher and parent–teacher interactions presented in Chapters Five and Six, respectively, will be discussed further in Chapter Seven.

Mā te mātau, ka ora
Through knowledge, comes being wellbeing

Chapter Seven

7.0 Teacher Practices that Foster an Ako-rich Environment in the Classroom and Beyond

This chapter highlights three themes that emerged across the two analysis chapters, revealing student and parent perspectives of teacher actions that reflect and support an ako-rich teacher practice (Section 7.1). These themes are teachers valuing stakeholder knowledge (Section 7.1.1); teachers sharing student information with parent stakeholders (Section 7.1.2); and teachers holding high expectations of student learning and behaviour (Section 7.1.3). Interplay was noted within these three themes as student and parent perspectives often both contributed to the grounded theory emerging in regard to either the same specific teacher behaviour element in the ATA framework to support student learning (Chapters Five and Six); or the same specific barrier to parent involvement learning (Section 6.2.2; Table 6.3). For example, in terms of interplay within a specific behaviour element, it was noted that students (Section 5.1.4) and parents (Section 6.2.1.4) both valued timely and honest feedback from the teacher (ATA element 4), regarding sharing academic progress as a way to promote student learning. In terms of interplay within a specific barrier, it was noted for example that parents feeling too busy to interact with a teacher during the school day (barrier A; Table 6.3) was a concern to both students and their parents, and could inhibit interactions occurring between school and home, regarding student learning (Sections 5.1.4 and 6.2.1.2).

Student and parent perspectives that were assigned to the three themes were aligned with the success-indicator outcomes of ako in teacher practice from student and parent perspectives, drawn from *Tātaiako* (Ministry of Education, 2011) (Section 7.1.4). This alignment was carried out to allow checking of the ATA framework (Section 2.3.1) and PP-TP typology (Section 6.2.1) separately, to determine the suitability of these two results scaffolds for giving life to the concept of ako in terms of the Māori education strategy *Ka Hikitia*. Generic indicators of ako being enacted successfully as per *Ka Hikitia* are provided to educators in *Tātaiako* by the mandating body of *Ka Hikitia*, the Ministry of Education (Sections 1.3; 1.4.1; 1.4.2; 1.4.3; and, 2.2).

A brief section summary is given (Section 7.1.5) before the interplay between themes arising between the ATA framework and the PT-PP typology is summarised in an integrated 'ako in mathematics' model (AIM) (Section 7.2). The AIM model draws together the elements of teacher behaviour students and parents perceived to promote student learning, through ako-rich teacher actions in the classroom and through positive parent–teacher interactions beyond the classroom.

7.1 Practices that Support Ako-rich Interactions in the Classroom and Beyond

Ways that each of the ATA framework and PT-PP typology elements can be demonstrated in practice will be discussed here in three sections (Sections 7.1.1–7.1.3). Limitations and benefits of elements will be described from student, parent, and teacher stakeholder perspectives. Following the description of elements in the pertinent section(s), the teacher behaviour outcomes in all sections will be aligned with the list of student (9) and parent (6) outcomes of ako drawn from stakeholder voices and stated in *Tātaiako* (Ministry of Education, 2011) (Section 7.1.4). Then, a brief section summary is given (Section 7.1.5).

7.1.1 Teachers valuing stakeholder knowledge

The international literature (see, for example, Gay, 2010; Ladson-Billings, 1995), New Zealand literature (see, for example, Bishop et al., 2003; McKinley, 2000), policy documents (Ministry of Education, 2011; 2013) and the classroom trials of data-gathering tools (Section 3.1.2) indicate the importance of exploring the contribution that education stakeholders sharing knowledge with one another provides to the development of an ako-rich culturally responsive classroom environment. The study teacher's use of the ako-based practice of acknowledging and valuing the knowledge that students and parents shared with her was common across and between these stakeholder groups. The possible effects of such knowledge sharing on student engagement and parent involvement in mathematics learning emerged in both analysis chapters, but predominantly in Chapter Five.

The study teacher encouraged students and their parents to share their knowledge with her (Sections 5.1 and 6.2.1.4). This practice enabled the teacher to treat each student as an individual learner, with learning pathways co-constructed (Section 5.1.5) to suit individuals' mathematical needs (Sections 5.1.1, 5.1.2, and 5.1.4) and needs according to their own world (Section 5.1.6). The ako-rich elements contributing to this aspect of teacher practice are important, because when practised together students were more motivated and engaged in their learning, mainly due to positive feelings the students experienced in the study classroom (consistent with Averill, 2013). Such positive student feelings subsequently influenced feelings of their parents in a positive way (Section 6.1), and saw parents more likely to be involved in ongoing reciprocal interactions with the study teacher (Section 6.2.1.4 and 6.2.1.5). The finding that both student engagement and parent involvement were enhanced by an ako-rich classroom environment can help teachers understand that they can give life to the Māori concept of children and their parents being unable to be “treated as separate, isolated or disconnected” (Ministry of Education, 2013, p. 17), in an English-medium mathematics classroom context.

Specifically, study parents believed in the core importance of positive feelings in the classroom, sharing that students need to be happy to positively experience mathematics learning. Furthermore, parents viewed teachers as exerting the most influence (consistent with Hattie, 2003) over their children's positivity about learning:

If she's not happy, she's not going to learn. I know being happy will help her learn better actually (*Māori Parent*).

Teachers have a huge influence about whether kids learn, or not (*Pākehā Parent*).

This finding was also consistent with those of Bishop et al. (2003). This thesis study has built on findings by Bishop et al., by showing how a teacher could use their influence to positively affect student feelings in the mathematics context by first acknowledging (such as listening, thanking) and then valuing stakeholder knowledge (that is, by acting responsively). The main way the study teacher demonstrated valuing stakeholder knowledge was through responsively paced lessons (such as the teacher knowing when

to slow down and speed up according to individuals' mathematical or personal world needs):

We get to work on what we need to work on with you instead of going over and over the same easy stuff. You're not talking at me and telling me stuff I already know (*Māori Student*).

I let my stress out by talking to you first and then I can learn (*Pākehā Student*).

Beyond the classroom, parents having their knowledge being acknowledged and valued by their child's teacher was important to them:

You replied really quickly to my email about Mack's learning and it made me feel like you were interested in what I said (*Pākehā Parent*).

Student–teacher and parent–teacher interactions where knowledge was shared appeared to be founded on reciprocity. This was particularly so when the teacher took the position of a learner:

At least give te reo a try and if you're being corrected now and then [by students], then let yourself be corrected. It's all good (*Māori Parent*).

Ako-based reciprocity is at the heart of culturally responsive teaching and learning for Māori learners. When the roles of teachers and learners are interchangeable in an ako-rich classroom there is a move away from traditional top-down English-medium teaching style where the teacher is the 'expert'. This expert role sets up a Eurocentric, hierarchical dynamic in the classroom where the teacher makes the decision and power is not shared. By positioning herself as a learner acknowledging and valuing students' cultural, mathematical, and world knowledge, the study teacher interrupted this traditional hierarchaical practice to promote stakeholder equity. Bishop et al. (2003) also show that parents of Māori Year 9 and 10 learners in their study believed that their culture must be affirmed in English-medium schools. In this thesis study, Māori students' cultures being reflected in their mathematics learning was important to students' Māori parent(s), more so than to their Pākehā parent. All parent participants reported that ethnicity was just one facet of their child's culture, and the depth to which their child identifies as Māori was not for a teacher to assume. Māori parents in this thesis study also expressed that development of their child's Māori cultural knowledge was the responsibility of the child's

family, more so than that of the teacher, which is consistent with findings by Macfarlane, Webber, McRae, and Cookson-Cox (2014). Any attempts the teacher made to incorporate te ao Māori into lessons were appreciated and were indicated as key to this particular teacher behaviour being perceived as genuine and not tokenistic by participants. The study teacher's enthusiasm for te ao Māori was appreciated by Māori students and parents alike. Māori students and parents seemed to rely on their feelings of the teacher's intent about incorporating te ao Māori in order to gauge her genuineness about valuing their ethnicity.

Specific ways the study teacher responded to students' individual needs through acknowledging and valuing their knowledge in the classroom environment will now be described. To acknowledge student knowledge, the teacher used revision activities at the start of the lessons, walked around the room during lessons monitoring student progress, and conducted whole-class and one-to-one polling activities at the end of the lessons. Co-construction of learning pathways occurred in the study classes during feedback and feedforward conversations processes where student knowledge was tracked and shared with parents. The importance of these actions is highlighted in student comments:

It's not just you standing up at the front being the boss. You ask us what we want and we work together (*Māori Student*).

The teacher should tell the parents how we need help (*Pākehā Student*).

Both students and parents appreciated student and learning pathway information being shared with them, in an honest, timely and non-judgemental, solution-focused manner (consistent with Bull et al., 2008; McKinley, 2000). It was important to students and parents that the teacher did not give up on any student's learning, especially the students who were 'rolling through the middle'. Māori parents held expectations of teachers to want the best for students' learning progress, as they would want for their own child.

When a gap in student knowledge was identified in student knowledge during monitoring, having discreet ways of conveying their needs were critical for encouraging student comfort to access the teacher's help to fill this gap. Written methods of conveying needs were useful, and provided a transition to verbal methods. Consistent with findings by Glynn et al. (2010), once gaps (and strengths) in their knowledge were conveyed,

students seeking one another out in reciprocal teacher–learner interactions were a benefit to student comfort and learning. The pedagogical decisions the teacher made were informed not only by student and parent feedback shared in conversations, but also by teacher reflection on literature and research carried out within the classroom. Again, as indicated in findings by Bishop et al. (2003), the study teacher showed how a more traditional top-down hierarchical teaching approach can be shifted to reflect a more discursive classroom practice. This shift is signalled when teachers increase their acknowledgement of students' prior learning knowledge, give feedback and feed-forward based on knowledge shared, and position themselves as co-learners with students and co-construct learning pathways with students.

As the study teacher's practice moved away from whole-class instruction from the front of the room, to a more conversational practice where more time was spent moving around the class while interacting with individuals and small groups, increasing student cooperation was observed (consistent with Glynn et al., 2010). The reciprocity and purposeful cooperative nature of students is highlighted by these student comments:

You listen to us so we listen to you.

You work with us so we work with you.

You're not mean to us, so we aren't really mean to you.

The teacher's impression was that the increasing cooperativeness of the class resulted in a more settled environment, conducive to student learning and freeing up teacher time to focus on teaching and learning rather than discipline (Section 5.1.7).

7.1.1.1 Summary of implications when teachers do not value stakeholder knowledge

The participants reported that the study teacher exhibited greater levels of acknowledging and valuing stakeholder knowledge than other teachers at the study school. A comparison between the study teacher and other teachers at the study school was not a planned aspect of the data collection; however, participants were keen to share such perspectives. Other teachers were reported by participants to have failed to show acknowledgement

and value of prior and current learning, which seemed to be linked with a reluctance of students to engage in their learning, and of parents to participate in positive interactions with the teacher. Other teachers infrequently co-constructed lessons informed by student knowledge, and rarely took students' personal challenges and commitments into consideration in the classroom. This led to stakeholders feeling misunderstood. Teacher-tracked student achievement did not tend to be shared with students, or with their parents; when it was shared, participants felt it could be dishonest, non-specific, and incomplete. Teachers' failure to recognise Māori stakeholders' culture appropriately (that is, without essentialising or 'putting them in a box'), or assuming a student's ethnicity and the level to which it should be recognised without consultation with students and parents, was perceived in negative ways reflecting disrespect. Students and their parents had negative perceptions of other teachers treating all students 'the same' in light of a lack of the teacher learning about the students through shared knowledge (Chapters Five and Six).

7.1.2 Teachers sharing student information with parent stakeholders

International literature (see, for example, Chenhall, Holmes, Lea, Senior, & Wegner, 2011; Gunn, Pomahac, Striker, & Tailfeathers, 2011), New Zealand literature (see, for example, Averill et al., 2016; Bishop et al., 2003; Bull et al., 2008; McKinley, 2000; Meaney et al., 2013), and policy documents (Ministry of Education, 2011; 2013) indicates the importance of exploring the contribution that teachers sharing information about students' learning with the students' parents provides to developing a culturally responsive pedagogy. The study teacher's use of the ako-based practice of sharing tracked student learning information with parents was common across and between these stakeholder groups. The possible effects of such information sharing on student learning and parent involvement in mathematics learning emerged in both analysis chapters, predominantly in Chapter Six.

The study teacher shared information about student learning not only with students, but also with students' parents. Specific teacher actions demonstrated within this sharing process saw parents enter into reciprocal and ongoing interactions with the study teacher, taking the practice of ako beyond the classroom. All elements of teacher practice

contributing to the aspect of teachers and parents sharing information in a reciprocal and ongoing way are important, as the more successful the partnership between teachers and parents, the more the students' learning is known to benefit (Biddulph et al., 2003; Mutch & Collins, 2012). Benefits are particularly so for minority student groups who may be more dependent on parental involvement in their education than students whose cultural capital is more closely aligned with their teachers (Kerbaiv & Bernhardt, 2018).

Although parents in general are known to care about their child's learning, and they are willing to enter into productive partnerships with teachers and schools, parental involvement tends to lessen as their child progresses through the education system. The least parental involvement is observed in secondary schools (Bull et al., 2008; McKinley, 2000). Consistent with these prior studies, this thesis study found that all parents were interested in receiving information about their child's learning successes and struggles, and felt that communication from the teacher was important; however, they felt they received limited information from the study school compared to when their child was at primary school:

I like to know what's happening (*Māori Parent*).

Communication from teachers is really important (*Pākehā Parent*).

I think you're the probably first teacher that I've come across that has bothered to keep us in the loop [at secondary school] (*Pākehā Parent*).

In this study, parents' interactions with teachers were found to be influenced in three main ways: by their interactions with teachers during their own historic education; through their own more recent interactions with their child's teachers; and following observations of their child's feelings resulting from recent student-teacher interactions they had experienced in the classroom (see also Section 7.1.1). In terms of parents being influenced by experiences of their own past education, Bishop et al., (2003) report that Māori parents view "today's schools through yesterday's eyes; that is their own experiences of schooling limits their ability to approach schools today" (p. 31). The finding in this thesis study that parent participants shared negative experiences of their own education, and shared that they had assumed their child's experience of mathematics would be the same, was consistent with Bishop et al.'s. (2003) findings. This experience and assumption association study saw parents holding low expectations for how their

children would experience and progress in mathematics. Such low expectations were held, despite, in the case of all Māori parents, the whole group holding high aspirations for their child's mathematics outcomes.

Specific ways the study teacher encouraged positive interactions to be facilitated with parents who may have been reluctant to interact with teachers due to their own, or their child's, negative learning experiences will now be discussed. Parent voice in this thesis study showed that teachers must show respect through recognising students as culturally located individuals; investing time into student learning beyond the 'minimum requirements'; and realising the power they hold due to (i) the significant time students spend at school, and (ii) the professional and subject knowledge they hold about guiding student learning relied on by parents. Moreover, teachers must show understanding towards stakeholders by taking into account that parents and their children lead busy lives; and that parents may have limited mathematical knowledge to use to help with their child's learning.

Parent participants reciprocated teacher respect and understanding by respecting the information and knowledge teachers held, and by understanding the difficulty teachers may face in meeting parent expectations of information sharing, due to their role as a teacher. Messages were very similar from parent and student participants in regard to their expectations of teacher respect and understanding. One difference between student groups in regard to teacher–parent interactions was that it was critical to Year 10 students that the teacher was very clear that home contact was not being made by the teacher due to the student having misbehaved. As this may be due to enculturation in the study school environment (Section 4.1), this finding may not be common to other schools in the local context.

Specific ways the study teacher responded to parents who held mismatched expectations and aspirations will now be discussed in more detail. Parents and teachers holding realistic aspirations for student achievement that are shared are a key to raising Māori student outcomes (Ministry of Education, 2011; 2013). While this study found that Māori parents held aspirational goals that were at least as high as those non-Māori parents held for their children's future outcomes, which was consistent with literature (see, for example, McKinley, 2000), they did not articulate their aspirations using qualification-specific

language (consistent with Mckinley, 2000). This cultural difference found within parents' perspective data (Section 6.2.1.3) highlighted the importance of the ways Māori parents' aspirations could potentially be (mis)interpreted by English-medium teachers. Where there is cultural mismatch between teachers and parents, teachers cannot assume that the strategies that facilitate collaboration and connections with non-Māori families will also work for Māori parents. It is important that teachers do not marginalise the aspirations of their Treaty of Waitangi partners, by failing to acknowledge that they themselves may be operating from a traditional Eurocentric position and a Pākehā worldview (Berryman et al., 2018). Sharing positive information about student learning with parents seemed to be a key to lifting at least Pākehā parents' expectations to be more aligned with their child's actual capabilities, and with the expectations the study teacher held for all students (Section 7.1.3). Raising parent expectations was not an intended focus of this study, and the single term of data collection limited further exploration of this emerging theme with Māori parents during the study timeframe. The lack of data gathered around this focus limits the applicability of the key to lifting parent expectations and indicates a further study direction.

While parents' positive feelings were facilitated when the teacher shared student information with them, underpinned by an approach of respect and understanding, *ongoing* interactions where information was exchanged in reciprocal ways to support student learning was the ultimate goal. Ongoing interactions were more likely to occur if the teacher explicitly invited parent responses:

You always invited me to continue to communicate with you any time if I needed to, so it wasn't just a cut off conversation. Your emails were written in a conversation way, it wasn't just to reply to me, there were questions and an invitation to reply. So it really felt like we were having a conversation.

Ongoing interactions were also more likely to occur when information the teacher shared was positively framed, honest, timely, responsive to individual student and parent needs, specific, and solution focused.

7.1.3 Teachers holding high expectations of student learning and behaviour

The international literature (see, for example, Gay, 1997), New Zealand literature (see, for example, Alton-Lee, 2003; Bishop, 2010) and policy documents (Ministry of Education 2011; 2013) indicates the importance of exploring the contribution of high teacher expectations to developing an ako-rich, culturally responsive classroom environment. The study teacher holding high expectations of the ako-rich practice of student learning behaviour and conduct was common across all student groups, and both students and parents appreciated the teacher expecting students to reach their potential and behave cooperatively. The possible effects of such high expectations on student engagement in mathematics learning emerged predominantly in Chapter Five; the positive effect of this element on encouraging parent involvement emerged in Chapter Six (see Section 7.1.2).

The study teacher held high expectations of all students regarding engaging in their learning and behaving in a way that enabled all students to learn at all times. This element of teacher practice was important because it is one way that the study teacher could reject deficit theorising (Section 2.2.2), by refusing to rationalise Māori cultural experiences and background as being other than the norm, and therefore could impede Māori achieving educational success. Moreover, although there are documents and programmes guiding teacher practice underpinned by anti-deficit theory (Section 1.4), it is critical that teachers with their significant influence on student success (Section 7.1.1) explore how they might participate, even subconsciously (Section 2.2.1) in the systematic marginalisation of Māori students in their own classroom practice where there is cultural mismatch (Bishop et al., 2009; Metge, 2014). Students received the teacher's high expectations in a positive way, and as a result rose to the challenge of taking responsibility for their learning behaviour and conduct. Conversely, when students perceived their teacher held low expectations, students reported that they often deliberately misbehaved, and gave up on their learning due to the negative experience this lack of ako-rich behaviour resulted in for them and for parents, in regard to their mathematics learning.

Holding consistently high learning behaviour expectations of *all* students was found to positively influence student engagement, encourage student–student teaching and learning, and also result in deliberate cooperation by students throughout the study. Benefits to student learning were further enhanced when the study teacher demonstrated

an understanding toward students' world needs (such as listening to students who were having a bad day and responsively altering discipline on a case-by-case basis). These finding outcomes were of benefit to the students, and to the teacher.

Benefits to the students of high teacher expectations included:

- a more settled classroom conducive to engagement and learning
- a sense of being treated fairly and responsively to their needs
- a feeling that their teacher enjoyed teaching them
- knowing that their teacher did not give up on their learning.

Benefits to the teacher holding high teacher expectations included:

- greater enjoyment of interacting with the students
- more time to focus on teaching and learning
- reduced variation in the productivity of lessons, dependent on the time of day.

High teacher expectations were reciprocated by study students who indicated that they held high expectations of the teacher. Students expected their teachers to acknowledge their preferences for respectful, caring, understanding, and kind teacher practices in regard to the teacher's classroom role.

7.1.4 Alignment of the study findings with ako outcomes in *Tātaiako*

Examples of observable outcomes reflecting the successful practice of ako by teachers (curriculum wide, from early childhood to secondary education) that were gathered from perspectives of Māori learners and parents are presented in *Tātaiako* (Sections 1.4.3; 2.2; and 2.3) (see also Ministry of Education, 2011). Table 7.1 shows teacher behaviours in the ATA framework and PT-PP typology teacher behaviour outcomes (Section 7.1.1–7.1.3) roughly cross-checked against the *Tātaiako* outcomes. Cross-checking was done to return to *Tātaiako*, which provided the definition of ako for this study in the first instance, to explore the integrity of the outcomes of this study in relation to education policy focused on promoting success for Māori learners (Chapter Seven, introduction) (Ministry of Education, 2011).

Table 7.1

Study finding Ako-Rich Practice Behaviour Outcome Alignment with Tātaiako Ako-Rich Practice Behaviour Outcomes

Behaviour outcomes drawn from <i>Tātaiako</i> (Ministry of Education, 2011, p. 15)	Behaviour outcome drawn from thesis section		
	7.1.1	7.1.2	7.1.3
Learner Voice			
Lets me and my peers know when we're doing well	✓		
Never gives up on us	✓	✓	✓
Knows what works for me and my learning	✓	✓	
Asks us what we know	✓		
Shows me how to learn	✓		
Expects every one of us to do our best all the time	✓	✓	
Believes I can succeed	✓	✓	✓
Tells me that we are both responsible for how well I do			✓
Seems to enjoy learning from us too	✓	✓	✓
Parent Voice			
Every one of our children is achieving well at this school			✓
As Māori parents and whanau, we talk with teachers regularly about our children's learning		✓	
We determine the type of information we want to receive about our children's learning and also how that information is provided	✓	✓	
As parent of the Māori community we can make decisions about the teaching and learning programmes at the school (learning pathway in the classroom in this study context)	✓	✓	
We know what our children are learning at school and can support them at home	✓	✓	

From Table 7.1 it can be seen that there is strong coverage, and overlap, of the behaviour outcomes from *Tātaiako* and the two scaffolds combined (ATA framework and PP-TP typology). This result indicates that the ATA framework and the PT-PP typology can be combined with confidence, in order to provide teacher behaviour indicators that have enabled a Pākeha teacher of Year 9 and 10 mathematics to successfully demonstrate an ako-rich practice consistent with *Tātaiako* (Ministry of Education, 2011).

7.1.5 Summary

The behaviour elements in the ATP framework and the PP-TP typology (Sections 7.1.1–4) are connected and interwoven with one another, demonstrated by interplay and connections and commonalities between student and parent data. When practised holistically together the scaffold behaviours resulted in positive feelings, potentially for all study participants. For example, the teacher investing time to acknowledge and value students' knowledge (such as ATA framework elements 1 and 2) was positively appreciated by students and their parents as a caring teacher practice reflecting respect (such as PP-TP element 'respect'). Such respect appeared to increase stakeholder positivity about the mathematics learning. Increasing stakeholder positivity seemed to increase student engagement in the classroom and increase the likelihood of parents exchanging information with the teacher. The increased student engagement also appeared to positively affect classroom management, which was a benefit for the students, and for the study teacher.

7.2 The Ako in Mathematics Model

First, an overview of the model will be given, followed by a description of potential uses of the model (Section 7.2.1) and finally a comparison of the model with the literature (Section 7.2.2).

Student, parent, and teacher perspectives, along with cultural advice and an in-depth reflection on literature have been combined to create a new model, the Ako in Mathematics (AIM) model. This model encapsulates teacher behaviours that facilitate

reciprocity in mathematics teaching and learning. The AIM model, drawn from the substantive evidence base from one teacher's work with students and their parents, provides detail regarding how mathematics teachers can give life to *Ka Hikitia* (Ministry of Education, 2013) and *Tātaiako* (Ministry of Education, 2011) (Figure 7.1) in their own classrooms. The AIM model facilitates the sharing of goals and information between student, parent, and teacher stakeholders, underpinned by respectful and understanding approaches where co-construction of learning facilitates a culturally responsive environment, even when stakeholders are culturally mis-matched (Section 2.2).

The three overlapping layers of the AIM model, representing teacher interactions with self, students, and parents, show the ways teachers can embed reciprocity into their classroom role. This reciprocity occurs when stakeholders are treated as individuals, and it is recognised that they all hold valuable knowledge to share. The three layers that are embedded holistically within teacher practice remind educators of the different ways of attending to improving student outcomes through teacher positioning as a learner (teacher–self layer), teacher influencing student engagement with learning (teacher–student–(parent) layer), and teacher influencing parent involvement with their child's learning (teacher–parent–(student) layer). The AIM model is offered as an extension of the teaching resource, *Tātaiako* (Section 2.2; Ministry of Education, 2011). The layers in the model provide a cue to consider that concurrent relationships with various stakeholders are at the centre of *ako*, and these relationships that consider a person's individuality are nested and linked inseparably within one another.

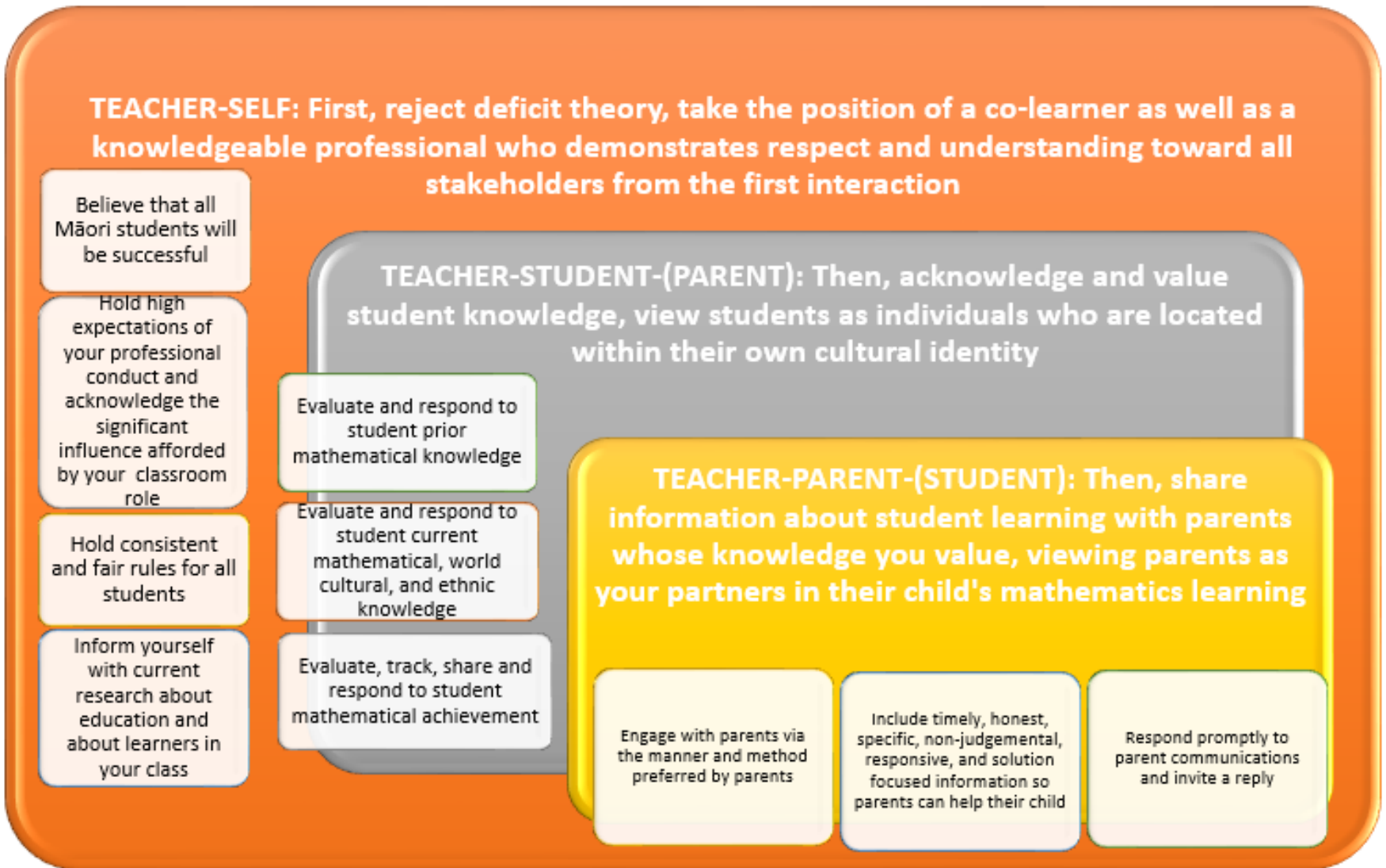


Figure 7.1. The Ako in Mathematics (AIM) Model

7.2.1 Potential uses of the AIM model

The purpose of the AIM model is in enabling teachers to develop culturally responsive mathematics classrooms, in particular for Māori learners. Consistent with the notion that what works for Maori students, works for all students (University of Waikato & Te Whare Wānanga o Awanuiārangi, 2010) the AIM model was found to enhance the mathematics learning experiences of all participants in a multiethnic classroom. Teacher behaviours synthesised in this study as being conducive to ako-rich student–teacher and parent–teacher interactions and partnerships appeared to be undermined when students of all ethnic backgrounds and their parents perceived the layers of the model were not being practised. The study data indicated that when elements of the AIM model (Figure 7.1) are working well together (such as when students are engaged, and parents are involved in mathematics learning), effective student–teacher and parent–teacher interactions are in place and reciprocity between student and parent needs, and elements of the teacher’s behaviour, exists. Alton-Lee (2003) and Bishop et al. (2003), consistent with Pere’s (1994) concept of an inclusive environment for a diverse range of learners refer to teacher actions in structuring opportunities within learning environments, for a range of rich learning-focused exchanges between learners and their tasks, resources, peers, and teachers.

Reciprocity between student needs and teacher behaviours found in this study included:

- teachers learning from students in exchanges of ideas to monitor student understanding, guided by the teacher’s choice of examples and explanations to suit what students knew and what they still needed to learn (Sections 5.1.1–2);
- teacher-facilitated student collaboration increased student engagement and outcomes (Section 5.1.3);
- co-construction of learning pathways resulted in lessons that were paced in response to student needs, resulting in higher student engagement (Sections 5.1.4–6); and

- negotiating classroom expectations with learners is seen as co-operative teacher behaviour, reciprocated by co-operative student behaviour (Section 5.1.7).

Reciprocity between parent needs and teacher behaviours found in this study included:

- teachers and parents respecting and understanding each other, and each others' roles, in supporting student mathematics learning (Sections 6.2.1.1–2);
- teachers and parents sharing goals for student outcomes (Section 6.2.1.3); and
- teachers and parents exchanging information about students' learning, so stakeholders could contribute effectively to students' progress (Sections 6.2.1.5–6).

7.2.2 Comparing the AIM model with the literature

According to the principles articulated by Bishop et al. (2003) and Bishop and Berryman (2009), which are consistent with the messages in *Ka Hikitia* (Ministry of Education, 2013), mathematics classroom practices that are congruent with the AIM model are likely to support positive student outcomes. Through teacher attention to the three layers of the model when participating in the teaching and learning of mathematics, they will gather information through research carried out outside of their classroom, as well as information from stakeholders in research and sharing carried out inside the classroom. Such researched information is required as part of an authentically local culturally responsive practice of *ako*. Through this research the teacher will be able to safely position themselves as a learner without shame of being the 'not knower', consistent with messages from (Berryman et al., 2018).

Although 'we are all New Zealanders', the assumption that 'we are all the same' marginalises and minimises the differences between Pakeha and Māori, who hold a unique and Treaty of Waitangi-defined position as *tāngata whenua*, or *people of the land* (Glynn and Bevan-Brown, 2007). Obscuring, or failing to understand and value differences, denies the importance of "Māori beliefs, values and preferred ways of thinking

and acting for the identity, wellbeing and achievement of Māori in their own country” (Glynn and Bevan-Brown, 2007, p. 25). For a teacher to not research and value stakeholder knowledge, is to take a position of assumption and sameness, making it difficult to build relationships with people teachers know little about:

They [educators] will find it even more difficult if the starting point involves assumptions of sameness, and assumptions that their cultural values and practices around teaching, assessment and intervention will “make sense” for everyone, so that there is little for them to learn from Māori students and whānau, and from their Māori colleagues. It is essential for educational professionals to build relationships of trust and respect with Māori colleagues and whānau, and to understand how contemporary Māori society “works”. This means moving beyond present comfort zones, and engaging and participating comfortably with Māori in authentic cultural contexts where te reo Māori and tikanga Māori can prevail (Glynn & Bevan-Brown, 2007, p.30).

Ako-rich environments are places where students are able to be themselves and express their cultural identity, feelings, and needs that are valued by the teacher and met with responsive teacher practice, are essential conditions for student learning as expressed in *Ka Hikitia* (Ministry of Education, 2013). Students will experience benefits of their parents being involved in their learning consistent with Māori policy mandates and traditional Māori concepts, acknowledging the inseparable nature of students from their parents (Ministry of Education, 2011; 2013). The findings of this study suggest that use of reciprocity, underpinned by respect and understanding is a valuable element of teacher practice that affords opportunities to nurture positive student–teacher and parent–teacher relationships of mutual respect, understanding, and cooperation.

7.3 Summary

The AIM model allows the consideration and examination of a range of mathematics teachers’ behaviours conducive to generating an ako-rich practice in the classroom, and beyond. Comments from a Māori student and a Māori parent illustrate the fundamental importance of a teacher effectively valuing contributions from stakeholder knowledge:

It's not just you standing up at the front being the boss. You ask us what we want and we work together. You work with us so we work with you (*Māori student*).

Once we got talking I thought you were someone I'd definitely like to talk to further. It felt like "this lady is on our waka" (*Māori parent*).

When all the AIM layers are in place, student positivity contributes to a positive experience in mathematics learning and parent involvement (Chapters Five and Six).

Chapter Eight

8.0 Discussion and Conclusion

The goal of this research was to examine how a Pākehā teacher might demonstrate ako-rich behaviours in a junior secondary school multiethnic mathematics classroom. Elements of ako-rich teacher practices were considered within three areas of practice: teachers acknowledging and valuing stakeholder knowledge; teachers and parents sharing information; and teachers holding high expectations. The research participants included one teacher, 36 students, and 12 parents in a mid-decile, large English-medium school. The study data included lesson observations, student and parent interviews, running reflections, and two surveys. A framework (Chapter Five) and a typology (Chapter Six) were used to analyse and describe the results, culminating in an integrated model (Section 7.2).

This chapter describes issues affecting the research process and results (Section 8.1), the main findings of the research in light of the literature on ako as part of a culturally responsive teacher practice (Section 8.2), implications of the findings for teachers and policy makers (Section 8.3), topics worthy of further exploration that emerged during the analysis of this study (Section 8.4), and final concluding remarks (Section 8.5).

8.1 Issues Affecting the Research Process and Results

Substantial care was applied in the design and implementation of this study to ensure that data collected were representative and reliable. Cultural advisors and critical friends were consulted, data-gathering tools were piloted and refined, and practicalities of data collection were negotiated with participants (Chapter Three). Across two school terms in consecutive years, 10 full lesson observations, 19 student interviews, 17 parent interviews, 244 student survey questionnaires, and student written reflection, and teacher running journals were carried out to assist with ensuring representative data samples reflected the full range of perceptions about ako in the study-teacher's practice. Despite various types of data being collected, the data was only a sample of the teacher's lessons

with this class over the school term. Moreover, the majority of the data was collected in Year One of the study.

All studies are susceptible to limitations due to possible effects of the study design, sample, non-response error, timing, and method of data-gathering and analysis methods on the findings (Johnson & Christensen, 2012; Patton, 2002). The effects of each of these limitation factors will now be considered in turn.

8.1.1 Study design

This study combined qualitative and quantitative data-gathering methods to explore the breadth of student and parent perceptions, and to allow comparisons within and between groups. The analysis chapters (Chapters Five and Six) provide summaries and quotes to illustrate the range of student and parent views, alongside tables and relative frequencies to illustrate comparisons of student perceptions and achievement, over time. Mixed methods research is widely used in educational research; however, inherent assumptions grounding qualitative and quantitative methods and interpretation of data from these two methods vary and they can be seen to be in conflict (Tashakkori & Teddlie, 2010). Possible effects of the assumptions of these methodological paradigms on the reliability of this study and its findings were mitigated by:

- using triangulation techniques (Chapter Three); and
- substantial consultation with cultural advisors on the suitability of data-gathering tools, data analysis, and interpretation of results.

The thesis areas where results from qualitative and quantitative methods demonstrate convergence indicate greater confidence can be applied to findings, whereas areas where divergence is noted signal further research questions (Patton, 2002). In this study, the results pertinent to ako in teacher practice within the classroom and beyond were fairly consistent across data-gathering methods and tools. The area of most divergence emerged within the theme of student engagement and achievement (Chapter Five). It is

probable that the reason for less consistency in the data gathered for this part of the study relates to the non-anonymity of the E&E survey questionnaire (Appendix 10), for example through participant responses potentially describing their idealistic, rather than real thoughts (Onwuegbuzie & Teddlie, 2003).

8.1.2 Sampling

In combination with there being only a single teacher from the study school, the sample is therefore unlikely to be representative of all mathematics teachers and students. To provide data, analysis, and findings relating to effective practice of ako in classrooms where students were most likely to progress and benefit from such progress before they entered the senior school, the study classes were made up of Year 9 and 10 students with average to below-average mathematical ability.

8.1.3 Non-response error

Not all students in the two study classes participated in the study:

- 1 (out of 24) Year 9 students and 6 (out of 21) Year 10 students did not return consent forms;
- Not all students were present at every survey point, nor did every student complete a survey questionnaire (the completion rate ranged between 45 and 86%); and
- Not all students participated in interviews, the interview groups were fluid, and the group(s) changed from week to week (Appendix 4).

To provide data, analysis, and findings relating to effective practice of involving parents in the learning occurring in ako in classrooms, all parents of study class students were invited to participate. The study sample is unlikely to be representative of all mathematics students' parents, particularly as not all students' parents participated in the study (12 individual parents).

No patterns of lack of consent or participation were noted across ethnic groups, for students and parents.

8.1.4 Timing and method of data gathering, and data analysis

The research design process (repeated data collection from each study class) and timeframe (one school term of data collected, in each of two consecutive years) allowed time for researcher reflection and consultation allowing iterative examination of the research questions, data-gathering tools, and of the data. The integrated analysis approach provided time to consider interrelated scaffolds (a framework and a typology) for examining study data, drawing conclusions, and discussing study findings.

The data collected from the Year 9 class proved the most useful data to answer the study questions because:

- lessons were recorded and reviewed in several interviews
- ATP survey data and PAT achievement data accompanied the interview data for triangulation during analysis.

The first student data-collection points in both study years occurred after the researcher and students had been together for the first school term of the year (approximately 30 mathematics lessons). Data collection continued throughout the whole of the second school term of the year, where approximately another 35 mathematics lessons were shared. These deliberate timings meant that the study participants had some knowledge of the researcher as their (or their child's) teacher and had gained a sense of trust in the researcher's respect for them and their opinions. This trust of researcher intentions resulted in open and honest interview, reflection and ATP survey responses. However, on reflection of the data-gathering processes, the following changes may allow further trustworthiness and reliability in similar studies:

- Anonymising survey questionnaires;
- Aiming to reduce the number of students who did not return consent forms; and
- Adding observations of other teachers' classes.

8.2 Main Study Findings

This study achieved its aims. The findings provide New Zealand mathematics teachers with behavioural indicators they can use with confidence to develop ako-rich classroom practices that will meet the learning needs and preferences of many New Zealand students and their parents, including Māori, and will assist in promoting the success of students learning mathematics. The analysis has illuminated:

- it is critical for teachers to seek, value and share with students and parents (Chapters Five and Six);
- the importance of treating students as individuals (Chapters Five and Six);
- strategies that facilitate comfortable classroom conditions to facilitate positive feelings for students' learning experiences (Chapter Five and Six);
- along with their low levels of student feelings of wellbeing, such negative sentiments and feelings can be overridden within an individual classroom (Chapters Five and Six) when the study school environment affected the students' prevailing sense of a lack of cultural responsive teaching and learning;
- encouraging positive parental feelings for positive involvement in student learning (including the high expectations Māori parents have for teacher care; Chapter Six) showed the importance of respect and understanding being shown by teachers to students and their parents;
- the need for the teacher to position themselves as the 'not knower' when learning about student culture is appreciated by students and parents alike (Chapters Five and Six), as illuminated by the complexity of student culture from the parent perspective;
- parents' own schooling experience affected the way parents felt about becoming involved in their child's education and on their prediction for their child's mathematical experience, as did the negative feelings parents associate with their own lack of mathematical knowledge (Chapters Five and Six);
- the importance of teacher-held high expectations on student outcomes (Chapter Five);

- strategies that appear to assist with aligning low parent expectations of student outcomes with the teacher’s high expectations (Chapter Six); and
- the seeming lack of parent involvement in students’ mathematical (and general) learning at junior secondary learning (Chapter Six).

Bishop et al. (2003) show that increased teacher effectiveness and an increase in Māori student motivation and learning were results based on Bishop et al.’s (2009) *Effective Teaching Profile*, which was informed by their *Te Kotahitanga* project (Section 1.4.2). This study further informs understanding of the element of ako in the Effective Teaching Profile for students in multiethnic English-medium mathematics classrooms. This study also further informs the behavioural indicators in *Tātaiako* (Ministry of Education 2011), by adding detail to ways a teacher can demonstrate the indicators of ako provided within, to meet the outcomes that are also stated in the document (Chapter Five).

The literature (see, for example, Bishop & Berryman, 2009; Smith, 1997) presents a strong case for embedding ako in classrooms, where teachers enter into more conversational partnerships with students for enhancing student learning and addressing traditional power imbalances through which Māori culture is valued and understood. In a study by Glynn et al. (2010), teachers successfully used ako in primary school science classrooms to modify their classroom practice so that Māori students found their Indigenous knowledge was respected and affirmed in the classroom, which led to positive outcomes in Māori students’ knowledge and understanding in science. This study has helped examine the assertion by Glynn et al., that in light of the significant relationship between ako and “the principles of culturally relevant pedagogy and transformative education for culturally diverse learners” (p. 126), it provides evidence that their findings are of relevance to teachers working with Indigenous students in contexts other than science education.

The literature (see, for example, Bull et al., 2008; McKinley, 2000; Meaney & Fairhall, 2003) also presents a strong case for enhancing students’ learning by involving students’ parents in the learning. This study has helped to respond requirements in Māori education policy (Ministry of Education, 2013) and supporting documents (Ministry of Education,

2011) to identify ways in which teachers can grasp the notion of inseparability of students and their parents, and more confidently enact measures to ensure this notion is attended to in their classroom. Furthermore, this study has helped respond to calls in literature (see, for example, Berryman et al., 2018; Glynn & Bevan-Brown, 2007) to engage with parents on terms that are understanding of the diversity between Pākehā teachers, and Māori parents, where assumptions of ‘sameness’ and relevance of Eurocentric navigation of relationships are not held.

The developed framework and typology (Chapters Five and Six) integrated into a new model (Chapter Seven) all acknowledge the links between the teacher actions and student and parent disposition to engagement and involvement with mathematics learning. The framework and typology were drawn from sound policy and supporting documents to help describe the results of this study. The integrated AIM model can be used to describe, develop, and analyse ako-rich mathematics teaching practices. It is hoped that the elements the model is constructed from can be used to give teachers confidence to learn about and affirm Māori culture in their classroom to enhance the learning experiences and outcomes of mathematics learners. Although the AIM model emerged from this study of ako in a junior mathematics classroom, many aspects of this model are sufficiently generic that they may have transferability within other curriculum areas and school levels in New Zealand, and potentially further afield.

8.3 Implications of the Findings

The study findings indicate that much work may be required by teachers to fully realise the goals of *Ka Hikitia* (Ministry of Education, 2013), so that Māori can achieve ‘as Māori’ in the classroom. Much work may also be required in implementing practices in the classroom that incorporate discursive power-sharing environments where teaching and learning is reciprocal and involves students’ parents.

Student and parent data indicated that positive feelings were an important motivator for students learning mathematics (Chapters Five and Six) and increase the likelihood of parents interacting with teachers. However, few examples of positive feelings in other teachers’ classrooms were shared by participants. This indicates that, consistent with

Māori education policy goals (Ministry of Education, 2013), a significant amount of work needs to be done to align classroom practices with Māori-preferred pedagogies to realise the potential of Māori students.

This study highlights that practice recommended for teachers to enhance the outcomes of groups of students and parents traditionally underserved by mathematics education (see, for example, Bishop et al., 2003) are likely to also be appreciated, and enhance the learning experience of other groups. Furthermore, no evidence emerged in this study that ako-rich practices were detrimental to the learning of any other groups of students. The generic nature of the AIM model is highlighted by the diverse combinations of student ethnicity in the study group (Chapter Four).

New Zealand schools are becoming increasingly ethnically diverse, and there is an increasing awareness of the need to understand diversity within the student and parent body. For teachers, school management, teacher educators, and policy management, there is much to be gained from understanding and promoting a set of practices and behaviours that are suitable for enhancing achievement across ethnicities rather than attempting to implement varied strategies for different student groups. Moreover, consistent with the findings of Bishop et al. (2003), this study has shown that a Pākehā teacher can successfully enact a pedagogy that is appreciated by Māori students, and their parents. In practice, the accuracy of teachers' informal judgements about student ethnicity are likely to vary and a teacher-defined level of student engagement within their heritage culture may be inaccurate and unappreciated by students' parents (Chapter Six).

8.3.1 Contributions of this research in terms of Fraser's framework

Fraser's framework (Section 3.1.1.1). can be used to explore issues of schooling and social justice in local and international contexts (Keddie, 2012; Meaney et al., 2016 Vale et al., 2016; 2020). The findings of this thesis contribute to strengthening understanding of the elements of redistribution, recognition, and representation in the local mathematics context, with transferability to international cross-curricula contexts. The redistribution of

teachers with deep Indigenous knowledge as intellectual resources is possible through practices aligned with *ako*. The challenges of distribution of teachers with rich Indigenous knowledge being able to make positive impacts for learners can be somewhat mitigated by ensuring that initial teacher training and professional development encourage all teachers to hold high expectations for all Indigenous learners in classrooms (Rubie-Davis & Webber, 2015), thus avoiding restricting mathematics learning of Indigenous students due to deficit theorising by teachers (Section 2.2.1.1). Lifting the level of education made accessible to Indigenous students is always important, and particularly so in societies where increasing levels of education are required for career and further education paths (Section 6.2.1.3), which in turn affect monetary distribution (Section 2.4). The element of *ako* identified in the ATA framework (Section 2.3.1 and 2.3.2.3) speaks to teachers holding high expectations of students' learning behaviour and conduct. This element can best be the teacher works with parents to support the goals and aspirations being set and attained (Sections 6.2.1.3 and 6.2.1.4) Looking internationally, research suggests that teachers do tend to adjust what they are teaching in line with their own perceptions of what is student-appropriate. While this could be seen as good a pedagogical practise on the surface, this practice can restrict opportunities by "dumbing down" the curriculum when teacher decisions are influenced by deficit theorising (Atweh, 2017; Vale et al., 2016). The elements of redistribution aligned with this study can be used to foster social arrangements in classrooms which promote parity by encouraging teachers to be mindful of how they view student disadvantage. When considering altering their practice teachers must be mindful that essentialising ethnic identity can magnify difference and otherness and create more inequity (Keddide, 2012). Teachers working with students and parents to set and uphold appropriately high expectations of learners using the ATA framework as a starting point, is transferable across all school levels, and school subjects.

Necessary changes in *how* mathematics could be taught to all learners, at the level of day-to-day culturally appropriate interactions with teachers (Cazden, 2012), is made in this research. The focus of this research was on how the 'system' could change to better serve the learners, rather than expecting the learners to change to fit the system. Redressing misrecognition was done through upholding values which were anti-subordination including: valuing students' and parents' cultural and mathematical

knowledge (Chapter 5 and Section 6), encouraging students and parents to suggest how the mathematics programme was delivered, and switching teaching and learning roles between the teacher and student (Chapter 5). Celebrating successes of individual students with their collective whānau (Section 5.1.2 and 6.2.1.5) gave recognition to students as individuals, within the collective class, avoiding essentialising students' ethnic backgrounds. Recognition of *what* should be taught in mathematics (Cazden, 2012) and assessment methods were out of the scope of this research, and these remain areas crucial for Indigenous learners and hence important for further study. In contexts internationally, members of marginalised groups may seek to reject deficit theorising, and assumptions of the prevailing culture that “assume their cultures, knowledges, values, even their humanity, are of no worth” (Cazden, 2012, p.182). Recognising who students are, by working with students and their families, in order to know learners well, so that education can be delivered in ways that students can take full advantage of educational opportunities is critical. This research provides strong evidence that by working with students and parents to gain awareness of students' cultural backgrounds, teachers can increase the equity of access to mathematics learning and achievement Indigenous students experience across school levels and curriculum subjects.

Representation includes Indigenous communities being involved in decisions about what is taught in mathematics, and how it is taught in classrooms, and highlights *who* is making these decisions. The study design, methods and research questions focused on hearing the voices of students and parents, so that a student-teacher-parent partnership could be reached where all stakeholders made the decisions about mathematics learning in the researcher's classroom. The research findings showed that while students and parents were able to voice their perspectives on mathematics teaching and learning occurring, and the teacher made responsive changes, the teacher remained the holder of the expert mathematics and pedagogical knowledge which parents relied on for their child's education (Section 7.1.2). Looking internationally, Indigenous peoples are arguably amongst the least adequately represented within their own countries (Cazden, 2012). The findings of this study provide important evidence that involving parents and students in curriculum and teaching decisions, by hearing and acting upon their voices, is one way

towards misrepresentation being redressed that can be implemented across all school levels and school curricula.

A key issue which undermines justice in education contexts is an assumption that an individual needs to be a member of a particular group to authentically represent the group's interests (Cazden, 2012; Keddie, 2012). This assumption restricts who can know and speak about issues of marginality. Furthermore, this assumption leads to confined roles that members of privileged non-Indigenous groups must play in order to support Indigenous peoples. Placing all of the expectation and responsibility on marginalised Indigenous students and parents to advocate for educational change can be mitigated by the efforts of members of the dominant group reaching for social justice in education, in actions *with* those who are othered.

In this study, a full partnership status was not expected nor reached between the student-teacher-parent stakeholder, as the teacher held an expert role. There was a prevailing atmosphere of “withness”, however. Each stakeholder held their expert knowledge: the students about their cultural and mathematical knowledge; the teacher about pedagogy and mathematics; and, the parent about their whānau background and their child. By iteratively sharing expert knowledge with one another where the parties could switch between the knower and the not knower, the speaker and the listener, the teacher and the learner, respectful relationships were built up which were based on understanding and shared goals. Mathematics teaching and learning was carried out *with* the student and parent input, in the researcher's classroom.

8.4 Topics for Further Exploration

Many ideas for further research into student perceptions and teacher behaviours have emerged through this study. Further understanding of ako in teacher practice could be gained by exploring:

- examples of what Māori students perceive to be reflective of their heritage culture being incorporated in various mathematics topics (Section 5.1.6);
- perspectives of NZE parents of NZE learners regarding the inclusion of te ao Māori into mathematics lessons (Section 6.2.1);
- ways to co-construct with parents the roles parents can take to more actively support their child's mathematics learning (Section 6.2.1.5);
- with parents, whether their apparent low expectations of teachers at the study school to include te ao Māori in their teaching is due to conditions at the school, or other reason(s) (Section 6.2.1.1);
- the results and ease of use of the AIM model by other teachers;
- the complexities of professional development that would be required for teachers to implement the findings of the thesis, including programmes and documentation that could support the implementation.
- whether the teacher's practice based on the AIM model is positively received by students; and
- transferability of the AIM model to other mathematics classrooms and those of other curriculum areas within and outside New Zealand.

For each of the ideas for further study, a range of suitable research methods to collect a range of diverse perspectives are provided in this study. Ways of collecting data through methods that facilitate equity, such as cogen, important when working with Indigenous cultures, are also exemplified in this study. Any further study would be enhanced by the inclusion of other researchers including researchers of Māori cultural heritage or the heritage culture of the focus student group.

8.5 Final Comments

Increasing opportunities for Māori to access mathematics in ways that promote their success, as Māori, are urgently required (Ministry of Education, 2013). By acknowledging, understanding, and valuing cultural differences in bicultural and multiethnic classrooms in New Zealand, teaching practices can become more culturally responsive to mitigate the disparate effect cultural mismatch can have on Māori achievement outcomes. This

study builds on previous research carried out to explore effective teacher practices for Māori learners (Bishop et al., 2003) by providing detail around how a Pakeha teacher enacted ako and by highlighting how teaching behaviours consistent with such practice can also be effective and essential for students of other ethnicities.

This study indicates that there are particular teaching behaviours that provide opportunities for students to express their own cultural and mathematical knowledge, over and above what is offered in traditional-style Euro-centric classrooms. Activities that access past and more recent prior knowledge, and written modes of current knowledge sharing, are examples of activities that offer opportunities for student confidence, discussion, and comfort. Moreover, these opportunities facilitate the teacher positioning themselves as a learner and growing their understanding of the students as individuals, enabling responsive teaching to students' personal and mathematical needs. Growing positivity in the student body, was enhanced by parent interactions with the teacher, which were then developed further through mutual respect, understanding, and a conversational tone when relevant information was shared. This study adds to the literature by providing evidence that elements of ako can be interpreted in the light of increased redistribution of high expectations, recognition of cultural and mathematical knowledge, and representation of students and parent voices in co-constructing learning with the teacher wishing to enhance social justice in the classroom.

The results of this study support the claims of Berryman et al. (2018) and Glynn and Bevan-Brown (2007) that teachers must be prepared to position themselves as the 'not-knower', without fear or shame, as Māori stakeholder worldviews have much to offer in the teacher's understanding and implementation of *Ka Hikitia* (Ministry of Education, 2013) when members of different ethnic groups work *with* each other to redress social injustice. Observational and interview data indicated that many students and their parents felt positive about the deeper level of respect and understanding for one another, afforded by an ako-rich practice, and evidence further challenging the traditional top-down, teacher as expert classroom model. Co-construction of learning processes, how and what information is shared, flexibility to incorporate individual needs, underpinned by a sense of teacher care and passion where priority is placed on positive interactions can be seen

to be consistent with a Māori worldview supporting a community of practice (Lave & Wenger, 1991) model of mathematics education. Particularly given the grounding in research, advice, literature, and policy, these understandings drawn from the study results are likely to help assist with successful implementation of culturally responsive elements of current and future Ministry of Education policies for education of Māori learners.

Understanding classroom teacher practices that facilitate student–teacher–parent relationships that have been historically marginalised in the face of our founding document, The Treaty of Waitangi, are one way that we can work towards equity for all in mathematics, through creating culturally responsive classrooms and schools. Through a perception there was something amiss in my classroom, to becoming aware that cultural responsiveness was the key to unlocking student potential, led to understanding that I needed to position myself as a learner to be able to embrace and embed ako-rich practice. Once I understood the worldviews of students and their parents, gaining insight into their perspective of culture and of mathematics by working with these stakeholders in matters of redistribution, recognition, and representation, the classroom reached a state of positivity that enhanced student learning and parent involvement.

Mā te rongō, ka mōhio

Mā te mōhio, ka mārama

Mā te mārama, ka mātau

Mā te mātau, ka ora

The Māori concept of ako, and Kaupapa Maori Theory were both interpreted and applied in this research through the Pākehā researcher’s lens. Stepping into this type of research as a Pakeha was challenging; positioning oneself as a ‘not-knower’ in this context is not for the fainthearted, as Berryman et al. (2018) have pointed out. Reciprocity in the processes of teaching *and* learning are necessary for nurturing positivity and equity in order to maximise student learning, supported by parents and teachers acting as supportive partners for each other, and the student. There are limitations in achieving a

'true partnership' in the sense where all stakeholders share the same level of power in the classroom context. These limitations are provided by the structure of English-medium education such as, the expectations of teaching and learning content in curriculum areas, the order of teaching topics set by the school, the length of classroom lessons, and assessment timelines to name a few. To meet such school-wide expectations, the teacher will need to make some decisions that are 'non-negotiable' with students and parents. While equal partnerships might not be possible, what has been termed in this research as a "withness" is entirely possible. Our desires must be to do everything possible to "do maths *with* the students and parents" to have students enjoying mathematics. By strongly reflecting *ako* in our teacher practice all around Aotearoa New Zealand. A comment made by a Māori student indicated that teacher–student reciprocity in working *with* each other had been realised in a mathematics classroom by a Pākehā teacher, and better still, had been recognised by students:

It's not just you standing up at the front being the boss. You ask us what we want and we work together. You work with us so we work with you.

REFERENCES

- Agnew, S. (2011). The impact of school socioeconomic status on student-generated teacher ratings. *Journal of College Teaching & Learning (TLC)*, 8(1), 39-46.
- Aldridge, J. M., Fraser, B. J., Taylor, P. C., & Chen, C.-C. (2000). Constructivist Learning Environments in a Cross-National Study in Taiwan and Australia. *International Journal of Science Education*, 22(1), 37-55. doi:10.1080/095006900289994
- Alton-Lee, A. (2003). *Quality teaching for diverse students in schooling : Best evidence synthesis*. Wellington Ministry of Education.
- Alton-Lee, A. (2008). *Making a Bigger Difference for Diverse Learners: The Iterative Best Evidence Synthesis Programme in New Zealand (Vol. 2)*. Dordrecht: Springer Netherlands.
- Alton-Lee, A. (2015). *Ka Hikitia: A Demonstration Report: Effectiveness of Te Kotahitanga Phase 5, 2010-2012*. (047816565X). Wellington: Ministry of Education.
- Anderson, D., Averill, R., Te Maro, P., Taiwhati, M., & Higgins, J. (2010). Knowing Each Other as Learners: Māori Students Learning Mathematics. Delving into Diversity: An International Exploration of Issues of Diversity in Education. In K. Makar, S. Dole, J. Visnovska, M. Goos, A. Bennison, & K. Fry (Eds.), *Research in Mathematics Education in Australasia 2012-2015* (pp. 45-56). New York: Nova Science Publishers.
- Anthony, G., & Walshaw, M. (2007). *Effective Pedagogy in Mathematics/pangarau: Best Evidence Synthesis Iteration*. Wellington: Ministry of Education.
- Au, K. H. (1998). Social constructivism and the school literacy learning of students of diverse backgrounds. *Journal of literacy research*, 30(2), 297-319.
- Averill, R. (2012). Caring teaching practices in multiethnic mathematics classrooms: Attending to health and well-being. *Mathematics Education Research Journal*, 24, 105-128. doi:10.1007/s13394-011-0028-x
- Averill, R. (2013). Enjoying maximising opportunities for learning mathematics. *Southeast Asian Mathematics Education Journal*, 3(1), 27-37.
- Averill, R. (2020). Involving Parents in Curriculum: Expectations, Supports and Challenges. In N. Toren & G. van Schalkwyk (Eds.), *Parental Involvement: Practices, Improvement Strategies and Challenges* (pp. 1-32). New York: Nova Science.
- Averill, R., Anderson, D., & Drake, M. (2015). Developing Culturally Responsive Teaching through Professional Noticing within Teacher Educator Modelling. *Mathematics teacher education and development*, 17(2), 64-83.

- Averill, R., & Clark, M. (2006). "If they don't care, then I won't": The importance of caring about our students' mathematics learning. *Set: Research Information for Teachers*, 3, 15-20.
- Averill, R., Hindle, R., Hynds, A., Meyer, L., Penetito, W., Taiwhati, M., . . . Faircloth, S. (2014). "It means everything doesn't it?" Interpretations of Māori students achieving and enjoying educational success 'as Māori'. *Set: Research Information for Teachers*, 2, 22-40.
- Averill, R., & McRae, H. (2020). Exploring culturally sustaining practice for indigenous learners in initial teacher education in Aotearoa New Zealand. *Pesquisa e Ensino*, 1, e202014-e202014.
- Averill, R., Metson, A., & Bailey, S. (2016). Enhancing parental involvement in student learning. *Curriculum Matters*, 12, 109-131. doi:10.18296/cm.0016
- Baker, T. L. (1994). *Doing Social Research* (2nd ed.). New York: McGraw-Hill Inc.
- Banks, J. (2015). *Cultural diversity and education : Foundations, curriculum, and teaching* (5th ed.). Seattle: Pearson.
- Banks, J. (2019). *Multicultural education: Issues and perspectives* (J. Banks & C. Banks Eds. 6th ed.). New York: John Wiley
- Banks, J. A. (1998). The lives and values of researchers: Implications for educating citizens in a multicultural society. *Educational Researcher*, 27(7), 4-17.
- Barton, B. (1993). Ethnomathematics and its place in the Classroom. *SAMEpapers*, 93, 46-68.
- Berryman, M., Egan, M., & Ford, T. (2016). Examining the potential of critical and Kaupapa Māori approaches to leading education reform in New Zealand's English-medium secondary schools. *International Journal of Education*, 1-14. doi:10.1080/13603124.2016.1206973
- Berryman, M., & Eley, E. (2017a). Accelerating success and promoting equity through the ako (Note 1): Critical contexts for change. *Asian Education Studies*, 2(1), 99-112.
- Berryman, M., & Eley, E. (2017b). Succeeding as Māori: Māori students' views on our stepping up to the Ka Hikitia challenge. *New Zealand Journal of Educational Studies*, 52(1), 93-107.
- Berryman, M., Eley, E., Ford, T., & Egan, M. (2015). Leadership: Going beyond personal will and professional skills to give life to Ka Hikitia. *Journal of Educational Leadership, Policy and Practice*, 30(2), 56-68.
- Berryman, M., & Ford, T. (2017). Culturally Responsive Relationships Promoting Partnerships between Schools and Indigenous Māori Families and Communities.

- In *Realising Innovative Partnerships in Educational Research* (pp. 147-156): Brill Sense.
- Berryman, M., Kerr, K., Macfarlane, A., Penetito, W., & Smith, G. (2013). *Education for Māori: Implementing Ka Hikitia – Managing for Success*. Wellington: Office of the Auditor-General.
- Berryman, M., Lawrence, D., & Lamont, R. (2018). Cultural relationships for responsive pedagogy: A bicultural mana ōrite perspective. *Set: Research Information for Teachers, 1*, 3-10.
- Bevan-Brown, J. (2000). *Running the gauntlet: A gifted Māori learner's journey through secondary school*. Paper presented at the Now is the Future Conference, Auckland.
- Biddulph, F., Biddulph, J., & Biddulph, C. (2003). *The complexity of community and family influences on children's achievement in New Zealand: Best evidence synthesis*. Wellington: Ministry of Education
- Bishop, R. (1995). *Collaborative research stories: Whakawhanaungatanga*. (Doctoral dissertation), University of Otago, Dunedin. Retrieved from <http://hdl.handle.net/10523/531>
- Bishop, R. (1998). Freeing ourselves from neo-colonial domination in research: A Maori approach to creating knowledge. *International Journal of Qualitative Studies in Education, 11*(2), 199-219.
- Bishop, R. (1999). Kaupapa Maori Research: An indigenous approach to creating knowledge. *Māori and Psychology: Research and Practice*. Hamilton: Department of Psychology, University of Waikato.
- Bishop, R. (2000). 1999 Professorial Address: Nau te rourou, naku te rourou Māori education: setting an agenda. *Waikato Journal of Education, 20*(3), 3-18.
- Bishop, R. (2003). Changing Power Relations in Education: Kaupapa Māori Messages for "Mainstream" Education in Aotearoa/New Zealand. *Comparative Education, 39*, 221-238.
- Bishop, R. (2010). Effective teaching for indigenous and minoritized students. *Procedia-Social and Behavioral Sciences, 7*, 57-62.
- Bishop, R. (2012). Pretty difficult: Implementing kaupapa Maori theory in English-medium secondary schools. *New Zealand Journal of Educational Studies, 47*, 38-50.
- Bishop, R., & Berryman, M. (2006). *Culture speaks: Cultural relationships and classroom learning*: Huia Publishers.

- Bishop, R., & Berryman, M. (2009). The Te Kotahitanga effective teaching profile. *Set: Research Information for Teachers*, 2(2), 27-33.
- Bishop, R., Berryman, M., Cavanagh, T., & Teddy, L. (2009). Te Kotahitanga: Addressing educational disparities facing Māori students in New Zealand. *Teaching and Teacher Education*, 25, 734-742.
- Bishop, R., Berryman, M., & Richardson, C. (2002). Te Toi Huarewa: Effective Teaching and Learning in Total Immersion Maori Language Educational Settings. *Canadian Journal of Native Education*, 26(1), 44-61.
- Bishop, R., Berryman, M., Tiakiwai, S., & Richardson, C. (2003). *Te Kotahitanga: The experiences of year 9 and 10 Maori students in mainstream classrooms*. Hamilton: Ministry of Education.
- Bishop, R., Berryman, M., Wearmouth, J., Peter, M., & Clapham, S. (2012). Professional development, changes in teacher practice and improvements in Indigenous students' educational performance: A case study from New Zealand. *Teaching and Teacher Education*, 28, 694-705. doi:10.1016/j.tate.2012.02.002
- Bishop, R., & Glynn, T. (1992). He Kanohi Kitea: Conducting and evaluating educational research. *New Zealand Journal of Educational Studies*.
- Bishop, R., & Glynn, T. (1998). Achieving cultural integrity within education in New Zealand. *Intercultural Perspectives on Intercultural Education*. New York: Lawrence Earlbaum Associates.
- Bishop, R., & Glynn, T. (1999). Researching in Maori contexts: An interpretation of participatory consciousness. *Journal of Intercultural Studies*, 20(2), 167-182. doi:10.1080/07256868.1999.9963478
- Bishop, R., & Glynn, T. (2003). *Culture counts: Changing power relations in education*. Palmerston North: Dunmore Press.
- Bishop, R., O'Sullivan, D., & Berryman, M. (2010). *Scaling up education reform: addressing the politics of disparity*. Wellington: NZCER Press.
- Bland, D., & Atweh, B. (2007). Students as researchers: engaging students' voices in PAR. *Educational Action Research*, 15(3), 337-349.
- Bondi, S. (2013). Using Cogenerative Dialogues to Improve Teaching and Learning. *About Campus*, 18(3), 2-8. doi:10.1002/abc.21117
- Boulton, D., & Hammersley, M. (1996). Analysis of unstructured data. In R. Sapsford & V. Jupp (Eds.), *Data collection and analysis* (pp. 282-297). London: Sage Publications.
- Bourdieu, P. (1973). *Cultural reproduction and social reproduction*. London: Tavistock.

- Breckenridge, J., & Jones, D. (2009). Demystifying theoretical sampling in grounded theory research. *Grounded Theory Review*, 8(2), 113-126.
- Bresler, L. (1995). Ethnography, phenomenology and action research in music education. *Quarterly Journal of Music Teaching and Learning*, 6, 4-17.
- Bull, A., Brooking, K., & Campbell, R. (2008). *Successful home-school partnerships*: Ministry of Education Wellington.
- Cameron, M., Berger, J. G., Lovett, S., & Baker, R. (2007). *Ako: Being a teacher, being a learner, being part of a learning profession*. Paper presented at the Paper presented at the annual conference of the American Educational Research Association (AERA).
- Carpenter, V. M., & McMurchy-Pilkington, C. (2008). Cross-cultural researching: Māori and Pākehā in te whakapakari. *Qualitative Research*, 8(2), 179-196.
- Cazden, C. (2012). A framework for social justice in education. *International Journal of Educational Psychology*, 1(3), 178–198.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: Sage Publications.
- Chenhall, R. D., Holmes, C., Lea, T., Senior, K., & Wegner, A. (2011). Parent-school engagement: exploring the concept of 'invisible' Indigenous parents in three north Australian school communities.
- Coghlan, D., & Brydon-Miller, M. (2014). *The SAGE encyclopedia of action research*. London: Sage Publisher.
- Colquhoun, G. (2004). *Jumping ship*. Wellington [N.Z: Four Winds Press.
- Côté-Lussier, C., & Fitzpatrick, C. (2016). Feelings of safety at school, socioemotional functioning, and classroom engagement. *Journal of Adolescent Health*, 58(5), 543-550.
- Cowie, B., Jones, A., & Otrell-Cass, K. (2011). Re-engaging students in science: Issues of assessment, funds of knowledge and sites for learning. *International Journal of Science and Mathematics Education*, 9(2), 347-366.
- Cram, F., Phillips, H., Tipene-Matua, B., Parsons, M., & Taupo, K. (2004). A 'Parallel process'? beginning a constructive conversation about a Māori methodology. *Journal of Bioethical Inquiry*, 1(1), 14-19. doi:10.1007/BF02448902
- Creswell, J. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*: Sage publications.

- Creswell, J., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into practice*, 39(3), 124-130.
- Creswell, J., & Plano Clark, V. (2017). *Designing and conducting mixed methods research*: Sage publications.
- (personal communication, June 21, 2019).
- Cunningham, C., & Durie, M. (1998). A taxonomy, and a framework for outcomes and strategic research goals, for Māori research and development. A summary paper prepared for Foresight Participants. *Pacific Health Dialog*, 7(1), 62-69.
- Darling-Hammond, L. (2008). Teacher learning that supports student learning. *Teaching for intelligence*, 2(1), 91-100.
- Delpit, L. (1995). Other people's children: Cultural conflict in the classroom. *Harvard educational review*, 65, 510-510.
- Denscombe, M. (2009). *Ground rules for social research: Guidelines for good practice*. United Kingdom: McGraw-Hill Education.
- Denscombe, M. (2014). *The good research guide : for small-scale research projects* (5th ed.). Berkshire: Open University Press.
- Denzin, N. K. (2007). *Triangulation*: Wiley Online Library.
- Denzin, N. K., & Lincoln, Y. S. (2008). Introduction: The discipline and practice of qualitative research.
- Denzin, N. K., & Lincoln, Y. S. (2011). *The SAGE handbook of qualitative research*: Sage Publishers.
- Desforges, C., & Abouchaar, A. (2003). *The impact of parental involvement, parental support and family education on pupil achievement and adjustment: A literature review* (Vol. 433). London: DfES London.
- Dewey, J. (2011). *The sources of a science of education*: Read Books Ltd.
- Dotterer, A. M., & Lowe, K. (2011). Classroom context, school engagement, and academic achievement in early adolescence. *Journal of youth and adolescence*, 40(12), 1649-1660.
- Dreise, T., & Thomson, S. (2014). Unfinished business: PISA shows Indigenous youth are being left behind.
- Durie, A. (1998). Emancipatory Maori Education: Speaking from the Heart. *Language, Culture, and Curriculum*, 11(3), 297-308. doi:10.1080/07908319808666558

- Durie, M. (2003). Maori educational advancement at the interface between te ao Maori and te ao whanui. *Hui Taumata Mātauranga, Tuatoru*, 9, 33-44.
- Durie, M. (2006). Whanau, education, and Maori potential. *Hui Taumata Matauranga V, Taupo, New Zealand*.
- Durie, M. (2012). Interview: Kaupapa Maori: Shifting the social. *New Zealand Journal of Educational Studies*, 47(2), 21-29.
- Education Council. (2017). Our code, our standards. In. Wellington: Education Council.
- Education Review Office. (2008). *Partners in Learning: Good Practice*. Retrieved from Wellington: <https://www.ero.govt.nz/assets/Uploads/pil-gp-sep08.pdf>
- Education Review Office. (2018). *Building genuine learning partnerships with parents*. Retrieved from <https://www.ero.govt.nz/publications/building-genuine-learning-partnerships-with-parents/>
- Edwards, S. (2013). Ako Wānanga: The art, science and spiritual endeavour of teaching and learning in a wānanga: A localised approach. *International Journal of Pedagogical Innovations*, 209(1179), 1-5.
- Eketone, A. (2008). Theoretical underpinnings of Kaupapa Maori directed practice. *Mai Review*, 1-11.
- Epstein, J. (2018). *School, Family, and Community Partnerships, Student Economy Edition: Preparing Educators and Improving Schools*. New York: Routledge.
- Feilzer, M. Y. (2010). Doing Mixed Methods Research Pragmatically: Implications for the Rediscovery of Pragmatism as a Research Paradigm. *Journal of Mixed Methods Research*, 4(1), 6-16. doi:10.1177/1558689809349691
- Ferguson, S. L. (2008). Key elements for a Māori e-learning framework. *Mai Review*, 3(3), 1-7.
- Fickel, L., Abbiss, J., Brown, L., & Astall, C. (2018). The Importance of Community Knowledge in Learning to Teach: Foregrounding Māori Cultural Knowledge to Support Preservice Teachers' Development of Culturally Responsive Practice. *Peabody Journal of Education*, 93(3), 285-294.
- Flores, A. (2007). Examining Disparities in Mathematics Education: Achievement Gap or Opportunity Gap? *The High School Journal*, 91, 29-42.
- Fogarty, G. J. (2007). *Research on the progressive achievement tests and academic achievement in secondary schools*. Melbourne: Australian Council for Educational Research.

- Foulger, T. S. (2010). External conversations: An unexpected discovery about the critical friend in action research inquiries. *Action Research*, 8(2), 135-152.
- Fraser, N. (2007). Reframing justice in a globalizing world. *Global inequality: Patterns and explanations*, 252-272.
- Freire, P. (1972). *Pedagogy of the oppressed*. New York: Herder.
- Garland, R. (1991). The mid-point on a rating scale: Is it desirable. *Marketing bulletin*, 2(1), 66-70.
- Gay, G. (1997). Educational equality for students of color. In *Multicultural education: Issues and perspectives* (4th ed.). Hoboken, NJ: John Wiley & Sons.
- Gay, G. (2010). *Culturally responsive teaching : Theory, research, and practice* (2nd ed.). New York: Teachers College Press.
- Gidley, M., & Bidley, B. (1994). Representing Others: An Introduction. In *Representing Others White Views of Indigenous Peoples* (pp. 1-13). Exeter University of Exeter Press.
- Glynn, T. (2015). Bicultural challenges for educational professionals in Aotearoa. *Waikato Journal of Education*, 20, 103-113.
- Glynn, T., Atvars, K., & O'Brien, K. (1999). Culturally appropriate strategies for assisting Māori students experiencing learning and behavioural difficulties. *New Zealand annual review of education*, 7, 111-132.
- Glynn, T., Berryman, M., Loader, K., & Cavanagh, T. (2005). From literacy in Māori to biliteracy in Māori and English: A community and school transition programme. *International Journal of Bilingual Education and Bilingualism*, 8(5), 433-454.
- Glynn, T., & Bevan-Brown, J. (2007). " We Know What You Need..." and Other Misconceptions about Maori Learners. *Kairaranga*, 8(2), 25-31.
- Glynn, T., Cowie, B., Otrell-Cass, K., & Macfarlane, A. (2010). Culturally Responsive Pedagogy: Connecting New Zealand Teachers of Science with their Maori Students. *Australian Journal of Indigenous Education*, 39(1), 118-127.
- Goldkuhl, G. (2012). Pragmatism vs interpretivism in qualitative information systems research. *European journal of information systems*, 21(2), 135-146.
- Goodall, J., & Vorhaus, J. (2011). *Review of best practice in parental engagement*. Retrieved from https://www.researchgate.net/profile/Janet_Goodall/publication/26567305Review_of_best_practice_in_parental_engagement/links/54abfff0cf2ce2df6692e19/Review-of-best-practice-in-parental-engagement.pdf

- Goulding, C. (1998). Grounded theory: the missing methodology on the interpretivist agenda. *Qualitative Market Research: An International Journal*, 1(1), 50-57.
- Graham, J., Meyer, L. H., McKenzie, L., McClure, J., & Weir, K. F. (2010). Maori and Pacific Secondary Student and Parent Perspectives on Achievement, Motivation and NCEA. *Assessment Matters*, 2, 132-157.
- Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational evaluation and policy analysis*, 11(3), 255-274.
- Gunn, T. M., Pomahac, G., Striker, E. G., & Tailfeathers, J. (2011). First Nations, Métis, and Inuit education: The Alberta initiative for school improvement approach to improve indigenous education in Alberta. *Journal of Educational Change*, 12(3), 323-345.
- Hamilton, M. L. (1998). *Reconceptualizing teaching practice: Self-study in teacher education*. London: Tavistock.
- Hammersley, M., & Atkinson, P. (2007). *Ethnography: Principles in practice*. London: Routledge.
- Harrison, B. (2005). The Development of an Indigenous Knowledge Program in a New Zealand Maori-Language Immersion School. *Anthropology & Education Quarterly*, 36(1), 57-72.
- Harvey, R., & Averill, R. (2012). A Lesson Based on the Use of Contexts: An Example of Effective Practice in Secondary School Mathematics. *Mathematics teacher education and development*, 14(1), 41-59.
- Hattie, J. (2003). *Teachers Make a Difference, What is the research evidence?* Paper presented at the What does the research tell us ACER Research Conference, Melbourne, Australia. . http://research.acer.edu.au/research_conference_2003/4/
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.
- Hāwera, N., & Taylor, M. (2008). Māori and mathematics: "Nā te mea he pai mō tō roro. In *An Evaluation of Te Poutama Tau 2007* (pp. 36-48). Wellington: Ministry of Education.
- Hāwera, N., Taylor, M., Young-Loveridge, J., & Sharma, S. (2007). "Who helps me learn mathematics, and how?": Māori Children's Perspectives. *Findings from the New Zealand numeracy development projects 2006*, 54-66.
- He, J., & van de Vijver, F. (2012). Bias and equivalence in cross-cultural research. *Online readings in psychology and culture*, 2(2), 2307-0919.

- Herbert, J., & Ausubel, D. P. (1969). *Psychology in teacher preparation*. Monograph Series No. 5.
- Hetaraka, M. (2019). A kaupapa Māori analysis of tātaiako - considering Māori education policy. *MAI journal (Online)*, 8(2), 159-171. doi:10.20507/MAIJournal.2019.8.2.5
- Higgins, J., & Bonne, L. (2014). Exploring classroom life through cogenerative dialogues. *Cultural Studies of Science Education*, 9, 53-61.
- Hill, J. L. (2018). What Do Culturally Diverse Students in New Zealand Value Most for Their Mathematics Learning? *Mathematics Education Research Group of Australasia*.
- Hills, J. R. (1983). Interpreting Stanine Scores. *Educational Measurement: Issues and Practice*, 2(3), 18-27.
- Holt, G. (2001). Mathematics education for Māori students in mainstream classrooms. *ACE papers*, 11, 18-29.
- Hornby, G. (2011). *Parental involvement in childhood education: Building effective school-family partnerships*. New York: Springer Science & Business Media.
- Hotere-Barnes, A. (2013). *What can Pākehā learn from engaging in kaupapa Māori educational research?* Wellington: NZCER.
- Hudson, M. (2004). *He matatika Maori: Maori and ethical review in health research*. (Doctoral dissertation), Auckland University of Technology, Auckland.
- Hudson, M., & Russell, K. (2009). The Treaty of Waitangi and research ethics in Aotearoa. *Journal of Bioethical Inquiry*, 6(1), 61-68.
- Hynds, A. (2014). *Evaluation of He Kākano: professional development for leaders in secondary schools 2011-2012*. Retrieved from <https://apo.org.au/node/39774>
- Hynds, A., Meyer, L. H., Penetito, W., Averill, R., Hindle, D., Taiwhati, M., . . . Faircloth, S. (2013). *Evaluation of He Kākano: Professional Development for Leaders in Secondary Schools (2011–2012): Final Report*. Retrieved from Wellington: https://www.educationcounts.govt.nz/_data/assets/pdf_file/0005/144644/Evaluation-of-He-Kakano.pdf
- Jahnke, H., & Taiapa, J. (2003). *Māori research*. In *Social Science Research in New Zealand: Many Paths to Understanding* Auckland: Pearson Education New Zealand.
- Jeynes, W. H. (2003). A meta-analysis: The effects of parental involvement on minority children's academic achievement. *Education and urban society*, 35(2), 202-218.

- Jeynes, W. H. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education, 40*(3), 237-269.
- Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative science quarterly, 24*(4), 602-611.
- Johansen, A., Little, S. G., & Akin-Little, A. (2011). An Examination of New Zealand Teachers' Attributions and Perceptions of Behaviour, Classroom Management, and the Level of Formal Teacher Training Received in Behaviour Management. *Kairaranga, 12*(2), 3-12.
- Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education, 118*(2), 282-293.
- Johnson, R. B., & Christensen, L. (2012). *Educational research : Quantitative, qualitative, and mixed approaches* (4th ed.). California: Sage Publications.
- Johnson, R. B., & Onwuegbuzie, A. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher, 33*(7), 14-26. doi:10.3102/0013189X033007014
- Johnson, R. B., Onwuegbuzie, A., & Turner, L. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research, 1*(2), 112-133.
- Jones, A. (2012). Dangerous liaisons: Pākehā, kaupapa Māori, and educational research. *New Zealand Journal of Educational Studies, 47*(2), 100-112.
- Katyal, K. R., & Evers, C. W. (2007). Parents—partners or clients? A reconceptualization of home–school interactions. *Teaching Education, 18*(1), 61-76.
- Keddie, A. (2012) Schooling and social justice through the lenses of Nancy Fraser. *Critical Studies in Education, 53*(3), 263-279.
- Kember, D., Ha, T.-S., Lam, B.-H., Lee, A., NG, S., Yan, L., & Yum, J. C. (1997). The diverse role of the critical friend in supporting educational action research projects. *Educational Action Research, 5*(3), 463-481.
- Kemmis, S., McTaggart, R., & Nixon, R. (2013). *Action Research Planner : Doing Critical Participatory Action Research*. Singapore: Springer.
- Kerbaiv, D., & Bernhardt, A. (2018). Parental Intervention in the School: The Context of Minority Involvement. In J. Coleman (Ed.), *Parents, Their Children, And Schools* (pp. 115-146). United Kingdom: Routledge.
- Kingi, T., Russell, L., & Ashby, W. (2017). Mā te mātau, ka ora: The use of traditional Indigenous knowledge to support contemporary rangatahi Māori who self-injure. *New Zealand Journal of Psychology, 46*(3), 137-145.

- Kivunja, C., & Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, 6(5), 26-41.
- Kozulin, A., Gindis, B., Ageyev, V. S., & Miller, S. M. (2003). *Vygotsky's educational theory in cultural context*. United Kingdom: Cambridge University Press.
- Ladson-Billings, G. (2006). From the achievement gap to the education debt: Understanding achievement in US schools. *Educational Researcher*, 35(7), 3-12.
- Ladson-Billings, G. (2014). Culturally relevant pedagogy 2.0: aka the remix. *Harvard educational review*, 84(1), 74-84.
- Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory into practice*, 34(3), 159-165.
- Lange, T., & Meaney, T. (2011). I actually started to scream: Emotional and mathematical trauma from doing school mathematics homework. *Educational Studies in Mathematics*, 77(1), 35-51.
- LaVan, S.-K., & Beers, J. (2005). The role of cogenerative dialogue in learning to teach and transforming learning environments. In K. Tobin, R. Elmesky, & G. Seiler (Eds.), *Improving urban science education: New roles for teachers, students and researchers* (pp. 147-164). New York: Rowman & Littlefield Publishers.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*: Cambridge university press.
- Lee, J. (2005). *Māori cultural regeneration: Pūrākau as pedagogy*. Paper presented at the 3rd International CRL Conference: What a difference a pedagogy makes: Researching lifelong learning and teaching, Stirling, Scotland.
- Lee, J. (2008). *Ako: Pūrākau of Māori teachers' work in secondary schools*. (Doctor in Education dissertation), University of Auckland, Auckland.
- Leech, N. L. (2012). Writing mixed research reports. *American Behavioral Scientist*, 56(6), 866-881.
- Lerman, S. (2006). Socio-cultural research in PME. In A. Gutierrez & P. Boero (Eds.), *Handbook of research on the psychology of mathematics education: Past, present and future* (pp. 347-366). Rotterdam: Sense.
- Lewin, K. (1946). Action research and minority problems. *Journal of social issues*, 2(4), 34-46.
- Lingard, B. (2002). Research focuses on student achievement. *NZ Education Review*, 7(43), 3.

- Macfarlane, A. (2015). Restlessness, resoluteness and reason: Looking back at 50 years of Māori education. *New Zealand Journal of Educational Studies*, 50(2), 177-193.
- Macfarlane, A., Glynn, T., Cavanagh, T., & Bateman, S. (2007). Creating Culturally-Safe Schools for Māori Students. *Australian Journal of Indigenous Education*, 36(1), 65-76. doi:10.1017/S1326011100004439
- Macfarlane, A., Glynn, T., Grace, W., Penetito, W., & Bateman, S. (2008). Indigenous epistemology in a national curriculum framework? *Ethnicities*, 8(1), 102-126.
- Macfarlane, A., & Macfarlane, S. (2012). Weaving the dimensions of culture and learning: Implications for educators. In J. Loughran (Ed.), *Understanding Teaching and Learning* (pp. 213-224). United Kingdom: Brill Sense.
- Macfarlane, A., Webber, M., McRae, H., & Cookson-Cox, C. (2014). *Ka Awatea: An iwi case study of Māori students' success*: Te Rū Rangahau, University of Canterbury.
- Mackinlay, E., & Barney, K. (2014). Unknown and unknowing possibilities: Transformative learning, social justice, and decolonising pedagogy in Indigenous Australian studies. *Journal of Transformative Education*, 12(1), 54-73.
- Mara, G. M. (1998). Interrogating the Identities of Excellence: Liberal Education and Democratic Culture in Aristotle's "Nicomachean Ethics". *Polity*, 31(2), 301-329.
- Mart, C. T. (2013). A passionate teacher: Teacher commitment and dedication to student learning. *International Journal of Academic Research in Progressive Education and Development*, 2(1), 437-442.
- Maxwell, K. (2015). *Positive learning dispositions in mathematics*: University of Auckland, Faculty of Education.
- May, S. (2003). Critical multiculturalism. *Counterpoints*, 168, 199-212.
- May, S., & Hill, R. (2008). Māori-medium education: Current issues and challenges. In N. Hornberger (Ed.), *Can schools save indigenous languages?* (pp. 66-98). New York: Palgrave Macmillan.
- May, S., & Sleeter, C. E. (2010). *Critical multiculturalism: Theory and praxis*. New York: Routledge.
- McKinley, E., & Webber, M. (2018). Whāia te Ara Whetu: Navigating Change in Mainstream Secondary Schooling for Indigenous Students. In E. A. McKinley & L. T. Smith (Eds.), *Handbook of Indigenous Education* (pp. 1-27). Singapore: Springer.
- McKinley, S. (2000). *Maori Parents and Education: Ko Nga Matua Maori me te Matauranga* (1877140813). Retrieved from Wellington:

- McMurphy-Pilkington, C., Trinick, T., & Meaney, T. (2013). Mathematics curriculum development and Indigenous language revitalisation: Contested spaces. *Mathematics Education Research Journal*, 25(3), 341-360.
- McNiff, J. (2013). *Action research: Principles and practice* (4th ed.). London: Routledge.
- Meaney, T., Edmonds-Wathen, C., McMurphy-Pilkington, C., Trinick, T. (2016). Distribution, recognition and representation: Mathematics education and Indigenous students. In *Research in mathematics education in Australasia 2012-2015* (pp. 143–164). Springer Singapore. https://doi.org/10.1007/978-981-10-1419-2_8
- Meaney, T., & Fairhall, U. (2003). *Tensions and possibilities: Indigenous parents doing mathematics curriculum development*. Paper presented at the Mathematics Education Research: Innovation, Networking, and Opportunity. Proceedings of the 26th annual conference of the Mathematics Education Research Group of Australasia.
- Meaney, T., Trinick, T., & Fairhall, U. (2013). One Size Does NOT Fit All : Achieving Equity in Maori Mathematics Classrooms. *Journal for research in mathematics education*, 44(1), 235-263. doi:10.5951/jresmetheduc.44.1.0235
- Merriam, S. B. (1998). Qualitative Research and Case Study Applications in Education. In San Francisco
 Jossey-Bass Publishers.
- Merriam, S. B. (2002). Introduction to qualitative research. *Qualitative research in practice: Examples for discussion and analysis*, 1(1), 1-17.
- Merriam, S. B., Johnson-Bailey, J., Lee, M.-Y., Kee, Y., Ntseane, G., & Muhamad, M. (2001). Power and positionality: Negotiating insider/outsider status within and across cultures. *International Journal of Lifelong Education*, 20(5), 405-416.
- Metge, J. (1984). *Learning and teaching: He tikanga Maori*. Wellington: Department of Education.
- Metge, J. (2014). *Talking past each other : problems of cross cultural communication*. Wellington: Victoria University Press.
- Meyer, L., Penetito, W., Hynds, A., Savage, C., Hindle, R., & Sleeter, C. (2010). *Evaluation of Te Kotahitanga: 2004–2008*. Retrieved from https://www.educationcounts.govt.nz/data/assets/pdf_file/0009/78966/955_TK-Evaluation_V2-16082010.pdf
- Milne, A. (2009). *Colouring in the White Spaces: Cultural Identity and Learning in School*. Retrieved from <https://static1.squarespace.com/static/57438b77f699bbfae400bbca/t/5750ead5f8>

[50827880ea8e39/1464920802604/Colouring+in+the+White+Spaces +Cultural+Identity+and+Learning+in+School.pdf](https://www.educationcounts.govt.nz/statistics/schooling/national-standards/National_Standards)

Ministry of Education. (2007). *The New Zealand Curriculum*. Wellington: Ministry of Education.

Ministry of Education. (2008). *Ka Hikitia—Managing for success: The Māori education strategy 2008–2012*. Wellington: Ministry of Education

Ministry of Education. (2009a). *Te Aho Arataki Marau mo te Ako i Te Reo Maori. Curriculum Guidelines for Teaching and Learning Te Reo Maori in English-medium schools: Years 1 - 13*. Wellington: Ministry of Education.

Ministry of Education. (2009b). *Te whatu pōkeka kaupapa Māori assessment for learning : early childhood exemplars*. Wellington: Learning Media.

Ministry of Education. (2011). *Tataiako. Cultural competencies for teachers of Maori learners*. Wellington: Ministry of Education.

Ministry of Education. (2013). *Ka Hikitia Accelerating Success*. Wellington: Ministry of Education.

Ministry of Education. (2015a). Education counts: National Standards achievement information. Retrieved from https://www.educationcounts.govt.nz/statistics/schooling/national-standards/National_Standards

Ministry of Education. (2015b). *Mathematics achievement: What we know from New Zealand's participation in TIMSS 2014/15 and PISA 2015*. Retrieved from Wellington: https://www.educationcounts.govt.nz/_data/assets/pdf_file/0003/181569/Mathematics-achievement-What-we-know-from-NZs-participation-in-TIMSS-2014-15-and-PISA-2015.pdf

Ministry of Education. (2018). Ka Hikitia timeline. Retrieved from <https://www.education.govt.nz/our-work/overall-strategies-and-policies/ka-hikitia-accelerating-success-20132017/ka-hikitia-history/ka-hikitia-timeline/>

Ministry of Education. (n.d.). He Kakano.

Mitchell, L., Cameron, M., & Wylie, C. (2002). *Sustaining school improvement: Ten primary schools' journeys*: New Zealand Council for Educational Research Wellington.

- Mooij, T., & Fettelaar, D. (2013). School and pupil effects on secondary pupils' feelings of safety in school, around school, and at home. *Journal of interpersonal violence*, 28(6), 1240-1266.
- Morgan, D. L. (2014). Pragmatism as a Paradigm for Social Research. *Qualitative Inquiry*, 20(8), 1045-1053. doi:10.1177/1077800413513733
- Mutch, C., & Collins, S. (2012). Partners in Learning: Schools' Engagement With Parents, Families, and Communities in New Zealand. *School Community Journal*, 22(1), 167-187.
- Nasir, N. i. S., Hand, V., & Taylor, E. V. (2008). Culture and Mathematics in School: Boundaries between "Cultural" and "Domain" Knowledge in the Mathematics Classroom and beyond. *Review of Research in Education*, 32(1), 187-224.
- New Zealand Teachers Council. (2011). Tātaiako: Cultural competencies for teachers of Māori learners. Retrieved from <http://www.minedu.govt.nz/theministry/educationinitiatives/tataiako.aspx>.
- Newman, I., Ridenour, C. S., Newman, C., & DeMarco Jr, G. M. P. (2003). A typology of research purposes and its relationship to mixed methods. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 167-188). California: Sage Publishers.
- Nuthall, G. (2001). The cultural myths and the realities of teaching and learning. *New Zealand annual review of education*, 11(1), 5-30.
- O'Carroll, A. (2013). *Kanohi ki te kanohi, a thing of the past? Examining the notion of virtual ahikā and the implications for kanohi ki te kanohi*. (Doctor of Philosophy dissertation), Massey University, Palmerston North.
- Oakley, A. (2013). Interviewing women: A contradiction in terms. In H. Roberts (Ed.), *Doing feminist research* (pp. 52-83). London: Routledge.
- Onwuegbuzie, A. J., & Johnson, R. B. (2006). The validity issue in mixed research. *Research in the Schools*, 13(1), 48-63.
- Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. *Handbook of mixed methods in social and behavioral research*, 2(1), 397-430.
- Openshaw, R. (2007). *Evaluation of Te Kōtahitanga, Phase 3*. Retrieved from Wellington: https://www.educationcounts.govt.nz/data/assets/pdf_file/0009/78966/955_TK-Evaluation_V2-16082010.pdf
- Orange, C. (2015). *The Treaty of Waitangi*. New Zealand: Bridget Williams Books.

- Packer, M. J., & Goicoechea, J. (2000). Sociocultural and constructivist theories of learning: Ontology, not just epistemology. *Educational psychologist*, 35(4), 227-241.
- Patton, M. Q. (1987). *How to use qualitative methods in evaluation*. California: Sage Publishers.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3 ed.. ed.). California: Sage Publications.
- Pekrun, R. (2000). A social-cognitive, control-value theory of achievement emotions. In J. Heckhausen (Ed.), *Motivational psychology of human development: Developing motivation and motivating development* (pp. 143–163). Netherlands: Elsevier.
- Penetito, W. (2010). *What's Māori about Māori education?: The struggle for a meaningful context*. Wellington: Victoria University Press.
- Penetito, W. (2011). Kaupapa Māori education: Research as the exposed edge. *Kei Tua o te Pae Hui Proceedings: The Challenges of Kaupapa Māori Research in the 21st Century, Wellington, New Zealand*.
- Pere, R. (1988). *Te wheke: Whaia te maramatanga me te aroha* (Vol. 1). Gisborne: Gisborne Education Centre.
- Pere, R. (1994). *Ako : Concepts and learning in the Maori tradition*. Wellington: Te Kohanga Reo National Trust Board.
- Peterson, E. R., Rubie-Davies, C., Elley-Brown, M. J., Widdowson, D. A., Dixon, R. S., & Irving, S. E. (2011). Who is to blame? Students, teachers and parents views on who is responsible for student achievement. *Research in Education*, 86(1), 1-12.
- Pianta, R. C., & Hamre, B. K. (2009). Conceptualization, measurement, and improvement of classroom processes: Standardized observation can leverage capacity. *Educational Researcher*, 38(2), 109-119.
- Pihama, L., Cram, F., & Walker, S. (2002). Creating Methodological Space: A Literature Review of Kaupapa Maori Research. *Canadian Journal of Native Education*, 26(1), 30-43.
- Pihama, L., Smith, K., Taki, M., & Lee, J. (2004a). *A literature review on kaupapa Maori and Maori education pedagogy*. Retrieved from Wellington: <http://hdl.voced.edu.au/10707/212867>.
- Pihama, L., Smith, K., Taki, M., & Lee, J. (2004b). A literature review on kaupapa Māori and Māori education pedagogy. *Auckland, New Zealand*.

- Pirie, S. (1998). Working toward a design for qualitative research. In A. R. Teppo (Ed.), *Qualitative research methods in mathematics education* (pp. 79-97). Virginia: National Council of Teachers of Mathematics.
- Pomeroy, D. C. H. (2011). *Thematic teaching and student engagement in a non-academic Year 12 mathematics course*. (Master of Education), Victoria University of Wellington, Wellington.
- Power, S. (2012). From redistribution to recognition to representation: social injustice and the changing politics of education. *Globalisation, societies and education*, 10(4), 473–492. <https://doi.org/10.1080/14767724.2012.735154>
- Prochnow, J., & Macfarlane, A. (2011). Managing classroom behaviour. In C. Rubie-Davies (Ed.), *Educational psychology: Concepts, research and challenges* (pp. 150-166). London: Routledge.
- Rallis, S. F., & Rossman, G. B. (2000). Dialogue for learning: Evaluator as critical friend. *New Directions for Evaluation*, 2000(86), 81-92.
- Raymond, A. M. (1997). Inconsistency between a beginning elementary school teacher's mathematics beliefs and teaching practice. *Journal for research in mathematics education*, 28(5), 550-576.
- Reschly, A. L., Huebner, E. S., Appleton, J. J., & Antaramian, S. (2008). Engagement as flourishing: The contribution of positive emotions and coping to adolescents' engagement at school and with learning. *Psychology in the Schools*, 45(5), 419-431.
- Reynolds, A. J. (1992). Comparing measures of parental involvement and their effects on academic achievement. *Early Childhood Research Quarterly*, 7(3), 441-462.
- Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2013). *Qualitative research practice: A guide for social science students and researchers*. London: Sage Publishers.
- Rømer, T. A. (2019). A critique of John Hattie's theory of Visible Learning. *Educational Philosophy and Theory*, 51(6), 587-598. doi:10.1080/00131857.2018.1488216
- Rubie-Davies, C., Peterson, E., Irving, E., Widdowson, D., & Dixon, R. (2010). Expectations of achievement: Student teacher and parent perceptions. *Research in Education*, 83(1), 36-53.
- Rubie-Davies, C., Webber, M., & Turner, H. (2018). Maori students flourishing in education. In G. Liem & D. McInerney (Eds.), *Big Theories Revisited 2* (pp. 213-). Charlotte, N.C.: Information Age Publishing.
- Rubie-Davies, C., Hattie, J., & Hamilton, R. (2006). Expecting the best for students: Teacher expectations and academic outcomes. *British Journal of Educational Psychology*, 76(3), 429-444.

- Russell, G. L., & Chernoff, E. J. (2013). The Marginalisation of Indigenous Students within School Mathematics and the Math Wars: Seeking Resolutions within Ethical Spaces. *Mathematics Education Research Journal*, 25(1), 109-127.
- Salmond, A. (1985). Maori epistemologies. In J. Overing (Ed.), *Reason and morality* (pp. 240-264). London: Tavistock.
- Salter, G. (2000). Culturally responsive pedagogy and the renaissance of a Maori dimension in physical education: Te reo kori as cultural taonga. *New Zealand Physical Educator*, 33(2), 42.
- Sandelowski, M. (2003). Tables or tableaux? The challenges of writing and reading mixed methods studies. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 321-350). California: Sage Publications.
- Saunders, K., Averill, R., & McRae, H. (2018). "I can't wait to get to maths": Ako in mathematics teaching and learning. *Set: Research Information for Teachers*, 1(1), 11-18. doi:<https://doi.org/10.18296/set.0097>
- Savage, C., Hindle, R., Meyer, L., Hynds, A., Penetito, W., & Sleeter, C. (2011). Culturally responsive pedagogies in the classroom: Indigenous student experiences across the curriculum. *Asia-Pacific Journal of Teacher Education*, 39(3), 183-198.
- Scheurich, J. J., & Young, M. D. (1997). Coloring epistemologies: Are our research epistemologies racially biased? *Educational Researcher*, 26(4), 4-16.
- Schuck, S., & Russell, T. (2005). Self-Study, Critical Friendship, and the Complexities of Teacher Education. *Studying Teacher Education*, 1(2), 107-121. doi:10.1080/17425960500288291
- Scott, D. (2018). Post-school labour-market outcomes of school-based NCEA. Retrieved from <https://www.educationcounts.govt.nz/publications/80898/post-school-labour-market-outcomes-of-school-based-ncea>
- Shady, A. (2014). Negotiating cultural differences in urban science education: an overview of teacher's first-hand experience reflection of cogen journey. *Cultural Studies of Science Education*, 9(1), 31-51.
- Shady, A. (2015). Negotiating Differences in Small Urban Schools Using Cogenerative Dialogue to Enhance Inclusivity. *Urban Education*, 50(8), 1019-1044.
- Shulman, L. S. (1991). Ways of seeing, ways of knowing: Ways of teaching, ways of learning about teaching. *J. Curriculum Studies*, 23(5), 393-395.
- Silverman, D. (2016). *Qualitative research*. London: Sage Publications.

- Singh, M., & Major, J. (2017). Conducting Indigenous Research in Western Knowledge Spaces: Aligning Theory and Methodology. *Australian Educational Researcher*, 44(1), 5-19. doi:10.1007/s13384-017-0233-z
- Siry, C. A., & Zawatski, E. (2011). 'Working with' as a methodological stance: collaborating with students in teaching, writing, and research. *International Journal of Qualitative Studies in Education*, 24(3), 343-361.
- Slavin, R. (2018). John Hattie is wrong. *Robert Slavin's Blog*. URL: <https://robertslavinsblog.wordpress.com/2018/06/21/john-hattie-is-wrong>.
- Sleeter, C., & Banks, J. (2004). *Culture, difference, and power*. Monterey Bay, California: Teachers College Press.
- Sleeter, C. E. (2001). Preparing teachers for culturally diverse schools: Research and the overwhelming presence of whiteness. *Journal of teacher education*, 52(2), 94-106.
- The politics of reforming Maori education: the transforming potential of Kura Kaupapa Maori. (Routledge 2012a).
- Smith, G. H. (1997). *The development of Kaupapa Maori: Theory and praxis*. (Doctoral dissertation), The University of Auckland, Auckland.
- Smith, G. H. (2000). Maori education: Revolution and transformative action. *Canadian Journal of Native Education*, 24(1), 57-72.
- Smith, G. H. (2003). *Indigenous struggle for the transformation of education and schooling*. Paper presented at the Alaskan Federation of Natives Convention, Anchorage, Alaska.
- Smith, G. H. (2012b). The politics of reforming Maori education: The transforming potential of Kura Kaupapa Maori. In H. Lauder & C. Wylie (Eds.), *Towards successful schooling* (pp. 73-87). London: Routledge.
- Smith, G. H., Hoskins, T., & Jones, A. (2012). Interview: Kaupapa Maori: the dangers of domestication. *New Zealand Journal of Educational Studies*, 47(2), 10-20.
- Smith, L. (2013). *Decolonizing methodologies: Research and indigenous peoples*. London: Zed Books Ltd.
- Smith, L., & Reid, P. (2000). *Māori research development: Kaupapa Māori principles and practices*. A Literature Review.
- Spoonley, P. (1999). The challenge of cross-cultural research. *Social science research in New Zealand. Many paths to understanding*, 51-61.
- Starnes, B. A. (2006). What We Don't Know Can Hurt Them: White Teachers, Indian Children. *The Phi Delta Kappan*, 87(5), 384-392.

- Stringer, E. T. (2013). *Action research* (4th ed.). Los Angeles: Sage publications.
- Sullivan, A. (2001). Cultural capital and educational attainment. *Sociology*, 35(4), 893-912.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches* (Vol. 46). London: Sage Publications.
- Tashakkori, A., & Teddlie, C. (2010). *Handbook of Mixed Methods in Social & Behavioral Research* (2 ed.). California: Sage Publications.
- Te Maro, P., Higgins, J., & Averill, R. (2008). Creating strong achievement gains for Maori students in English-medium mathematics classrooms. *Te Poutama Tau Evaluation Report*, 49-61.
- Teddlie, C., & Tashakkori, A. (2003a). *Handbook of mixed methods in social & behavioral research*. London: Sage Publications.
- Teddlie, C., & Tashakkori, A. (2003b). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. *Handbook of mixed methods in social & behavioral research*, 3-50.
- Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2008). Teacher professional learning and development best evidence synthesis iteration (BES).
- Tobin, K. (2007). Collaborating with students to produce success in science. *Journal of Science and Mathematics Education in Southeast Asia*, 30(2), 1-43.
- Tobin, K. (2014). Twenty questions about cogenerative dialogues. In *Transforming urban education: Collaborating to produce success in science, mathematics and technology education* (pp. 181-190). Netherlands: Sense.
- Tolich, M. (2002). Pakeha "paralysis": cultural safety for those researching the general population of Aotearoa. *Social Policy Journal of New Zealand*, 19(1), 164-175.
- Tomlins-Jahnke, H. (2008). The place of cultural standards in indigenous education. *MAI Review LW*, 1(1), 11.
- Turner, H., Rubie-Davies, C., & Webber, M. (2015). Teacher Expectations, Ethnicity and the Achievement Gap. *New Zealand Journal of Educational Studies*, 50(1), 55-69. doi:10.1007/s40841-015-0004-1
- University of Waikato, & Te Whare Wānanga o Awanuiārangi. (2010). He Kākano: Te awe o ngā toroa: A school based programme for the development of culturally responsive leaders. In: University of Waikato & Te Whare Wānanga o Awanuiārangi Waikato, New Zealand.

- Vale, C., Atweh, B., Averill, R., & Skourdumbis, A. (2016). Equity, social justice and ethics in mathematics education. In K. Makar, S. Dole, J. Visnovska, M. Goos, A. Bennison, & K. Fry (Eds.), *Research in mathematics education in Australasia 2012-2015* (pp. 97-118). Singapore: Springer.
- Vale, C., Averill, R., Hall, J., Forgasz, H., & Leder, G. (2020). Equity, social justice, and ethics. In J. Way, C. Attard, J. Anderson, J. Bobis, H. McMaster, & K. Cartwright (Eds.), *Research in mathematics education in Australasia 2016–2019*. (pp. 177-208). Singapore: Springer.
- Van de Pol, J., Volman, M., & Beishuizen, J. (2011). Patterns of contingent teaching in teacher–student interaction. *Learning and Instruction, 21*(1), 46-57.
- Van Maanen, J. (2011). *Tales of the field: On writing ethnography*. University of Chicago Press.
- Van Teijlingen, E. R., & Hundley, V. (2001). The importance of pilot studies. *Nursing Standard, 16*(40), 33-36.
- Villegas, A. M. (1988). School failure and cultural mismatch: Another view. *The Urban Review, 20*(1), 253-265.
- Villegas, A. M., & Lucas, T. (2002). *Educating culturally responsive teachers: A coherent approach*. Albany: State University of New York Press.
- Vygotsky, L. (1980). *Mind in society: The development of higher psychological processes*. Massachusetts: Harvard university press.
- Walker, R. (1973). Biculturalism in education. In D. Bray & C. Hill (Eds.), *Polynesian and Pākehā in New Zealand education: The sharing of cultures* (Vol. 1, pp. 110-125). Auckland: Penguin.
- Walker, S., Eketone, A., & Gibbs, A. (2006). An exploration of kaupapa Maori research, its principles, processes and applications. *International Journal of Social Research Methodology, 9*(4), 331-344. doi:10.1080/13645570600916049
- Walshaw, M., & Anthony, G. (2008). Creating productive learning communities in the mathematics classroom: an international literature review. *Pedagogies: an international journal, 3*(3), 133-149.
- Wassell, B. A., Martin, S. N., & Scantlebury, K. (2013). Using Cogenerative Dialogues to Foster Community and Support English Language Learner Students' Learning. *TESOL Journal, 4*(4), 759-771. doi:10.1002/tesj.109
- Webber, M., McKinley, E., & Rubie-Davies, C. (2016). Making it personal: Academic counseling with Māori students and their families. *Contemporary Educational Psychology, 47*(1), 51-60.

- Weber, M., Wagner, L., & Ruch, W. (2016). Positive Feelings at School: On the Relationships Between Students' Character Strengths, School-Related Affect, and School Functioning. *Journal of Happiness Studies*, 17(1), 341-355. doi:10.1007/s10902-014-9597-1
- Weijters, B., Cabooter, E., & Schillewaert, N. (2010). The effect of rating scale format on response styles: The number of response categories and response category labels. *International Journal of Research in Marketing*, 27(3), 236-247.
- Werner, O., Schoepfle, G. M., & Ahern, J. (1987). *Systematic fieldwork: Ethnographic analysis and data management*. London: Sage Publications.
- Wilson, D., & Neville, S. (2009). Culturally safe research with vulnerable populations. *Contemporary nurse*, 33(1), 69-79.
- Wilson, S., McChesney, J., & Brown, L. (2017). Cultural Competencies and Planning for Teaching Mathematics: Preservice Teachers Responding to Expectations, Opportunities, and Resources. *Journal of Urban Mathematics Education*, 10(1), 95-112.
- Wragg, E. C. (1999). *An introduction to classroom observation* (2nd ed.). New York: Routledge.
- Wylie, C., Hodgen, E., Hipkins, R., & Vaughan, K. (2009). *Competent learners on the edge of adulthood: A summary of key findings from the Competent Learners@ 16 Project*. Retrieved from Wellington,:
- Zuckerman, T., & Rajuan, M. (2008). From journal writing to action research: Steps toward systematic reflective writing.

Appendices

Appendix 1: Ako in teaching practice framework

<p>Teachers acknowledge and value students' prior knowledge</p> <p><i>Students bring prior knowledge into learning process, and it is acknowledged and valued by the teacher</i></p>
<p>Teachers value current knowledge students share with them</p> <p><i>Teacher learns from students and vice versa in conversations; teacher shows appreciation of the sharing of student knowledge</i></p>
<p>Teacher encourages students to teach and learn from one another</p>
<p>Teacher tracks student progress and shares tracking information with stakeholders</p> <p><i>Teacher and students discuss feedback and feedforward on achievement and engagement, which is tracked and shared with parent stakeholders</i></p>
<p>Teacher co-constructs learning based on deliberate, reflective, research-based decisions</p> <p><i>Learning processes are co-constructed between ākonga and kaiako and suit the needs of ākonga, with deliberate, reflective, research-based decisions being made by the kaiako about classroom practice</i></p>
<p>Teacher encourages representation of student culture and identity in the classroom</p> <p><i>Student cultures are represented in the classroom and students feel comfortable to express their culture and identity in the classroom and in their learning</i></p>
<p>Teacher conveys high expectations of student conduct</p> <p><i>Teacher conveys high expectations of student learning behaviour and classroom conduct</i></p>

Appendix 2: Literature (main empirical studies)

Authors and Study Focus	Context	Participants	Method
<p>Bishop, Berryman, Tiakiwai, and Richardson (2003)</p> <p>Experiences of Māori students in English medium secondary schools</p>	<p>New Zealand</p> <p>English-medium secondary schools, a mix of decile, single-sex and co-educational schools</p>	<p>70 Year 9 and 10 students, 50 parents, 80 teachers, and four principals across four urban and rural town schools</p>	<p>Group and individual interviews</p>
<p>McKinley (2000)</p> <p>Identifying aspirations and concerns of Māori parents/whanau regarding their child's education along with addressing issues with participation of these parents in their children's education</p>	<p>New Zealand</p> <p>English-medium and bilingual schools, a mix of decile, schools mainly in the Wellington region</p>	<p>82 students, 96 parents, 27 teachers, one assistant principal and 11 principals across 12 primary & secondary schools</p>	<p>Group and individual interviews carried out by three Māori women</p>
<p>Higgins and Bonne (2014)</p> <p>Using cogenerative dialogue as a research method to provide insights into classroom life</p>	<p>New Zealand</p> <p>Early secondary students, predominantly New Zealand European ethnicity, with small numbers of Māori, Pasifika, and Asian students in the class taught by a Māori teacher</p>	<p>11 students at one school</p>	<p>Multi-method interpretive study, including cogenerative dialogue</p>
<p>Shady (2015)</p> <p>Cogenerative dialogue conversations as a resource to draw on in changing oppressive structural features in education, utilised cogenative dialogue as a tool to create a cosmopolitan environment that respects and adopts differences</p>	<p>USA</p> <p>Small, predominantly European urban high school. Racially, ethnically, religiously, academically, and socioeconomic diverse backgrounds</p>	<p>10 students, one teacher</p>	<p>Teacher-as-researcher lens, auto-ethnography</p>

Appendix 3: Further literature

Authors (Books and Reports)	Main Context	Focus
Pere (1994)	New Zealand	Learning explored from a Māori perspective
Alton-Lee (2003)	New Zealand	Effective practice for teaching diverse students, synthesis of literature on teaching diverse learners
Anthony and Walshaw (2007)	New Zealand	Effective mathematics teaching practice, synthesis of literature on mathematics teaching and learning
Mutch and Collins (2012)	New Zealand	Key findings from an evaluation of engagement between schools and the parents and whānau of students
Bull, Brooking and Campbell (2008)	New Zealand and International	Review of evidence data linking home-school partnership initiatives to improvements in student achievement
Macfarlane, Glynn, Cavanagh, and Bateman (2007)	New Zealand	Discussion of the importance of creating culturally-safe schools, where reciprocal relationships exist in classrooms within an environment of care
Gay (2010)	USA	Culturally responsive teaching; power of caring within culturally responsive teaching
Ladson-Billings (1995)	USA	Culturally responsive teaching framework and description
Villegas and Lucas (2002)	USA	Culturally responsive teacher education
Smith (1997)	New Zealand	Examines educational and schooling resistance initiatives of 'Kaupapa Māori' that have emerged in the New Zealand context

Appendix 4: Cogenerative-type discussion meeting participants

Meeting number	Week meeting was held (in Term Two, 2017)	Participants
1	1	Mali, Maui, Mave, Mazz, Neve, Otto
2	2	Mali, Maui, Mave, Mazz, Neve, Nick, Otto
3	3	Mali, Maui, Mave, Mazz, Neve, Nick, Otto
4	4	Maui, Nick, Otis, Otto
5	5	Mali, Mazz, Neve, Nita
	6 <i>School-wide activities interrupted cogenerative dialogue meeting schedule</i>	
6	7	Mazz, Neve
7a	8	Maui, Otis, Otto,
7b		Mave, Mazz, Mere, Neve
8a	9	Maui, Otis, Otto
8b		Mazz, Mere, Neve,

Meeting number	Week meeting was held (in Term Two, 2018)	Lunchtime or spontaneous in class time	Participants
1	2	Lunchtime	Maci, Mady, Mimi, Nell, Nova
2	3	Spontaneous	Maci, Mady, Mimi, Nepa, Mika, Mark, Nova, Nate, Nash
3	4	Lunchtime	Maci, Mady, Mimi, Nell, Nova
4	5	Lunchtime	Mady, Mimi, Nell, Nepa
5	6	Spontaneous	Mark, Mika, Nash, Nate, Noah
6	7	Lunchtime	Mady, Mimi, Nova, Nell, Nepa
7	8	Lunchtime	Maci, Mady, Mimi, Nell, Nova
8	9	Lunchtime	Maci, Mady, Mimi, Nell, Nova

Appendix 5: Cogenerative-type dialogue questions for the start of meetings

Guidelines to running the cogenerative dialogue meeting

- Everyone is equally important
- Words are respectful
- Listen to each other
- Everyone has a turn to talk
- We are all responsible for making sure the rules are met
- At the end of the meeting we agree what we'll do next

Questions for the structured beginning to cogenerative dialogue meetings

- What aspect of ako (if any) was demonstrated in the lesson today
- Did this example of ako help your learning, or the learning of others?
How/why?
- What could the teacher do next time to make the ako better and more effective for learning?
- Would you like that aspect of ako in class more often?

Appendix 6: Sample Ethics Information Letter



Ako in teacher practice in a junior mathematics classroom

Information for parents/caregivers

**prepared for _____
to accompany student participant information**

What is the aim of my project and what do I want to find out?

I am a mathematics teacher at Kikorangi College, working on a PhD research project supervised by two lecturers specialising in Mathematics Education and Māori Education. In a two-year study, I am looking at ways of incorporating the practice of ‘ako’ in mathematics teaching, to raise the achievement of all students in the classroom. My supervisors are Dr Robin Averill and Dr Hiria McRae from Victoria University.

How do I plan to find this out and with whom will I work?

As the mathematics teacher of your son or daughter in Year-10, I will be videotaping 10 to 15 mathematics lessons during Term Two in 2018. The video camera will be set up to capture mainly the image of the teacher. I will watch the lesson video and select several short examples of ako from each lesson. These examples will be shared with a small group of students in the class in order to gain feedback about ako in my practice in an interview setting. A written survey will also be available for all other students in the class so that they can also share their views on the teaching and learning. Please see the student information letter for further details about the interview and survey.

A small group of parents/caregivers will be invited to participate in interview sessions to discuss the teaching and learning in this mathematics class. Further information will be provided for parents/caregivers at a later date, prior to their invitation to participate.

What will I do with the data and how will I share the results?

The video and audio data captured may also be viewed or listened to by the two project supervisors and a cultural expert, but not by anybody else, and only for the purposes of this research. When material about this project is published, or presented at conferences, or written about in my PhD thesis, I will not use any video images or identify any participants by name. To maintain confidentiality, pseudonyms will be used instead of any real names of participants.

The video, audio and related data will be stored electronically in a password protected directory and then destroyed five years after the completion of the research.

Early in 2020 a summary of the project as a whole will be available. Please provide the researcher with an email address to which you would like the summary sent. There is a space for the email address on the consent form.

Consent

If you are willing for (*insert student name) to participate in this research project, please complete the parental consent section on the student consent form, which can be collected from Mrs [SS]. The completed sheet can be returned to the drop-box labelled “ako in teacher practice in a junior mathematics classroom consent forms”, which will be kept in the school office. Consent may be withdrawn up until Friday 28 September, 2018.

Research approval and contacts

This research has been approved by the Faculty of Education Human Ethics Sub-committee under delegated authority from the Victoria University Human Ethics Committee. You can contact my supervisors about any aspect of this research: Dr Robin Averill, robin.averill@vuw.ac.nz, ph 04 463 9714, and Dr Hiria McRae, hiria.mcrae@vuw.ac.nz, ph 04 463 9602. If you have any ethical questions about this research, please contact Associate Professor Susan Corbett, Convenor of the Human Ethics Committee, Victoria University of Wellington (susan.corbett@vuw.ac.nz, ph: 04 463 5480).

Karyn Saunders
Kikorangi College
(0X) XXX XXX
[email address]

Appendix 7: Sample Ethics Consent Form



Ako in teacher practice in a junior mathematics classroom

STUDENT PARTICIPANT CONSENT FORM

- I have read the information sheet and have had the details of the study explained to me.
- I agree to participate in the recorded (video or audio) sessions of the ‘ako in junior mathematics teaching practice’ research.
- I understand that I may withdraw my consent at any time up until 28 September 2018.
- I understand that I can review any recordings that capture my image or voice (after the completion of the lesson).
- I understand that I may ask for any video segment that includes me to be deleted.
- I understand that the video and audio recordings may be reviewed by our class, the two Victoria University lecturers involved in the project, and a cultural expert.
- I understand that the video recordings, audio recordings, and associated data will be held in a password protected file, and destroyed five years after the completion of the project.
- I understand that no images of me will be shown to any other people.
- I agree to complete written surveys on my learning and the teacher’s practice.
- I agree to participate in interviews about the project if I am invited to do so, and understand that attendance at these sessions is strictly on a voluntary basis.
- I understand that I will not be identified by my real name in any publications or presentations arising from this research, and instead a pseudonym will be used.
- I understand that my participation or non-participation in this research project will have no impact on my assessment results.

I, the student named below, consent to my participation in the above research (please tick)

Signature: _____ Date: _____

Full Name Printed: _____

I, the parent/caregiver of the above-named student, consent to his/her participation in the above research (please tick)

Signature: _____ Date: _____

Full Name Printed: _____

If you wish to receive a progress report from this project by the end of 2019, please provide an email address that you will be able to access at that time.

Email address *(Please print clearly)*

Please put this completed form in the drop-box labelled **“ako in teacher practice in a junior mathematics classroom consent forms”** in the **school office**.

Appendix 8: Year 9 Participant PAT Stanine Scores and E&E shift in Term One of Year One of the study.

Student Identifier	Student Ethnicity	Student Gender	PAT Stanine	Maths PAT 6A Raw Score (/43)			Learning Improving		Attendance %
				Initial	Final	Shift	Initial	Final	
1	N	Male			8			SA	74
2	M	Female	2	8	10	2	SA	SA	88
3	N	Female	3	10	13	3	D	SA	94
4	M	Female	2	9	12	3	A	SA	76
5	M	Male	3	10	14	4	A	A	88
6	N	Male	3	12	21	9	A	SA	97
7	N	Male	3	12	14	2	SA	A	100
8	N	Male	3	12	12	0	A	SA	88
9	N	Female	3	13	14	1	A	SA	91
10	M	Male	3	13	17	4	A	SA	97
11	N	Male	4	16			D	D	85
12	N	Male	4	15	16	1	A	A	100
13	N	Female	4	16	20	4	SA	SA	97
14	N	Female	3	12	21	9	A	SA	97
15	M	Female	5	19	14	-5	A	SA	88
16	N	Female	5	19	20	1	A	SA	97
17	M	Female	5	20	22	2	A	A	95
18	M	Female	5	20	26	6	A	SA	91
19	N	Female	5	22	27	5	D	A	91
20	N	Male	4	14	17	3	A	SA	91
21	O	Male	6	27	36	9	SA	SA	97
22	O	Male	6	28	36	8	A	SA	100
23	M	Female	7	31			A	SA	62

NOTES:

Ethnicity: M=Māori; N=NZE; O=Other

Stanine: Stanine of students at TP0 to reflect the mixed ability nature of the Year 9 class. Cell shading: red = below average score; orange = average score; green = above average score.

Raw score: columns contain the initial (left) raw PAT score at TP0, followed by the final raw PAT score post-TP7 (Section 3.4.5). Green text shows improvement in score, blue text shows no change, red text shows a decrease in score.

Attendance: shows the percentage of mathematics lessons the students attended in the study period. Students 1 and 11 were absent for PAT testing, student 23 left Kikorangi College at approximately TP6 and enrolled at another local school.

Learning improving: columns contain the initial (left) answer at the earliest timepoint that they participated, followed by their answer at the final timepoint in which they participated in the survey, responding to the question “my learning is improving”. The options for the answers can be seen in Appendix 10. Green text shows improvement in score, blue text shows no change, red text shows a decrease in score.

Appendix 9: Ako in teacher practice survey

Student Survey "Ako in teacher practice"

In questions 1, 2, and 3 circle the option that best describes what happened in class today

1.Thinking about what YOU did today in class

i) I used things that I'd already learned before to help understand today's learning					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
ii) I helped another student with their learning today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
iii) Another student helped me with my learning today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
iv) I had a conversation about my learning with my teacher today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
v) I know how successful I was with my learning today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
vi) I know a way I can improve my learning next time I have maths					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree

2. Thinking about what the TEACHER did in class today

i) My teacher did not give up on my learning today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
ii) My teacher learned something from me about doing maths today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
iii) My teacher learned something about my life today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
iv) My teacher enjoyed teaching me today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
v) My teacher showed she cared about me today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
vi) My teacher had high expectations of my learning behaviours today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree

3. Thinking about YOUR culture

i) My teacher valued my culture					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
ii) I used something from my culture in my learning today					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
iii) My teacher encouraged me to use my own culture or ideas to understand today's learning					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree

In question 4 circle the option that best describes what happened in the last week

4. Thinking about YOUR whānau and family

i) I talked to my whānau /family during the last week about my maths learning					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
ii) My whānau/family asked me about my maths learning in the last week					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree
iii) My teacher spoke to, or emailed my family/whānau about my learning in the last week					
strongly disagree	disagree	disagree slightly	agree slightly	agree	strongly agree

5. In question 5 circle the option that best describes the culture that you identify with

Māori NZEuropean/Pākehā Other European Pasifika Asian Other (please state)





6. Lastly, please circle the option that best describes your gender

Male Female

Appendix 10: Engagement and enjoyment survey

Student Survey Engagement and Enjoyment

For each question, put a tick in the box under the face that best describes how you feel

	 Strongly Agree Great Very Good	 Agree OK Good	 Disagree Not that great Not much	 Strongly disagree Don't like it Bad
I am interested in maths				
I make sure I ask questions when I'm not sure how to do my work				
I think maths is important for my future goals in life				
I work hard in maths and try my best				
I think I am good at the level of maths I'm up to				
My family think I can do maths				
My teacher thinks I can do maths				
I like doing maths at school				
My maths learning is improving				
I'm going to keep doing maths when I am in Year 12 and 13				
Maths is my best subject at school				

Your name _____

Date _____

Can the teacher talk to you about your answers? _____

Appendix 11: Semi-structured parent–teacher interview questions

Which ethnicity or ethnicities do you identify with?

Which ethnicity or ethnicities does your child identify with?

Which school-based factor do you believe to have the most significant impact on your child's mathematics learning?

Can you describe classroom conditions that you perceive as important for your child to positively experience mathematics learning at school?

Does your child enjoy mathematics this year?

How do you know?

Has this always been the case?

Do you feel that the amount of communication you have received from me this year has been satisfactory?

What method of communication is the most suitable for you?

Are there any changes to the content, frequency or timing of the communications I send out to you about your child's learning?

How important is it to you that your child's mathematics lessons reflect their culture?

Can you suggest ways that I could incorporate Māori culture into your child's mathematics lessons? (Asked of Māori parents only.)

Appendix 12: The PT-PP Typology Analysis Guide

Sub-section(s) of thesis	Interaction element key word drawn from <i>Ka Hikitia</i> (Ministry of Education, 2013)	Cultural competency guiding definition drawn from <i>Tātaiako</i> (Ministry of Education, 2011)	Examples of common words in the interview data
6.2.2 High Expectations	Respect	Manaakitanga	Belief, Care, Culture, Genuine, Māori, Passion, Sincere, Teaching.
	Understanding		Busy, Difference, Diversity, Knowing, Unique.
	Aspirations		Do well, Level One, Pass, University.
6.2.3 Exchange of Information	Conversations	Wānanga	Call, Celebrations, Conversations, E-mail, Heard, Kōrero, ⁱ Listen, Mail, Phone, Questions, Reply, Respond, Specific, Struggles, Time.
6.2.4 Collaboration	Shared contribution	Whanaungatanga	Advice, Advocate Help, Interested, Solutions.
6.2.2–6.2.4	Teacher accountability		Depend, Follow-up, Honesty, Power, Responsibility.

ⁱ Māori term for speaking.