

**A hermeneutic phenomenological study of  
the lived experiences of immigrant students in  
their mathematics classrooms at  
a secondary school in Auckland, New Zealand**

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## **Attestation of Authorship**

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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## Dedication

This work is dedicated to the memory of my extraordinary mum

Mrs Lalitha Hemraj

whose unconditional love and inspiration

I will forever treasure dearly.

## **Abstract**

The presence of immigrant students in mathematics classrooms continues to become more and more prevalent as a consequence of global migration. While their transitional experiences in their new environment may be understood from the multitude of theories in the vast landscape of literature, research focused on these 'lived experiences' from the immigrant students' perspective is less prevalent. This study is premised within a hermeneutic phenomenological framework because it explored the perceived lived experiences of ten immigrant students in their mathematics classrooms, as the phenomena, the hermeneutics component emerged from the interpretations of these perceived experiences.

The study answers the underlying question of the study: How do the perceived past and present lived experiences of immigrant students influence their transition in the mathematics classrooms? A cross-cultural focus surfaced in the form of immigrant students experiencing different degrees of cultural shift in their new environment compared to what they had been accustomed to in their home country classrooms. The background that some of the students had come from included learning mathematics through a different language, single-sex schools, use of corporal punishment, silent classroom environments with a reluctance to be involved in class discussion, and a strict non-confrontational classroom environment. With regards to them forming relationships, most of the students in this study interacted positively and expressed positive attitudes towards their mathematics teachers and peers in their respective classrooms. The interpretations of how the ten immigrant students in this study perceived their mathematics ability, from their own perspective and from their perceived teachers' perspectives, provided an understanding of how they positioned themselves in their mathematics classrooms. Additionally, an interpretation of the students' perceptions of how their parents' would have rated their ability offered another dimension in understanding their academic self-concept.

While interpretations made from the borrowed experiences of the immigrant students have been presented through the researcher's lens, as the researcher, I am mindful that there are multiple realities and acknowledge that these experiences are unique because the ten immigrant students have given voice to their individual stories.

## **Chapter 1: Introduction**

This study focuses on the lived experiences of immigrant students in their New Zealand mathematics classrooms. As a result of global migration, schools around the world continue to change from homogeneous compositions to diverse heterogeneous compositions. Consequently, this trend has initiated educational discourses surrounding immigrant students in schools, both in national and international spheres.

While teachers often attempt to provide an inclusive learning environment for all the learners in the classroom, we must be mindful that both, teachers and students, cannot help but bring their own values and beliefs into the classroom (de Abreu, 2002; Khisty & Chval, 2002; Morgan & Watson, 2002; Shan & Bailey, 1991) which, inevitably influence the experiences for all classroom participants. Students bring a unique perception of the learning situation that is shaped by past learning experiences. What the immigrant students take from the learning environment may be accentuated by their own cultural background and belief (den Brok, van Tartwijk, Wubbels & Veldman, 2010). According to Van Manen (1990, p. 101) lived experiences are unique to the individual and they present “multiple and different lifeworlds that belong to different human existences and realities”. Therefore, as the researcher I acknowledge that, while my interpretations of the lived classroom experiences from the immigrant students' perspectives provides an insight into their transition in their new environment, these understandings have been influenced by the lifeworlds inhabited by the ten students, and by me at the time.

### ***The impetus of the study***

The study focused on the immigrant students' perceptions of their experiences in their mathematics classrooms rather than how their experiences might have been theorised. This approach gained its impetus from the words of Sanchez (2007) who asserted that when it comes to teaching and learning research, our most valuable resources are not abstract theories and principles but the untapped experiences of real students in the classroom. The research was guided by my own pre-conceptions, experiences and



wonderings that are encapsulated in the question: "How do the perceived past and present lived experiences of immigrant students influence their transition in the mathematics classrooms?"

In an attempt to answer this broad question the three spiral threads of transition model (see Figure 3(i) in Chapter 3, page 51) was developed to represent the study's assumptions and its temporal focus. Three focus questions within the temporal spiral threads that steered the research process were:

- How do perceived similarities and differences between immigrant students' past and present experiences influence their understandings of the mathematics classroom environment?
- How do immigrant students integrate their past experiences into their present mathematics classroom environment with regard to forming relationships with their teachers and peers?
- How do the past and present experiences of immigrant students affect their perceived academic self-concept in finding their place in the mathematics classroom?

### ***The purpose of the study***

In the context of New Zealand's diverse and multicultural student body, current literature (Begg, Bakalevu, Edwards, Koloto & Sharma, 1996; Marat, 2005; Ohia, 1993) suggested the need for a multicultural focus on mathematics teaching and learning. In this study I set out to expand on such a focus through my interpretations of the students' perceptions of their experiences in the mathematics classroom environment. These understandings have not only exposed the perceived experiences of the immigrant students' mathematical learning, but also have the potential to enhance the learning experience for immigrant students by informing mathematics teachers of some of the students' needs.

The following were envisioned as some of the potential benefits of the study:

- Through the voices of immigrant students, a richer and deeper understanding of their transitional experiences would be brought to the fore.
- On the one hand, this study would give the students a voice to tell their story while, on the other, it would allow me to reconceptualise the mathematics classroom from the immigrant students' perspectives. Through this new understanding of the different worldviews that immigrant students might bring to mathematics classrooms, I expect to develop greater understandings of their needs.
- This study is intended to fit well with two of the eight principles in the New Zealand Curriculum (Ministry of Education, 2007); cultural diversity and inclusion, which underpin decision making in schools. I expect new theoretical constructs to emerge that could potentially benefit the field of mathematics education and education in general at secondary schools in New Zealand.
- The findings of this study will be specific to the group of immigrant students to be studied and may or may not be typical of the experiences of other immigrant students residing in Auckland. Although this study is not expected to offer generalizations it may be beneficial because of its interpretative nature, which is likely to engender new concepts and elaborate on existing ones (Peshkin, 1983). As a researcher I anticipate that other teachers of immigrant students would identify with some of my findings.

Finally, the study has been influenced by the preconception that advocates for the view that diversity is not a problem to be fixed, but that it is something to be celebrated as a fundamental potentiality of the classroom learning environment (Gorgorio, Planas & Vililla, 2002; Davidson & Kramer, 1997).

### *Methodological justifications*

This research is positioned in a hermeneutic phenomenological theoretical framework within the interpretive social science mode of inquiry. Through the phenomenological component I attempted to understand the classroom experiences as the phenomena while through the hermeneutic component multiple interpretations of the students' experiences emerged. This hermeneutic phenomenological study presented bi-directional benefits. On the one hand it has given immigrant students a platform to tell their stories, and on the other hand, it has allowed me to gain a perspective of the immigrant students' perceptions of their experiences in their mathematics classrooms. The philosophical stance that this study takes about the nature of mathematics is that mathematics is not stagnant (Burton, 1995; Guba & Lincoln, 1994) because its reality is constantly changing and being constructed by individuals (Cresswell, 1995).

Drawing from Van Manen's (1997, p. 101) lifeworld existentials: “the lived space”, “the lived body”, “the lived time” and “the lived human relation”; and Ricouer's (1990, p. 70) “three modes of temporality”: the being within the past, present and future dimensions of time; this study developed an existential temporal framework to interpret the experiences of ten immigrant students at an Auckland secondary school. Both of these ideologies have been explained in detail in the methodology chapter (Chapter 3, page 47).

The ten participants were immigrant students from one Auckland, secondary school. They had all come from non-English speaking backgrounds and were of eight different nationalities. The countries they came from were South Africa, the Philippines, China, Saudi Arabia, Nigeria, Fiji, India and Thailand. A profile of the ten participants is presented in Chapter 3 (Table 3a, page 50).

### *My personal context in the study*

I acknowledge that there are multiple views of reality (Bogdan & Bilken, 1992; Van Manen, 1997), and that although the interpretations are set within a landscape of literature, they reflect my interpretations of the perceived reality of the lived experiences of the ten immigrant students in their mathematics classrooms. My interpretations were based on the ontological hermeneutic assumption that my perceived and interpreted realities had evolved from my own pre-existing values and beliefs at the time (Herda, 1999). In order to shed light on my initial values and beliefs, I have provided a brief description of my own being-in-the-world from the past to the present situation in which I find myself (Heidegger, 1996).

### *Politically correct to be racially different*

My own experiences growing up in apartheid South Africa meant that I was forced, by law, to see people differently. This difference was based on the idea of the existence of four racial classifications that saw those of European ancestry belonging to the superior, privileged group, while the remaining three groups, of Indian or Asian ancestry, of mixed racial ancestry (classified as 'coloured'), and of native African ancestry, being considered inferior others (Jhagroo, 2004; Kamwanamalu, 2007; Martin, 1997). These classifications produced a dichotomous society represented by 'whites' and 'non-whites'. My Indian ancestry placed me in the 'non-white' category, and like all South African students during the apartheid era, I was a recipient of differentiated education. I seemed to be trapped in the cycle of the apartheid system when I completed my teaching degree and began teaching in the differentiated system. In the mid-1990s, I had witnessed the collapse of the differentiated education system and the merging of students of different ethnicities. I felt overwhelmed in not being able to make the learning context accessible to some of my students from diverse backgrounds. Democracy produced a context of change, where the mathematics curriculum had undergone three revisions within two decades, and resulted in nationwide discord as educators and researchers scurried in search of new methods to teach in multiracial classrooms (Setati, 2002; Vithal, 2003).

### *A different place but the same concerns*

My pursuit for a better life governed by a desire for equity and fairness of opportunity brought me to New Zealand, initially as a primary school teacher, and subsequently as a mathematics teacher and assistant head of department at an Auckland secondary school. In spite of a global geographical change, my concern for the diverse, immigrant students in my classroom persisted. In search of a deeper understanding of the New Zealand teaching and learning context, I completed my Master of Education (MEd) qualification at Auckland College of Education (now known as the University of Auckland) in 2004. This served two purposes. Firstly, I developed my own understanding of education and theory by completing a thesis on the experiences of South African trained teachers in Auckland. Secondly, it allowed me to experience being a student in a multicultural environment. However, my experiences may have been dissimilar to other immigrant students on many levels because I had come from an English speaking background, I was an adult-student at a tertiary institute, and my ability to socialise was based on years of experience, unlike that of immigrant secondary school students. As a mathematics teacher I had encountered diverse immigrant students with seemingly different transitional experiences. My desire to understand some of the immigrant students' perceptions of their transitional experiences in the mathematics classroom prompted the current doctoral study.

### ***Structure of the thesis***

This thesis is presented in ten chapters.

Chapter 1, titled the "Introduction", has set the scene for this study with regards to the impetus for the study, the purpose for the study, my personal context in the study, the justification for the use of the chosen study methodology, and an overview of the structure of the thesis.

Chapter 2, titled "A landscape of literature" provides a global perspective of immigrant students, an historical perspective of mathematics, a perspective of some of the cultural

differences that the students encounter in their new environment, and a snapshot of the mathematics learning-context in a variety of countries.

Chapter 3, titled “Methodology”, presents the hermeneutic phenomenological philosophical paradigms from which the design of the research process emerged. A justification for the use of the methodology is offered and the details of methods employed are described comprehensively.

Chapter 4, titled “Voices of the past from the present” is the first of the three findings chapters. This chapter provides the participants’ comparisons of their perceptions of their past mathematics classroom experiences to their perceptions of their present experiences.

Chapter 5 is the second of the three findings chapters and it focuses on the perceived experiences of the participants in their New Zealand mathematics classrooms. This chapter is titled “Voices inside the present” because it draws on their interactions with the different participants in their classroom environment and their experiences with their mathematics learning content.

Chapter 6 is the final findings chapter titled “Voices towards the future”. It provides graphic representations of how the ten immigrant students in this study rated their academic self-concept and also presents their mathematical aspirations.

Chapter 7 is the first of the three discussion chapters and is titled “Understanding the learning environment”. It provides interpretations of the participants’ perceptions and understandings of their learning environment.

Chapter 8, titled “Forming relationships”, is the second of the discussion chapters. It discusses the various relationships that the participants form with other classroom participants.

Chapter 9, titled “Negotiating one’s place” is the final discussion chapter. It discusses the participants’ academic self-concept from multiple dimensions in an attempt to provide interpretations of how they find their place in a new environment. The discussions place the findings of this study within an academic research platform by making reference to the vast literature.

Chapter 10, titled “Concluding thoughts” provides a summary of the main study findings against relevant literature, the contributions and implications of this study, acknowledgement of the limitations, and finally, offers areas of consideration for future studies.

The subsidiary sections that follow are the extensive list of references and the appendices.

## **Chapter 2: A landscape of literature**

For centuries migration has been a global phenomenon driven essentially by the innate human desire for an improved life, and triggered by political, educational, social, cultural and economic factors. While the effects of this macro-event extend to all facets of society, this study has focused on its impact on mathematics education. In order to understand immigrant students' transitional experiences in a new learning environment this review extensively examined national and international literature on immigrant students in public schools. The review provides an overview of: immigrant students in the New Zealand context, different perspectives of mathematics, mathematics and culture, language as a barrier, relationships with the teacher, peer relationships, the learning environment, immigrant parents and mathematics education, achievements and aspirations of immigrant students, and multiple worldviews of learning mathematics.

### ***Immigrants in New Zealand context***

The last two decades have seen a heightened awareness among mathematics researchers toward the social and cultural nature of mathematics (Barton, 1993; Begg, Bakalevu, Edwards, Koloto & Sharma, 1996; Bishop, 2002; Ellerton & Clements, 1996; Grootenboer & Hemmings, 2007; Huang & Leung, 2004; Marat, 2005). The public school system as an institution plays a critical role in educating immigrant students and facilitating their performance in the larger society (Huang, 2000). Barton (1996), Bishop (1991), Burton (1994), and Zevenbergen (1996) advanced the argument that academic achievement and underachievement of different groups of students may be attributed to their level of acceptance of the dominant approach to teaching mathematics. Additionally, these studies suggested that students who come from social and cultural groups whose language and culture are dissimilar to that of formal schooling are often at a distinct disadvantage in effectively communicating their mathematics ideas. Such findings have been acknowledged in culturally diverse countries, like New Zealand, where the curriculum has an explicit focus on “cultural diversity” and “inclusion”, as well as advocating for “non-sexist, non-racist, and non-discriminatory” education



(Ministry of Education, 2007, p. 9). Furthermore, the implication of the current New Zealand curriculum is that learning is inseparable from the social and cultural context.

New Zealand is an example of a nation that has evolved from biculturalism, founded on the principles of the Treaty of Waitangi, to complex, international multiculturalism. Immigration to New Zealand has increased steadily over the past few decades and the diversity of immigrants has transitioned from predominantly European settlers to an influx of people from the Pacific Islands, Asia and Africa (Harrison, 1998; Ward & Masgoret, 2008). The reasons for individuals and young families choosing to uproot from their home countries are numerous but underpinned by a common goal; they are in search of a better life (Statistics New Zealand, 2006). This desire overrides the potential challenges that a new environment may demand.

Census data from 1996 to 2006 provided a comparative perspective on the growing number of immigrants from a variety of nationalities that have chosen New Zealand as their new place of residence (Statistics New Zealand, 2006). During this ten-year period the number of overseas born people in New Zealand increased from 17.5% of the total population in 1996 to 22.9% of the total population in 2006 (Table 2a). This corresponded with a proportional decrease in New Zealand born people in the total population. New Zealand as a preferred country of domicile was most popular among English, Chinese, Australian, Samoan, Indian, South African, Fijian, Scottish, and Korean nationals (Statistics New Zealand, 2006).

**Table 2a: Actual counts and percentages of New Zealand born people compared to overseas born people in New Zealand in 1996, 2001, and 2006**  
(statistics adapted from Table 9 in *QuickStats About Culture and Identity - Tables* available at Statistics New Zealand, 2006)

	1996	2001	2006
New Zealand born			
<i>Count</i>	2,848,209	2,890,869	2,960,217
%	82.5	80.5	77.1
Overseas born			
<i>Count</i>	605,061	698,628	879,543
%	17.5	19.5	22.9
Total population	3,453,270	3,589,497	3,839,760

Within New Zealand, Auckland has been the only region to experience annual growth in school rolls over this period. Concurrently, the region has also seen the highest growth rate of immigrants when compared to other regions within the same period (Statistics New Zealand, 2006). In 2010, Asian students made up 9.4% of the domestic roll, an increase of 3.3% since the previous year (Ministry of Education, 2010). This trend has been acknowledged by government agencies, such as the Ministry of Education who have actively promoted policies in *The New Zealand Curriculum* that account for this demographic shift (Ministry of Education, 2007).

Increased migration is not confined to New Zealand's borders but rather is a global event that has resulted in more people moving from one country to another. The new waves of immigration have resulted in complexities that have necessitated the need for research of this nature to gain a better insight into the problems faced by immigrant students. Studies have shown that immigrant students face a myriad of social and cultural pressures while trying to settle into a new school environment (Ahlquist, 2001; Bishop, 2002; Huang, 2000; Perkins & Flores, 2002; Shan & Bailey, 1991). The social and cultural pressures that immigrant students experience present intertwined obstacles to their learning and often see them residing in “the margins of two cultures” (Suarez-Orozco & Suarez-Orozco, 2001, p. 92) because they never truly belong to either.

### ***Different perspectives of mathematics***

The changing perspectives of Western mathematics surfaced from the ideas of early Greek philosophers Plato, synonymous with absolutist philosophy, and Aristotle, synonymous with fallibilist philosophy. The Eastern perspectives of mathematics, on the other hand, were embedded in other philosophies such as the Confucian Heritage Cultural ideology (Han & Scull, 2010; Kaufman, 2004). The commonly held beliefs of mathematics are that it is some sort of mystical language; the privileged secret code of the academically elite; and a universal language shared by all human beings regardless of culture, religion, or gender (Dengate, 1995). These perspectives and beliefs of mathematics present the epistemological pillars on which mathematics education was

built in the different societies and have shaped the beliefs that both educators and learners form (D'Ambrosio, 1999; Ernest, 2004b).

Historically, Western mathematics can be traced to an era of antiquity, dating back to the fourth century B.C.E. (Dossey, 1992). Plato asserted that the existence of mathematics was not confined to the human mind but that it had existed as an entity on its own (Dossey, 1992). During the time of Plato, it was generally perceived that mathematics existed independently of human knowledge possessing a kind of absolute truth (D'Ambrosio, 1999; Dengate, 1995). This philosophy of mathematics was later questioned by mathematicians and philosophers, thus giving rise to Aristotle's fallibilist philosophy. The epistemological assertion of this philosophy was that mathematics knowledge is manifested on the lived reality of experiments, observations and abstractions (Dossey, 1992). Similarly, Hersh (1986) proposed a new philosophy of mathematics in which mathematics could be viewed as a human activity characterised by ideas. Perspectives of mathematics have gone through significant periods of evolution that were triggered by social, political, and economic events, and the contributions of various mathematicians (Swetz, 1997). In spite of the emergence of different views of the nature of mathematics, some educators still hold the belief that the universal status of mathematical knowledge has been tainted by this contextual and cultural focus (Dengate, 1995).

Since the late twentieth century mathematics has had to move at a very rapid pace as more and more avenues for exploration became necessary with technological advancements. The relationship between technology and mathematics is bi-directional; they influence the growth of one another (Niss, 1994). Technological developments, for example, computers, cellular telephone and the digital camera are all based on fundamental principles of mathematics (Ernest, 2004a). Despite rapid technological advancement, traditional pedagogy of the world's largest studied academic discipline, mathematics, has remained unchanged in classrooms around the world (Niss, 1994). The Western belief of mathematics is that the domains of mathematics are number, chance, form, and algorithms, and that it relies on logic rather than observation as its standard of

truth (Li, 2006). Additionally, mathematics has been associated with a better understanding of the world because of its influence on technology and science (D'Ambrosio, 1999; Ernest, 2004a; Niss, 1994).

Mathematics has been perceived to occupy an important gate-keeping role in the inclusion or exclusion of students into higher mathematics education platforms (Vithal, 2003). In spite of its important status, for many people mathematics is associated with anxiety and failure because of its public image of being difficult, abstract and inaccessible (D'Ambrosio, 1999; Ernest, 2004b). This idea is reinforced by mathematicians who view mathematics as a higher order discipline, requiring complex skill and understanding. This abstractness has very little to do with reality (Ernest, 2004b). Such ideas position mathematics within a vacuum of elitism, advocating the belief that it is a non-inclusive discipline, and raises questions about the importance of understanding mathematics epistemology in a multicultural world.

More contemporary perspectives have alluded to these multicultural views and advocate that the world of the learner is important because making sense of mathematics occurs within a cultural context (Barton, 1993, Ernest, 2004a, Ernest, 2004b). The cultural context of mathematics has been termed 'ethnomathematics' by D'Ambrosio (1999). Barton (1993) has identified four broad categories of cultural dimensions of mathematics:

- historical ethnomathematics that refers to something in the past that may not directly affect contemporary practice but is well documented;
- frozen mathematics which distinguishes between the initiator of an idea and those that copy the idea;
- transitional ethnomathematics refers to the inter-cultural experiences of mathematics; and
- potential mathematics that refers to mathematics in the daily life.

The richness of cultural diversity has, until recently, not been sufficiently understood, recognised or given any importance in mathematics education (D'Ambrosio, 1999; Shan & Bailey, 1991). A student's cultural frame may be different to that of the dominant culture prevalent in the mathematics classroom and this difference has implications for the student's success (Moody, 2001). The classroom is the micro representation of the society that functions within specific rules, routines and regulations (Luk & Lin, 2007).

Students' self-beliefs and academic self-concepts are formed unconsciously, but influenced by their cultural background that, in turn, impacts on their academic achievement and their perceptions of performance (Marat, 2005). Self-belief plays an important role in beliefs students have of mathematics and "self-efficacy predicts not only the students' mathematical performance but also other motivational variables that influence aspects of overall mathematics achievement" (Stevens, Olivarez, Lan & Tallent-Runnels, 2004, p. 219). Self-efficacy is a multidimensional construct that was introduced by Bandura and defined as "a generative capability in which cognitive, social, emotional, and behavioral subskills must be organised and effectively orchestrated to serve innumerable purposes" (Bandura, 1997, p. 37). Additionally, Marat (2005, p.103) described "the construct of self-efficacy" as being "future orientated", and "malleable in nature" with the potential to influence behaviours and interactions of people with each other and with their environment.

This idea that self-concept and culture may be intertwined was practically observed by Seah, Atweh, Clarkson and Ellerton (2008) in their analysis of the Programme for International Student Assessment (PISA) study, a comparative study of the mathematics achievement of students from the main industrialised countries. In this study, Asian students from Japan, Korea, Hong Kong and Macau reported the lowest self-concept scores. Other studies have found that cultural factors such as parental expectation (Boado, 2008; Civil, Planas & Quintos, 2005) and work ethic (Kirova, 2002; Saran, 2010) may contribute to these differences.

In contrast, the study by Kaufman (2004) found that Chinese immigrant students rated their academic ability higher than the local New York students. This high rating may be interpreted as Chinese immigrant students having high academic self-concepts. Additionally, the study concluded that, students' perceptions of their own effort and academic success was dependent on the social environment and the cultural interactions that occur within the teaching and learning process. These findings may have sociocultural and educational implications for Australasian countries, like New Zealand, which are currently experiencing a high volume of Asian immigrants (Seah, Atweh, Clarkson & Ellerton, 2008).

Teaching and educating are often used as synonyms, but they have very different implications in the context of learning mathematics as pointed out by Bishop in the following excerpt:

*Educating* people mathematically consists of much more than just teaching them some mathematics. It is much more difficult to do, and the problems and issues are much more challenging. It requires a fundamental awareness of the *values*, which underlie mathematics, and recognition of the complexity of educating children about those values. It is not enough to merely teach them mathematics, we need also to educate them *about* mathematics, to educate them *through* mathematics, and to educate them *with* mathematics.

Teaching children to *do* mathematics emphasises knowledge as 'a way of doing'. A mathematical *education* is essentially concerned with 'a way of knowing'. That then speaks of a cultural perspective on mathematical knowledge.

(Bishop, 1991, p. 3)

The challenge for educators and teachers is to bridge the gap of dissimilarity and make mathematics learning less alien to immigrant students. Barton (1993) emphasised the need for ethnomathematics in education and saw its role as initiating critical thinking about the nature of mathematics within different cultures, resisting cultural domination of the Western mathematical values, and acknowledging and drawing from students existing frameworks to enhance learning. Including other worldviews into the mathematics classroom has the potential to broaden students' views. Additionally, this ideology propounded by Barton (1993) spoke of added knowledge and understanding through the interaction of multiple languages as a means of communication.

Ethnomathematics has challenged the Western views' claim to Eurocentrism being the basis of mathematics education, and questions, what constitutes and counts as mathematical knowledge, how it continues to be legitimised, and who is recognised for its production (Shan & Bailey, 1991; Swetz, 1997; Vithal, 2003). Ethnomathematics gave rise to social, cultural, and political dimensions of mathematics education that viewed teaching and learning from a broader spectrum.

Inspired by the hermeneutic phenomenological stance, which propounds that realities are not objectively visible, but that multiple realities are created by people (Reichardt & Rallis, 1994; Van Manen, 1990), I examined the students' use of their background experiences in constructing knowledge in their new environment. I have been mindful of the cultural and ethnic identities as essential constructs in trying to interpret relationships and interactions in the mathematics classroom (de Abreu, Cline & Shamsi, 2002; Khisty & Chval, 2002; Morgan & Watson, 2002).

### *Language as a barrier*

The above perspectives of mathematics have argued that mathematics is not a discipline of absolutism and factual knowledge that transcends all cultural, language and political spheres. Language that presents itself in a variety of different forms such as spoken, written, symbolic, diagrammatic, graphical, and tabular inevitably affect students' problem-solving abilities (Seah, Atweh, Clarkson & Ellerton, 2008). According to Tanners (1997) the biggest challenge that immigrant students face in their new classroom is to speak, read and write in a language dissimilar to their own. In spite of the challenge, Roer-Strier and Strier (2007) stress the importance of national language proficiency for immigrant students to cope in their classroom environments.

A national mathematics curriculum imposed on minority groups or immigrants is seen to be a form of cultural imperialism by Ellerton and Clements (1996). Any curriculum encompasses the overt skills, content and texts, as well as, the covert "hidden curriculum" with "a set of ideas, beliefs and values" (Shan & Bailey, 1991, p. 20). While this is the reality of the immigrant experience in a new country, Shan and Bailey (1991),

view the covert curriculum as an imposition forced upon the immigrant students. Therefore to engage immigrant students in school, teachers must facilitate avenues for the students to explore and strengthen their ethnic identity and languages while developing their ability to study in a new country (Walqui, 2006; Ahlquist, 2001). English being the dominant medium of instruction in New Zealand schools, (Harrison, 1998) and the fact that immigrant students come with a variety of languages, necessitates a language focus when trying to understand their transitional experiences.

Numerous international studies of immigrant students have highlighted the language difficulties that they are exposed to in their new country (Gardner, 1980; Gunderson, 2000; Harris, Brown, Ford & Richardson, 2004; Huang, 2000; Li, 2009; Perkins & Flores, 2002; Secada, 1992; Secada, 1995; Suarez-Orozco & Suarez-Orozco, 2001). Immigrant students are often faced with the complexity of learning mathematics through one language at school and a different language at home (Bishop, 2002; Li, 2009; Rao & Yuan, 2006; Seah, Atweh, Clarkson & Ellerton, 2008). This part of the literature review provides a description of language as a barrier to learning in different educational contexts.

Some of the difficulties that Latin American immigrants in the United States of America experienced were as a result of language and cultural barriers, notational differences, algorithmic procedural differences and the texts used (Perkins & Flores, 2002). Notational differences included the way numerals were written, the way numbers were read or represented, systems of measurement (metric and imperial), and symbols such as the forward slash (/) and the colon (:). Mexican textbooks use both symbols to represent division yet in the US the colon is used to show ratios and proportions. The way mathematical ideas are presented in the immigrant students' home country and the way these ideas are represented in their new country can be very different and can cause interference to the students' understandings of mathematics (Perkins & Flores, 2002). Problem solving in mathematics requires proficiency in the dominant language for students to explain their reasoning. A lack of language proficiency results in immigrant students being silenced and their non-involvement in peer group activities that require



verbal communication and negotiation of meaning of a high level (Secada, 1992; Secada, 1995).

Al-Nofaie (2010) and Yashau (2009) provided perspectives on the attitudes and difficulties experienced by students towards learning English in Saudi Arabian public schools and the learning of mathematics through English. Both authors have alluded to English as the world's most prestigious language, having the potential to benefit Saudi Arabian people by allowing them to extend their understanding of mathematics and science on an international arena. Al-Nofaie's (2010) study found that, in spite of the status accorded to English, Saudi Arabian students did not readily embrace it and viewed it as a foreign language. This attitude was attributed to their late exposure to the language which occurred after six years of schooling. Yashau (2009) found that the lack of English language proficiency of Saudi Arabian students, enrolled in English medium mathematics courses at universities, has created a barrier to their mathematical understanding. Additionally, this study emphasised that the central position that language occupies in the teaching and learning of mathematics should not be underestimated. Although the above studies had not focused on immigrant students, they raise awareness of the language barriers that students are faced with when their medium of instruction in mathematics is other than their home language.

Similarly, Rao and Harrington (1997), and Shameem (2004 & 2007) discussed the language barriers that Fijian students are faced with because of their trilingual educational system with English being the language of choice at public schools and in the public service. Unlike the Saudi Arabian students' attitude towards English, the majority of Fijian teachers and students favoured English as the medium of instruction (Shameen, 2004) and the national junior certificate results indicated that there was no difference in performance of students who studied one of the mother-tongue languages, Hindi or Fijian, and those students that had studied through an English-only medium of instruction (Rao & Harrington, 1997).

Like the Saudi Arabian studies by Al-Nofaie (2010) and Yashau (2009), Baker (2008) discussed the status of English in Thailand. According to the study, English occupies a de facto second language status because:

- it is a compulsory second language at schools;
- it is the most commonly used language in the business arena after Thai;
- government publications are written in Thai and in English; and
- the public signs are in both Thai and English to cater to the needs of its large tourism industry.

However, despite the extensive presence of English in Thailand, Thai people do not identify with the language. They view English as “the language of outsiders” (Baker, 2008, p. 136); and this may be attributed firstly, to the Thai people’s indifference to embrace the language and secondly, to the fact that because English textbooks that they are exposed to lack Thai context, they view them as artefacts belonging to another culture.

In the South African educational sphere, Napier and Napier (2002) claimed that the apartheid education system had compromised and marginalised the vast majority of South Africans. This marginalisation was, in part, attributed to the dominance of English and Afrikaans as colonialist languages playing an instrumental role in deepening the racial divide (Kamwanamalu, 2007; Martin, 1997; Napier, 2002; Napier & Napier, 2002; Setati, 2002). During the apartheid era English and Afrikaans shared an almost equal status as a tool of political dominance while the native African languages, spoken by the majority of South Africans, were ignored completely from education and political arenas (Napier, 2002). It was only after the new Constitution of 1996 that eleven languages occupied an official status, giving linguistic rights to the many indigenous languages spoken by South Africans. Currently, the official languages of South Africa are Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Tsonga, Afrikaans, English, isiNdebele, isiXhosa, and isiZulu. Furthermore, English enjoys a new status as a potential link between people of different dialects through national and international media (Napier, 2002). The implication of having eleven official languages is that students have the right

to request instruction at schools in the language of their choice and this is granted if teachers are available (Napier, 2002). However, in spite of this constitutional right, Kamwanamalu (2007) and Setati (2002) argued that indigenous African languages remain at risk because students and parents perceive English to have a higher social, economic and educational status than the other languages spoken in South Africa.

A Danish study by Horst and Holmen (2006) found that immigrant students are often faced with language related problems in their mathematics classrooms. Education authorities in Denmark have attributed immigrant students' low academic achievement to lack of proficiency in Danish. However, Danish mathematics teachers agreed that schools in Denmark should integrate the cultural and linguistic background of immigrant students in their teaching. They also opposed the abolishment of teaching in ethnic-minority, mother-tongue instruction, with only a few teachers believing that mathematics could not be successfully taught in the ethnic minority languages (Horst & Holmen, 2006).

An extensive study by Huang (2000) comparing the mathematics achievement of immigrant students in five English-speaking countries also found that, although limited English language proficiency handicapped the learning of students, this problem seemed to have been more prevalent in first generation immigrants and non-immigrants whose first language was not English. With second-generation immigrant students, bilingual proficiency had a positive influence on immigrant students' cognitive growth. This study of the five developed countries concluded that first generation immigrant students lagged behind in the United States, England and Canada, while in Australia and New Zealand the immigrant students' mathematics written assessments scores were similar to those of their Australian-born and New Zealand-born peers (Huang, 2000). However, this statement must be viewed with caution because the circumstances of the immigrants in the different countries may be dissimilar and affect student motivation and achievement (Gunderson, 2000; Suarez-Orozco & Suarez-Orozco, 2001).

In a Canadian study, Li (2009) found that Chinese immigrant students excelled academically in mathematics and science in spite of the language barrier. This high achievement was attributed to the value the students placed on maintaining their home language and culture that promoted excellence. Another study of immigrant students in Canada by Gunderson (2000) claimed that the high dropout rate of minority-language students from school might have been attributed to compounding factors. Two of these factors were: firstly, the students' lack of English language proficiency; and secondly, the teachers' attitudes that English ability ought to be a prerequisite for all subjects including mathematics learning. According to Gunderson (2000), Suarez-Orozco and Suarez-Orozco (2001), Harris, Brown, Ford and Richardson (2004), some teachers exhibited negative perceptions of immigrant students because of their limited language proficiency and they saw them as inferior, lacking in ability and un-teachable.

The literature evidently points to the central role of language in students thinking, learning and their ability to negotiate meanings to solve problems (Bose & Choudhury, 2010; Parvanehnezhad & Clarkson, 2008). These authors further assert that learning mathematics in a language other the one they are comfortable with may lead to an inferior quality of mathematics education. Additionally, the study advocates for the use of code mixing and code switching as a mechanism to develop sociomathematical practices and negotiate meanings among students for whom the language of instruction is unfamiliar. Code mixing involves people speaking in one language but substituting certain words from another language without changing the meaning of the sentence, while code occurs when a primary and secondary language is combined and used interchangeably to construct sentences (Bose & Choudhury, 2010).

### ***Relationships with the teacher***

It is our connectedness to other people and the relationships that we form that make us human (Heidegger, 1996). Such relationships manifest within the social milieu of the classroom in which learners constantly make decisions about their own being within the classroom environment (Bishop, 2002).

The perceptions that students, not just immigrant students, have of their mathematics teacher have been found to be closely associated with their own academic self-concept and their achievement outcomes (Adedoyin, 2010; Bishop, 2002; den Brok, van Tartwijk, Wubbels & Veldman, 2010; Igoa, 1995; Kirova, 2001; McCollum & Yoder, 2011). Perceptions of cooperative and approachable teachers have been associated with positive student achievement, while perceptions of confrontational and unhelpful teachers have been associated with low student achievement (Adedoyin, 2010).

Differences in teachers' perceptions of students' learning have also been found to impact on student learning. Huang and Leung's (2004) study found a difference in the beliefs held by teachers, where Western teachers believed that meaningful learning is linked to concrete models, and Asian teachers believed that abstract concepts developed students' critical thinking and logical reasoning ability. Although teachers may be aware of the diverse cultural backgrounds that their students may come from, it is the immigrant student who experiences contrasting shifts in the classroom's learning environment because of these different beliefs that teachers may exert on the learners (den Brok & Levy, 2005; den Brok, Wubbels, Veldman, & van Tartwijk, 2009).

Bishop (2002) viewed the relationship between the teacher and the immigrant student as one of the most important features of the transition experience for the student. Studies have asserted that immigrant students sometimes exhibit withdrawn behaviour and tend to avoid verbal interactions with their teachers, often choosing to work silently in the classroom (Endo, 2010; Esmonde, 2009; Igoa, 1995; Wickett, 1997). Multiple interpretations of students' silence have been presented in various studies (Baker, 2008; Endo, 2010; Esmonde, 2009; Han & Scull, 2010; Wickett, 1997). Endo (2010) attributed the immigrant students' silence in class to two factors. Firstly, she suggested that students' discomfort and lack of confidence in expressing themselves verbally is due to their own lack of proficiency in the dominant classroom language. Secondly, the teachers deliberately avoided communication with immigrant students for fear of not being able to comprehend what they might say. The latter view of the teacher's inability to reach out and smooth the transitional process for immigrant students has also been alluded to by Hones (1999, p. 3) who viewed the teacher as a "cultural healer".

Other researchers viewed students' silence as a necessary and important nurturing phase for students to develop their language proficiency (Esmonde, 2009; Igoa, 1995). Additionally, it is the teachers' acknowledgement of this incubatory phase that leads to them not directing questions at the immigrant students (Wickett, 1997). Another contributory factor to students choosing to be silent may be attributed to their cultural background. As mentioned by Baker (2008), and Han and Scull (2010) some cultures propagate the idea of cooperation in order to maintain a hierarchical social order, especially when a teacher is viewed as occupying a high position in society and students a comparatively lower position.

While Walshaw and Anthony (2008) claimed that purposeful interactions between the teacher and the students were a necessary component in stimulating thinking in students, den Brok, van Tartwijk, Wubbels and Veldman (2010) added that teachers' interactions with students are sometimes influenced by the students' ethnicities. A Dutch study of immigrant students confirmed this assumption in its observation of teacher interactions in their classrooms. The study found that Dutch teachers had shown negative bias towards students of Moroccan descent, and were more inclined to verbally correct their mistakes compared to any other ethnic group (den Brok, Wubbels, Veldman & van Tartwijk, 2009). This finding paralleled Simpson and Erikson's (1983) study, which also found that teachers displayed different behaviours towards white students and non-white students in the classroom, and tended to be more critical towards African American, male students.

Another study has associated low teacher expectations with low student achievement (Harris, Brown, Ford & Richardson, 2004). This United States' study also revealed that these low expectations often resulted in African American students and ethnic minority groups being over-represented in special needs classes, and often having low self-esteem. Teachers were found to communicate their attitudes through covert means such as assigning immigrant students less challenging tasks, seating them at the back of the class and by not encouraging their participation in class discussions (Harris, Brown, Ford & Richardson, 2004). Like the reservations that teachers have portrayed towards

immigrant students, Albertini (2004) has found that immigrant students are also guilty of prejudice against their teachers. This prejudice takes the form of mistrust towards teachers of different ethnicities to their own.

Watkins and Melde (2010) presented a different picture of teachers' attitudes towards immigrant students in their assertion that teachers tended to show positive bias towards Latino and Asian immigrant students because they viewed these immigrant students to be more respectful and hardworking compared to their American students. The fundamental role of the teacher is to facilitate the learning of all students in the classroom environment through an inclusive programme. Ngo (2010) warns against inclusion as tokenisation of immigrant students' cultures and advocates that critical conversations about the real life experiences with the immigrant students would be more beneficial to their sense of belonging.

Similar to Watkins and Melde's (2010) assertion concerning the respectful nature of immigrant students in the United States, Baker (2008) has also found that Thai students exhibited respectful and non-confrontational behaviours towards their teachers in Thailand. Their respectful mannerisms were attributed to the high esteem in which a teacher is held within the Thai culture. According to Baker (2008, p. 139), the predominantly Buddhist Thai society views teachers as the "givers of knowledge", while students occupy a subordinate position because of their lack of educational and life experiences. Therefore within a culture that encourages detachment and the acceptance of the status quo, questioning the teacher would be inappropriate and seen as a student's ingratitude and disrespect towards the teacher (Baker, 2008). The attitudes that students possess towards their teachers in their home countries seem to be transferred when they move to new countries as immigrant students (Watkins & Melde, 2010). This idea was echoed by Kaufman (2004), who found that Chinese immigrant students in New York schools displayed positive attitudes towards their teachers, they were less judgemental, and any criticism seemed to have been directed at their own expectations of their teachers to encourage them to work hard to succeed.

The interactions of students with their peers and teachers in their respective countries also seemed to be framed by their cultural construct (Liem, Martin, Nair, Bernado & Prasetya, 2009). This international comparative study of secondary school students in Australia, Singapore, the Philippines, and Indonesia revealed some differences in the interactions between the students and their teachers. The first difference was that the Australian students' interactions with their teachers and with their peers seemed to be similar, while the students from the three Asian countries showed less interactions with their teachers compared to their peers which reflected the presence of a hierarchical relationship. The second difference was that Australian students seemed to be more comfortable challenging their teachers compared to their Asian counterparts. The third difference was that Asian students exhibited a greater level of conformity and competitiveness compared to Australian students.

This review suggested that student interactions and the relationships that they, not just immigrant students, form with their teachers are culturally constructed. Asian students' attitudes towards the teacher tended to be influenced by a hierarchical, social constraint.

### ***Peer relationships***

Classroom interactions with peers are important in the development of self-perception, academic achievement, and engagement in the transition of immigrant students especially with regard to how they position themselves in a new environment (Teaver, 2005). Croom (1997) emphasised that peer-group learning encourages students' exploration of mathematical concepts and promotes academic self-concept, motivation and achievement in minority students.

Thomas (1997) talks about how sharing different cultural beliefs and values through songs may not only add a rich flavour to the mathematics classroom, but also serve to bring about understanding among the diverse participants of the classroom. The shared cultural approach parallels social interdependence theory that is believed, not only to enhance student achievement, but also to be the key to a successful mathematics



classroom of diversity (Croom, 1997; Johnson, Johnson & Roseth, 2010). According to this theory, positive social interdependence refers to the successful learning outcomes of individuals that are affected by their own and the group's actions, and the successful learning outcomes of the group that are affected by the actions of individuals (Johnson & Johnson, 2009). This two-way learning model may allow local students and teachers to learn about the culture of the immigrant student, and in turn, the immigrant students may be able to experience the culture of the local group (Thomas, 1997). This relationship, according to Teaver (2005) has the potential to provide group membership, which is essential for immigrant students' survival in the classroom (Bishop, 2002). Boaler (2008) also found that mixed-ability groups resulted in positive relationships, interactions and respect for diversity and discouraged the formation of homogeneous cliques. Other studies have posited a counter argument for peer interactions, where peer-group interactions have placed immigrant students in a compromising position by being exposed to racism, intimidation, isolation and a general sense of powerlessness (Endo, 2010; Kirova, 2001; Kirova-Petrova, 2000; Tanners, 1997). This negative influence has been acknowledged in the study by Campbell and Rowan (1997), who claimed that peer group activities have the potential to amplify differences in students, if they are permanent in nature and based on ability levels.

Kirova and Emme (2006) studied some of the difficulties that immigrant students faced in trying to establish themselves in peer groups. Vithal (2003, p. 310) also found that despite working on common projects, students exerted “unequal positions and relations of power” in peer group situations. Peer group influence is not only confined to the classroom, it manifests in the playground as well where new comers often have problems understanding the non-verbal interactions. Non-verbal interactions are culturally specific and sometimes inaccessible and confusing to immigrant students especially where local students are unwelcoming (Kirova & Emme, 2006). The lack of tolerance may sometimes lead to peer-group rejection where immigrant students develop feelings of social isolation and loneliness, and believe that they are inferior to other students. As a result immigrant students are seen to be at risk of believing that they are socially deficit and helpless in their environment (Flores, 1997; Kirova, 2001). Such

feelings of isolation and helplessness often drive immigrant students to seek refuge with students who share a similar background to their own (Yearwood, Brown & Karlik, 2002).

The nature of interactions within peer groups appears to be culturally constructed. According to Esmonde (2009), cooperation may have different connotations for diverse students in the classroom. While some students may perceive peer group work to imply that the students work together without explicitly giving one another the answer, other students may be of the notion that peer-group work means that the group works together towards getting a collective answer (Esmonde, 2009; Fuligni, 1997). Such differences in ideas of what constitutes group work may lead to misunderstandings and conflicting expectations among members that have the potential to further ostracise some members. Misunderstandings also arise from certain exhibited behaviours. The mismatch between the behaviour of immigrant students compared to their local counterparts may potentially be grounds for misunderstanding (de Abreu, 2002). This was evident in the behaviours of Asian immigrant students in schools in the United States that were sometimes misunderstood by the local students (Brown, 2004). The study found that Asian immigrant students often reacted to awkward situations with laughter. This laughter had also been observed when they avoided confrontations with their peers, because, according to the author, Asian students come from a background that nurtures harmony and collectivism.

Another example of immigrant students exhibiting a different behaviour was mentioned in a Canadian study by Emme, Kirova, Kamau and Kasonovich (2006) who wrote about their own experiences in a new country. One of the authors professed to have been baffled at why her son had got into trouble for showing affection towards other students on the playground by hugging and kissing them. This practice presented a cultural conflict because it had different connotations for the two groups that saw it being unacceptable in one. Such displays of different behaviours to the norm are expected to create barriers in immigrant students forming relationships with their peers (Brown, 2004; Emme, Kirova, Kamau & Kasonovich, 2006).

Peer interactions have an important role to play in language acquisition for immigrant students. Interactions with local peers expose immigrant students to the domestic language, which not only assists their linguistic development, but also encourages them to think in the second language (Christianakis, 2010). The influence of peer-group conversations on thought processes have important repercussions for immigrant students' expressions of their mathematical ideas (Esmonde, 2009). This idea of assisted learning is rooted in Vygotsky's (1978) theory of the Zone of Proximal Development (ZPD), where students develop through interactions with others. Through collaboration and conversations within the ZPD students negotiate their own positions and form relationships (Christianakis, 2010; Esmonde, 2009).

Immigrant students may be at risk of being influenced negatively by their peers in their new environments (Johnson, Johnson & Roseth, 2010). Studies have found that during the transitional period immigrant students may be at risk of lowering their own academic aspirations, and engage in negative behaviours such as truancy, in order to conform to peer pressure and perhaps, feel a sense of belonging to the group (Kaufman, 2004; Suarez-Orozco, 1995; Tanners, 1997). These negative effects have also been observed in some Cambodian and Vietnamese immigrant youth in the United States that have resorted to delinquency and substance abuse through deviant peer associations (Lim, Stormshak & Falkenstein, 2011).

The literature has affirmed the importance of students forming relationships in the classroom environment. While some of relationships may have both, positive and negative effects on their transitional experiences in their new environments, Boaler (2008) asserts that heterogeneous groupings have the potential to promote relational equity in mathematics classroom. These relational equities refer to the development of respect and relations through such groupings.

### ***The learning environment***

Immigrant students face a multitude of adjustment problems in their new environments. However, according to Shim and Schwartz (2007), these problems diminish as immigrant students become familiar with their new environment. McCollum and Yoder (2011) found that the school climate was complex and framed by the students' perceptions of the academic and social milieu in which they found themselves. Their findings reinforced the idea that immigrant students' understandings of the classroom environment influence their transitional experiences. Other studies of immigrant and ethnic minority students have commented on non-inclusiveness as a barrier to their transition into their new school environment (Casteel and Rider, 1994; Dowling, 1998; Ladson-Billings, 1995; Nkhoma, 2002; Ohia, 1993; Shan & Bailey, 1991; Zevenbergen, 2003).

A Chinese cultural model of learning reported by Li (2004) indicated that Chinese students' beliefs centred on a set of purposes that focused on perfecting one's self morally, acquiring knowledge and skills for oneself, contributing to society, and obtaining social respect. This was in contrast to the Western ideology of learning that focused on the mind, its processes, understanding of the world, and personal excellence (Li, 2004). According to the study, Chinese students also believed that in order for them to attain these attributes they needed to develop learning virtues. These learning virtues took the form of commitment, love and passion for learning, respect for one's teacher, and humility for one's self. Not only was failure associated with shame and guilt, but it was also seen as motivation for perfection (Li, 2004).

The acceptance or non-acceptance that immigrant students show towards their new learning environment determined their level of integration (Shim & Schwartz, 2007). According to Berry (2003) and Shim and Schwartz (2007) the degree of mergence between their past and present experiences affects whether the immigrant students' integration takes the form of assimilation, acculturation or bicultural integration. Hastings, Clelland and Danielson (1982) asserted that assimilation occurred when immigrant students chose to replace their past experiences with their new experiences to

identify with their new culture. Acculturation, on the other hand, referred to students accepting aspects of their past and present experiences to enhance their existence in their new cultural environment (Berry, 2003; Moyerman & Forman, 1992; Wong-Rieger & Quintana, 1987). While for some students merging their past and their present cultures seemed to be unnatural and they found their own existence between two different cultures, that Shim and Schwartz (2007) referred to as bicultural integration.

Immigrant students may come with different ideas about mathematics textbooks that are used extensively in mathematics classrooms in both Western and Eastern countries (Cao, Seah, & Bishop, 2006; Macintyre & Hamilton, 2010; Park & Leung, 2006; Shan & Bailey, 1991). However, the use of textbooks and the content messages transmitted from them may vary. In a comparative study of mathematics textbooks in East Asian countries such as Japan, China and Korea, and Western countries such as the United States and England, Park and Leung (2006) found a range of differences. Mathematics textbooks in East Asian countries were chosen by their respective Ministries of Education and directly aligned to their respective national curriculums. In contrast, Western countries offered schools a choice of textbooks and these schools were at liberty to choose the order in which the curriculum was to be taught. Another difference was that all East Asian students were expected to study a uniform curriculum in their country with no consideration for the variations in students' abilities, while Western countries catered to the needs of students at different ability levels and, therefore, textbooks were written accordingly. Additionally, the East Asian textbooks lacked colour and were reflective of prescriptive knowledge that students were expected to learn, while the colourfully illustrated Western textbooks seemed to be a source of reference where teachers and learners chose learning tasks that suited them (Park & Leung, 2006).

The status that textbooks once occupied has diminished over the years but they still form an integral part of the mathematics learning experience at school (Cao, Seah, & Bishop, 2006; Haggarty & Pepin, 2002). Dowling (1998) pointed to a lack of extensive analysis of mathematical textbooks. However, the limited research of mathematics textbooks has raised questions about the invisibility of non-white people in these textbooks. Shan and

Bailey (1991, p. 45) viewed this lack of representation of “black” people in the late 1980s as being the sinister “hidden curriculum” in Great Britain and concluded that texts of this nature portrayed a mono-cultural society that was middle-class, white, Christian, monolingual, and male dominated. Within this society, other minority cultural groups were completely disregarded, thus ignoring 84% of the world’s population living outside Western Europe and North America. Such European attitudes of supremacy were also evident in the New Zealand study by Ohia (1993). He found that the mathematics classroom represented an extension of the “Pākehā” (or English) way of life because the language, examples chosen, equipment used, and the values and mores promoted were targeted towards the dominant Pākehā traditions. The underachievement of Māori in New Zealand led the Ministry of Education to embark on extensive national initiatives to raise the standards of these students’ achievement (Ministry of Education, 2001). Lack of inclusion and the non-familiarity with the curriculum have been identified as features that inhibit mathematics education of immigrant students (Casteel & Rider, 1994; Ladson-Billings, 1995; Nkhoma, 2002; Zevenbergen, 2003). As asserted by Baker (2008) when students cannot identify with the textbook they are inclined to view it as a learning experience that belongs to somebody else. While some researchers see the use of ethnic names in texts as tokenism (Macintyre & Hamilton, 2010; Shan & Bailey, 1991), Begg, Bakalevu, Edwards, Koloto and Sharma (1996) see it as a natural first step towards change. Mathematics education in New Zealand that once drew from a predominantly English heritage (Barton, Begg, Butel, & Ellis, 1995) has come a long way towards an inclusive national identity that is aligned to what Shan and Bailey (1991) refer to as equal opportunity for all.

Mathematics teachers in New Zealand have a variety of commercially produced textbooks available to supplement their teaching materials in the classroom. Barton's (2008) *Beta Mathematics* textbook, for example, is popular at secondary schools because it has been closely aligned with the latest new National Mathematics Curriculum, has corresponding write-on workbooks for students to use at home, and encourages the use of interactive technology and websites. Its use of Māori and other ethnic names such as Manzoor, Mustaq, Hemi, Nga and Poa, and culturally neutral icons, such as robot

figures as guides to the various sections of the text, negates bias towards any specific demographic group. While the textbook included photographs of people who appear to be of predominantly European ancestry, it was primarily set within the context of New Zealand's geographical, social and political environment. The use of New Zealand specific data, like "Crater Lake in Mount Ruapehu", average rainfall in different parts of New Zealand (Barton, 2008, p. 425), ethnic group tables, nationality of passengers arriving at Auckland International Airport, and newspaper articles about current affairs may have a positive effect creating a sense of loyalty and pride for New Zealanders, and a sense of interest and curiosity for immigrant students. In contrast to Shan and Bailey's (1991) findings that mathematics textbooks in the United Kingdom were biased towards the dominant group, within the New Zealand context, *Beta Mathematics* exemplified a more inclusive learning resource. Irrespective of attempts at capturing student diversity in the textbooks, immigrant students may experience non-inclusiveness in other spheres of the classroom and the playground through lack of connection with the curriculum, classroom practices and, classroom participants (Casteel & Rider, 1994; Dowling, 1998; Ladson-Billings, 1995; Nkhoma, 2002; Ohia, 1993; Shan & Bailey, 1991; Zevenbergen, 2003).

For some immigrant students who have come from strict classroom environments characterised by large class sizes, silent students, and the practice of corporal punishment, adjusting to their new environments that encourage discussion and collaborative learning may be problematic (Brown, 2009). Their perceptions of their new environment are based on their past classroom experiences, and Tanner's (1997) study of immigrant students in their New York classrooms, found that immigrant students' perception of local students was that they lacked in discipline because teachers did not punish them.

Brown (2009, p. 4) defined corporal punishment as the "intentional infliction of physical pain" to modify misconduct, and provided a perspective of its practice in South Korean schools. According to this study, corporal punishment was considered appropriate and not an unusual practice by parents, teachers and the students themselves. South Korean

educators in the study affirmed that it embraces Confucian values and is also currently practised because of its association with higher educational standards and expectations. Teachers in South Korea were held in high esteem and given the utmost respect and the authority to inflict corporal punishment on students that misbehaved, thus resulting in student behaviour not being problematic (Brown, 2009). Krajewski (2006) also confirmed the practice of corporal punishment on Chinese students from both their teachers and their parents. It was not only confined to modifying misbehaviour, but was also used as a punitive measure for poor grades and to encourage rote learning, which involved students' recollections of mathematics facts that have been committed to memory (Krajewski, 2006). Studies have found that it was common for Asian students, irrespective of their age, to receive physical punishment from their teachers and parents if academic achievement had not aligned with their parents and teachers expectations (Kaufman, 2004; Krajewski, 2006).

Chianu (2000) provided a picture of the extent of the use of corporal punishment in Nigeria. Although teachers are not specifically granted the right to inflict corporal punishment on students, it has become a taken-for-granted practice that has resulted in deaths of students and grievous bodily harm. However, in spite of the abuse inflicted upon their children and their right to withhold the teachers' authority to inflict punishment on their children, parents lack of knowledge of their rights have seen them accept corporal punishment as part of their children's educational process and have legally granted teachers *in loco parentis* status (Chianu, 2000). *In loco parentis* status implies that teachers, on behalf of the parents, have the right to inflict corporal punishment on the students to modify behaviour.

While the literature has shown that immigrant students are faced with the daunting task of adjustment from their home classroom culture to their new classroom culture in a new country, Davidson and Kramer (1997) argue that an inclusive environment would help smooth the transitional experience. According to these authors change is necessary in the curriculum, the instruction and the classroom culture.



### ***Immigrant parents and mathematics education***

The perceptions and expectations of parents play an important role in the mathematics achievement of immigrant students and influence the perceptions that the students have of their own mathematical ability (de Abreu, Cline & Shamsi, 2002). The perceptions that parents hold of mathematics learning may be different to those held by the teacher and this results in confusion for the immigrant student who may be trying to assimilate or acculturate into a new culture (Civil, Planas & Quintos, 2005). The level and standard of work may differ remarkably from the country the immigrant students come from and their new place of residence. The dilemma that the immigrant students face is whether to accept the new levels, sometimes perceived to be lower, or to continue challenging themselves. The decisions they make may result in conflicts at home between the parents, who expect their children to work to their full potential, and immigrant students who are willing to accept a lower level of work ethic in order to conform (Bishop, 2002). Anything that positioned the immigrant student apart from his/her peers was considered negative, including higher academic achievement (Bishop, 2002).

The difference between home mathematics, where parents may have experienced a different school culture and system, and school mathematics, was seen as a contributing factor to the mathematics achievement of immigrant students in England (de Abreu, Cline & Shamsi, 2002). This comparative study of English and Pakistani students in England revealed the students' perceptions of home and school mathematics. With regards to mathematics knowledge, the students were varied in their views about the help received at home. While for some students it had been the same as school, others perceived it to be different to what they learnt at school. The study found that most of the students, who saw home as different to school mathematics preferred the school, while the high achievers placed equal preference on home and school mathematics learning. Another perception that the students held was that they found it easier to learn at school and there was an overwhelming preference for school as the best place for learning (de Abreu, Cline & Shamsi, 2002).

Parents' participation and involvement in their children's mathematics education showed strong cultural differences in the Pakistan-English study. The English parents saw their role as being very minimal with the mother usually assisting the child. The Pakistani parents emphasised the importance of learning arithmetic and encouraged siblings to assist (de Abreu, Cline, Shamsi, 2002). Another difference that students sometimes experience is the dissimilar mathematics content that they are exposed to in their classrooms tasks and homework tasks. This reflected the perception of local Australian students towards the lack of continuation in their classroom tasks and their homework tasks in an international study of Australian, and South-East Asian students (Liem, Martin, Nair, Bernado & Prasetya, 2009).

Family background has also been found to be a contributing factor for Ethiopian immigrant students dropping out of schools in Israel (Rosenblum, Goldblatt & Moin, 2008). The parents of Ethiopian immigrant students had been unable to help their children because of their own inability to communicate with their children's teachers and fully understand the educational system that their children had been exposed to. In spite of their inability to communicate in the dominant language, the values that the Ethiopian parents instilled in their children were very different to those of the local students. Ethiopian culture promoted non-verbal, non-confrontational communication that had also been associated with respect for adults by not making eye contact, being silent and by speaking in low volume (Rosenblum, Goldblatt & Moin, 2008). While, in North Carolina, Latino parents' involvement in their children's education was found to be high, it was also noted that structural barriers may be in opposition to their desire to be involved in their children's schooling (Valencia & Johnson, 2006).

Differences in cultural values and its impact on student achievement have also been documented in Li's (2009) Canadian study of immigrant students that reported high achievement of Chinese students being attributed to their home background. Chinese students' home background was characterized by close parental supervision of their children's work and high parental expectations within Confucian values. However, the study also found that because of the high parental expectations and the fear of letting

their parents down, Chinese immigrant students often do not speak to their parents about the adjustment problems that they face in school (Li, 2009). Similar assertions of immigrant students in France were made by Boado (2008) who came to the conclusion that immigrant students' high achievement at school was attributed to their families motivation, positive outlook to life and their ambitious educational expectations compared to their local-born counterparts. According to Areepatamannil and Freeman (2008) the ambitious educational expectations that parents have for their children may be attributed to their perception that education plays a pivotal role in establishing their own being and improving their existence in a new country.

Filipino parents nurture values of cooperation, mutual support, family loyalty and interdependence in their children therefore education is regarded as a family assignment and not an individual task (Salazar, Schludermann & Schludermann, 2000). The study also identified and examined how the three parenting styles affected their children's academic outcomes. The first type was the authoritative parenting style, which was characterised by high expectations and responsiveness, the second was the authoritarian parenting style, characterised by high expectations and low responsiveness, and the third was identified as the permissive parenting style that was characterised by low expectations and low responsiveness. Salazar, Schludermann and Schludermann (2000) found that authoritative parenting style was strongly associated with family obligation and positive academic achievement.

Immigrant students often seem to be caught in a space between two cultures as a result of mixed messages from their parents (Suarez-Orozco & Suarez-Orozco, 2001). On one hand, parents encourage their children to embrace their new educational culture, while at the same time expecting them to maintain their own cultural values and identity, which may be in conflict with their new cultural environment (Civil, Planas & Quintos, 2005). The study has also found that in spite of the cultural conflict that may exist, immigrant students' perceptions of their parents' expectations frame their own aspirations and opportunities at school.

### *Achievements and aspirations of immigrant students*

Studies have shown that students' academic self-concepts, achievement outcomes and aspirations in particular areas of learning are shaped by the students' past and present experiences with the subject (McCollum & Yoder, 2011; Meaney, 2002; Park & Lee, 2010; Walker & McCoy, 1997). High student expectations have been linked to positive academic outcomes while low student expectations have been linked to negative academic outcomes (Kirova, 2001). Areepatamannil and Freeman (2008) have also found that positive academic outcomes have been associated with positive academic self-concept and low academic outcomes have been associated with negative self-esteem.

There is however some evidence to the contrary, in their analysis of the PISA study, Seah, Atweh, Clarkson and Ellerton's (2008) found that student beliefs as determined by their mathematics self-efficacy and self-concept was not always an indicator of their mathematics performance. Consistent with the findings of other studies (Areepatamannil & Freeman, 2008; Kirova, 2001), Australian students in this study showed a positive correlation between both their mathematics self-efficacy and self-concept, and their mathematical literacy performance. This association, however, was not universally observed, as demonstrated by the below-average self-efficacy means, in countries with mathematics performance scores both, higher than Australia, such as Finland, the Netherlands, and Korea, and lower than Australia, such as Brazil and Thailand. Such findings demonstrate that the association between student beliefs and their academic performance is not always explicit.

While Areepatamannil and Freeman (2008) asserted that academic achievement plays an important role in determining the future success of immigrant students, Tanners (1997) believed that in the process of assimilation or acculturation in their new environment immigrant students are at risk of losing their academic motivation. In her study of immigrant students in New York, Tanners (1997) asserted that immigrant students tend to lose their desire to excel and that, in turn, compromises their academic aspirations and achievements. Shim and Schwartz (2007) also asserted that the lowered motivation to

excel might be attributed to immigrant students experiencing psychological conflict in trying to accommodate the values of their new environment while firmly holding on to their innate values. However, Valencia and Johnson (2006) asserted that high acculturation was associated with high academic aspirations in immigrant students in the United States. The study measured acculturation as the combination of the students' language preference and the number of years that they had resided in the United States.

Other studies have found that immigrant students exhibit a greater desire to excel than local students (Areepatamannil & Freeman, 2008; Kaufman, 2004; Kirova, 2001; Ng, Lee & Pak, 2007; Salazar, Schludermann, Schludermann & Huynh, 2000). This assertion was also made by Boado (2008) who compared the academic achievement of immigrant students to their native-born counterparts in France. Boado (2008) concluded that immigrant families and their children have more ambitious educational expectations than their French-born counterparts.

Another important factor associated with immigrant students' achievement is their own internal attributes or intrinsic motivation (Areepatamannil & Freeman (2008); Kaufman, 2004; Kirova, 2001; Salazar, Schludermann, Schludermann & Huynh, 2000). While some studies may argue that these internal attributes stem from family expectations, Kirova (2001), Li (2006), and Salazar, Schludermann, Schludermann and Huynh (2000) acknowledge this to be a possibility but also offered credit to the immigrant students' own effort, commitment and time spent studying towards achieving their desired outcomes. Areepatamannil and Freeman (2008) also acknowledged that despite the adjustment challenges faced by the immigrant students, they seem to have succeeded academically in Canadian schools and presented higher levels of academic self-concept in mathematics than their non-immigrant counterparts. These sentiments were also expressed by immigrant students in a large New York school, who believed that irrespective of students' ability, they are able to improve academically through hard work and effort (Kaufman, 2004). The students in this study attributed their success and failure to their own effort and commitment. The study also claimed that immigrant students of Asian origin seem to be overrepresented in high-achieving and advanced

classes. However, contrary to Kaufman's (2004) study, other studies have asserted that immigrant students are overrepresented in special education programmes that have been designed for students with disabilities (Harris, Brown, Ford & Richardson, 2004; Lee, 2001; Luciak, 2008). Placing students into differentiated educational programmes have been associated with schools' having low academic expectations of the students and offering mediocre courses to minority students (Lee, 2001).

Two studies asserted that immigrant students from Asian educational systems often exhibit assessment-driven motivation in the mathematics classrooms because of their background in examination-orientated curricula (Zheng, 2006; Wu & Zhang, 2006). In spite of immigrant students rating themselves highly, their academic self-concept may sometimes be affected by their lack of language proficiency (Kaufman, 2004). The study also concluded that immigrant students' perceptions of their academic ability may be influenced by their social and cultural environment.

### ***Multiple worldviews of learning mathematics***

Language, culture, and environmental factors influence the multiple worldviews that different students have of mathematics learning (Bishop, 1988; Croom, 1997). In the case of immigrant students, they are at risk of being confronted with conflicted worldviews in an environment that encourages them to be passive listeners who are often disconnected to the learning process (Croom, 1997).

Hirabayashi (2006) provided a Japanese perspective of mathematics that was believed to have its origins in the Confucian Heritage Culture. Ironically, in spite of Japanese students' high achievement in international mathematics test scores, Hirabayashi (2006) has asserted that they have a dislike for the subject and often prefer not to pursue further mathematics studies. The Japanese teachers of mathematics seem to teach students fundamental mathematics concepts with an emphasis on attitudes and learning habits, however, this approach is often in conflict with the parents' expectations of an assessment focused education. Therefore, in order to ensure their children's success in assessments, they enrol them for private tuition after school that is based on traditional

mathematics education principles that focus on the development of the mind. Additionally, Ueno (2006) asserted that Japanese students learn mathematics because it offered them entrance to higher education, thus accentuating an assessment driven curriculum. As concluded by Wu and Zhang (2006) students in countries such as China, Japan, Korea, Singapore, and Vietnam experience an examination driven curriculum.

According to Li (2006) practising for perfection is a key belief in China and East Asian countries where routine or repetition is an important learning style. It is also believed, in Chinese culture, that study should not be taken lightly because it is achieved only through an arduous struggle. This learning style is different from Western approaches that emphasise the importance of understanding and creativity. Siu (2004) brought to the fore the two paradoxical issues concerning mathematics education within the Confucian heritage culture (CHC) in China. The first was that students of CHC were perceived to use rote-based strategies in a classroom environment that is seen as not conducive to high mathematics achievement, yet the students of CHC achieved better results than their Western counterparts (Zheng, 2006). The second paradox was that teachers of CHC produced a positive learning outcome from, what the Western educators' perceived to be, sub-standard conditions. Huang and Leung (2004) investigated these paradoxes further at schools in Shanghai and Hong Kong and argued that conformity should be looked at positively because it is rule abiding and a prerequisite for innovations. The findings provided an alternative view to the negative images associated with strict mathematics learning environments in which Chinese students are exposed. Teachers in both cities stressed the importance of exploration. This description of education in China is further endorsed by the work of Krajewski (2006) who stated that mathematics education in China was in a process of transition from the overcrowded classrooms, rote-learning, corporal punishment and lecture type lessons towards a more inquiry based learning environment with contextually relevant lessons.

Mathematics education in the post-apartheid South Africa was reported by Vithal (2003), who asserted that the national mathematics curriculum had endured three curriculum reforms. The first change happened in 1995 when the old curriculum was

challenged, initiating the inclusion of a political, social, critical and cultural perspective. The 1997 revised mathematics curriculum positioned an outcomes-based education (OBE) at its centre. The term 'outcomes-based education' was first coined by Spady (1994) who asserted that such a curriculum was based on a student-centred learning philosophy, which attempted to develop life-long learners through meaningful interactions in the classroom. The third and current curriculum statement according to Vithal (2003) appeared to humanise mathematics by placing it in a cultural, social, political and economic context. This new national curriculum, according to Clark, Shimizu, Ulep, Gallos, Sethole, Adler and Vithal (2006), reflects relevance, is inclusive and is directed at bringing down the divides of racism. However, in her reflections on freedom and structure in the mathematics classroom in South Africa, Vithal (2003) came to the conclusion that most mathematics lessons seem to follow a common structure, with the teacher teaching the rules or concepts with examples and students implementing these rules when completing similar examples. Vithal (2003, p. 306) referred to this traditional format as the “didactical contract” between the teacher and the student, where the teacher is expected to teach mathematics and the student is expected to learn mathematics.

Boaler and Green (2000) presented a picture of mathematics learning at schools in the United States from their own observations and the perceptions of 48 students in their classroom environments. According to the students’ perceptions, mathematics was viewed differently at the various schools. Some perceived it to be very structured, unimaginative and lacked creativity, like the mathematics classroom situation in South Africa described by Vithal (2003). The study also found that the mathematics lesson in these classrooms followed a similar routine, where the teacher presented procedures that students were expected to learn (Boaler & Green, 2000) and then implement independently when solving problems from the textbook. Students in such environments perceived mathematics to have only one right answer, to be non-interactive and comprise a collection of conceptual procedures. For these students, success in mathematics meant receiving knowledge from the teacher, compliance and obedience. However, in the schools that encouraged peer learning and discussions, contrasting



perceptions emerged about mathematics learning. These perceptions were that it was enjoyable, interactive, social, and offered an opportunity to think (Boaler & Green, 2000).

Education, specifically mathematics education, has been afforded a prestigious status and is often viewed as a means of social advancement for immigrant students and their families that attempt to negotiate their place in their new environment (Boado, 2008; Hirabayashi, 2003; Marks, 2005; Meaney, 2002). However, as pointed out by Davidson and Kramer (1997) this social advancement is often hindered because of the students' lack of access to learning in a mono-cultural environment. These authors warn against the use of a "tourist" curriculum that includes aspects of different cultures occasionally and not as part of the essential learning material (Davidson & Kramer, 1997, p. 132). The different perspectives of mathematics learning, while not exhaustive, are testimony to the multiple worldviews that immigrant students bring into their classroom learning environments.

This literature review has highlighted some of the theories and ideas from an array of studies that have offered different points for consideration with regard to the educational world of immigrant students. While the experiences of immigrant students in various countries may be different, the literature has shown that what remains the same for immigrant students is the reality of them experiencing a new classroom environment, a new teacher, a new group of peers and new relationships. However, past experiences must not be forgotten, because education is fundamentally preoccupied with extracting values from the past in the hope of preparing students for the future (D'Ambrosio, 1999). The need for an inclusive multicultural learning experience that develops from what all learners, both immigrants and non-immigrants, bring into the mathematics classroom should not be underestimated.

### **Chapter 3: Methodology**

This study represented a departure from the belief that mathematics is a discipline of absolutism and factual knowledge that transcends all cultural, language and political spheres and is positioned on the belief that mathematics knowledge is relative to the knower, in this study, ten immigrant students. The underlying philosophy is premised in the ideology that mathematics education is not value neutral, that students' understanding of mathematics is influenced by the context in which this learning occurs. This alludes to an epistemology of constructivism which displaces the idea of a value-free mathematics in favour of a hermeneutic, pluralist and relativist view of the nature of mathematics education (Burton, 1995; Guba & Lincoln, 1994). The use of a qualitative paradigm allowed me to capture these multiple realities (Cresswell, 1995).

The research is a hermeneutic phenomenological study. The inquiry is phenomenological because it aimed to understand the experiences of immigrant students, as phenomena. Phenomenological human science research endeavours to understand the structure of the human lifeworld as it is lived in everyday situations and relations (Van Manen, 1997). It is hermeneutic because it attempted to present understandings of these experiences through interpretation, which are complex and different for each individual (Van Manen, 1990).

The approach has helped me gain an understanding of the immigrant students' lived experiences in their mathematics classrooms. While the perceived experiences of each student in this study emerged from my own interpretations and interactions with them, I acknowledge that there are multiple ways of interpreting these experiences to gain meanings and construct realities (Bogdan & Bilken, 1992; Van Manen, 2005). Therefore the study design took shape from the following five qualitative paradigm assumptions: my assumptions of reality; my assumptions of relationships; my assumptions of values; my assumptions of the use of language; and my assumptions of what constitutes an appropriate methodology for the study (Cresswell, 1994; Guba & Lincoln, 1994).

Reality in this study has been reliant on the voices of ten immigrant students and evolved from multiple perspectives that they had offered about their perceived experiences in the mathematics classroom. In order to portray the realities of the immigrant students, this study has captured the students' voices through extensive use of their own words verbatim from the interviews (Cresswell, 1994). The interpretations of these realities attempted to provide meanings embedded in the interviews (Neuman, 2000) and, as the researcher, I was mindful that interpretations are not autonomous acts but rather they evolve from past experiences and interactions (Bogdan & Biklen, 1992).

Ontologically, this study has presented multiple subjective views of reality from the various perspectives of ten immigrant students, from my own interpretations as the researcher, and from the different interpretations that the audience take from this work (Cresswell, 1995; Van Manen, 2005).

The relationship between the researcher and the immigrant students in this study was important to gain an understanding of the participants' lived experiences in the classroom. It was necessary to observe the immigrant students in their classroom environments (Bogdan & Biklen, 1992; Herda, 1999) and interview the participants to add meaningful depth to their interpretations. The distance between the researcher and the participants had been minimised (Cresswell, 1994) through direct personal contact (Neuman, 2000). The students and I had developed a positive rapport which was characterised by the numerous observations and the rich conversations. Through this relationship I was able to gain an understanding of the different worldviews that the students had brought to the classroom.

The close relationship between the researcher and the participants had implications for the role of values and biases in this study. The value-laden nature of the information that emerged from the voices of the ten students was inevitable and imperative in gathering the stories in order to gain a perspective on the immigrant students lived experiences (Cresswell, 1994). As the researcher, I acknowledge the prevalence of value-laden data and biases in this study, firstly because the voice of the immigrant students played a

pivotal role and secondly, because my own interpretations would inevitably have been influenced by my own values and biases (Van Manen, 1990).

The use of informal language in this study was fundamental to enable students to speak freely about their lived experiences. This study encouraged ten immigrant students to express themselves in their own words through conversations that took shape as each interview progressed (Cresswell, 1994). The study was also premised on the assumption that every word uttered by the immigrant students had the potential to add to the understanding of their transitional experiences (Bogdan & Biklen, 1992). According to Guba and Lincoln (1994) qualitative research does not attempt to provide scientific explanations or comparisons that are characteristic of quantitative studies, but rather it attempts to understand, interpret and gain meaning from its ambiguous language-saturated information (Cresswell, 1994). This study, therefore, sits well within the qualitative paradigm because of its extensive use of informal language that drew from the personal voice of the students in order to gain an understanding of their perceived experiences in their mathematics classrooms.

The methodological assumptions for this study emerged from my assumptions of reality, the relationship between the researcher and the researched, the role of values and biases, and the use of language. Inductive logic was prevalent in the study where the researcher interpreted the information and formulated context-bound categories that emerged from the experiences presented by the ten students to understand the transitional phenomenon (Bogdan & Biklen, 1992; Cresswell, 1994). The study employed the use of interviews through conversations to elicit information and to verify what had been observed in the classroom environment, consistent with qualitative data collection research methods (Cresswell, 1994; Guba & Lincoln, 1994; Neuman, 2000).

Phenomenology is also closely linked to symbolic interactionism. The key assumptions of symbolic interactionism are that: people transmit and receive symbolic communication when they socially interact; they create and act on perceptions of each other and social settings; and the perceptions they form of themselves and others are

based on these interactions (Neuman, 2000). According to Krathwohl (2009, p. 242) people “act according to the meaning they attribute to things and persons; their reality is socially constructed ... it is necessary to see the world through their eyes.” This is especially relevant in the case of immigrant students who are constantly interacting within their new environment, school culture, with their peers and teachers, and inadvertently creating new perceptions of reality. The variety of values and interpretations that the immigrant students bring to the classroom are not seen as problems to be treated (Gorgorio, Planas & Vililla, 2002) but instead, as valuable educational contributions in embracing diversity.

The interpretivist nature of the study allowed me to interpret the students' perceived individual understandings, reasoning processes and social norms as a primary source of data (Mason, 2002). The study gained its momentum and depth from the selfless contributions of the ten immigrant students. Adopting an ontological hermeneutic approach was imperative for understanding the experiences of the immigrant students. Each experience was explored individually because each individual had brought a unique set of experiences to the study (Van Manen, 1997).

Max Weber, a German sociologist, and Wilhem Dilthey, a German philosopher were founders of the interpretive social science approach that advocated the need for understanding. The notions of hermeneutics and understanding are associated with the work of Fredrich Schleiermacher who explained the importance of linguistic dimensions of human understanding, Wilhem von Humboldt whose contribution to hermeneutics was the role of sociability, and to Johann Gustav Drysen who bridged the gap between the subject and the object and laid the epistemological foundation for Dilthey's contribution of human sciences (Herda, 1999). To Dilthey, understanding is both existential (what we do) and methodological (how we explain what we do). Dilthey propounded the theory that understanding a person's inner state involves an interpretation of the individual's entire context of life and is “conditioned by its milieu” (Dilthey, 2010, p. 439). Understanding is “always a manifestation of an expressed meaning of life, a life-expression derived from a lived experience” (Herda, 1999, p. 51).

Researchers attempt to provide explanations of lived experiences through observations of participants in their natural environment. According to Merleau-Ponty, the lived experience phenomenon implies “re-learning to look at the world by re-awakening the basic experience of the world” (2003, p. viii).

This study is not premised in the epistemological hermeneutic view of myself as all knowing and objective, and the text as a passive object (Herda, 1999), but rather the study is premised on the ontological hermeneutic view, that one can only interpret what is being experienced through one's own understanding of the situation. I attempted to understand how meanings were constructed by interpreting the observed classroom interactions and conversations. This approach encapsulates the idea that meaning attached to a shifting condition is based on a person's definition of a situation (Neuman, 2000) and that a person's “past and his prejudices are necessary conditions of all understanding” (Herda, 1999, p. 62). This was particularly relevant in the mathematics classroom where immigrant students were constantly confronted with situations that affected, not only a shift in their interpretation of an event, but also their transitional experience. While positivists may be of the opinion that all human beings have a singular meaning system and experience of the world, this research rests in the interpretive approach that assumes peoples' realities of the world are pluralistic and multi-faceted.

The observational research component of this study provided a glimpse into the classroom interactions of the ten immigrant students, while the interviews provided data for interpretation about how the students constructed meaning in their secondary school mathematics classrooms. The observations were conducted within a variety of relations including friendships, socialising, and the four types: “competition, exploitation, domination and cultural selection” that influence interactions between student and student, and student and teacher (Cotton & Hardy, 2004, p. 90).

An existential temporal focus provided a frame within which the nature and essence of the immigrant students' experiences in their mathematics classrooms were interpreted and understood. This existential temporal framework which drew from Van Manen's

(1990) lifeworld existential and Ricoeur's (1990) three-fold temporal mimesis, is represented in the three spiral threads of transition model (see Figure 3(i), page 51).

According to Van Manen (1990) the four lifeworld existentials that transcend human existence, despite the individual's cultural or social differences, that provided a reflective structure for this research process were the lived space, the lived body, the lived time and the lived human relation. The lived space or spatiality refers to the psychological or mental state of being in an environment, and in this study it had reference to the perceptions that each student had about their experiences in their mathematics classroom environment. The lived body or the corporeality refers to the physical being in the world in response to the “gaze” of others (Van Manen, 1990, p. 104). In this study it has reference to the perceptions that the students had about their own being or academic self-concept in the social milieu of the classroom. The lived time or temporality refers to the being within the past, present and future dimensions of time, and has reference to the immigrant students in this study having compared their past and present lived experience and were in pursuit of negotiating their space in the mathematics classroom. The fourth existential was the lived other or the relationality which referred to the interpersonal space that people share, in this study that space has reference to the relationships that the immigrant students formed with their teachers and peers (Van Manen, 1990).

The association between time and conversation has been captured in the work of Ricoeur (1990) who explained the relationship as a three-fold mimesis, within three domains: past, present and future (Herda, 1999). Mimesis<sub>1</sub> refers to the world one enters with cultural values and norms already formed. In this study it had reference to the ten immigrant students' diverse backgrounds that they brought into their mathematics classrooms. Mimesis<sub>2</sub> refers to how one makes sense of the present world – in this study it has reference to the interactions and relationships of the ten immigrant students in their classrooms. Mimesis<sub>3</sub> refers to one finding a place in this new world (Herda, 1999), and the reference made to this study was the development of the immigrant students academic self-concept and their efforts in negotiating their place in their mathematics classrooms.

The study aimed to understand the experiences of immigrant students in their Auckland secondary school mathematics classrooms from their perceptions. The school chosen for this study was a decile 7, co-educational, multi-ethnic secondary school (Education Review Office, 2010, p. 10). The Ministry of Education determines the decile ranking of schools in New Zealand which is based on a sample of households of the students enrolled at the school. The ranking is calculated against the household income, occupation, crowding, educational qualification and income support as a means to determine the schools' socio-economic status for the purposes of funding (Ministry of Education, 2011). According to the Education Review Office report (2010, p. 10) ethnic composition of the students comprised: New Zealand European (32%); Maori (15%); Filipino (14%); Korean (5%); African (5%); Samoan (4%); Chinese (2%); Indian (2%); Middle Eastern (2%); Thailand (2%); other Asian (9%); and other European (8%). The first rationale for choosing this school was based on its co-educational and multi-ethnic composition, and the potential of this study to enhance my understanding of students' perspectives at my school which was anticipated to have a direct bearing on my own professional development. The second reason for the choice of this school was convenience of researching my own school with regards to time and organisational factors. I was able to meet my employment obligations while researching an area that I was passionate about (Mercer, 2007). The potential ethical matters arising from this insider study has been addressed in the methods section.

For the purpose of this study immigrant students were identified as those students who had resided in New Zealand for up to two years. The sample comprised ten students from a range of linguistic backgrounds and nationalities. The countries that they had come from were South Africa, the Philippines, China, Saudi Arabia, Nigeria, Fiji, India and Thailand. A profile of the participants is presented in Table 3a below. All ten participants claimed that English was not their first language. Nine of the participants communicated in English during the interviews, while one required an interpreter.



**Table 3a: Profile of the ten participants**

<b>Participant (Pseudonym)</b>	<b>Gender</b>	<b>Country of Birth</b>	<b>Duration of stay in NZ</b>	<b>First language</b>	<b>School Year</b>
Andrew	Male	China	15 months	Chinese	9
Terry	Male	China	2 months	Chinese	9
Jess	Female	Philippines	11 months	Filipino	9
Abdulla	Male	Saudi Arabia	7 months	Arabic	9
Ian	Male	Nigeria	24 months	Igbo	9
Karishma	Female	Fiji	8 months	Hindi	10
Tim	Male	India	12 months	Hindi/Punjabi	10
Annie	Female	Philippines	18 months	Filipino	10
Babeloo	Female	South Africa	12 months	Afrikaans	10
Van	Male	Thailand	12 months	Thai	10

The underlying question of this research was, "How do the perceived past and present lived experiences of immigrant students influence their transition in the mathematics classrooms?" In an attempt to understand these experiences, this research focused on the similarities and differences the immigrant students drew with regards to learning mathematics in New Zealand compared to their home countries, their perceptions of their experiences in the New Zealand mathematics classroom with regards to forming relationships, and finally the development of their academic self-concept in negotiating their respective places in New Zealand mathematics classrooms. The three-spiral-threads-of-transition model (see Figure 3(i)) was developed to represent the assumptions and the structure of the study. The first focus of the study was to gain an understanding of the students' past experiences in the mathematics classroom through their comparisons of their lived experiences in their past and present environments. The second focus was to understand how they integrate these experiences in their new environments, and finally to understand how the two threads helped them conceptualise the third, the self, in finding their place in a new environment. As suggested by the model these existential temporal experiences were viewed as being inseparable and intertwined because the past, the present and the future, together influence lived experiences (Herda, 1999).

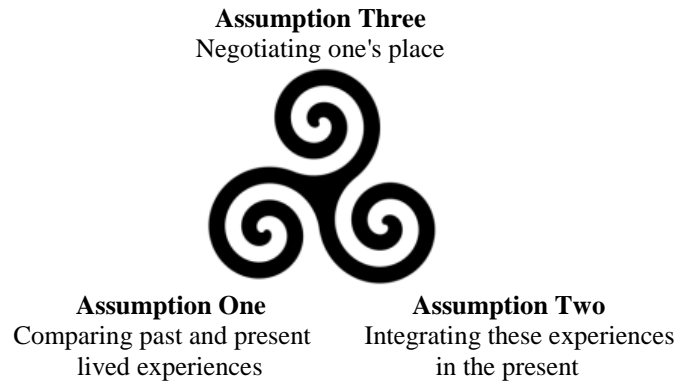


Figure 3(i): The spiral threads of transition

These spiral threads represented the following three questions that steered the path of this study.

- How do perceived similarities and differences between immigrant students' past and present experiences influence their understandings of their mathematics classroom environment?;
- How do immigrant students integrate past experiences into their present mathematics classroom environment with regards to forming relationships with their teachers and peers?;
- How do the past and present experiences of immigrant students affect their perceived academic self-concept in finding their place in the mathematics classroom?

A comparison of the present to the past involved the students drawing parallels between their experiences of mathematics learning in their home country compared to their experiences of mathematics learning in New Zealand. This investigation of the similarities and differences focused on areas of the mathematics curriculum, teaching approaches, expectations of lessons, classroom environments, resources and equipment, student involvement and cooperation, peer group learning, use of textbook, resources, and task sheets, as well as other factors that the students may have commented on. The assumption from which this comparison stemmed was that the differences in the mathematics curriculum and teaching approaches influenced how immigrant students perceived mathematics in their new environments.

The second thread that underpinned this study was that both the past and present experiences of the immigrant students in a mathematics classroom influenced their interactions with the subject, other students, their teachers and their learning. The third thread encapsulated the idea that immigrant students' transition in a mathematics classroom may have been premised on a culmination of their past experiences and present experiences together with their own attitudes and importance they attached to their learning of mathematics. The third question was devised to gain a comprehensive, yet not exhaustive, understanding of the immigrant students' academic self-concept in a new environment. This is consistent with Ricouer's (1990) idea of one's relational existence in a three-fold plane; past, present and future.

The methodological framework of this study provided a foundation upon which the study assumptions emerged. The three assumptions that directed this study were:

- The perceived similarities and differences between their past and present lived experiences influence immigrant students' understandings of their new mathematics classroom environment;
- Their perceptions of their past and present classroom lived experiences contribute to immigrant students' interactions in the classroom and the relationships that they form with their teachers and peers;
- The perceptions of their past and present lived experiences, their perceived academic self-concept, and their aspirations and attitudes towards mathematics play a fundamental role in immigrant students negotiating their own place in the mathematics classroom.

### ***Methods***

Two dominant data collection techniques were employed, the first being observations and the second involving interviews with ten immigrant students. The third data source was the consent form which contained information from the parents about their child's country of origin and their child's arrival date in New Zealand. The fourth data source, involving two of the participants' teachers, was incidental.

Choosing ten students proved to be manageable and appropriate for this qualitative study. While both techniques provided a rich source of data, the interviews as expected, provided deeper understandings of the observations (Fontana & Frey, 2000; Lewis, 2003) and drew on the past experiences of the participants.

Prior to the commencement of the research process the school principal and the Board of Trustees had been aware of the study and supported the idea of the research being conducted at the chosen school. They had provided written confirmation of their approval for the study to take place at the school. Thereafter all year 9 and 10 mathematics teachers were consulted and given written information about the nature of the study. None of the students taught by the researcher had been considered for participation in the study. A request was made for the teachers to provide access to their classrooms during mathematics lessons so that observational data could be obtained.

The guidance counsellor, who completed an intermediary confidentiality agreement, introduced the research to all year 9 and 10 students not taught by the researcher. All of these students received an information pack to give to their parents or guardians. The packs contained the participant information sheet, parent/guardian information sheet, parent consent form, the participant assent form, and a prepaid envelope addressed to the guidance counsellor. Parents had been informed that the study was directed at immigrant students who had resided in New Zealand for a period of six months to two years. They had also been informed that participation in the research was voluntary and that their child would have been neither advantaged nor disadvantaged by participation. Only those who volunteered to participate completed the relevant forms and posted them to the school.

Upon receipt of the consent form, the guidance counsellor selected a purposeful sample of students from a range of countries from the pool of potential participants. The final ten participants were chosen subject to their length of residence in New Zealand and the willingness of teachers in permitting observations to be conducted in their class. The names of the participants, including their assent form and their parents' consent forms, were then given to the researcher by the guidance counsellor. The researcher then

contacted the participants and parents of the students on the participation list to confirm their participation in the study. All the parents and students contacted had responded positively. Finally, prior to the commencement of the initial interviews, all participants were informed verbally about the nature of the research and time had been allocated to answer queries that may have arisen.

Research data collection commenced once the appropriate permission, and completed assent and consent forms had been received by the researcher. The data collection process began with 15 to 30 minute participant interviews (Appendix A), that had focused on the immigrant students drawing comparisons between their past and present experiences in the mathematics classroom. The second phase involved observations of the students in their respective mathematics classrooms, as per observation protocols (Appendix B and Appendix C). The first protocol comprised a spatial map of the participant's position in relation to the rest of the class, and an interaction map of the participants, that had been developed from Neuman's (2000) spatial and social maps. Appendix B illustrates recorded examples of these spatial maps that were compiled. The second protocol (Appendix C) comprised a direct observation sheet developed from Hopkins' (1989) guide to classroom observations. This direct observation sheet focused on classroom talk between the participants and their teachers, the participants and their peers, the participants' engagement with their texts, other students, teacher and their level of independence. It had also made provision for inferences to be drawn and for the researcher to make personal journal entries while observing the participants. Although it was difficult to observe the participants in isolation from the rest of the students in their classes, any recorded notes were made only about the participants and not of any other students.

After the observations, further short 10 minute interviews (Appendix D) were conducted to clarify aspects of the observations, which focused on the mathematics learning experience of the immigrant students in the classroom environments. The interviews were conducted by the researcher and held during school hours at the convenience of the participants and the teachers concerned. The final interview was held towards the end of

the school year. Prior to the commencement of the interviews the participants' concerns or questions about the research were clarified by the researcher. Each interviewee was asked to choose a pseudonym so that his/her identity would not be revealed in the research report.

As the researcher, I kept a journal that was used to record detailed notes of the events and interactions of the participants that occurred during the observations. The notes had been written on the observation sheets as the interactions occurred and were discussed and analysed directly after the observations. With the teachers' permission each participant was taken out of the classroom for follow-up interviews held in a vacant reading room. Retaining the original discourse and language used by these students were important in preserving the students' voices in this study (Krathwohl, 2009). The observers' comments had been marked and coded as such and were written separately from observation notes. As stated by Tolich and Davidson (2003), coding helped identify and aggregate areas of theoretical interest collected during observations and interviews in the form of field notes or transcripts. Further notes were written "as soon after the observation as possible" to prevent events being forgotten (Krathwohl, 2009, p. 272). Evidence of social relationships, emotions, or meanings were analysed after the observations to prevent the loss of observational data that may have occurred if analyses were conducted concurrently. Each participant was observed three to five times in their mathematics classroom. The analysis of the data and the meanings that emerged over time revealed common themes under which the findings are discussed.

Interviews were recorded and transcribed, therefore, in this study the issue of omitting valuable information had not been problematic (Neuman, 2000). The recorded and transcribed data also provided opportunities for further reference and follow up discussions with the participants. The transcription was necessary to gain a full picture because a complete written form of an interview is important in understanding the meanings of its content (Gillham, 2000). The interviewees were asked questions and invited to comment on any aspect that they felt necessary to comment on or elaborate on. The order of the questions changed according to the conversations because each

participant had brought a unique dimension to the research conversation and each interview had taken a different route (Herda, 1999). Indicative rather than rigid questions were used (Yin, 2003) to prompt conversations about the students' perceived experiences.

Although the interview schedules contained indicative questions, they were designed as a guide to elicit information about the students' past and present experiences in the mathematics classroom. The interviews were flexible and involved further probing questions to elicit explanations and to clarify observed data. All questions in the initial interview phase had an open-ended component including those that had a rating scale. The purpose of the rating scales was not for quantitative analysis but to provide a focus for discussion. Such open-ended questions were less likely to influence responses and were helpful in exploring a range of possible responses, and probe for understanding (Krathwohl, 2009).

The interview process is a well established data collection research method (Gillham, 2000; Krathwohl, 2009; Neuman, 2000; Yin, 2003), however, may have been limiting because of issues surrounding expectations of the participants. According to Bechhofer and Paterson (2000) researchers must be aware of the issues that arise from interviewing for a number of reasons. Firstly, an interviewer may have expectations of the participant that he or she brings to the interview and this may lead to habituation where important responses may be overlooked. Secondly the participants may have expectations of the interviewer where external stimuli, such as the interviewer's position as a teacher at the school may affect their response. Thirdly the participant may enter the interview process with preconceived beliefs and expectations of the interviewer and the interviewer's expectation of them (Bechhofer & Paterson, 2000).

While re-reading the data and presenting each students observed data and interview transcripts under the broad headings "Past" (Where they came from), "Present" (Where they are now), and "Future" (Where they are heading to), common experiences began to emerge from my interpretations. These common experiences were then analysed as

themes, and these themes appeared to have the "phenomenological power" to reveal the meanings of the perceived lived classroom experiences (Van Manen, 1990, p. 90). The use of the themes provided the means for me to present my interpretations of what I heard in the students' voices and saw in their classrooms as the findings in chapters 4, 5 and 6. The literature was then drawn upon against which the findings were analysed and discussed in chapters 7, 8, and 9.

As both a researcher and a teacher at the school, I was aware of the potential conflict of interest that could have arisen due to power imbalances between the students and me. It has been well documented that research with children, in this study secondary school students, is affected by the relationships that are formed and maintained between the researcher and the researched (Gollop, 1997; Milner & Carolin, 1997; Thompson, 1990). To minimise, if not completely prevent, such conflicts from occurring several measures had been put in place. The first measure introduced aimed to directly reduce conflict of interest by restricting participation to only students that were not in my classes. The second measure was the use of proxies because I may have been viewed as an authority figure by some students.

The school's guidance counsellor facilitated the recruitment process which reduced the influence I may have exerted on the students when they were contemplating their participation in the study. In addition, as the teacher-in-charge of junior mathematics I had not been involved in any decision concerning students' grades and had delegated this duty to the head of department. Closely related to the second measure, the third measure involved me excusing myself from professional appraisals of any of the teachers in whose class or classes I had observed the participants. I was also cognisant of the potential teacher-teacher conflict of interest that could have arisen because of my role as assistant head of department which required me to appraise some of my colleagues in the mathematics department. This measure minimised conflict of interest and prevented any potential strain on my professional relationships with my colleagues.



Although these measures attempted to ensure that conflicts of interest were minimised due to my prior and future involvement with students and staff at the school, my position as a teacher may have also been advantageous to the study. Since most of the students were familiar with my presence in their mathematics classroom as the teacher-in-charge of junior mathematics at the school, this may have had a positive influence because, as the researcher, I may not have been seen as a stranger. Trust did not have to be built, therefore the presence of the researcher during student observations in the classroom, seemed to have had minimal effect on the natural classroom dynamic. The students saw me as an insider (Mercer, 2007).

The participants were minors, under 16 years of age, and therefore they were only able to provide informed assent. Informed consent had been sought from the parents/guardians of the participants. The parent/guardian information sheet was translated into Korean, Chinese, Japanese and Hindi and had been available if parents/guardians wished to have it in any of those languages. In spite of the translations being available, none of the parents requested a translated version of the information sheet.

The participants had to be known to me because of the nature of this study which involved observations of them in their classroom environments and face-to-face interviews. However, to protect the participants, and maintain confidentiality, any confidential information that may have arisen from the interviews was not used in the research and was deleted from the audio recording. The only data concerning third parties involved the parents providing information about the participants' country of birth and their arrival date to New Zealand, and this information was also available to the school guidance counsellor.

While there were no apparent risks for the participants, I was mindful that participants may have felt apprehensive about answering questions concerning their abilities, or what others may think about their ability in mathematics. In the event of students experiencing any discomfort, embarrassment, or incapacity, all participants and

parents/guardians had been informed of counselling available from, a counsellor at Auckland University of Technology who had agreed to provide counselling services to the participants at school or at the university, if required.

The methodological justification for this study is that the classroom observation phase was an important part of the research because actions take place within the period of a lived experience, and this was important in understanding that action (Biehler, 2005). I was known to the students and had visited the classes on a number of occasions prior to the research therefore the idea of my being an intrusive agent, would have been minimal. The participants' familiarity with me may have resulted in trust where I was obvious, unconcealed and able to take notes as an insider (Krathwohl, 2009; Mercer, 2007). None of the participants in the study had been chosen from my classes because, it was speculated that, their responses may be influenced by what they perceived to be an appropriate response that I would have liked to hear. This was consistent with the concern that preconceived beliefs and expectations of the participants with regards to the interviewer's expectation of them (Bechhofer & Paterson, 2000), may influence their responses.

The overall purpose of the interview was to provide meaning and depth to supplement the observations and provide some informal triangulation of the data. Thus allowing the study to gather information from multiple sources and view the experiences as phenomena through multiple lenses (Yin, 2003; Cresswell, 2003). Lewis (2003) supports the idea that interviews can provide a detailed account of the participants' experiences and claimed that:

A key feature of in-depth interviews is their depth of focus on the individual. They provide an opportunity for detailed investigation of each person's personal perspective, for an in-depth understanding of the personal context within which the research phenomenon is located, and for very detailed subject coverage.

(Lewis, 2003, p. 102)

The advantages of this interpretive social approach was that it provided a framework to delve beneath the surface and unpack some of the preconceived ideas that the immigrant students brought to the classroom, a lens through which students' experiences of

mathematics had been viewed from different cultural perspectives, and highlighted some of the difficulties that they had experienced in their mathematics classrooms. These preconceived ideas and beliefs may be attributed to the different background experiences and culture of the immigrant students (de Abreu, Cline, & Shamsi, 2002; Barton, 1993; Olneck, 2004). This in-depth study of the lived experiences of immigrant students in New Zealand was possible because of the small number of participants. Richie, Lewis and Elam (2003) asserted that qualitative samples are usually small in size. However, because of the limited sample size generalised statements concerning immigrant students have not been made especially since the experiences of the participants were unique to each of them.

Another advantage of the methodology employed was that I attempted to understand, contextualise and humanise the phenomena (Krathwohl, 2009). My research was emergent and inductive rather than deductive, and reflects the phenomenology of the participants' experiences rather than comparing them using standard measures. The design of the study was intended to enable me to understand the participants' classroom experiences through their eyes. I, as the researcher, was the primary instrument in collecting the descriptive data in my attempt at understanding the students' multiple realities (Cresswell, 2003).

In this study my role was to assist the participants' recollection of their experiences and to understand how they made sense of their lived experiences in their mathematics classrooms. Although my interpretation may have been influenced by my personal worldviews and biases, some view the contribution of the researcher as useful and positive rather than detrimental (Cresswell, 2003; Neuman, 2000). In spite of Krathwohl's (2009) argument that the central problem with observations is that the behaviour of the participants tends to change because they are aware of the observer, my contribution and presence in this study could be viewed positively because the students may have identified with me as an immigrant as well and therefore responded more openly.

Overall, the methodological approach of this study offered bi-directional benefits; on the one hand it has given the immigrant students a voice to be heard, and on the other hand, through the perceptions of ten immigrant students I have been able to gain some understanding of the lived experiences of immigrant students in the mathematics classrooms.

The findings of the study are presented in the next three chapters. These chapters focus on the voices of the students with regards to their perceived lived experiences in the mathematics classroom.

## Chapter 4: Voices of the past from the present

The experiences of the participants have been presented as permeable or changeable structures of meaning in order to describe and interpret them (Van Manen, 1990), while still maintaining their uniqueness in their individual stories. A profile of the participants has been presented in the previous chapter in an attempt to preserve their individuality. The experiences of the participants may or may not be typical of all immigrant students in the mathematics classroom in New Zealand and, therefore, this study does not make generalisations of these experiences, though it is possible to draw some generalisations from them as an aspect of possibilities of being an immigrant student.

Drawing from Van Manen's (1997, p. 101) "lifeworld existentials" and Ricouer's (1990, p. 70) "three modes of temporality" a framework was developed in an attempt to capture the lived experiences of the immigrant students in their mathematics classrooms. Van Manen's (1997) four lifeworld existentials – *lived time, lived body, lived other and lived space* – which transcend all human beings, provided the fundamental existential structure within which these experiences were explored. Ricouer's (1990) association between time and experience in the three-fold plane within the *past, present and future* domains provided the fundamental temporal structure for this study. Together the existential temporal focus of this study was necessary to understand the nature or essence of the learning experience in mathematics classroom from the immigrant students' perspectives in a new country.

Using this framework, meanings were explicated from the everyday lived experiences of the immigrant students, as temporal existential planes in order to better understand influences from the worldviews that they brought to the classroom. The findings of this study have been presented in the next three chapters, each representing a temporal existential plane. I refer to the first plane as *voices of the past from the present* because it is the reflection of a lived time and the recollection of the students' past experiences in the present, and this is the focus of this chapter. I have named the second plane *voices inside the present*, because it examined the present experiences of immigrant students in their classroom. These experiences focused on the immigrant students' interactions and

lived body reactions to the gaze of others, and are discussed in chapter five. The final plane is what I termed *voices towards the future* that depicts how these students use their past and present experiences to find their own life space or place in the New Zealand classroom, and this is the focus of chapter six.

As mentioned before this chapter is titled, '*voices of the past from the present*' because it had taken shape by drawing from the students what they had to say about their lived experiences in their home countries compared to their present lived experiences in their New Zealand mathematics classrooms. The following dominant themes became apparent from the voices of the ten participants and formed the structure for this chapter: importance of mathematics; the teacher's role; peer study; mathematics content; typical classroom/school routines; use of calculators; and textbooks.

This chapter aims to explicitly articulate the classroom culture through the voices of the immigrant students by listening to the stories they had to tell whilst comparing their perceptions of their present New Zealand classroom experiences with that of their country of origin. The experiences that the participants volunteered were in response to general questions posed during the interview about what they found to be similar and what they found to be different when comparing the mathematics classroom in New Zealand with that of the country they had come from. While participants felt that certain present practices and expectations were similar to those of their past, there were dissimilarities in other aspects that presented challenges and a sense of alienation for them.

### ***Importance of mathematics***

The comparison that the participants made with regards to the importance of mathematics in their home countries and in New Zealand highlights their experiences with the subject and provides an understanding of their worldviews. In order to establish the importance that the participants had attached to mathematics in their home country and in New Zealand, they were asked to rate the importance of studying mathematics on a scale from 1 to 5, with 1 being not important and 5 being very important (Appendix

A). The participants were required to elaborate on their rating by providing a reason for their chosen rating. The other themes had emerged from the indicative questions during the initial and subsequent interviews and conversations (Appendix A & D).

While all ten participants believed that mathematics is very important in New Zealand, eight of the ten participants believed that it was also important in the country they had come from. The reasons the participants attached to its importance were varied. Karishma voiced its relevance to our daily lives in the following words:

*In both [Fiji and New Zealand] maths is a compulsory subject because we use maths in our everyday life*

Van also echoed the importance of mathematics in our daily life as the foundation for other subjects:

*[Mathematics is] important in Thailand and New Zealand because it's basis to other subjects and for basic living like economy and marketing.*

The most popular reason advanced for the importance of mathematics was future-focused job success. Annie aptly captured this in the following comment:

*Mathematics can be good for the future if you want to have a good job when you grow up.*

Ian defined a good job that required mathematical skills in New Zealand in the following words:

*a good job ... engineer or doctor.*

This was further echoed by Babeloo, who not only expressed surprise at being asked to rate the importance of mathematics because she felt that everybody ought to have shared her own views and knowledge about the importance of mathematics, but she also emphasised that:

*Maths is very important, it is an important subject because you have to have it after school and stuff so I think there [in South Africa] and in New Zealand, it is quite important.*

The participants offered examples of specific job related mathematical skills that they believed to be important to show the importance of mathematics. Both Babeloo and Tim spoke about the mathematical skills required to work at the supermarket. Babeloo was

confident that it was essential for workers to have numeracy skills to work at a supermarket as is evident in her words:

*because when you work at Pak' n Save [supermarket] you have to know your numbers and stuff.*

Tim's sentiments reiterated the mathematical skill required by employees concerning the exchange and handling of money at a supermarket in the following statement:

*if you work in Countdown [supermarket] you need to know about money, how to collect the money.*

Babeloo also provided an insight into the skills she would need to achieve her own ambition in the following words:

*I want to become a park ranger, I'll have to know distances and that type of stuff which you learn in maths, which means maths is a really, really important subject.*

Ian and Tim expressed their views that mathematics was not as important in Nigeria and India, respectively, as they perceived it to be in New Zealand. This non-importance was attributed to jobs that did not require mathematics. As Tim pointed out:

*There are less jobs [in India] ... like any jobs that need maths.*

Andrew, on the other hand, felt that while mathematics occupied a very important status for the students in China, some students in New Zealand held a different view. This was evident in the following comment:

*My friend ... like the Kiwi [New Zealand European], Māori, Samoan, Fijian they think maybe they think maths is not important because they don't like maths.*

According to Andrew good mathematics performance was associated with good schools in China. He was of the view that:

*if you are good at Maths you can go to a good school.*

Jess seemed to share this belief in the New Zealand context as suggested in the following comment:

*it is important [in New Zealand] because it gets me ready for the ... future schools that I will go to.*



While the participants expressed the importance of mathematics with regards to their employment opportunities in New Zealand, it seemed to be either equally important or not to have held such a prominent position in the countries they had come from.

### ***The Teacher's Role***

The interactions that the participants had with their teachers and the descriptions they provided about their teachers indicated what they perceived the role of the teacher to be. Their descriptions of the teachers from the country they had come from included: being a supervisor, hesitant to help, and too busy to help. In contrast, the descriptions given for the New Zealand teachers included being helpful and fun.

While some participants viewed the supervisory role of the teacher positively, other participants expressed resentment because help was not always forthcoming. Karishma's past experiences in her Fijian classroom and present experience in a New Zealand classroom indicated her perceived role of the teacher as being helpful. However, a difference in the roles became apparent upon closer examination of her comparative description of her mathematics teachers in Fiji and in New Zealand. When reflecting on her mathematics teacher in Fiji Karishma said:

*He [the mathematics teacher in Fiji] would be supervising us and if we don't know what's like, if we don't know a certain thing ... we ask the teacher.*

When asked about her mathematics teacher in New Zealand, she said:

*The teachers here are very helpful in each and every lesson they'll tell us again and again so that we can get it in our head and that's easy to remember too.*

This helpful role of the teacher seemed to be more evident in the New Zealand classroom. However, for Van from Thailand, it appeared to represent the loss of the student's independent thinking. When asked what he enjoyed about mathematics in Thailand Van responded:

*Teacher because the teacher helps us with thinking.*

The following words from Andrew about his mathematics teacher in China reflected his perception of a teacher as the facilitator of independent thinking:

*Teachers want you to use your brain. Maybe that's the rule*

Van and Andrew did not seem to be opposed to the idea of asking the teacher for help. When asked what they would do if they experienced problems in their current classrooms, both had given the following identical responses:

*ask my teacher [for help].*

For Babeloo, a student requiring a lot of assistance understanding mathematics, approaching her mathematics teacher in South Africa had been unpleasant and stressful. Her recollection of her experience with her mathematics teacher was that:

*I wasn't really good [in South Africa] and kept asking questions and stuff and she got quite mad at me about that. She'd [the teacher] usually ask me 'Weren't you concentrating?' and stuff like that, if you put you[r] hand up she would think like you were just talking and stuff.*

In contrast to her experiences in her South African mathematics classroom, Babeloo talked about the constant help that she received from her New Zealand mathematics teacher who was also responsible for her thinking of mathematics as being her best subject. This was evident in her comment:

*Yes, I do ask questions, I put my hand up and the teacher will come and explain it over and over and over, it doesn't matter how many times, until I get it, he will keep on explaining it. Math's is a fun class [in New Zealand] because Mr ---- [the teacher] is a fun teacher. Yeah it is better than the other subjects that I have.*

Terry also supported the notion of mathematics being fun in New Zealand and offered his understanding of why this had not been the case in China. Terry's recollection of the teachers in China not being very helpful was evident in his comments:

*... because there is too many people there ... Maybe in China maths is not so interesting because teacher just tell you how to do it and too many work ... and here is more interesting than China.*

His sympathy and understanding of the teachers' busy workload were further exemplified in the following statement suggesting his unsuccessful attempt at seeking help from his teacher in China:

*When in class I listen to teachers ... if teacher has some work I can go home and ask my mum for help.*

The idea of the teacher being the fountain of knowledge that dispels all ignorance seemed to manifest in the words of Ian whose response to what he would do if he experienced problems in his Nigerian classroom was that he would have:

*listen[ed] to the teacher and ... know what to do.*

When Annie compared her experience with her mathematics teacher in the Philippines with the teacher in New Zealand, she was confronted with dissimilar experiences. Her recollection of the mathematics teacher in the Philippines was that:

*[In the Philippines] they [the teachers] let us solve problems with not much explanation*

Although Annie experienced problems in her mathematics classroom when she first arrived, her problems seemed to have diminished with her teacher's intervention.

*It was confusing at first but when he [the New Zealand mathematics teacher] explained it, it became easy...*

Her New Zealand experience seemed to have enabled Annie to develop enjoyment and confidence in mathematics with the help of her teacher. This was evident in her comment:

*I enjoy maths in New Zealand because maths in New Zealand is easier and I can understand more because they [the teachers] give us more methods and more possibilities.*

The comparison drawn between their experiences with their New Zealand mathematics teachers and their teachers from their home countries was indicative of attitudes, relationships and expectations that the participants had towards their past and present mathematics teachers.

### ***Peer study***

Working in a group or with a partner may be taken for granted as normal practice in New Zealand classrooms, and while the concept of group work may be familiar to many immigrant students, to some of the participants in this study, it was evidently foreign and required getting used to.

For Karishma group work was normal practice in Fiji and she viewed it positively as a strategy for students that required assistance with their learning. She enthusiastically described the role of peer interactions in Fiji in the following statement:

*Over there we had groups of people working together, in groups of six, each and everyone got in groups of six, and so if you don't understand anything you can ask the group leader or you can discuss it with the students... and they'll help you out. Like you got to interact and they tell you each and every thing. Peer studies are there [in Fiji].*

Working with a peer seemed to have provided a sense of comfort and pleasure for Terry who said that:

*In China we can do maths together with a friend or with a classmate ... we can do maths together so you feel very like happy.*

Like Karishma and Terry, Van too felt a sense of comfort in working with his peers if he needed help in Thailand. This was suggested in his words:

*... they [my friends] help me to work. [In Thailand] I work with someone who sits near me.*

For some of the participants working in groups or with a partner was a rare experience in their home country. This was evident in Jess' comparison of the mathematics classroom in the Philippines and New Zealand when she pointed out:

*... here [in New Zealand] we usually do [activities] in groups but we rarely do it in the Philippines.*

Annie too reiterated the concept of individual study in the Philippines and welcomed the idea of studying in groups or in pairs. As suggested in her comment:

*... we didn't study in pairs we studied alone [in the Philippines]. I like mathematics in New Zealand because we study ... sometimes they let us study in pairs.*

According to Abdulla's recollection of the mathematics classroom in Saudi Arabia, discussion with peers was not allowed. Abdulla's description of the classroom placed the teacher at the centre in the following words:

*The teacher would explain and ask the class to get on with the work. Students worked individually. Not in groups. Not allowed to discuss their learning with other students.*

Babeloo attributed the lack of group work in South African mathematics classrooms to the physical straight-line arrangement of the single desks. She viewed the layout of the New Zealand mathematics classroom to be more appealing compared to the South African classroom, and suggested that the New Zealand classroom environment was more conducive to group work and promoted peer learning, as follows:

*[In South Africa] We usually didn't work in groups, we worked in ones and stuff. The classrooms, it had only one desk, one student at a desk and we were in rows. [In New Zealand] we work in groups and we can put our hand up if we don't understand something, we sit next to each other so we can always ask the person next to us.*

Peer learning or group learning was a welcome practice that all the participants seem to enjoy whether they have had prior exposure to it or not. Those participants that came from classroom environments where peer learning was not permitted seemed to look at their home country environments with a degree of negativity.

### ***Mathematics content***

Upon reflection on the mathematics learning content, some participants experienced difficulty in their new environment while others seemed to have adjusted comfortably and found New Zealand mathematics to be easier to learn. For Karishma adjusting to her learning environment was problematic because of the timing of her arrival in relation to the topics studied or not studied in Fiji. This was evident in her comments:

*I didn't find it easy to settle in because I came in the middle of the term and the stuff they were learning, I didn't know. I didn't know most of the stuff ... it was the last lesson of the topic. So the next day we started a new topic.*

The topic that was studied by her class when Karishma arrived in New Zealand was trigonometry, a topic that is done for the first time in year 10. The repercussion of her missing out on the topic was evident in her end of year assessment. For Jess, however, who had not studied algebra in the Philippines, studying the topic in New Zealand seemed to have been an enjoyable experience because of its novelty.

*We have ... in the Philippines I haven't studied algebra yet ... I enjoy doing algebra [in New Zealand] because it ... I think I found it easy.*

Babeloo also experienced difficulty adjusting to her new environment and attributed it to the change in the medium of instruction. In South Africa she studied mathematics through the medium of Afrikaans and experienced difficulty understanding mathematics concepts in New Zealand.

*Well at the beginning maths wasn't ... I didn't understand it that well but after a while, after about a month or something I think I was doing quite well in it.*

While most of the participants found mathematics work in New Zealand to be easier than the work they were accustomed to in the countries they had come from, this was not the case for Ian and Abdulla. Ian recalled the following:

*the maths we did in Nigeria is different than this one here [in New Zealand]. New Zealand is harder than Nigeria one [maths]... I'm listening but I don't know how to do it because I haven't done it before ... like Nigeria one [maths] is easier than New Zealand one.*

Ian displayed frustration at his inability to understand the concepts in spite of making every effort to do so. Similarly Abdulla was trying to grasp the mathematics concepts which, according to him, were much more difficult than those he remembered studying in Saudi Arabia.

*I haven't realised what I like about maths yet, it is so different. It is very basic in Saudi Arabia, only pluses and minuses and triangles and angles, that's all we do while here it's more complicated. We had not done things like algebra.*

Not only did Abdulla find mathematics different in New Zealand, but also his learning difficulties seemed to be compounded by his lack of the mathematical skills necessary to solve the problems.

*Did not learn this stuff before. Never took it before. I know what is written but I do not know how to calculate it.*

In contrast to Ian and Abdulla's experiences, the other participants were of the view that mathematics in New Zealand was easier than mathematics in their respective countries and offered a variety of reasons for this difference.

For Annie the transition into the mathematics work environment from the Philippines to New Zealand was not problematic because:

*...what we did in the first few weeks was what we had done in the Philippines.*

Annie believed that studying mathematics in the Philippines was more difficult than the work in New Zealand and she offered this explanation for the level of work being more difficult in the Philippines:

*[In the Philippines] They give us more work and sometimes they let us solve problems with not much explanation ... they [the teachers] teach us maths but kind of harder because they want us to learn more and more. They [also] give us weekly tests on what we're learning.*

She seemed to enjoy learning mathematics in the New Zealand classroom environment not only because it was easier, but also because she had a better understanding of what she had learnt. Annie suggested in the following statement, that her enjoyment of the subject was as a result of her teachers' approach:

*I enjoy maths in New Zealand because maths in New Zealand is easier and I can understand more because they give us more methods and more possibilities.*

Andrew also found mathematics easier in New Zealand compared to studying mathematics in China as indicated by his words:

*In China the maths is hard and when I came here the math is ... like quite easy. No it's not same. It's quite hard [in China], I think.*

He also indicated that he was given more homework to complete in China than in New Zealand each day, and that often he could not complete the work:

*Homework ... in China the homework is quite hard because there's quite a lot of homework each day so ... I can't do ... no I don't want to do ... in China I'm quite lazy ... because when I come to New Zealand homework it not too much ... it is quite easy to do. In China is lot of homework each day.*

Based on his assertion that Chinese mathematics was more difficult than New Zealand mathematics, Andrew believed that Chinese students had more advanced mathematical

skills than New Zealand students. In his attempt to provide evidence of his believed, he compared himself to his friend in China in the following words:

*My friend is ... is same age as me ... in high school in China. I think ... my friend's maths is better than me [mine] because Chinese maths is harder than New Zealand maths, I think.*

For Tim, not only did he find mathematics easier to understand in New Zealand, but he also found the new learning to be more enjoyable and pointed out:

*India has lots of homework but New Zealand has not lot of homework ... easier to learn Maths in New Zealand. I did not do probability in India so I like it here.*

Van also found mathematics easy in New Zealand. He attributed this to the deeper level of mathematics learning and higher expectations in Thailand.

*Maths in New Zealand is easier because year 10 maths in New Zealand is difficult like year 8 or 9 maths in Thai. Algebra is the same [in NZ and Thailand] but in Thai we study deeper than here. In Thai we got lots of homework ... maths homework. Sometimes 10 pages [to complete each evening from] ... six o' clock to almost 10pm in maybe 3 or 4 days, or day to day.*

In spite of the initial difficulty that Babeloo experienced in her New Zealand classroom, she began to enjoy the subject when she found the work to be easier than the mathematics she had experienced in South Africa.

*In South Africa I didn't enjoy maths. Maths is just ... it wasn't as fun as it is here. Here it's more, the classroom, the students everything is way more fun. The work is not as difficult.*

Like some of the participants Terry found that learning mathematics was easy in New Zealand. He attributed the difficulty in his home country to the numerous examinations and assessments that students were subjected to in China. As was evident in the following comment, Terry preferred to learn mathematics in New Zealand:

*In China we have many exam, maybe one day 2 or 3 ... it's too hard too many but in here it's not too many exam ... and I think it's better than in China.*



Andrew too, echoed similar sentiments about greater workload and the number of tests in China, compared to what students are exposed to in New Zealand, in the following comment:

*... in China they got many exercise, many tests...and just like...they go like half month each test and in New Zealand one chapter each test and it's quite...it's not really similar.*

The mathematics learning difficulties experienced by some participants were attributed to the level of mathematics, the timing of topics being taught resulting in gaps in the participants' learning, and a different language of instruction. For other participants the positive experience of learning mathematics in New Zealand was attributed to easier content, fewer assessments and a fun learning environment.

### ***Typical classroom/school routines***

The participants offered some interesting taken-for-granted classroom or school routines and practices that they were accustomed to prior to their learning experience in the New Zealand classroom.

While talking to Karishma it became apparent that, to her, the New Zealand grades were too non-specific compared to the marks or percentage system that she experienced in Fiji. The allocation of marks gave students a comparative position that they occupied in class.

*In Fiji we did not have grades we had positions ... so yeah ... if you had the highest mark, you'll come first. If you get the second highest you'll come second ... third and so on ... like if there are 40 students you shouldn't fail, you should be above twentieth position and like the 40<sup>th</sup> person has the last position. The lowest score is the last and the highest is the first*

Although Karishma enjoyed knowing her position in class in relation to the other students, she despised the manner in which the positions were made public. She believed that other students like herself were pressured into working harder and felt a sense of humiliation when she did not perform well. This was evident in her words:

*... because the teacher will call out all their scores and say you first, you second, and third and so on.*

Andrew, on the other hand, attributed students' hard work and better performance in China to certain practices. According to Andrew, misbehaviour by students in China was not common but when students lost concentration, they would put their head on the desk or leave the classroom. In the following comments Andrew asserted that such actions made students learn better:

*My friends in China they will ... stand up and go outside because they ... like just sleeping on the table ... like not concentrating. In China they stand up and go outside and ... I think ... they all do pretty good.*

Corporal punishment was practised in Nigeria and according to Ian, disciplinary actions were administered differently to what he had experienced in New Zealand. Ian remembered getting into trouble and being caned in the office for his late arrival to school or for not doing his homework tasks, as the following comments suggested:

*[In Nigeria] if we not do our homework we get in big trouble. ...stick... whacking sticks ... if I came late to school ... have to whacking with sticks.*

Van too talked about students being caned in Thailand for misbehaviour. Although Van had never been caned he recalled students breaking down in tears after being caned in class in the presence of other students.

*[Bad students were] Punish ... punish [by] caning ... done at the desk while other students are watching. It hurts sometimes students cry.*

Different classroom environments can sometimes be challenging for immigrant students. For Karishma moving from class to class in New Zealand was a little confusing at the beginning because, according to her, in Fiji:

*... the teachers used to come to us. The students used to stay in one room and the teachers used to move around.*

Abdulla, on the other hand, quickly adjusted to the concept of co-educational schools in New Zealand because, according to him:

*In Saudi Arabia there were single-sex schools and here there are mixed sex schools. So it is different.*

However, he eagerly pointed out that he was enjoying the idea of having boys and girls learning together in the same class.

Andrew believed that the biggest adjustment that he had to make when he arrived in New Zealand was the shorter school day. He recalled a typical school day in China where he would:

*... start school at 7.30 and finish school at 5 o' clock ... sometimes ... that's 5pm ... sometimes at 4 o'clock ... sometimes at 3 o'clock. There you go to school at 7.30 then at 12.30 you go lunch and you can sleep if you want and then you go to school at 2.30. Then after you go to school you can study like reading or some lesson then after school you can play or do homework.*

A comparison of the classroom environment also revealed that some of the participants had come from classrooms with large numbers of students. As pointed out by Annie:

*we had a lot of students [in the Philippines] ... more than in New Zealand.*

For Ian who was in a small foundation class of between 16 and 20 students in New Zealand, the experience of being in a class of 30 students in Nigeria was a very different experience.

*It's bigger than this classroom here ... had more people ... like 30 something [in Nigeria]. I think there's 20 or 16 [in New Zealand].*

Babeloo experienced a slightly larger number of students in smaller classrooms in South Africa compared to her class in New Zealand.

*There are smaller classes, because in South Africa there were about 35 in each class and here it is about 20, 25.*

Similarly Karishma recalled having approximately forty students in her class in Fiji.

*we had about 40 students in each class*

Abdulla also recalled large class sizes in Saudi Arabia and smaller classrooms.

*In Saudi Arabia there are about 40 or 41 students in smaller classrooms than this.*

While Van recalled class sizes of between 40 and 50 students in Thailand, Andrew was confident that there were 56 students in his class in China compared to approximately 20 students in his New Zealand mathematics class.

*In my class in China 56 people and it's quite a big class and here [in New Zealand] there's like 20 ... no more than 20. It is quite small.*

While comparing the classroom routines and practices that the participants experienced in their home countries with the New Zealand classroom situation, many of the participants seemed to covertly express criticism. These criticisms were the non-verbal expressions that students displayed while talking about their negative experiences such as corporal punishment, public announcement of test marks and large class size. All the participants welcomed the small class size in New Zealand.

### *Use of Calculators*

The participants indicated varying attitudes towards the use of calculators that may be attributed to their past experiences. For some participants, using the calculator was a natural experience in the mathematics classroom because as pointed out by Karishma:

*we were allowed to use the calculator in class [in Fiji] the way we are allowed to use it here [in New Zealand].*

Although Abdulla had been taught how to use the calculator in his Saudi Arabian classroom he preferred not to. He maintained this view in New Zealand where he said that he:

*does not use it a lot. I prefer to use my head.*

According to Abdulla another factor that inhibited his use of the calculator in the New Zealand mathematics classroom was that he had:

*not started working by myself yet ... I am always copying from my friend who is sitting next to me. So I haven't experienced using the calculators or solving problems yet.*

Although Van was allowed to use the calculator in his mathematics classroom in Thailand, his use of the calculator in the New Zealand classroom was dependent on his state of mind. Van used the calculator towards the end of the school day when he felt tired because:

*it's easier than to think.*

For other students, attitudes towards the use of the calculator may be associated with its non-use practices in the country that they have come from. Although Tim was not allowed to use the calculator in his mathematics classroom in India and believed that:

*we learn more ... if not use calculator,*

he often used it in the New Zealand mathematics classroom.

Jess endorsed the non-use of calculators in the mathematics classroom. This objection was evident in her words:

*In the Philippines we don't ... we don't use the calculators to solve problems. You just use scratch paper to solve the problems.*

When asked whether she felt that not using the calculator was better for students, Jess asserted that not using the calculator would challenge students to think more:

*to learn the problems ... to solve it using [their] heads not with the help of calculators.*

This apprehensive view was also evident in Terry's attitude towards the use of a calculator in the mathematics classroom. According to Terry, his mathematics teacher in China did not want him to use a calculator and Terry believed that there were more benefits in not using the calculator than in using it because:

*you will be very fast.*

He also asserted that students would develop strategies to solve problems:

*by writing it if sometimes you don't have calculator.*

Like Terry, Andrew had not been allowed to use the calculator in China to complete his mathematics class work or homework. He was, however, allowed to use a calculator to complete certain tests. Andrew expressed very strong views about the use of the calculator in solving problems and had formulated a belief about Chinese students. He stated:

*I think they [are] smarter than New Zealand students because they [are] not using calculator too much.*

The participants' preference to use the calculator or not to use it in New Zealand seemed to be based on their past practices. Their attitudes towards the use of the calculator ranged from it being accepted as a natural tool in the mathematics classroom, a welcome change that made mathematics learning easier, to the calculator having a limiting effect on their ability to think.

### ***Textbooks***

Although English was the second language for the participants from the Philippines, India, Nigeria and Fiji, they did not experience difficulty working from the New Zealand mathematics textbook because the mathematics textbooks in their home countries were also written in English. Jess spoke of the mathematics textbooks in the Philippines as being much thicker.

*The books that all like ... big like lot of problems in ... thick books.*

For Tim the mathematics textbooks in India were not only thicker, but they also appeared to have included more work.

*The India textbook is big like all sorts of work in there. It is written in English*

Ian too had studied mathematics through the medium of Igbo, a Nigerian language, but his textbooks were written in English. Therefore he believed that his thinking was based on the language in which he learnt the mathematical concepts.

*If I learnt it [the work] in Nigeria I think in Nigeria, if I learnt it in New Zealand then I think about it in English.*

According to Van students in Thailand had a choice between an English programme and a Thai programme of study at the same school. Students that chose the English programme used mathematics textbooks from Singapore.

*In [the] English programme we use Singapore textbook it's in English but if it is not English programme then we use Thai.*

Babeloo had been at an Afrikaans-medium school in South Africa and therefore she had only been exposed to mathematics textbooks written in Afrikaans.

*The textbook is in Afrikaans. You don't get any English textbooks there [at an Afrikaans medium school].*

Although Abdulla had very limited English language skills, he was familiar with the Hindu-Arabic numbers. He recalled the textbooks in Saudi Arabia being written in Arabic but the numbers being written in the Hindu-Arabic form. He also provided information about a political change in Saudi Arabia since 2007 when schools replaced the Arabic numbers with the Hindu-Arabic numbers.

*Textbooks were written in Arabic, the explanations were in Arabic but the numbers were in English [Hindu-Arabic] ... all the textbooks have numbers written in the English way. From 2007 to 2010 they [schools in Saudi Arabia] used to write the numbers the way it is written in English. Before 2007 the schools used to use the Arabic numbers.*

Both Andrew and Terry mentioned that the mathematics textbooks that they had used in China were written in Chinese. Andrew also stated that the students used two textbooks per year. He continued studying Chinese mathematics with the help of his friend who mailed the textbooks to him.

*[textbooks are written] in Chinese. Maybe two textbooks each year. It's 2010 ... now it's October. In China when you use book half year then change one ... so my friend post two for one year. Then my friend will post me two in 2011.*

In spite of Terry's limited English language skills he did not foresee a problem understanding the mathematics textbook in New Zealand because of his electronic Chinese-English dictionary.

*I have a dictionary about Chinese and English. I can just use the dictionary [to understand the textbook].*

He also found his New Zealand mathematics textbook to be interesting and easy to follow because of the illustrations that were not found in the Chinese textbooks.

*I think the book [NZ textbook] is interesting it has many picture and many like draw pictures... in China is just about number and Chinese.*

In their comparisons of the mathematics textbooks used in their home countries to that New Zealand, the participants spoke mainly about the thickness of the books and the language in which the books were written. Although many of the participants seemed to enjoy working from their New Zealand mathematics textbook, their perceptions may be categorised into two groups. The first group comprised the perceptions of those participants that used mathematics textbooks written in English in their home countries, but whose medium of instruction was their mother tongue, and not English. The second group included the perceptions of those participants whose mathematics textbooks and medium of instruction was in their mother tongue, and not English.

The findings presented in this chapter provided comprehensive comparisons made by the immigrant students about their perceptions of their past, home country environment, and present New Zealand mathematics classroom environment. My own interpretations evolved from these comparisons about the students' understandings of their mathematics learning environment.

The discussions in chapter 7 that focuses on the cross-cultural classroom environment, language and communication barriers, and how the students cope with content, embed these understandings of the learning environment within a vast body of literature.



## **Chapter 5: Voices inside the present**

As alluded to in chapter four this chapter is based on the second temporal existential plane and is focused on the lived experiences of the ten immigrant students in their current New Zealand mathematics classroom environments. It is the second of the three findings chapters. The themes had taken form from the numerous observations of the participants in their classroom (Appendix B & C) and the subsequent interviews/conversations (Appendix D). These lived experiences have been presented under the following themes: language/communication barriers; work habits and level of independence; interactions with the teacher; interactions with other students; relationships; class discussion; and the participants' seating position in the classroom.

My observation notes in the mathematics classroom, together with my reflective journal entries and the participants' interpretations of what happened in the classroom provided an insight into the experiences of the ten participants in their respective mathematics classrooms. It is important not to forget that the ten participants are individuals with unique experiences that may not be typical of all immigrant students in New Zealand mathematics classrooms.

### ***Language/communication barriers***

English language proficiency varied among the ten participants, for all of whom English was not their first language. While most of the participants seemed to be integrating into the New Zealand mathematics classroom with ease, this section highlights some of the specific language related difficulties experienced by some of them. Their individual perceptions indicated that for some of the participants language was not a major barrier, and for others it seemed to have hindered their learning, especially for those participants with very limited English language proficiency.

For Karishma and Annie, studying mathematics through the medium of English was something they were used to in their respective countries, Fiji and the Philippines. Jess, like Annie, was from the Philippines and found that group discussions in both English

and Filipino enhanced her understanding of mathematics. Choosing a group seemed to be important to her for the purpose of communication and she had asked the teacher if she could join a specific group of her choice during group discussions. As was pointed out by Jess in the following comment:

*we communicated in English and Filipino ... for better understanding.*

According to Tim, he had been exposed to mathematics textbooks written in English. However, he recalled that the medium of instruction in his class in India had been Punjabi and not English. In spite of Tim being in a foundation class for English and Mathematics because of his limited English language ability, he believed that studying mathematics in New Zealand was not difficult and stated that:

*Maths is easy ... easy to learn [in New Zealand].*

Babeloo, who had come to New Zealand from an Afrikaans background, had experienced difficulties in the mathematics classroom initially and asserted that:

*at the beginning it was really hard the terms and everything is quite different. The words...are different because it is in a different language.*

She also believed that her good English language skills helped make mathematics learning in New Zealand easier.

*I think I'm quite good at English and understanding it and stuff. So yeah, but now it's just more ... how can I say... more easier. So yah I adjusted quite well to language and stuff.*

Andrew who had also come from a non-English speaking background experienced some difficulty understanding the concepts initially but after his English language skills improved his understanding improved.

*First time it was quite hard... language [English] was difficult ... reading writing and talking because I can't... I can't understand, after that it was like... I can understand it, I can understand.*

He also mentioned that after coming to New Zealand from China his learning focus was directed at learning English rather than concentrating on the mathematical concepts. He seemed to suggest that the new focus had hindered his mathematics learning in the following words:

*Because in China you can learn ... but now I want to speak English more than Chinese because Chinese language is easy to understand and Chinese Maths is harder than New Zealand Maths and you can do more exercise in China...it's quite hard but I like China because I learn more maths.*

He attributed his confusion and difficulty in understanding what is written in the textbook to his limited English language skills.

*It might be because of the language ... I can't understand when the exercise is when it's in the book...I can't understand when it's some exercise and some texts. That's confusing I think.*

However, Terry believed that mathematics was easy and transcended the language barrier:

*...because Maths is not all English ... have many number and just draw picture so it's easy to do,*

he admitted experiencing language problems and mentioned two coping strategies that he employed. The first being:

*... maybe I can look at the answer [at the back of the book] maybe will know what that will means.*

The second coping strategy involved the use of his electronic Chinese-English dictionary as he pointed out:

*I don't know the mean [meaning] and I just use the dictionary and I get the mean [meaning] so I can do that.*

Terry had also found the limitations of the dictionary especially when students seek literal meanings. This limitation was evident in the frustration that Terry felt when he tried to find the meaning of “Alpha Mathematics blackline master” which was a resource reference found in the textbook. The literal meaning was very confusing as Terry tried to understand what these words meant on his electronic dictionary.

Terry's sentiment of mathematics being easy to understand because it transcended the language barrier was also echoed by Van who talked about mathematics as being:

*... easy for me ... because I think it's easy for me ... and don't have a lot of English to understand.*

Van did, however, acknowledge that mathematics had been his favourite subject but his less-than-excellent grades in mathematics assessments may have been attributed to his limited English language proficiency.

*I usually got merit and not excellence because maybe English not good. Maths is my favourite subject because it's easy for me ... and don't have a lot of English to understand ... very hard to write.*

Van's inability to express himself became visible when he was incapable of describing the flooring while comparing the Thai classroom to his New Zealand classroom. Another example of his limited English language proficiency was observed when he tried to communicate with a classmate during a paired activity and he found it easier to use four fingers to indicate the number four instead of saying it verbally. In spite of his very limited English language skills Van was reluctant to use his electronic Thai-English dictionary because:

*My mum said if you don't use it very much or too much your English will improve.*

Ian too was experiencing problems understanding mathematics because of his very limited English language proficiency as suggested in his comment:

*... it was pretty difficult because they speak English and they do different stuffs. In Nigeria we don't do like English because we not speak English there, we speak our country. ... we speak our country ... it's more easier before... and here have to speak English.*

Ian had been working with a teacher aide because of his limited language skills and he had shown frustration in not being able to express himself sufficiently. The first frustration observed involved his inability to name a basic mathematics tool, the protractor:

*...the thing you have to draw with the ruler ... the thing [showing a circular shape].*

The second frustration occurred when he was unable to understand the instruction on an assessment sheet that required the students to complete the totals on a probability table. Ian's response to not completing the totals was not his poor mathematical skills because:

*I know how to add them, I didn't know I had to add them.*

Another assessment instruction that highlighted the language barrier surfaced when Ian was asked to draw the probability tree showing all possible outcomes of a family of three children. In response Ian drew a duck, a tree and three houses. When asked why he had drawn those objects his response was:

*For the kids... a tree and duck for the kids ....to play with ... and house to live in.*

Interestingly, Ian offered information about the language in which he thought, which appeared to have geographic and contextual influences. He asserted that:

*I think in English when learn work in New Zealand. I think in Nigerian [Igbo]if learn work in Nigeria, and if work in New Zealand is same as one I learn in Nigeria, I think about it in Nigerian.*

Abdulla's frustration stemmed from his very limited English language skills in the mathematics classroom. This came to the fore in his words through an interpreter:

*I find it difficult to understand because I do not speak English...  
I understand a little bit, just words, small words.  
I don't understand the teacher.  
I did not understand the lesson .... I don't understand people speaking*

Understanding concepts in English have proven to be very challenging for Abdulla. Although he was able to read English he seemed to be unable to comprehend what he read or what the teacher taught. This was evident in his expression of confusion during an interview when he pointed out:

*I do understand if it is a minus or a plus or something. Do not understand the degrees. I don't know how it is 90 when they are just lines. What do you mean... how can lines be 90?*

The real impact of Abdulla's inability to communicate with his teacher was felt when he arrived late to class and was issued a detention because he could not explain his reason for being late to the teacher. He relied on his friend to inform the teacher but during the conversation important information was missed out resulting in him being given a detention. During the interview the actual reason for his late arrival to class was revealed via an interpreter:

*I wasn't feeling well because I problems with my eye vision. So I was calling my dad but my dad couldn't pick me up because he was downtown.*

When asked whether he tried to explain that to the teacher, his response depicted a sense of helplessness:

*I wish I could have got it across but if I can't explain it to her why would I bother.*

He went on, in an almost dismissive manner, to pursue a discussion with the interpreter about where the detention room was and what he would be doing there. Then he added:

*It's okay, he says it's okay. He says it's only writing, I'll sit and write, it's not a big deal.*

The above stories depict some of the difficulties experienced by the participants that had arisen from language and communication barriers. While their limited English language proficiency gave rise to frustration, the participants still maintained a positive view of their ability to succeed in the mathematics classroom.

### ***Work habits and level of independence***

The participants' level of independence in the classroom environment was determined through their work habits during observations. The observations focused on their engagement, confidence and their dependence on the teacher or other students in completing assigned tasks.

Some of the participants showed high levels of independence. Classroom observations revealed that Tim's level of independence was evident in his non-involvement in idle student chatter. He chose, instead, to get on with the task set by his teacher. While Van appeared to be very happy and comfortable working through his textbook exercise and other assigned tasks, he did not appear to be very impressed with the detention system at the school saying:

*if teacher gives me detention then I will feel bored.*

Karishma showed signs of missing her friends in Fiji. However, she seemed keen to move on and demonstrated a high level of independence and confidence in her ability. Observations of Karishma working in her classroom showed that after group activities she promptly moved back to her original seat to consolidate her learning. Her level of

maturity was also evident when she chose not to join other students in mocking a student's writing on the whiteboard; Karishma chose to get on with her work instead.

Karishma's behaviour in class seemed to indicate her particular notion of acceptable behaviour in the presence of the teacher. A change in her mature behaviour or behaviour of compliance was observed when her teacher left the room briefly and Karishma and the student next to her began shooting at each other with the dice. When the teacher entered the room her playful behaviour stopped immediately and she appeared to continue with her assigned task.

This maturity and motivation to learn was also visible in Annie's behaviour when she seemed to be unaffected by the teacher leaving the room as she continued with her work. When the teacher returned, she listened intently with her arms folded and appeared to have been eager to begin the activity as soon as the instructions were given. Annie believed that there was a significant difference in her level of independence in the Philippines compared to New Zealand:

*I feel that I am more independent in New Zealand and I work more hard in New Zealand and I understand them more easily here.*

Terry, like the participants mentioned above, also presented a high level of independence and engagement in his work in the mathematics classroom. From the observation Terry appeared to be comfortable working silently and seems to have achieved independence through the use of his electronic dictionary and by making reference to the expected answers at the textbook. He appears to take responsibility for his learning and not be reliant on the teacher as was evident when he completed the assigned task he reviews other mathematics topics of his own accord. An interesting observation was made of Terry while he worked independently. The students were required to estimate the size of an angle without the use of a protractor and Terry chose to use a ruler and estimated the sizes with astonishing accuracy.

Babeloo's level of independence seemed to fluctuate. At times she displayed high levels of independence but on other occasions she seemed to be at a loss without assistance

from her teacher or other students in completing assigned tasks. She seemed to depend on her teacher and other students for basic mathematics equipment such as a calculator and correction fluid, even though she had them in her bag. When asked whether she had a calculator, her response was:

*Ya, I have one but I can't be bothered getting it out of my bag.*

Babeloo presented two interesting behaviour patterns during the classroom observations. The first was the thinking strategy that she used when she tried to work through a difficult problem. As she mentioned:

*When I don't know what it [the problem] is, I always do that [talk to myself] when I am busy thinking.*

Another behaviour that she exhibited in class was her desire for neatness with regards to her book. She seemed to rip off her pages from her mathematics workbook very often. When asked why she did that Babeloo responded:

*because I did something wrong and didn't have twink [correction fluid] so I ripped it out. I want my work to be neat.*

Jess also demonstrated a high level of independence, growing confidence, and certainly took responsibility for her learning as is suggested in the following observational notes:

Jess seems to be comfortably working through the questions and completes the assessment early. She then moves on to an activity sheet that she collects from the activity box which the teacher has set up for early finishers. Jess is busy with a hands-on task involving isometric drawing. She tries drawing her first shape with 4 cubes in a line on the ground and succeeds. Then begins the next with 3 cubes on the ground and 1 on the top. She manages that well and proceeds to the next with 2 on the ground and 2 at the top. This also poses no problems and then she becomes more adventurous trying out other shapes.

Andrew's growing confidence and independence in the classroom seems to have stemmed from his commitment to study mathematics at home and the assistance that he received from an older friend. As he pointed out:

*I study at home... sometimes my friend teach me. He is 24 years old... sometimes I check it on the internet.*



Although Andrew worked independently on assigned tasks in class, he seemed to experience confusion occasionally, when he compromised care for speed. His teacher also warned him about his carelessness. Andrew acknowledged this point, and responded:

*I don't like reading the questions.*

According to Andrew his independence would improve if he did not use the calculator or an electronic dictionary. He believed that frequent use of these items would make him dependent on them and compromise his confidence in mathematics.

*I like using my brain ... use dictionary in the library ... I don't have Chinese dictionary.*

Andrew presented an interesting behaviour during the classroom observations where he would impulsively stand and look out of the window. This seemed to have been very noticeable to other students and the teacher because Andrew's seat was at the front of the class, yet he seemed to be unconcerned about how it may have affected others in the class. When asked about it he responded:

*because it [the work] is quite boring. I finish the work so I have nothing else to do*

Ian was receiving supplementary learning support from a teacher-aide to improve his independence and confidence. He was either taken out of his mathematics class or the teacher-aide assisted him in the classroom. Observations of him in the mathematics classroom indicated a very low level of independence. When the rest of the class settled down to independent consolidation of the work covered in class, Ian sat playing with his pen or scribbling in his book. While he may have appeared to be working quietly from his textbook, Ian spent a lot of time just looking at the questions confused, yet he hesitated to ask the teacher for help. He would usually wait for the teacher to offer assistance to him.

He seemed to be able to follow simple instructions and enjoyed tactile activities, such as cutting out triangular shapes, but found it difficult to line them up on a straight line. Ian relied on the teacher-aide or his teacher to assist him in completing his assigned tasks in class. This assistance usually involved the teacher working with Ian individually or in a

small group of two to three students. Ian seemed to expect the teacher to compile notes and examples for him in his class workbook.

In spite of not being able to understand anything in the mathematics classroom, Abdulla unlike Ian, compiled his own notes and examples in his book. Abdulla watched the teacher explain what the diagrams meant. Abdulla was evidently very dependent on his Arabic-speaking student next to him and observed everything he did before writing or attempting an activity. However, during assessments Abdulla was faced with a problem because he was not permitted to communicate with other students.

The varying range of independence and confidence that the participants presented inevitably influenced their interactions with their teachers and peers.

### ***Interactions with the teacher***

The way the participants interacted with their mathematics teachers may be indicative of the way they perceived their teachers. The observations of the participants showed a variety of interactions that ranged from active verbal interactions to passive non-verbal interactions.

From the observations of Jess and Terry, it was evident that they viewed the teacher as the knowledge expert. Jess, for example, listened carefully every time the teacher explained a concept and would commence with the assigned task as soon as the teacher had given the instruction to do so. An incident that occurred in her class, suggested that Jess viewed her teacher with utmost respect and would not want to let herself down in the teacher's presence. The incident involved her leaving her file at home and the teacher speaking firmly to the group that had also done so. Jess seemed to have been personally affected and appeared to be disappointed in herself. She worked silently on a worksheet until the end of the period. When asked what she had been feeling after the incident Jess quietly said:

*I thought I was in trouble.*

Although Terry had not been observed speaking to the teacher in the class, he said that he would seek help from the teacher from whom he believed help would always be forthcoming:

*If I don't know I always ask the teacher and the teacher will always help me.*

Karishma also seemed to regard the teacher as the knowledge expert and listened to him intently as he discussed the various concepts. In addition her interactions with the teacher suggested that she considered him to be the verifier of knowledge as well.

*Sometimes I go and ask my teacher [to check] if my answers are correct [or not], and if I finish all of them [the assigned work], then when the teacher moves around [the classroom] I ask him to check my work [again].*

Andrew demonstrated varied interactions and attitudes towards his teacher. At times he appeared to be very attentive to what his teacher said and responded instantly when he was asked to place his calculator on his desk, but at other times he showed lack of interest in the teacher's explanations and disregarded the teacher's request for a volunteer. His behaviour could be interpreted as being disrespectful. In one incident while the teacher was teaching the class he chose to swing on his chair, play with a ball, and call out to a messenger who entered the room; and on another occasion he stood up and gazed out of the window.

A large part of interactions between Andrew and his teacher focused on behaviour. This involved the teacher reminding Andrew to work quietly and get rid of his gum after he unexpectedly made a loud high-pitched screech. In response to the teacher's request, Andrew got off his chair and walked to the front of the class to throw a piece of paper into the bin. Another incident where Andrew seemed to test his teacher's patience surfaced was when he asked his teacher:

*Can we draw?*

and the teacher told Andrew that he was asked to complete a task for a reason. This response appeared to have annoyed Andrew.

Andrew felt comfortable raising his hand and asking the teacher to explain certain terms. Often the teacher would encourage him to look for the answer from the notes and examples that were displayed on the whiteboard. In spite of Andrew's reluctance to find the answer on the board, the teacher would present him with lead questions that would make him get the answer to his question and this resulted in his visible sigh of relief. He also seemed to regard the teacher as the expert to whom he could go for assistance to clarify his own understanding. Andrew seemed to prefer asking for help on a one-on-one basis and returned to his seat after he felt satisfied with the teacher's explanation. According to Andrew another reason for his going to the teacher's table to talk to the teacher was to inform the teacher about the condition of his textbook. The teacher's opinion of him seemed to be very important, and therefore, he needed to tell the teacher that he was not responsible for the writing in his textbook and:

*that someone else wrote in the book.*

Like Andrew, Van also seemed to show little interest in what the teacher was discussing with the class and instead was engaged in playing with two dice. When asked why he did not pay attention when the teacher was teaching, his response was:

*I know the work. I was playing with the dice but I was still thinking while the teacher was talking.*

Ian was very quick to respond to the teacher's instruction to the class and placed his protractor on his desk when asked to do so. He seemed to want to please the teacher by raising his hand to indicate to the teacher that he had his equipment. However, Ian seemed to lose interest in the lesson when the teacher asked the class about their learning. He appeared to have ignored the teacher's questions.

Tim did not ignore the teacher's questions, although he did not provide a verbal response. He acknowledged what the teacher was saying by nodding or smiling at the teacher. Tim, like some of the participants mentioned earlier, also seemed to regard the teacher as a verifier of knowledge. This was evident when he walked up to the teacher's table with a query. During the interview Tim explained his reason for going to the teacher:

*to check the answer.*

Tim was visibly pleased and smiled when the teacher told him that his answer was perfect. The teacher's reaction seemed to give him a sense of satisfaction as he walked back to his seat to continue with his task.

Gaining the teacher's approval for the work that she had attempted seemed to be very important to Annie. She presented assertiveness when seeking assistance from the teacher. She would often call out to the teacher:

*Mister, Mister,*

and ask him to check her work. She would respond with a smile when her teacher affirmed that what she was doing was correct. Annie occasionally approached her teacher for assistance after consulting with her peers.

*I ask the person next to me for help first. If she doesn't know then I will call the teacher.*

During independent class work sessions Annie would often raise her hand to get her teacher's attention because she had completed her assigned tasks very quickly compared to the rest of the class. She appeared to be very motivated to complete the individual programme that the teacher often developed for her.

Babeloo also, showed assertiveness in gaining the teacher's attention. While her intention would often be for assistance, her approach seemed to be unusual. An example of this was observed when Babeloo had called out to the teacher for assistance. When the teacher arrived at her place she explained the problem and before he could respond she asked:

*Do you like my nails, sir?*

Although the teacher expressed surprise at the question, he offered a comment saying that it would have taken a while for her to do, and then continued explaining the problem to her. Babeloo seemed to be preoccupied with her nails and showed no interest in the teacher's explanation. However, her question seems to suggest her desire to invite the teacher into her personal world.

Babeloo also displayed attention-seeking behaviour. In spite of her having the required equipment in her bag, she would often borrow things from the teacher, seemingly, a ploy to gain the teacher's attention:

*Sir can I borrow your twink [correction fluid] please?*

For Abdulla the teacher appeared to be very inaccessible because of the language barrier. In spite of his efforts in trying to understand English, he found difficulty in comprehending what the teacher said:

*I don't understand what the teacher is saying. It is very difficult.*

Abdulla would often look in the direction of the teacher but avoided making eye contact and would constantly glance at what the student next to him was doing. If the student next to him wrote the examples and notes in his book then Abdulla would do the same. Abdulla seemed to be lost and very distant from the learning in the classroom. Another example of Abdulla's lack of comprehension was evident when, during a geometry lesson, the teacher approached Abdulla quietly and asked him if he knew what to do. He nodded. When the teacher pointed to an angle and asked him how to calculate it, he nodded again and with a very confused look Abdulla turned to his Arabic-speaking friend and exchanged a few words.

The nature and frequency of interactions between the participants and their mathematics teachers not only provided a glimpse into how the participants viewed their teachers but also highlighted some of their expectations of their mathematics teachers, and highlighted the importance of language in mathematics for the purposes of communication and understanding.

### ***Interactions with other students***

While the observed interactions between the participants and their respective teachers in their mathematics classroom, whether extensive or minimal, provided part of the rich environment for interpretation of their present experiences, a complete picture would only be gained by also examining the interaction between the participants and their peers. The interactions between the participants and their peers ranged from very minimal interactions to constant interactions.

Abdulla's limited English language skills made it very difficult for him to communicate or interact with other students in his class except for one student who spoke Arabic. Abdulla seemed to be constantly at a loss and reliant on his friend to cope in the mathematics classroom.

Although Ian interacted with other students in the class, he did it discreetly because he felt that it was something that he should not have been doing:

*I don't know ... because I don't have to talk ... I have to be quiet ... I'm not allowed to talk to another person.*

Ian has tried to initiate conversations with students sitting close to him without making eye contact with them and none of them responded to what he was saying. He also seemed unaffected by the non-response of the students and would just sit fidgeting with one of his mathematics equipment. When talking about whether the students in his class helped him, his response was:

*Sometimes they help me, sometimes they don't.*

Tim also seemed to be of the opinion that interacting with other students in his class was not allowed. This was observed when Tim was quietly engaged in a group activity. When the teacher left the room briefly, Tim began interacting with his peers but when the teacher stepped back into the room, he stopped talking immediately.

While Andrew's interaction with other students seemed to be unaffected by his teacher's presence or absence, he made an interesting comment about why he did not seek help from students in his class:

*The students in my class are quite lazy.*

However, Andrew often interacted with students in his class; but this interaction usually involved him trying to distract them rather than soliciting help.

Terry, on the other hand, occasionally interacted with another student because he required the student's assistance in interpreting the questions. He asserted that:

*Sometime I ask [a student in the class] if I don't know because the dictionary has some words I don't understand so I ask my classmate for help.*

Terry's reluctance to interact with students in his class may be attributed to his limited English language proficiency. This was evident when a new student arrived in his class and was allocated a seat next to him. When the teacher asked Terry to speak to the new students, Terry obliged and confined his conversation with the new student to the class rules:

*... I'm not really good at English so I just say hello and tell him about the rules in class.*

Babeloo's willingness to interactions with students in her class varied and seemed to be influenced by her mood at any particular times. At times she chose not to interact with other students and appeared to want to be left alone, while on other occasions she would be having a discussion with them. When she chose to interact with other students Babeloo seemed content and comfortable working through the problems and also seemed to enjoy taking charge of the group discussion. She also appeared to enjoy non-mathematical social conversations with the two students seated on either side of her. Babeloo showed annoyance and frustration in a rowdy classroom environment and said:

*I just don't concentrate that well when people are that loud around me.*

Interestingly, Babeloo found that her peers were not helpful to her. She felt that she would be more capable to offer help to them than seek their help. She emphatically stated that:

*they [her peers] are not really helpful ... because I'm a bit smarter than them I think, they come to me for help.*

Like Babeloo, Van's interactions with other students was also confined to those seated close to him, however, he seemed to enjoy being the class clown. When asked to write something on the board he would draw a funny picture that would make the students laugh. His interaction with other students was also very entertaining, especially when a student had come to sit next to him for a partnered activity and Van asked him:

*Why did you come here? Did you not have friends?*



The student seemed to understand Van's sense of humour and playfully gestured a punch at him. Van reacted excitedly and shook the dice in his spectacles case. Van also felt comfortable tapping his partner on his shoulder or showing various hand actions as a means of communication. While Van found most of the students to be helpful, he did find a few who were not helpful.

Annie was very particular about who she worked with during group or paired activities and seemed to have a small close group with whom she interacted. She displayed confidence in her interaction with other students as was evident when she and her partner chose to write their name beside their answer on the board. Annie seemed to enjoy interacting with the students around her. However, in a group situation, she did not readily accept the knowledge of the group without it being verified by her teacher.

Although Jess portrayed a more reserved personality compared to Annie, Jess seemed to have taken on a leadership role in the class. Her interaction with other students involved her passing out the textbooks, the worksheets and performing other activities. Like Annie, Jess also chose the group that she wanted to work with. According to Jess her interactions with other students, especially group work activities, have been well thought out in advance and based on how it could best benefit her learning. Jess pointed out:

*I like to work with the people I know can help me the most.*

Karishma's interactions during paired activities revealed her leadership qualities, and showed her preference to work with male rather than female students. Her gender preference was evident whenever the students were asked to find a partner, and on most occasions she would swiftly and in a matter-of-fact manner choose a male partner, often one seated next to her. According to Karishma:

*when the teacher tells us to work with a partner, I usually go to the person beside me. It doesn't matter who it is.*

During one activity she seemed to be quite comfortable discussing the activity with her partner and opted to roll the dice while her partner recorded the results on a sheet. Her desire for perfection seemed to have surfaced when she expressed her dissatisfaction

with the recording and took over recording the results. Interestingly her partner accepted her way of doing things and for the rest of the activity he observed what Karishma was doing.

Karishma mentioned the mutual benefit of the interaction between her and other students in the class:

*When he [partner] doesn't know something or doesn't understand something then he asks me and I help him out. When I don't understand the question then I discuss it with my friends or the person sitting beside me.*

Karishma seemed to complete her assigned tasks very quickly because of her desire to help her peers. She often completed her work in class and helped her neighbours. She fondly recalled her enjoyment in assisting other students:

*I started helping my two neighbours.  
I enjoy helping them and they usually ask me for help.*

### ***Relationships***

Relationships that students build with other students and their teachers are often manifested in their interactions. Some of the relationships between the participants and their teachers and peers that had formed, surfaced while observing their actions and listening to their stories.

For Babeloo, building a relationship with her teacher seemed very natural. The understanding and care that the teacher showed towards her was evident when the teacher offered an explanation for her absence from class. According to the teacher Babeloo had been having personal problems and therefore needed time off class to deal with her emotions. The teacher permitted this because he believed that Babeloo was coping well with her work based on her excellent performance in her assessments. On another occasion when she had arrived late and seemed very upset, Babeloo declined the teacher's offer for her to speak to the counsellor or to one of her friends. Although visibly upset she had chosen to sit in the classroom and work from her text. Clearly, the teacher seemed to show understanding and respected her choice.

However, according to Babeloo her relationship with her peers seemed to be very strained. She spoke about the students' feelings towards her and offered the following reasons for that:

*...all the students here hate me... Because it's just yah, everybody is rude to me and yah, even though I'm a bit smarter than them, I don't want to brag, but it's true ... probably because I'm new and because.*

Upon reflection on herself within the classroom situation she recognised how she may be influencing the relationship and claimed that:

*I don't let people tell me what to do. If they say something to me I will say something back. It's not always a good thing.*

Babeloo also provided insight into the kind of students she preferred to work with and how she dealt with students she believed to be discourteous towards her. She said:

*I usually work with people I have something in common with, people that I enjoy working with. So the people that are rude to me, I usually just stay away from.*

Annie had also found it difficult trying to join the already established groups because of her late arrival to the class.

*Yeah, because I came in late it was hard to make friends because all of them had groups already.*

She believed that it was up to her to make an effort and build a relationship with her peers in spite of her being in a class of mainly boys. She recalled her feelings when more girls arrived in her class:

*On the first day we had only 4 girls and heaps of boys in the class but I still made an effort to make friends. Then all the girls came in and it was better because all of them were nice and friendly.*

Annie had also built a relationship of competitiveness with one of the students in her class. She described this relationship with a sense of pride towards her own achievements as follows:

*Yeah, sometimes this boy, me and him compare results. Cause he tries to get a higher score and I always end up with merit and he ends up with achieved.*

Unlike Annie, Karishma appeared to have been more comfortable building relationships with the boys in her class, even though she found the girls to be generally friendly.

*The girls are very friendly, even in other classes. The students were all very polite. They were very polite. I also have friends in the class.*

According to Karishma, the students in her mathematics class are puzzled at her achievement and understanding of mathematics especially since she had come from a comparatively underdeveloped country. Her high achievement in mathematics has influenced the positive relationships that she has with her peers.

*I think they are shocked that I am from a third world country, like Fiji is not a good country, and I am smart. I am smart in maths.*

The relationships that the participants had with their teachers were not always explicitly explained by them; but became apparent in their interactions and by some of the stories voluntarily shared by teachers. In the case of Ian and his teacher, there was evidence of a strong relationship between them when the teacher sensed his need for help and approached him without Ian having to ask for help.

Similarly Tim's mathematics teacher voluntarily offered her thoughts about Tim that reflected the relationship between them. This relationship seemed to transcend the language barrier as evident in these words of the teacher:

*He is such a pleasure to watch. I know exactly when he understands the work.... He has a little smile on his lips. He does not have to say anything.*

The relationship between Terry and his teacher was also evident in his teacher providing voluntary information about her high expectations of him. She had based her expectations of him on his work ethic and achievements in assessments.

*Terry is an excellent student. He gained two grades of 'excellence' in the last two assessments and gained 5 out of 5 for his book work.*

While the relationships between the participants and their respective teachers appeared to be positive, there was evidently a variation in the relationships between the participants and their peers.

### *Class discussion*

While the relationships that the participants have with their peers and teachers may be triggered by a variety of factors, these relationships may have contributed to their decision on whether to participate in class discussions or not. Their participation in class discussions ranged from very low to moderate.

Tim, Abdulla, Terry, Ian, Van, Annie, and Babeloo chose not to participate in class discussions. Tim would not volunteer answers or contribute to class discussions but he listened intently to the contributions of other students. However, when the discussions shifted from mathematics then he would turn his attention and work quietly from his textbook. Abdulla also listened to the teacher explain various mathematical concepts. He appeared to find it very difficult to participate in class discussions. Terry too listened to the teacher's explanations and students answering questions but felt unable to offer a response of his own. He offered the following reason for his non-response:

*I'm not really good at English so I just do it in my book or just think it.  
I like to answer but my English is not good.*

Babeloo, like Terry, felt that her contribution to the class discussion would not be beneficial, and therefore, she preferred to have a one-on-one discussion with her teacher.

*I don't like talking aloud to the teacher because some people may mock me if I get it wrong. I ask my teacher questions when he walks around the room*

Ian also clearly expressed dislike to participate in class discussions:

*I don't like that... I don't like doing that. Too shy and I don't like it.*

So, as a ploy to avoid being asked a question by his teacher, he would put his head down on his desk, or hold his head back on his chair and rub his eyes.

Van showed involvement in activities and seemed to eagerly follow the teacher's instructions but he would not contribute to class discussions. Instead while the class would be discussing aspects of mathematics, Van was observed playing with the dice or working quietly on an assigned task.

Annie also showed no interest in the class discussions but her reason for not showing interest was that she had been working on a different topic compared to the rest of the class.

Jess showed a keen interest in being part of the class discussions. She would raise her hand to indicate her intention to answer a question. However, because of her quiet nature other students would often call out the answer, and Jess would politely put her hand down and get on with her work.

Andrew's participation in class discussions was very inconsistent. On some days he would not show interest in the discussions, while on other days he would eagerly want to answer questions. When asked how he felt about answering questions in class, he responded that he would feel:

*excited if I could answer the question.*

Karishma was an active listener who appeared to be more comfortable than the other students to participate in class discussions. Although her contributions were made in low volume, the teacher usually heard what she had to say and often accepted her responses and wrote them on the whiteboard.

The participants presented a variety of reasons for their participation or non-participation in class discussions. Each participant's decision was based on their level of comfort in the mathematics classroom.

### ***Seating position in class***

While most of the participants spoke of being allocated their seats by their teacher when they had first arrived in their mathematics classrooms, the seating arrangement seemed to have been flexible with students often choosing to change their places. The fluidity of where the students sat depended on a variety of factors such as the nature of the task they were engaged in during a specific lesson, the group activity that they may have been required to work on, or simply, their desire to sit next to their friends. The observed

seating positions of each of the ten immigrant students in this study are described below in an attempt to provide a panoramic perspective of their physical location in relation to the other participants in their mathematics classrooms.

According to Van, he had chosen to sit at the back of the class when he first arrived but did not provide a reason for his choice. However, he subsequently moved to the front of the class and seated himself between two of his friends. According to Van he had moved because:

*I have a friend at the back but he is absent today.*

Tim appeared to be content sitting in the seat that had been allocated to him at the beginning of the year. He did, however, move to another seat during group or paired activity sessions but preferred to sit in his allocated seat to complete his independent work.

Although Terry claimed to be content sitting in the same seat during his mathematics lesson, he was happy to move if it was going to benefit other students. He was also prepared to help other students in his class as he pointed out:

*I always sit there. It's good. Maybe if I can help them [other students] then I will move and sit near them.*

Babeloo's mathematics class was located in a science laboratory and like many of the participants she felt that she needed to sit in her allocated seat. This taken-for-granted manner was evident in her words:

*I always sit there, because it's in a seating plan. I always sit in the same place.*

However, when her class moved to the computer room to complete an activity, Babeloo had chosen to sit at the front of the room next to her friend. Babeloo's mood often dictated whether she had wanted other students to sit next to her or not. It seemed as though other students sensed her mood changes and if she appeared to be in a less sociable mood, they would avoid sitting next to her, and she would find herself sitting alone.

Karishma asserted that she had not been allocated a seat by her teacher and that she had chosen to sit towards the front of the class. She believed that sitting at the front of the class enabled her to concentrate and not get distracted. This was evident in her words:

*“It’s better to hear the teacher and you can get it more quickly when you in the front. And when you sitting in the back you are busy talking and everything.”*

However, the seat that she had chosen did not appeal to her when the students who usually sat next to her were absent and she was left alone. Although Karishma had not moved to another seat, she spoke about feeling isolated,

*At first I felt like a loner.*

Jess, like Karishma, preferred to sit in the place that she had chosen when she first arrived in the class. According to her the initial seating plan no longer existed and people moved freely to different seats as they wished. However, Jess had not wanted to move, pointing out as follows:

*We used to have one [seating plan] but some people have moved to different places and I don’t like to.*

Ian and Andrew were in a foundation class with approximately 20 other students in the class. In spite of the seating plan Ian preferred sitting alone towards the back of the class, while Andrew preferred a seat at the front of the class, usually with another student next to him.

Annie also preferred to sit towards the front of the class when she was busy with independent work but she moved to a seat closer to her friend when she had to work on group or paired activities.

According to Abdulla, his teacher had asked him to sit at the front of the class next to a student who also spoke Arabic. Abdulla appreciated the deliberately allocated seat and seemed comfortable sitting in that position. He believed that he would have been at a loss had it not been for the help he had received from the student next to him. He had the following to say if he had to sit anywhere else:

*I would be very lost and would not know what to do because M... [the Arabic-speaking student] is the only one that can help me.*



The participants expressed specific preferences for where they wanted to be seated in the class. While some participants felt that they had to sit in their allocated seats because of their seating plan, others felt free to move around to other places. Interestingly none of the participants expressed dissatisfaction or discomfort in their seating position in class.

The findings presented in this chapter provide a dense description of the ten students in their classroom environment with regards to their interactions and perceptions of the different classroom participants. Furthermore these findings are discussed in Chapter 8 against the backdrop of relevant literature in with regards to the students forming relationships in their new classroom environment. The immigrant students perceived role of the teacher, their interactions with the teacher, and their interactions with their peers form the structure for the discussion.

## **Chapter 6: Voices towards the future**

This chapter forms the third temporal existential plane of the findings section and examined how the ten immigrant students asserted themselves in their mathematics classrooms with regards to: their academic self-concept; and their attitudes towards their examination and assessments. The seating position of each participant in relation to the other students and the teacher had been graphically recorded on the observation grid (see example, appendix B, page 205) and adjusted accordingly if they had moved during the mathematics lesson.

Each participant's self-concept was viewed from multiple perspectives; from their own perspective, from their perceived parents' perspectives, and from their perceived teachers' perspectives. While all ten participants offered a separate rating for each perspective in their home country and in New Zealand, two students had not provided their perceived New Zealand teachers' ratings of their mathematics ability. The ratings were discussed during the initial interview/ conversations where each student was asked to provide a rating from 1 to 5, with 1 being poor and 5 being excellent, for each of the three perspectives (Appendix A). Graphic representations have also been provided to show the multiple perspective ratings of each student's academic self-concept (Figures 6(i) to 6(x), pages 113-118).

The chapter concludes with the ten students talking about their attitudes towards their achievements and assessments in mathematics. The findings in this section are an interpretation of how the participants perceived themselves in their mathematics environment. The notion of how they saw themselves provided me with a tentative understanding of how the participants continued to find their niche in their new environment. The study focused on the transitional experiences of the participants with regards to where they sat in class, their perceived mathematics ability, and their mathematical achievements and attitudes, as primary factors in shaping their individual futures.

### *Perceived mathematics ability*

The perceived mathematics ability of the participants was determined by their self-ratings and their perceptions of their teachers' and their parents' ratings of their mathematics ability. The questions involved the participants rating themselves, and what rating they thought their teachers and parent would give them. The ratings comprised a continuum from 1 to 5 with 1 being poor, 2 being satisfactory, 3 being good, 4 being very good and 5 being excellent. Half numbers (0.5) were used in instances where students rated their ability between two numbers, for example if a student rated his or her ability to be between 3 and 4, then a 3.5 rating was recorded. The main purpose of the ratings was not statistical, but rather to ascertain how the participants rated themselves in their home countries compared to New Zealand. The participants had also been encouraged to provide a reason for their choice of ratings. A composite rating has been provided in Table 6a, and this is followed by some of the reasons given by each participant for their self-rated, their perceived teachers' ratings, and their perceived parents' ratings of their mathematics ability.

**Table 6a: Participants' perceived ratings of their mathematics ability**

Participant	Home Country			New Zealand		
	Self Rating	Perceived Rating of		Self Rating	Perceived Rating of	
		Parents	Teacher		Parents	Teacher
Abdulla	5	5	4.5	1.5	1.5	3
Van	5	3	3	4	3	3
Ian	2	2	2	2.5	3	3
Andrew	3.5	3	2.5	3.5	3	Not sure
Tim	3	3	3	4	3	3
Karishma	3	3	3	4	4	5
Jess	3	3	3	4	3	4
Babeloo	2.5	3	2.5	4.5	3	Not sure
Annie	2	3	3	4	3	4
Terry	4	5	4	5	5	5

### ***Self-Rating***

The participants were requested to rate what they had perceived their mathematics ability in their home country to have been, and what they perceived their mathematics ability in New Zealand to be. Each participant provided a rating (Table 6a) and offered a reason for their self-rating.

Abdulla rated his mathematics ability as excellent (5) in Saudi Arabia citing as his reason that:

*because it [mathematics] was very easy.*

However he viewed his ability in New Zealand as being between poor (1) and satisfactory (2). Abdulla believes that this decline occurred:

*because I do not understand English. If I understood what people were saying then I would find it much easier*

Van also rated his mathematics ability higher in his home country. He rated his ability in Thailand as excellent (5) and slightly lower in New Zealand as very good (4). He confidently provided the following support for his rating:

*In Thailand I got 85 out of 100 marks in Thai assessments and in the exam my percentage was between 93 and 95. Here [in New Zealand] I usually get merit.*

Ian found mathematics to be very difficult both in Nigeria and in New Zealand. He rated his mathematics ability in Nigeria as satisfactory (2) and slightly higher in New Zealand as 2.5, which was between satisfactory and good. He attributed his low ratings to his lack of ability in the subject:

*I was not good at Maths. Even when I came here I'm not good at Maths. I'm slightly better now than before but I'm not good! Maths is too hard.*

Andrew believed that his mathematics ability in New Zealand was no different from what it was in China and rated his ability between good and very good at 3.5. Andrew was unsure about why he rated himself as he did but he seemed to have been disappointed in his declining assessment grades in New Zealand, pointing out:

*In the first test I got an 'excellence' [grade] then I got a 'merit' [grade] and two 'achieved' [grade].*

Tim based his mathematics ability on his performance in his assessments. He rated his ability in India as good (3) because:

*I did well in tests and the exam too.*

He rated his mathematics ability to be slightly higher in New Zealand as very good (4) and justified it by referring to his assessment grades:

*I get very good grades [in New Zealand].*

According to Karishma, passing her assessments was not the only factor that determined her mathematics ability. She believed that her ability to work through problems was also an important factor and therefore rated her mathematics ability as good (3) in Fiji, saying:

*I can answer some questions. I can't answer all of them properly. I used to pass in the tests and the exam.*

Karishma rated her ability in New Zealand as very good (4), basing this on the fact that she was given more responsibility in New Zealand. According to her some of these responsibilities included helping students with their work and assisting new students to settle in.

Jess also rated her mathematics ability higher in New Zealand. She believed that she was just good (3) or average in the Philippines because:

*I am not very good at maths when I was there. I usually find it hard to do maths in the Philippines.*

She rated her ability in New Zealand as very good (4), explaining that it was easier to learn mathematics in New Zealand:

*I find it easier to learn here [in New Zealand].*

Babeloo showed a marked variation in her ratings. She rated her mathematics ability in South Africa to be between satisfactory (2) and good (3). In other words she considered herself to have been of average or below average ability because of her lack of understanding as suggested in her words:

*I didn't understand Maths that well... in South Africa.*

She believed that her ability in mathematics improved in New Zealand and rated her ability as being between very good and excellent:

*...between excellence (5) and very good (4) because I think I'm quite good at it now but I'm not excellent [in New Zealand].*

Annie's rating of her mathematics ability was similar to that of Babeloo, although her reasons for the rating differed. Annie rated her ability in the Philippines as satisfactory (2) based on her test performance:

*I wasn't really good in the Philippines and sometimes I get developing [a below average grade] in my test results.*

Her rating of her mathematics ability in New Zealand was above average. She felt that she was very good (4) and she provided the following justification for the rating:

*... because I found Maths easier in New Zealand and I get merits now and then in my test results.*

Terry also rated his mathematics ability to be higher in New Zealand, his justification for this language related. Terry rated his ability in China as very good because he believed that he was able to focus more on other subjects as he did not have to spend too much time revising mathematics. This was evident in his comment:

*I would say (4) very good in China because maybe in China I did not work hard in maths. I thought my maths was alright so I spend more time learning science or Chinese.*

He rated his mathematics ability in New Zealand as excellent (5), suggesting that he was forced to work harder in mathematics because of English being the medium of instruction, and his lack of proficiency in the language. According to him:

*In New Zealand I would be excellent (5) because I think we learn maths through English. I'm not very good at English so I work harder in New Zealand.*

The participants' rating of their own mathematics ability was indicative of how they saw themselves before and after coming to New Zealand. This transformational information combined with their explanations for the rating provided invaluable understanding of the participants' mathematics self-concepts.

### ***Perceived Teacher's rating***

By the participants thinking about what rating they believed their teacher would have given to them, another dimension emerged, and that is about how they saw themselves from their teachers' perspectives.

Abdulla was confident that his mathematics teacher in Saudi Arabia would have rated him higher than his New Zealand mathematics teacher. He believed that he would be rated between very good (4) and excellent (5) by his teacher in Saudi Arabia because he had worked well there.

*I work good [well] in Saudi Arabia.*

However, he expressed confusion about where he thought his New Zealand teacher would rate his ability. While he seemed to think he should be rated below average, between poor (1) and satisfactory (2), he adjusted the rating to be good (3) because of the positive encouragement that he received from his teacher. His dilemma was evident in the following words:

*New Zealand teacher would rate me as 1 or 2 because I do not work that much in class. Or maybe 3, she [the teacher] keeps telling me "you doing well, you doing well."*

Van seemed to think that his mathematics teacher in Thailand would have rated his mathematics ability as good (3) and nothing more, as he pointed out:

*Thailand (3) good not (5) excellence. Maybe good.*

Similarly, he believed that his New Zealand mathematics teacher would also rate his ability as good (3). His reason for this rating was based on his performance in his assessments:

*New Zealand teacher would say good (3) because I usually get 'merit' not 'excellence' [grades].*

According to Ian his Nigerian teacher would have rated his mathematics ability as below average (2) and after long consideration believed that his New Zealand mathematics teacher would rate his ability as good (3). He did not offer a reason for the rating of his New Zealand teacher but felt that his Nigerian teacher would be influenced by the fact that:

*I'm not that good in maths in Nigeria.*

Although Andrew was not sure about the rating he would get from his New Zealand mathematics teacher, he believed that his teacher in China would have rated him between satisfactory (2) and good (3). His reason for this rating was attributed to his final assessment of the year's work. This was evident in his words:

*... in the last one I think I got 85.*

Tim was confident that he had done quite well in all his mathematics assessments and therefore his mathematics teachers both in India and in New Zealand would have rated his mathematics ability as good (3). He pointed out:

*My teacher in India and New Zealand will say I am good because in all the tests I do very well.*

Karishma believed that ratings of her Fijian mathematics teacher and her New Zealand mathematics teacher would be very different. According to her she would have been rated as an average (3) student by her Fijian teacher:

*because my teacher in Fiji never used to put me as a group leader or anything like that.*

She believed that her New Zealand teacher would have rated her as excellent (5) because of the responsibility that was entrusted upon her by her teacher as mentioned in her words:

*And 5 here [in New Zealand] because if a new student comes in class the teacher will tell her or him to sit beside me so she or he could learn quickly with me because I'm good in explaining to them.*

Jess believed that her mathematics teacher from the Philippines would have rated her mathematics ability as good (3) or average because she did not perform well in her assessments:

*[In the Philippines] good or average [3] because I don't do maths very well there.*

She also noted that her New Zealand mathematics teacher would as very good (4) because she was aware that she had found it easier to learn the subject in New Zealand:

*In New Zealand maybe very good (4). I find it easier to learn maths here.*



Babeloo was unable to provide a rating of herself from her New Zealand teacher's perspective. Her comment was:

*I really don't know, it's actually up to him. I don't know where he would rate it.*

She did, however, feel that her South African mathematics teacher would have rated her ability based on her below average performance in class and on her constant need for assistance from the teacher. She voiced this in the following manner:

*... between developing (2) and achieved (3), sort of average because I wasn't really good and kept asking questions and stuff and she got quite mad at me about that.*

Like Babeloo, Annie believed that her mathematics teacher in the Philippines would have rated her mathematics ability as average or good (3) because of her constant need of help from the teacher and her peers. The following comments suggested these thoughts:

*Average or good (3) by the Philippines teacher because she thinks I can do it but sometimes I ask for help from some of my friends and ask the teacher for help.*

Annie was convinced that her New Zealand mathematics teacher would rate her higher, as very good (4) compared to her teacher from the Philippines. Her assumption was attributed to the positive feedback that she received from the teacher, the teacher's proactive role in influencing her grades, and her above average performance. This was evident in her words:

*Very good (4) by my New Zealand teacher because he always praises me with my results and he is part of me getting merits... and because my class doesn't get that much good results.*

Terry believed that his mathematics teacher in China would have rated his mathematics ability as very good (4) and not excellent (5) because:

*I'm not work so hard in maths.*

He believed that his New Zealand mathematics teacher would rate him as excellent (5) because he had been making an effort in class as indicated by the following words:

*In New Zealand excellent because I work harder in class.*

The perceived teacher's rating of their mathematics ability provided useful insight into the participants' perceptions of how the teachers' saw them. This may be indicative of the participants' self-concept.

### ***Perceived parents' rating***

This section summarises what the ten participants perceived their parents' ratings of their mathematics ability would have been in their home countries and in New Zealand. Only three of the students showed a variation in the ratings.

Abdulla believed that his parents' rating of his mathematics ability would be very different in Saudi Arabia and New Zealand. According to him his parents would have rated his ability as excellent in Saudi Arabia because of his high achievement as evident in his words:

*5 in Saudi Arabia because I used to get high marks in Saudi Arabia.*

Their rating of his ability in New Zealand would have been 1.5, between poor and satisfactory, because of his language difficulty:

*because of English*

Van believed that his parents would have rated his mathematics ability as good (3) in both Thailand and in New Zealand. This was because he was prepared to seek help from them when he was unable to solve problems:

*because I sometimes ask them [my parents] for help and I sometimes can't do it.*

While Ian presented uncertainty about how his parents would have rated his mathematics ability, he guessed that they would probably have rated him as satisfactory (2) in Nigeria and good (3) in New Zealand. His reason for this was evident in his comments:

*Maybe good (3) in New Zealand, maybe satisfactory (2) before, I am not sure. Now I'm better than before.*

Andrew also seemed to be uncertain about his parents' rating of his mathematics ability. However, his uncertainty seemed to have arisen because he believed that his mum and dad would differ in their ratings. While he believed that each of his parents would have given him the same rating in China and in New Zealand, he thought that his mum would rate his ability as average or good (3) because:

*my mum think my maths is okay,*

Andrew believed that his dad would have given him a rating below average of satisfactory (2). He based this assumption on two factors:

*because my dad thinks my maths is not really good. Also sometimes when he gives me some tests and I don't want to do it, he thinks I don't want to do it because it means I don't know how.*

Tim was convinced that his parents would have based their rating on the work that he did at home and rated his mathematics ability as good (3) and definitely not as excellent (5). The following response that he offered appeared to present a sense of absurdity in his mind at the thought of him being an excellent student:

*They say good (3) in maths not excellent in India and New Zealand [laughs] because I'm doing work at home.*

Jess also believed that her parents would have rated her mathematics ability as average or good (3) in both New Zealand and the Philippines. She based her rating on her own difficulty with the subject and believed that her parents were aware that she had struggled with mathematics. This was evident in her comment:

*I think that when I started school I really find hard... I really find maths hard.*

Although Karishma did not provide an explicit numerically perceived parents rating of her ability in Fiji, her response suggested that they would have rated her ability as good (3), being slightly lower than her perceived New Zealand rating. She thought that her parents would have rated her mathematics ability as very good (4) in New Zealand:

*Very good (4) because they know like I'm good in maths in New Zealand. I'm really good in maths but in Fiji I wasn't like that good. I was good but not very good. So they think I'm bit smarter here.*

While Babeloo believed that her parents would have rated her mathematics ability as good (3) both in South Africa and in New Zealand, she claimed that they would have been influenced by her frequently asking questions and by their own lack of knowledge because they had done formal mathematics over two decades earlier, as her words indicated:

*I would say about good (3) because well, I ask them a lot of questions but they don't understand it because they had Maths about 25 years ago.*

Annie was of the opinion that her parents would have rated her mathematics ability as good (3) in the Philippines and in New Zealand because they were aware that she was good at mathematics and she had informed them that she felt that she found mathematics easier in New Zealand compared to learning the subject in the Philippines. However, she felt that they were not fully informed of her assessment grades, as suggested in her words:

*Good (3) they [parents] know that I'm pretty good at Maths but they don't really know that I get merit and excellences. They just know that I am capable of doing Maths by myself. I have spoken to them about maths being easier here in New Zealand.*

Terry believed that his parents would have rated his mathematics ability as excellent (5) both in China and in New Zealand. He attributed his assumption on his communication with his parents, the interest they showed in his study and the help that he received from them in New Zealand:

*Excellent because they always help me and ... yeah they always help me so I think when I finish my homework they will help me check it [in New Zealand].*

The participants' perceptions of how their parents rated their mathematics ability provided the third and final dimension towards an understanding of their self-concept.

### ***Graphic summary of the ratings***

A graphic combination of the three ratings, their own rating, their perceived teachers' ratings, and their perceived parents' rating of their ability, provided a comparative summary of each student's perceived mathematical ability in their home countries and New Zealand.

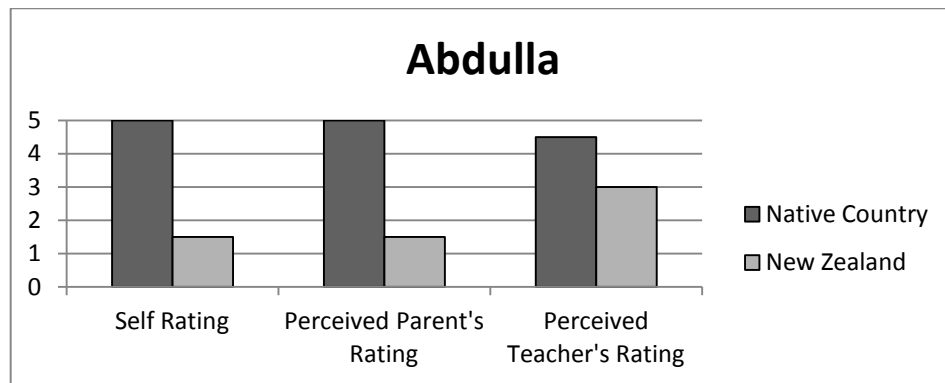


Figure 6(i): Abdulla's perceived ratings of his mathematics ability

Figure 6(i) illustrates that there was a marked decline in Abdulla's self-rating and his perceived parent's rating of his mathematics ability, and his perceived teachers' rating showed a slight decline in New Zealand compared to Saudi Arabia. Therefore overall, Abdulla's perceived mathematics academic self-concept appeared to have declined in his new mathematics classroom environment in New Zealand, however, this was probably largely due to his language difficulties.

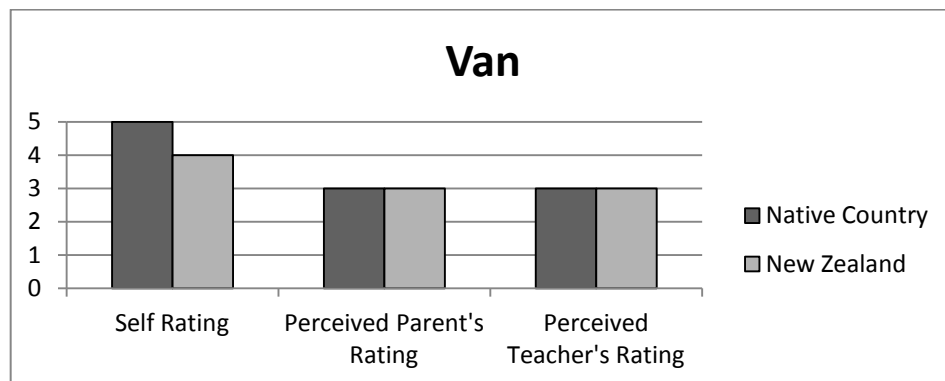


Figure 6(ii): Van's perceived ratings of his mathematics ability

As illustrated by Figure 6(ii) Van's rating of his mathematics ability was fairly consistent with his perceived parent's perspective and his perceived teacher's perspective. However, in spite of a slight variation in his self-rating, his rating remained at above average. The overall impression of these ratings suggested that there was a slight decline in Van's academic self-concept in his New Zealand mathematics classroom compared to his Thai classroom.

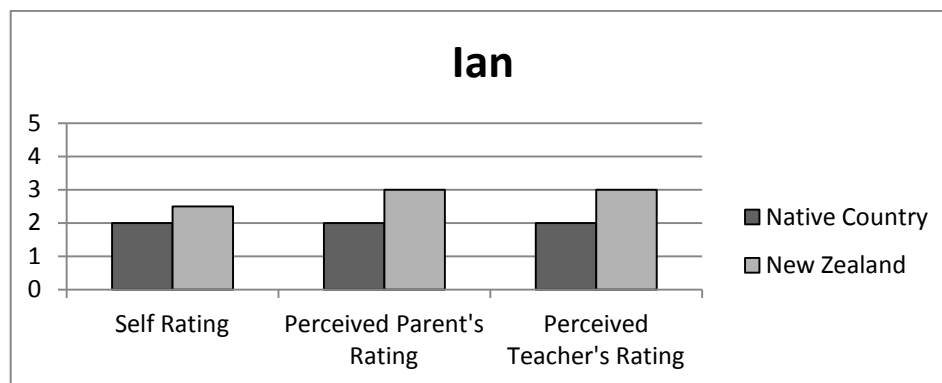


Figure 6(iii): Ian's perceived ratings of his mathematics ability

The overall impression extracted from Figure 6(iii) was that Ian's academic self-concept had improved in his New Zealand mathematics classroom compared to his mathematics academic self-concept in Nigeria.

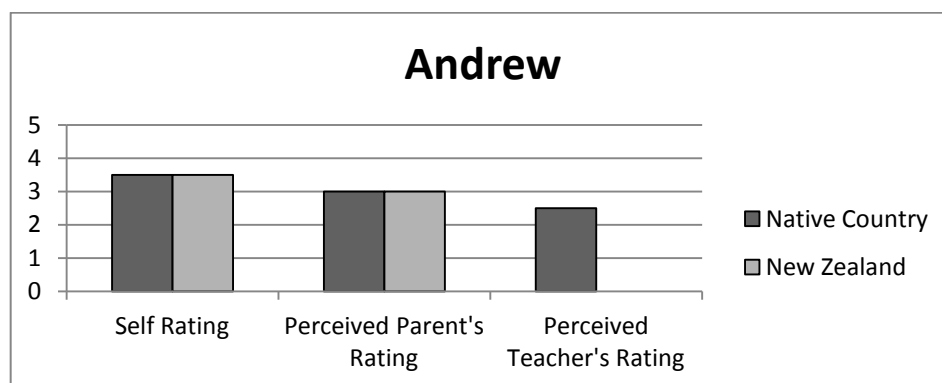


Figure 6(iv): Andrew's perceived ratings of his mathematics ability

Andrew's perceived rating of his mathematics ability reflected consistency in his self-rating and his perceived parent's rating. Figure 6(iv) illustrates that Andrew's mathematics academic self-concept has not changed in his New Zealand classroom compared to his classroom in China, however, his uncertainty in his perceived New Zealand teacher's rating may be attributed to other factors as discussed in chapter five.

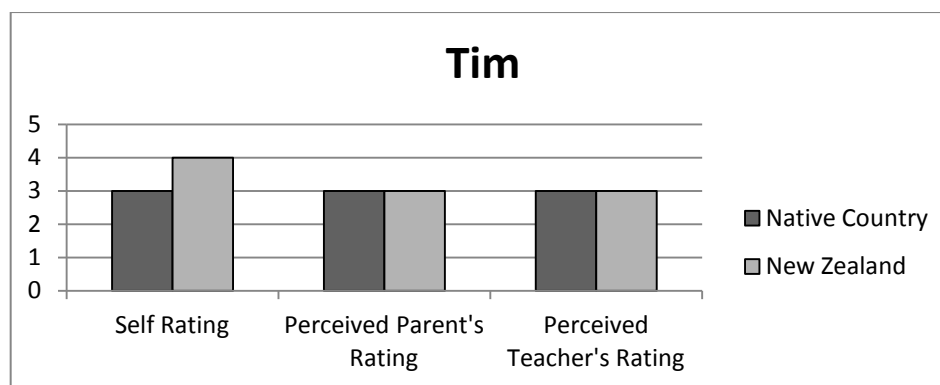


Figure 6(v): Tim's perceived ratings of his mathematics ability

Tim's perceived rating of his mathematical ability also reflected consistency with regards to his perceived parent's rating and his perceived teachers' rating. However, his slightly higher self-rating illustrated in Figure 6(v) might have been suggestive of a more positive mathematics academic self-concept in his New Zealand classroom environment compared to his classroom environment in India.

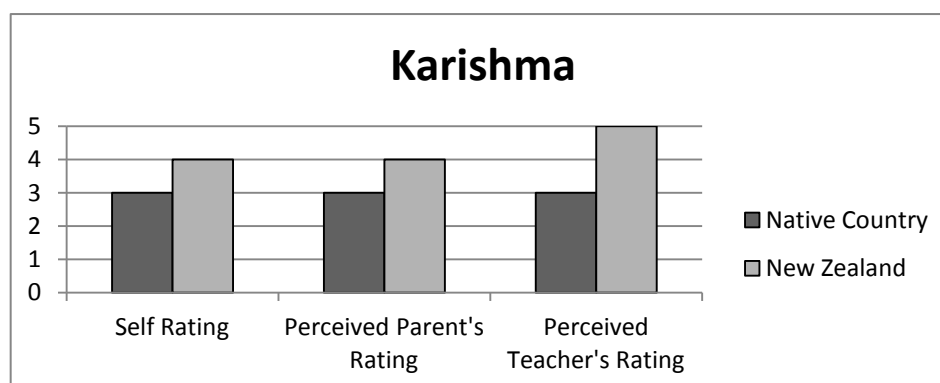


Figure 6(vi): Karishma's perceived ratings of her mathematics ability

Karishma's perception of her mathematics ability in Fiji as being average was based on her own rating and those of her perceived parent's teachers' ratings. However, Figure 6(vi) illustrates a higher rating in New Zealand in all three perspectives. Therefore the overall impression was that Karishma seemed to have a higher mathematics academic self-concept in New Zealand than she had in Fiji.

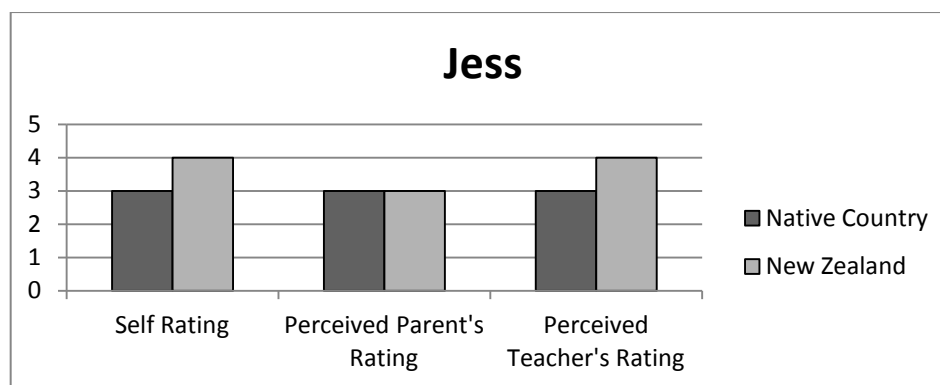


Figure 6(vii): Jess' perceived ratings of her mathematics ability

Jess has also rated her mathematics ability in her home country, the Philippines, as average from the three perspectives. However, higher ratings were given, as illustrated in Figure 6(vii), of her perceived parent's ratings and the perceived teacher's rating in New Zealand. The overall picture created was that Jess had a higher mathematics academic self-concept in New Zealand than in the Philippines.

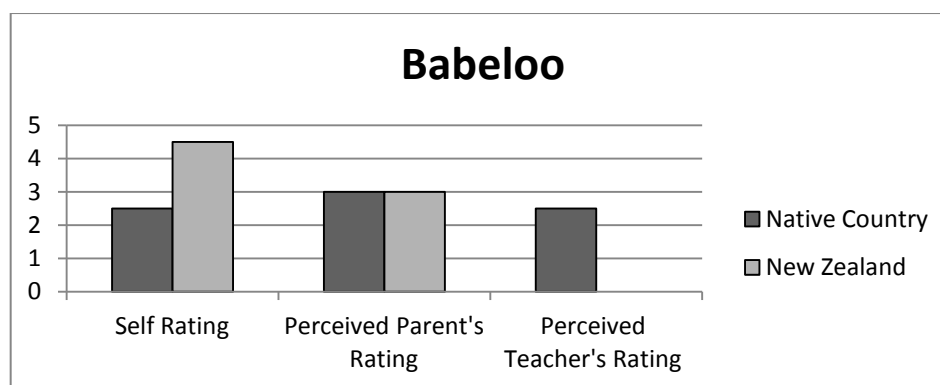


Figure 6(viii): Babeloo's perceived ratings of her mathematics ability

Figure 6(vii) shows that Babeloo had rated her mathematics ability in South Africa as average or below average from her own perspective, her perceived parent's perspective, and from her perceived teacher's perspective. While she rated her perceived parent's rating to be the same in both countries, she rated her own ability as higher in New Zealand. In spite of her uncertainty in her teacher's rating of her ability, the overall impression was that she seemed to have a higher mathematics academic self-concept in New Zealand than she had in South Africa.



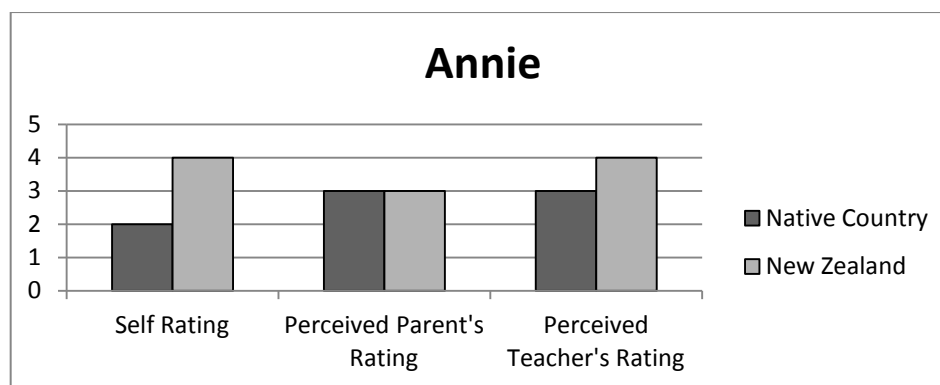


Figure 6(ix): Annie's perceived ratings

Like Babeloo, Annie had also rated her mathematics ability in her home country as average or below average. While her perceived parent's ratings remained the same in both countries, she rated her ability as higher in New Zealand from her own perspective and her perceived teacher's perspective. Figure 6(ix) suggests that Annie has a slightly higher mathematics academic self-concept in New Zealand than she had in the Philippines.

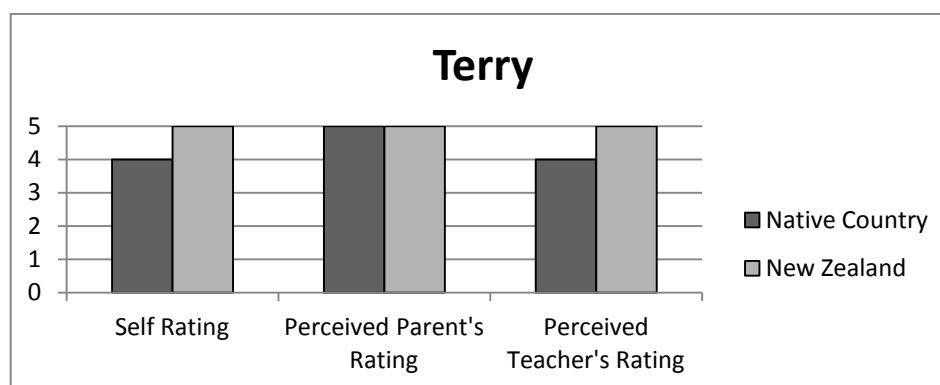


Figure 6(x): Terry's perceived ratings of his mathematics ability

Figure 6(x) illustrates that Terry had rated his mathematics ability to be above average in his home country and in New Zealand from all three perspectives. However, he rated his ability slightly higher in New Zealand from his own perspective and his perceived teacher's perspective. Overall his ratings suggested that he showed an increased mathematics academic self-concept in New Zealand than in China.

### *Attitudes and assessments*

The participants' attitudes towards assessments emerged from discussions during the interviews about their thoughts concerning the grades that they had gained in the assessments. Interestingly, nine participants felt the need to share their end-of-year examination results with me. These also provided important information about their aims and expectations for the future. Being a teacher at the school I was familiar with the assessment format and grading criteria. The assessment grading system used at their school was similar to the national grading system comprising "not achieved", "achieved", "merit", and "excellence". In the year 9 and 10 levels the "not achieved" had been replaced with two grades being "beginning" and "developing". The grades that the participants made reference to must be viewed as a continuum ascending from "beginning" to "excellence", where "beginning" and "developing" grades represented a failure to achieve the assessment. The participants made comments about various assessments that they completed at the end of the topics studied and the end of year examination that comprised all the topics that were studied for the year. The year 9 examination comprised three assessment booklets: (1) algebra, patterns and number; (2) geometry and measurement; and (3) statistics and probability. The year 10 examination comprised six booklets: algebra; number; measurement; trigonometry; statistics; and probability. The students gained a separate grade for each booklet in the examination.

According to Abdulla he had not passed any of his assessments in class and attributed this to his lack of understanding. He firmly believed that his grades would improve once his English language skills improved.

*I cannot pass because I do not understand anything. I will be better if I can understand.*

Abdulla was absent during the examination period and did not sit the final examination.

Van seemed to be very motivated to gain the highest grade in his assessments. The following response to his construction assessment was indicative of his disappointment in not gaining an "excellence" grade:

*Only an 'achieved' grade because I'm not really good at geometry.*

Van spoke about having no confidence in passing his English examination, but was eager to strive for excellence in the mathematics examination. According to him he gained an “achieved” grade in the algebra and statistics assessments, “merit” grade in measurement, number and probability, and an “excellence” grade in trigonometry. Although Van seemed disappointed in his examination results, these results made him more determined to improve his grades next year and believed that consistent practice from his mathematics textbook and homework book would help him achieve this goal.

Tim, on the other hand, did not appear to have high expectations when it came to his assessment grades. When asked what grade he hoped to gain in a class assessment on probability, he said:

*I hope to get ‘achieved’ because it would mean I pass.*

Although Tim worked at a higher level in preparation for the examination, he evidently would have been happy to pass all the assessments with an “achieved” grade, as indicated in his words:

*I will be happy to get ‘achieved’ but will try for ‘merit’ or ‘excellence’ in the exam.*

Tim passed the number, measurement, statistics, and probability examination assessments with an “achieved” grade and gained a “beginning” grade in the trigonometry and a “developing” grade in algebra. Tim was not available to be interviewed after the examination but he brought his examination scripts to me before he had left for India.

Annie believed that a good learning environment is fundamental to learning. She supports this comment by comparing her experiences in two New Zealand classroom environments:

*It is easier to learn when you are in a good environment. Because last year I wasn’t really...I didn’t really fit in my last school and I didn’t have any good results. When I came here I had good friends and good teachers and I did better.*

Annie also revealed a perfectionist nature because she considered all grades below an “excellence” to be a failed attempt. The high expectation of herself was evident in her response to her gaining a “merit” grade in a class assessment. With lowered eyes she said softly:

*I failed*

According to Annie, she gained an “excellence” grade in probability, an “achieved” grade in statistics, measurement, number and trigonometry, and a “developing” grade in algebra. Annie’s self esteem seemed to have been adversely affected by her performance in the examination, as expressed in her words:

*I thought I was pretty good but when it came to my exams, everything just falls down.*

Upon reflection Annie believed that her examination grades might have been attributed to the large volume of work in the examination while class tests comprise a single topic. This was suggested in the following sentiments she shared about her examination results:

*... cause the exam is all together and... too much work.*

Like Annie, Andrew had been striving for an “excellence” grade in his assessments. His disappointment in not gaining an “excellence” grade in his assessment was apparent in his words:

*I got a merit and I can get an excellence. I got merit and it’s not good so I’m not happy.*

Andrew believed that he did not gain an “excellence” because he might have been away from class and missed the work.

*I think I was at the physio so I just did not know how to do the questions.*

In spite of his grades being lower than his expectations Andrew felt that he had to inform his grandparents about his achievement in New Zealand by posting a photograph of the grade on the Internet.

*I wanted to put on the Internet because my grandparents is in China want to see it. So I put it in the website...there’s a website only for me so I can put on the picture so my grandparents can see it.*

Although he was not proud of his grade he felt that because his grandparents and friends did not understand the difference between an “excellence” grade and a “merit” grade, they would not be disappointed as well.

*They [grandparents and friends] do not understand English.*

Andrew passed the examination but felt that his results were not as good as he had expected them to be.

*I got ‘excellence’, ‘merit’ and ‘achieved’. It was not really good I wanted to get three excellences.*

His disappointment in his performance appeared to have been based on his comparison of his own average achievement to his friend’s excellent achievement:

*Three excellent because my friend came to New Zealand only four months ago but he got three excellence grades.*

Andrew believed that he needed to be placed in a better class. He felt that his current class environment was not conducive to work as suggested in the following comment about the students in his class:

*they didn’t work hard and they didn’t listen to teacher. I need to change class to better one.*

He also felt that being in the same class as his friend from China, would help him because they would be able to discuss the work. This was evident in the following words:

*I want to work harder than before I want to be in a nice class. Being in my friend’s class would be good because we can talk together about math. Maybe he can help me, I can help him for English, he can help me for maths.*

The friend that Andrew was referring to seemed to fit Terry’s profile because he had achieved excellent results in all his assessments as well as the examination. In spite of gaining an “excellence” grade in the three examination assessments, Terry claimed to have found the examination somewhat difficult.

*It’s difficult but it’s alright.*

He offered the following advice about writing assessment questions that he believed would benefit students with limited English language proficiency:

*I think can make the question more easy to understand.*

Babeloo viewed her mathematics assessment grades in New Zealand as an improvement compared to the grades that she used to obtain in South Africa. She believed that in spite of her efforts, her results were usually of an average or below average level.

*I tried to get excellence [in South Africa] but I ended up getting achieved or developing.*

She compared her previous grades to her current grades in New Zealand and seemed pleased with her higher level of achievement in her assessments in New Zealand. The following statement showed her satisfaction in her effort and progress:

*I usually get merits, I try to work harder to get excellence but merit is good enough.*

However, she acknowledged achieving a below average grade in an assessment in New Zealand and took responsibility for it, attributing it to her own negative attitude towards learning and lack of interest in her work.

*I got a developing because of my attitude for the last few weeks. Yeah I haven't been keen about anything.*

While Babeloo had been striving for excellence in the examination, she said that she would be satisfied with “merit” grades.

*I'll be going for excellence but I will be glad if I get merit.*

However, her results fell short of her expectations. Unfortunately Babeloo's attitude and reaction towards her examination grades was not captured in an interview, her disappointment was evident in her expression when came to inform me that she would not be available for an interview because she was not returning to the school the next year, however, she left her examination papers with me.

Jess seemed to really enjoy learning mathematics and strove to do her best. She also seemed to understand the dynamics of the classroom exceptionally well. She also appeared to have been aiming for excellence in all her assessments and the examination. Despite gaining an “achieved” grade in the algebra and number booklet, and a

"developing" grade in statistics and probability booklet, Jess presented a very disappointed yet mature acceptance of her examination grades, as suggested in her words:

*It's like alright. I got two 'achieved' grades and a 'developing' grade . It's fine, I guess, except for the developing. It[developing] is like not achieved, like under the passing grade. I was hoping to get at least 'merits' but it's okay.*

Although Ian was in a foundation class and received extra assistance from a teacher aid, he expressed concern for his low assessment grades. Ian also believed that he needed to work harder to improve his grades.

*No, I'm not happy, it's ['beginning' assessment grade] pretty low. I must listen to the teacher and know what to do to make it [the grade] better.*

He showed more acceptance of his achievement when he received another assessment result in which he gained a "developing" grade. This was evident in his words:

*It's okay, it's okay it's not that much bad. I would have liked to do better and achieved 'excellence'.*

Although Ian felt that he had worked very hard preparing for the examination, he found the examination very difficult. He was very disappointed to have gained 'beginning' grades in the three assessment booklets. He attributed the poor result to his not being in class and therefore not understanding some of the learning experiences that may have taken place in class.

*It [the examination] was hard, some of it was hard because some of the things there I didn't learn them in the class. Maybe I wasn't there.*

He also felt that being taken out of class by the teacher aid might have contributed to his poor performance in the examination because the work done in class was different to what he had been taught by the teacher aid.

*It's [examination grades] not good because the one [work] that we doing in the class is different than the one [work] she [teacher aid] is doing. It's [the work] more easier. There was different stuff I haven't learned before in the exam."*

He also believed that it would have been more beneficial for him to be in class to understand mathematics. He realised the importance of class learning and the influence of the teacher as suggested in his words:

*You know we all sit down in the class and we just listening to the teacher.  
So we know. We know what to do.*

In spite of not passing any assessment in year 9, Ian had not lost his desire to become an engineer. He had high expectations and was determined to make an effort in year 10 to achieve his desired grades. This was evident in the following statement:

*I will work hard to understand the work and get the answers correct  
because I want to be an engineer.*

While Karishma had always presented a very motivated attitude towards her learning, she believed that her assessment results were not high enough because she was a new student. She also believed that raising her expectations from “merit” grade to “excellent” grade would improve her assessment results as suggested in the following comments:

*I think I'll hope for an excellence this time because every time I'm getting  
an 'achieved' because I'm new and stuff so I got 'achieved'. In the last  
test I was just one point away from merit.*

According to her, she had gained an “achieved” grade in the statistics, probability, number and measurement, and a “developing” grade in the algebra examination assessment booklet. She gained a “beginning” grade in the trigonometry assessment because she had not attempted the assessment. Karishma attributed her poor performance in the trigonometry assessment to her not having studied the topic in Fiji and the fact that her current class had completed the unit prior to her arriving in New Zealand. She was determined to learn the work that she had missed and sought help from her teacher after the examination.

While Karishma also felt that she needed to make more of an effort in year 11, she also expressed disappointment in her algebra result and attributed her unsuccessful attempt to her confusion with the representation of variables.

*I get confused. I'm more comfortable with  $x$  instead of  $x$  and  $z$ 's. But when  
it comes to  $d$ 's and  $a$ 's and stuff, I get really confused.*

She also believed that the variable use in the examination differed from the way it had been taught in class by the teacher thus adding more confusion.



*Most of the teachers use  $x$  [variable] most of the time so I'm more comfortable with  $x$  because it's more easy to do. And all the  $a$ 's and the  $b$ 's and the  $h$ 's and the  $l$ 's [variables] confused me.*

The voices of the participants provided an understanding of the expectations and attitudes that they held towards their assessment grades. While some of the participants expressed feelings of disappointment, others saw their examination grades as having served a diagnostic purpose in highlighting the areas for improvement in the future.

The findings presented in this chapter provided a glimpse into the transitional experiences of the participants in their respective mathematics classrooms. Their perceived self-concept from multi-perspectives provided a picture of how they saw themselves, while their attitudes towards their assessments provided an understanding of where they hoped to see themselves in the future. Together these aspects provide a basis for interpreting how the participants will continue to shape their future and find their place. A discussion of how the students negotiate their own place in their new mathematics classroom environment is presented in chapter 9 in light of their perceived attitudes, aspirations and assessment grades, and their perceived academic self-concept.

## **Chapter 7: Understanding the learning environment**

The lived experiences of immigrant students in their respective mathematics classrooms form the source of this phenomenological study. It has been said that our best resources are not abstract theories and principles but the often untapped experiences of real students in the classrooms (Sanchez, 2007). These “borrowed experiences and their reflections on their experiences” (Van Manen, 1990, p. 62) provided meaning and understanding of what being a new student in a mathematics classroom was like for the ten immigrant students. What the students had to say triggered the discussion that follows and brings to the fore the importance of past and present mathematics education experiences in helping them converge their two worlds and negotiate their own place within the mathematics classroom.

The comparison that immigrant students made between the past and present classroom experiences was inevitable and may be fundamental for understanding their diverse worldviews of mathematics (Croom, 1997). Dissimilar to Tanners’ (1997) study that highlighted the problems faced by schools in accommodating diverse immigrant populations, this current study is premised within Davidson and Kramer’s (1997, p.131) notion that diversity is not only a gift but also “one of a classroom’s most powerful assets” and the assertion that diversity should be regarded as potentiality and not as a problem to be remedied (Gorgorio, Planas & Vililla, 2002; Davidson & Kramer, 1997).

This discussion chapter titled, *understanding the learning environment*, presents a theoretically-based perspective of the ten students’ cross-cultural experiences, the language and communication barriers that they had faced, and how they had coped with the mathematics content in their new environment.

This study aimed to gain an understanding of the mathematics classroom experiences of ten secondary school immigrant students’ in New Zealand by listening to what they had to say about their past and present experiences in the mathematics classroom. Such an understanding is fundamental to all mathematics teachers who purposefully attempt to provide an inclusive learning environment where learners of diverse backgrounds feel a

sense of belonging. Davidson and Kramer (1997) aptly described what they believed it would feel like for a student in a class in which he or she felt like an outsider; it would be like looking "into a mirror" and not seeing their own reflection (Davidson & Kramer, 1997, p. 139) and would create an environment where students would feel invisible, discounted and discredited (Davidson & Kramer, 1997; Igoa, 1995). Similarly Van Manen (1990) stated that students' experiences arise from their lived social, cultural and historical contexts and that they learn from active involvement in their environment. This initial learning that occurs on a social level, according to Van Manen (1990), later becomes internalised on an individual level.

### ***The cross-cultural classroom experience***

The stories and observed interactions of the ten immigrant students in this study revealed some of the cross-cultural experiences that they had been exposed to. One difference in the classroom experiences involved student behaviour and disciplinary measures employed to curb misconduct. This finding parallels the educational experiences of Chinese immigrant students in Canada who according to Li (2009) were actively involved in finding their intercultural space between their disciplined heritage tradition in their home countries and the mainstream culture at their new schools. This adjustment process, according to Shim and Schwartz (2007), becomes less problematic as immigrant students experience greater contact with and understanding of their new cultural environment.

According to Tanners (1997) teachers of immigrant students asserted that immigrant students displayed tentative behaviour when they first arrived in their new environment and they put this down to them experiencing a culture shock. The culture shock was attributed to the abundance of freedom in New York classrooms compared to the regimented classroom culture that most of the immigrant students had been accustomed to. Their newfound freedom also seemed to have steered the once motivated students away from their academic aspirations and often towards other less desirable non-academic preoccupations with their peers (Tanners, 1997).

An important cultural difference that came to the fore during an interview with Abdulla was that:

*in Saudi Arabia there were single sex schools and here there are mixed sex schools.*

In spite of Abdulla acknowledging that:

*it is different,*

he seemed to have been positively accepting of his new co-educational classroom environment as suggested by the claim that:

*it is fine.*

The attitude displayed by Abdulla may be representative of a complete paradigm shift (Tanners, 1997) from a traditional Saudi Arabian single sex classroom to his co-educational New Zealand classroom. This may be interpreted as his eagerness or need to become acculturated or immersed in his new environment (Moyerman & Forman, 1992; Wong-Rieger & Quintana, 1987).

Tanners (1997) also found that immigrant students often come from a more structured or strict cultural background. Some of the participants' observed classroom mannerisms in appeared to verify such an idea. The change in Karishma's behaviour from a quiet student when the teacher was in the classroom to becoming a playful Year 10 student when the teacher was not in the classroom, not only suggested what she considered to be acceptable behaviour in the presence of a teacher, but may also be suggestive of her past experiences in her Fijian classroom. Fijian classrooms were characterised by the teacher teaching the mathematics concepts and the students working quietly and independently (Seah, 2002).

The notion of strict discipline had also become evident when Ian tried to communicate with his peers without making eye contact with them. Ian seemed to do this so that the teacher would not know that he was talking to other students. His words:

*I have to be quiet ... I'm not allowed to speak to another person,*

were indicative of his idea of appropriate classroom behaviour and the disciplined focused classroom practices to which he had been exposed in Nigeria. Immigrant students who have come from quiet classroom environments may perceive students in their new environment as being “very loose” and lacking in discipline as was found in Tanner’s (1997, p. 244) study. Although Ian did not explicitly express such thoughts, his desire to communicate with other students without the teacher knowing may have also been associated with his past classroom experiences in Nigeria where corporal punishment had been practised as a disciplinary measure (Brown, 2009).

Ian, from central Africa, and Van, from South-east Asia, both mentioned coming from classrooms where they had experienced corporal punishment as a disciplinary measure. Ian had recalled non-compliance such as lateness to school and not completing homework tasks as warranting a:

*whacking,*

with a stick from the teacher. The severity of corporal punishment that students may have been exposed to in Nigeria may be understood in what Chianu (2000) terms “child abuse in the guise of corporal punishment”. According to Chianu the teacher stands *in loco parentis* legally and has a right to correct the student’s behaviour through “a blow or other force” (2000, p. 1006). The subjective interpretation of how severely the student should be struck has resulted in deaths and serious bodily harm to students in Nigeria (Chianu, 2000). If this had been the background from which Ian had come, then the New Zealand classroom would certainly present a very different learning environment for him.

Similarly Van’s recollection of students being caned or yelled at, in his mathematics classroom in Thailand for misbehaviour, endorsed the findings of recent studies about the current practice of corporal punishment in eastern countries. Kaufman (2004) and Krajewski (2006) mentioned that if the high academic expectations of the teachers and the parents were not met then it was commonplace for Asian students of all ages to receive physical punishment. While Brown (2009) also mentioned the practice of corporal punishment in schools in South Korea, it was associated with student

misconduct and lack of respect for teachers. Both of these aspects negatively affect the student's development, and according to Confucian filial philosophy, must be corrected by the parent or teacher through strict disciplinary actions (Han & Scull, 2010). This philosophy of harsh discipline appeared to manifest in Van's assertion:

*if teacher gives me detention then I will feel bored,*

that may be interpreted as him perceiving physical punishment as a more effective form of punishment than students sitting in the detention room and writing lines. Perhaps, for Van punishment is associated with physical pain (Chianu, 2000). Although the New Zealand classroom environment may be more relaxed in comparison to Van's Thailand classroom experience, his home environment may still be the same as it had been in Thailand. Perceived parental expectations of the students will be discussed later.

While Jess' eagerness to participate in the class discussions always seemed to be overpowered by other students in the class calling out the answer, this occurrence should be understood within the background of cooperation and preservation of social order from which Asian students have come (Baker, 2008). Not drawing unnecessary attention to one's self may be another reason why other students in this study chose not to participate in class discussions. For Ian answering questions during whole class discussions was something that he disliked because as he had emphatically pointed:

*I don't like that... I don't like doing that. Too shy and I don't like it.*

Babeloo, on the other hand, did not participate in class discussion for fear of being:

*mock [ed],*

by other students if she were to have answered incorrectly. This behaviour is consistent with what Han and Scull (2010, p. 603) term "saving face" when a student is too afraid to answer incorrectly for fear of being seen as incompetent by others.

Walker and McCoy (1997) assert that students choosing to be silent in the mathematics class may not only be attributed to the embarrassment of not knowing, but it may also be associated with being different or having an accent (Igoa, 1995). Although Karishma was assertive and loud during group discussions, she chose to speak softly during whole

class discussions. This could be attributed to the fact that she did not need to be loud because she had been seated towards the front of the class. Another dimension to her behaviour may be understood in light of a Fijian teacher's comparison of the Australian classroom and the Fijian classroom. In this study by Seah (2002), the Fijian teacher found difficulty adjusting because he had been accustomed to the students being silent when the teacher taught from the front of the classroom, and working in an environment of independence where discussions were not encouraged.

Immigrant students who have been exposed to the teachings of the Confucian heritage culture may view silence as the norm in the classroom environment (Han & Scull, 2010). According to these authors, the first pertinent idea of Confucianism is that obedient students only speak when spoken to and they should not disturb the flow of the lesson. Influenced by this or a similar cultural upbringing students would find it disrespectful to volunteer a comment without being asked to do so by the teacher. Contrary to the view of the teacher as the facilitator and not the fountain of knowledge (Campbell & Rowan, 1997), the second idea is that a teacher-centred classroom is essential for the transmission of knowledge from the teacher to the student (Han & Scull, 2010). This view was also expressed by Baker (2008) whose investigation of English language teaching in Thailand, revealed that traditional Thai education was based on Buddhist philosophy of preservation of natural, hierarchical and social order. Teachers are accorded a high status as the "givers of knowledge" and students are regarded as inexperienced to offer ideas (Baker, 2008, p.139). This idea of the teacher being an unquestionable figure of authority mirrors the era of the industrialised society characterised by overcrowded classrooms that also employed corporal punishment as a tactic to maintain student discipline in mass education systems (Brown, 2009).

Tim's silence during class discussions and the fact that he was comfortable approaching the teacher on a one-on-one basis may be suggestive of his discomfort in whole class discussions. However, his interest in what the other students had to say suggested his eagerness in being involved in the learning experience. Students choosing not to contribute to class discussions may also be associated with their own perceived

inadequacies as pointed out by Walker and McCoy (1997). Terry's hesitation to be involved in class discussions may be attributed to his own feeling of inadequacy. Terry expressed a desire to answer questions posed by the teacher but felt that working the answer out in his book or thinking about the answer silently was what he should be confined to because of his limited English language skills. This is consistent with what Tanners (1997) alluded to about the language difficulties experienced by immigrant students in trying to be understood by their teachers and peers. In her study she asserted that immigrant students felt more comfortable speaking in their mother tongue and found it difficult to communicate in class because they could not be understood by their teachers and peers.

For most of the immigrant students in this study participation in class discussions seemed to be an uncomfortable experience. This may be attributed to a number of factors: perhaps they had not experienced it before in their home country; they did not want to draw unnecessary attention to themselves; or that they felt they did not have sufficient language skills to express their ideas. Valencia and Johnson (2006) equate insufficient language acquisition to low levels of acculturation that inevitably result in immigrant students feeling a sense of alienation in their new environment.

### ***Language/communication barriers***

The challenge that immigrant students face is to “speak, read and write” in a language with which they are not familiar (Tanners, 1997, p. 244). The affirmation that English was not the first language of all ten participants necessitates an understanding of the status of English language usage in the countries that they have come from. Seven of the ten students had come from the Asia-Pacific region including India, China, Thailand, Philippines and Fiji, and the remaining three had come from Nigeria, South Africa and Saudi Arabia. The varying degree of English language proficiency that the immigrant students presented may be explained by the status of English in their respective countries.



Current research points to the importance of immigrant students having proficiency in the national language to be able to successfully integrate and belong to their new host cultures (Roer-Strier & Strier, 2007). According to Kachru and Smith (2009) the three concentric circles model (inner, outer, and expanding circles) provided an overview of the presence of English language in the various countries. New Zealand is considered to be in the inner circle (Baker, 2008; Kachru & Smith, 2009) because English is used as the medium of instruction at majority of the schools, except for bilingual Māori immersion schools that were established since 1985 (Harrison, 1998; Ward & Masgoret, 2008). India and the Philippines would be grouped in the outer circle because English is used as an “institutionalised additional language”, while China and Thailand would be grouped as part of the expanding circle because English has a foreign language status in those countries (Baker, 2008, p. 132; Kachru & Smith). Although English continues to gain impetus in its prestigious world language status (Al-Nofaie, 2010; Gunderson, 2000; Yashau, 2009), immigrant students are influenced by varying degrees of exposure to English in their home countries.

Although Fiji has also been listed in the expanding concentric circle by Baker (2008), English, Hindi and Fijian are the official languages of instruction at schools, making most Fijians bilingual or trilingual (Rao & Harrington, 1997; Shameem, 2004; Shameem, 2007). Karishma’s smooth transition into the classroom environment may be attributed to her exposure to mathematics textbooks written in English in Fiji. Similarly Jess and Annie from the Philippines, and Tim from India, also felt comfortable working from English written mathematics textbooks that they had been accustomed to in their respective countries (Baker, 2008).

The following responses by Terry:

*... maths is not all English ... have many number and just draw picture  
so it's easy to do,*

and Van:

*... easy for me ... because I think it's easy for me ... and don't have a lot  
of English to understand*

towards possible language problems may be associated with the perception of mathematics as a neutral and language-free subject. This perception parallels the belief of non-English speaking students who regard mathematics primarily as a subject involving the manipulation of symbols (Thomas, 1983). This belief is further strengthened by their performance in skills-based assessments and through rote learning often prevalent in the lower secondary school level (Thomas, 1997). The coping strategy mentioned by Terry:

*... maybe I can look at the answer [at the back of the book] maybe will know what that will mean,*

seemed to suggest a single correct skills-based answer involving symbol manipulation. While students with limited English experience may excel only in arithmetic, a subset of mathematics (Resnick, 1988), they experience problems when required to solve contextual word problems (Thomas, 1997). Terry appeared to have already experienced this difficulty in some of his assessments as inferred in his comment about the end of year examination:

*I think [the teacher] can make the question more easy to understand,*

with reference to word problems.

Ian presented a moderate level of English language difficulty and was able to express himself orally to be understood during the interviews. Consideration of Nigerian people's attitudes towards English in the school system may provide an understanding of his difficulty. According to Fasanmi (2010) Nigeria does not have an official national language because of the many dialects spoken by Nigerians. However in spite of the many languages, many Nigerian parents preferred sending their children to English medium schools because they believed that higher competence in English would offer better prospects for the future. Ian seemed to have bridged the gap between his mathematics learning in Nigeria and in New Zealand, as suggested in the following information he offered about the language in which he thinks:

*I think in English when learn work in New Zealand ... I think in Nigerian [Igbo] if I learn work in Nigeria, and if work in New Zealand is same as one I learn in Nigeria, I think about it in Nigerian [Igbo].*

Interestingly Ian's statement suggested that he thought about mathematics concepts in the language in which they were taught to him and that his language of choice was his mother tongue. This strategy employed by Ian has merit within Yushau's (2009) study that speaks of mathematical language being technically specific and dense in any native language and therefore resulting in second language learners experiencing problems when trying to translate the mathematics content into another language. A further example of the language problems that Ian faced was being unable to comprehend language rich instructions:

*I know how to add them. I didn't know I had to add them.*

This statement suggested that he probably would have been able to solve a symbol rich algorithm involving numbers and a plus sign (Thomas, 1983). Another important factor to consider about Ian's response is that perhaps he had been exposed to a learning environment that was procedure driven and perhaps could not apply his knowledge in solving a contextual (Boaler, 1998). This experience reiterates Boaler's (1998) argument that an inability to solve problems may not be due to a lack of mathematical knowledge but rather to their interpretations of the demands of the problem.

According to Babeloo her prior exposure to an Afrikaans medium schooling in South Africa and her limited English language skills had caused her initial problems adjusting to the New Zealand's English medium mathematics classroom:

*at the beginning it was really hard the terms and everything is quite different. The words...are different because it is in a different language.*

However, in the short period of time that she had resided in New Zealand, she seemed to have developed excellent English language skills and was able to converse fluently in English during the interviews. The diverse languages of South Africa presented by Napier (2002) provide a possible explanation for the exposure that Babeloo may have had to English while she had resided and attended school in South Africa. This exposure may have contributed to her proficiency in English in her New Zealand mathematics classroom.

A brief description of the presence of English in Saudi Arabia as described by Al-Nofaie (2010) may provide an understanding of Abdulla's limited exposure to English prior to coming to New Zealand. English had been introduced into Saudi Arabian schools since the early twentieth century as a foreign language for the purpose of acquiring knowledge from other countries, transmitting knowledge to other countries, and communicating with people from other parts of the predominantly English-speaking world (Al-Nofaie, 2010). As a result English is being adopted at universities as the medium of instruction for mathematics courses to Saudi Arabian students who wish to expand their mathematics learning to international standards (Yushau, 2009). Saudi Arabian students who choose to study English at public schools do not have sufficient exposure to the language because they only begin learning the language in their sixth year of schooling and are subjected to four short lessons per week (Al-Nofaie, 2010). Consequently Abdulla would not have studied English or would have had very limited exposure to learning English in Saudi Arabia. His inability to communicate was illustrated in an incident that resulted in him receiving punishment in the form of school detention. The incident involved Abdulla arriving late to his mathematics class because he had gone to make a telephone call to his dad. He was not able to explain his lateness to the teacher and was issued a lunchtime detention. This incident may be described as the compounding effects of immigrant students experiencing language problems and not knowing the school rules (Bishop, 2002).

Abdulla's response to why he had not tried to explain to the teacher that he was unwell:

*I wish I could have got it across but if I can't explain it to her why would I bother,*

depicted a sense of eagerness in wanting to be able to converse with the teacher and a sense of hopelessness because he felt that he was unable to make himself understood. His helpless acceptance of his situation seemed to be further exemplified in his response to the punishment in the form of detention that he had been given:

*It's okay ... it's only writing, I'll sit and write, it's not a big deal.*

During the course of the interview Abdulla had displayed frustration at not being able to understand everything in the classroom:

*... I don't understand the teacher. I did not understand the lesson .... I don't understand people speaking.*

This statement not only confirms Kirova's (2010) claim that all immigrants who do not speak the language spoken in their new country, experience problems understanding what others say, but also seemed to echo what Davidson and Kramer (1997) referred to as the immigrant students learning about a world in which they do not exist.

The language barrier may result in fundamental mathematics concepts being lost especially if concepts are not developed sufficiently (Thomas, 1997). This is consistent with the frustration that Abdulla seemed to have felt when his understanding of mathematics as a symbol manipulation discipline became more complex when he was confronted by geometric reasoning:

*I do understand if it is a minus or a plus or something.*

He seemed unable to draw links between the concepts, lines and angle measurements:

*... do not understand the degrees. I don't know how it is 90 when they are just lines. What do you mean... how can lines be 90.*

While limited English language skills may appear to be problematic for immigrant students, the following thought about the potential of second language acquisition offers an optimistic point of view:

The language we learn has its roots in the social environment in which we learn it. Yet, we are never locked within a single grammar, or a particular understanding, because the first language we learn also puts us in a position to step out of that language to interpret and critique our present and our past. Although we are shaped by our historical roots, and derive our prejudices and biases in interpretation from those roots, we can also go beyond them to create new structure and language systems when we interact with others.

(Herda, 1999,p. 26)

### *Coping with the content*

Contrary to the assumption that mathematics is a pure and neutral discipline, current thinking has exposed the textbook as an infestation of cultural bias (Macintyre & Hamilton, 2010; Shan & Bailey, 1991). Covert messages of racism, sexism and a non-inclusive curriculum have been traced to textbooks (Shan & Bailey, 1991). A study by Casteel and Rider (1994) found that students performed better in comprehension tests where the main characters were of the same ethnic group as they were. Therefore, the absence of minority immigrants in mathematics textbooks may have implications for their attitudes and achievements in mathematics (Begg, Bakalevu, Edwards, Koloto & Sharma, 1996; Ladson-Billings, 1995; Nkhoma, 2002; Thomas, 1997; Zevenbergen, 2003). Unlike countries where mathematics teaching is confined to prescribed textbooks (Haggarty & Papin, 2002), textbooks do occupy a prominent role in New Zealand schools together with a variety of resources in teaching mathematics. Although identifying bias in the textbooks used in the mathematics classroom of the participants was outside the scope of this study, apart from the language difficulties none of the participants mentioned cultural disorientation when using their textbooks.

The language difficulties experienced by the participants may have a bearing on their understanding of mathematics. Andrew who seemed to have felt confused when trying to understand questions from his mathematics textbook expressed language difficulties:

*... I can't understand when it's some exercise and some texts. That's confusing I think.*

Although Andrew did not provide explicit examples of his difficulties an example of this difficulty was evident in the confusion that Terry experienced in trying to understand the following instruction from his textbook: "Use the blackline master to complete each shape" (Barton, 2008). He seemed not to understand what "blackline master" meant and after typing the words into his electronic Chinese-English dictionary, he looked more confused than ever. Terry's confusion made me curious and I looked up the meaning of "blackline master" in the *World Book Dictionary*.

In spite of the term “blackline master” being commonly used for templates that may be copied for use in the classroom situation, according to the World Book dictionary (1989) the word “blackline” is non-existent. However, if Terry’s electronic dictionary offered him alternative options such as separating the words “blackline master” into three words “black”, “line” and “master”, then his confusion may be explained within the numerous meanings that he might have been confronted with, as shown in my own search for the meanings of the three words.

My search revealed ten meanings were given for “black” as an adjective, five as a noun, one as a transitive verb, and another as an intransitive verb. The following are just two of the many meanings available in *The World Book Dictionary* (1989, p. 207): black<sup>1</sup> – belonging to a human group with dark skin; and black<sup>2</sup> – opposite of white or absence of light. Thirty-five meanings were given for the word “line” as a noun, nine as a transitive verb, and two as an intransitive verb. The following three meanings are a sample of the numerous meanings provided in *The World Book Dictionary* (1989, p. 1215): line<sup>1</sup> – a long, narrow mark or band; line<sup>2</sup> – the equator; line<sup>3</sup> – cover the inside surface of a container or garment with a layer of different material. Sixteen meanings were given for the word “master” as a noun, five as an adjective, and three as a transitive verb. The following two are part of the many meanings provided by *The World Book Dictionary* (1989, p. 1279): master<sup>1</sup> – a man who has people such as slaves or servants working for him; and master<sup>2</sup> – a ship or boat with specified number of masts. In spite of the readily available language dictionaries the above example is illustrative of the immense difficulty that immigrant students, like Terry, are often faced with when trying to make sense of the literal meanings of information, questions and instructions in their mathematics textbooks.

Another example of the students’ difficulty in understanding contextual mathematical concepts was evident in Ian’s interpretation of an assessment task that required him to draw a probability tree to show all possible gender outcomes of the children if there were three children in the family. Ian’s attempted answer to the question and his explanation for his answer revealed to me that he was faced with multifaceted

difficulties in comprehending the question. The first difficulty was the lack of specific mathematical knowledge required for him to complete the task. The second difficulty was the use of the words ‘gender’ and ‘if’. As asserted by Thomas (1997) the question assumes that the reader understands the meaning of the word ‘gender’ in the statistical context in which it has been used, while the word ‘if’ may have presented a barrier because it required a higher level of language skills to understanding logical connectives (Gardner, 1980). The third issue that surfaced was Ian’s drawing of the tree, the duck, and three houses in response to the question. His explanation for this drawing:

*for the kids... a tree and duck for the kids ... to play with ... and house to live in,*

in spite of being mathematically “incorrect” provided an understanding of how Ian used the words ‘draw’, ‘tree’, ‘children’, ‘family’, and ‘outcomes’ to build a holistic picture that made sense to him. This example illustrated how a student’s worldview and cultural background affects their understanding of mathematics in the classroom (Bishop, 1988; de Abreu, 2002; Thomas, 1997).

The dissimilar cultural background compounded with the unparalleled mathematical concepts that immigrant students are sometimes confronted with when they arrive in a new country, may create gaps in their mathematics learning. Such a situation had resulted in frustration for three of the students in this study, who believed that:

*New Zealand [mathematics] is harder than [mathematics in] Nigeria, here [in New Zealand] it [mathematics] is more complicated ... and different [than in Saudi Arabia]*

and it was not easy to adjust because:

*I came in the middle of the term [from Fiji] and the stuff [mathematical concepts] they were learning [in New Zealand], I did not know.*

These statements appear to reiterate the assertions made in other studies about the academic underachievement of minority and immigrant students due to difficulties experienced in their new environment (Civil, Planas & Quintos, 2005; den Brok, van Tartwijk, Wubbels & Veldman, 2010; Gunderson, 2000; Luciak, 2008; Marks, 2005; Rosenblum, Goldblatt & Moin, 2008). A disturbing reality is that limited English language is sometimes associated with “lack of intelligence” (Gunderson, 2000, p. 694),



limited academic proficiency, and “deficit learners” (Flores, 1997, p. 82) that have resulted in the disproportionate placement of immigrant and minority students in special differentiated education programmes (Harris, Brown, Ford & Richardson, 2004; Lee, 2001; Luciak, 2008). In this study Ian was placed in a special programme and expressed resentment because he felt that he:

*missed out,*

on the work done in class and that the special programme of work that he was doing out of class:

*was different and did not help [him].*

Like Ian, Andrew was also placed in a foundation class that followed a special programme because of his limited English language skills. Andrew felt that the environment contributed to his lack of progress because the students in his class:

*didn't work hard and they didn't listen to teacher. I need to change class to better one.*

The negative attitudes about being placed in a special education programme is consistent with the study of immigrant students in Canada who also felt that such programmes promote stigmatisation and segregation (Gunderson, 2000). However these attitudes contradict the assertion made by Igoa (1995) that immigrant students felt more comfortable, secure and less lonely in a centre specifically designated for them. This idea of differentiated education may be extended to ability grouping in mathematics, which Boaler (1997) argues, has the potential to enhance educational inequality, not just for immigrant students but also non-immigrant students. Furthermore, these inequalities may have implications for secondary school students with regards to future attainment and their perceptions of their own ability (Slavin, 1990) because of the expectations associated with the ability grouping (Boaler & Wiliam, 2001).

In spite of two other students finding the learning experience in New Zealand to be different and not a continuation of what they had done before, they seem to have, not only adjusted to the new mathematical learning within a short period of time:

*after a while ... I think I was doing quite well,*

but also embraced the new learning:

*in the Philippines I haven't [had not] studied algebra ... I enjoy doing algebra [in New Zealand] ... I found it easy.*

Li, (2009) attributes the enthusiasm of immigrant students towards learning to their background that nurtures school performance. Another interpretation of this comment may be that the student has accepted the New Zealand mathematics learning experience and is showing signs of 'valorisation' by devaluing the mathematics learning experiences that she had been accustomed to in her home country (de Abreu, 2002, p. 182).

Contrary to some of the above mentioned studies that have found immigrant students to be underachieving in mathematics, other studies have found that immigrant students have a reputation to outperform their local counterparts (Li, 2009; Ng, Lee & Pak, 2007; Salazar, Schludermann, Schludermann & Huynh, 2000; Wang & Goldschmidt, 2003). Some of the students in this study have come to the conclusion that mathematics was their favourite subject because:

*it's easy, they [the teachers] give us more methods,*  
there are:

*not so many tests, less homework, and it's fun.*

These sentiments echo the voices of immigrant students in Canada who also claimed that schools placed less emphasis on homework tasks and that courses were found to be easy (Bishop, 2002; Gunderson, 2000) compared to what they had been accustomed to in their home countries.

While the discussion so far has focused on the classroom environment, the relationships and interactions with their teachers and peers form an integral part in interpreting the world from the immigrant students' perspectives because "interpreting our world comes from the social domain" (Herda, 1999, p. 26).

## Chapter 8: Forming relationships

This chapter, the second of the three discussion chapters, offers a discussion of the relationships formed by the ten immigrant students in this study in their New Zealand mathematics classrooms within the theoretical landscape. These relationships are based on my interpretation of what the students perceived to be the role of the teacher, their interactions with the teacher, and their interactions with their peers.

As human beings we are constantly connected to others through various relationships and to reiterate Heidegger's (1996) point; it is this connectedness that fundamentally makes us human. A learner's mathematical experience is shaped by the social milieu of the classroom in which the participants exert varying degrees of power (Bishop, 2002). In spite of the learner often possessing the ultimate power in the choices they make about whom they allow themselves to be influenced by (Bishop, 2002), this study asserts that immigrant students may be in a vulnerable position because of their status as newcomers to the classroom environment.

Similar to concluding remarks of Albertini (2004) that mistrust is rife among minority immigrant students towards their peers and teachers of different ethnic backgrounds as their own, one of the ten students in this study spoke about mistrust or suspicion towards her peers. This was evident in the comment made by Babeloo:

*... all the students here hate me... everybody is rude to me ... probably because I'm new.*

This statement may be interpreted as Babeloo having felt disconnected or unwelcome by the students in her class because she had been a new student. This disconnectedness seemed to have translated to her sensing strong negative feelings from her peers, thus having placed her at risk of isolation and alienation (Endo, 2010).

In fact, like the Tanners (1997) study, most of the students in this study had expressed positive attitudes towards their mathematics teachers and their peers in their respective classes. While interpreting the interactions of the students with both their teachers and

their peers, in this study I was mindful of the cultural constructs and personal beliefs that influence relationships (Civil, Planas & Quintos, 2005). This idea has also been alluded to by Walshaw and Anthony (2008), who pointed out that while exchanges of mathematical ideas may be conducive to student engagement, students with limited English might not feel comfortable interacting with the teacher.

### *Perceived role of the teacher*

The perceived role, and the expectations that the ten immigrant students in this study had of their teachers, seemed to have influenced how they interacted with them in the classroom. Another contributory factor to their relationship with their teachers in their new classroom environment may be attributed to the immigrant students' past experiences and relationships with their teachers from their home countries (Civil, Planas and Quintos, 2005). While the culture of the New Zealand classroom may reflect an environment of cooperative learning and collaboration between the students and the teacher, what each student experiences from the interactions is unique because teachers are perceived differently by different students (den Brok, van Tartwijk, Wubbels & Veldman, 2010). In addition, a Dutch study, by den Brok, van Tartwijk, Wubbels and Veldman (2010) of the perceived teacher-student interpersonal relationships in multi-ethnic classes, found that students' ethnicity influenced teacher behaviour.

Although not within the scope of this study, teachers in other studies have been found to have negative or positive attitudes toward immigrant students, as was seen in a United States study where some teachers identified immigrant student as intelligent learners while other teachers branded them as unteachable (Harris, Brown, Ford and Richardson, 2004; Suarez-Orozco & Suarez-Orozco, 2001). This assumption was endorsed in a Dutch observational study and a United States observational study of teachers. Both studies found teachers had a tendency to correct students from certain ethnic minority groups (den Brok, Wubbels, Veldman & van Tartwijk, 2009; Simpson & Erikson, 1983). According to Harris, Brown, Ford and Richardson (2004, p. 308) the underachievement of minority students has been associated with "negative or low teacher expectation" and misconceptions. Some of the misconceptions that teachers have of minority students or

students of colour are that they lack discipline, are uncooperative, need consistent assistance to complete tasks, are deficit learners and treated as though they possess no knowledge (Harris, Brown, Ford & Richardson, 2004; Ladson-Billings, 1995; Suarez-Orozco & Suarez-Orozco, 2001)

However, contrary to the negative claims surrounding teachers' prejudices, the positive perceptions of teachers portrayed by the immigrant students in this study supports the view of by Watkins and Melde (2010) that teachers are fondly partial to the immigrant students who are often hardworking, respectful, and polite and easy to teach. Further evidence of positive bias, was voluntarily provided by Tim's mathematics teacher, who had spoken fondly of him:

*he is such a pleasure to watch. I know exactly when he understands the work ... he has a little smile on his lips. He does not have to say anything.*

The perception of the teacher as an instant source of help, support and advice (Bishop, 2002) in the classroom had been voiced by most of the students in this study. The extent of help that the participants requested of their teachers seemed to have been determined by their own background experiences and perceptions of the role of the teacher. For Babeloo the change from her mathematics teacher in South Africa who:

*got quite mad*

at her because:

*she kept asking questions*

to a mathematics teacher in New Zealand who would:

*come and explain it over and over and over ... until I get it,*

seemed to have been appreciated and welcomed by her. Similarly the comparison that Karishma had made between her mathematics teachers in Fiji:

*if we don't know a certain thing ... we ask the teacher,*

and New Zealand:

*the teachers here [in New Zealand] are very helpful ... they'll tell us again and again,*

seemed to suggest that she too viewed her New Zealand teacher as being more helpful.

The comments made by both Babeloo and Karishma about their teachers being helpful were indicative of the positive light in which they saw their New Zealand mathematics teachers. These sentiments were consistent with those of immigrant students in the United States and Australia who also found teachers in their new adopted countries to be more helpful. Students' perceptions of support from their teacher have been linked to their success in the subject (McCollum & Yoder, 2011).

A counter argument to Babeloo and Karishma's descriptions of help from their teachers, however, questions whether their New Zealand teachers were perhaps overly helpful. Other students in this study, who expressed feelings of being deprived of thinking for themselves, confirmed this notion. For example, Van believed that thinking was very important in his Thai class and:

*the teacher helps us with thinking.*

Andrew too believed that his teachers in his Chinese class encouraged students to think:

*teachers want you to use your brain,*

Similarly, Annie felt that her teachers in the Philippines allowed students to think through problems themselves without too much of teacher input:

*let us solve problems with not much explanation.*

In contrast to their perceptions of their teachers in their home countries, some students seemed to suggest that solutions to their mathematics problems were too readily available from their teachers in their New Zealand classes. This sentiment may also be suggestive of some students' perception of not being challenged by their teachers in their new country of residence (Suarez-Orozco & Suarez-Orozco, 2001). This may be attributed to their intrinsic motivation to excel academically, their preference for "demanding teachers" that encourage academic excellence in challenging curriculum (Kaufman, 2004, p. 1294).

Another perception of the teacher that emerged from the voices of the students in this study was that their New Zealand teachers encouraged thinking by making mathematics learning fun and accessible. As evidenced in Babeloo's claim that mathematics was:

*a fun class [in New Zealand] because Mr --- is a fun teacher,*

in Annie's admission of confusion when she first arrived:

*but when he [the New Zealand mathematics teacher] explained it, it became easy... [the teachers] give us more methods and more possibilities.*

Terry's recollection of mathematics not being:

*so interesting [in his home country] because teacher just tell you how to do it.*

may be interpreted as his preference to study mathematics in New Zealand because his teachers made it interesting. These positive perceptions of the teacher in their new countries echo the findings of other studies of immigrant students (Igoa, 1995; Suarez-Orozco & Suarez-Orozco, 2001). These positive perceptions affirm the notion that New Zealand teachers focus on nurturing the students learning process through positive reinforcements rather than punitive measures (Brown, 2003; Renwick, 1997).

Abdulla's, statement:

*I don't understand what the teacher is saying*

however, was suggestive of the teacher and the learning experience being inaccessible to him because of the language barrier between him and his teacher. This perception of the teacher, according to Valencia and Johnson (2006) may be associated with immigrant students' low level of acculturation. It may also be suggestive of this particular teacher's inadequacy in bridging the learning gap for Abdulla as a "cultural healer" (Hones, 1999, p. 5). In this role as a cultural healer teachers attempt to help students adjust in their new environment by drawing on the past experiences that students' bring into the learning environment (Hones, 1999).

Immigrant students have been found to come from very structured classrooms with symmetrically organised desks facing the teacher who is considered to be the imparter of knowledge to the students (Suarez-Orozco & Suarez-Orozco, 2001). Although the descriptions of the students' positions may appear to be rigid as described in the findings chapter of this study, the movement of students were very fluid. They were at liberty to

move if they had wished to, and certainly did not appear to have been confined to their seats. This free movement had been observed during peer group activities and at the beginning of the mathematics period when students were seen swapping seats for various reasons.

The idea of the teacher being an unchallenged authority of knowledge (Suarez-Orozco & Suarez Orozco, 2001) was exemplified by Ian who felt that he would have been able to understand the mathematical concepts if he had:

*listen[ed] to the teacher.*

In such school environments “you just listen to the teacher and go home and do your homework” (Gunderson, 2000, p. 695). Terry’s description of his teacher in China mirrors the assertion made by Gunderson (2000) about the background from which some immigrant students come:

*when in class I listen to teachers ... I can go home and ask my mum for help.*

This behaviour may also suggest that Terry had perceived his teacher to be a figure of authority (Suarez-Orozco & Suarez Orozco, 2001) who knew best. Another implication of the teachers being viewed as authority figures who should be obeyed surfaced during the observations. In spite of having been given the option to move to a different seat in the classroom, with the exception of a few movements, most of the students preferred to remain in their original seats that had been allocated by their teachers.

The perception of the teacher as always having the student’s interest at heart was evident in Terry’s non-use of the calculator because his teacher had advised him not to use it. This acceptance of the teacher’s advice showed the respect and regard Terry had for his teachers, and it endorses the idea that students in China are taught to have a high regard for their teachers because they are responsible for the students’ intellectual development (Igoa, 1995). Students in whom such values have been taught experience a cultural shift when exposed to students who challenge what the teacher says. They may perceive such behaviour of local students towards the teacher as being disrespectful and disruptive (Tanners, 1997).



The negative or positive perceptions that immigrant students hold of the teacher have been found to have the most profound effect on their academic aspirations and success (McCollum & Yoder, 2011). While the primary perceived role of the teacher according to the students in this study was to lead their learning, their transitional experiences would have evolved from the extent of their acceptance of the new leader (Bishop, 2002). This study revealed that all ten students appeared to be non-judgemental towards their mathematics teachers and considered their teachers' roles as being in facilitating their learning. These positive attitudes had mirrored the findings of Kaufman (2004) that immigrant students were less critical towards their teacher than the non-immigrant students.

### ***Interactions with the teacher***

The interaction between the teacher and the student has been referred to as “proximity” by den Brok, van Tartwijk, Wubbels & Veldman (2010, p. 203). They defined proximity as the harmonious or disharmonious extent of the interactions between the teacher and the student. In this study the interactions between the student and the teacher ranged from silence to extroverted verbal exchanges. Each of the ten students’ interactions with the teacher is discussed to gain an understanding of their relationship with their respective teachers in the mathematics classroom.

Abdulla had demonstrated non-verbal interactions with his mathematics teacher when his teacher communicated directly with him without the assistance of the student interpreter. Irrespective of whether the teacher was making a comment or asking Abdulla a question he would nod his head without saying anything. While his nod may be interpreted as his acknowledgement of what the teacher is saying, it is important to understand his silence. Terry also had not been observed verbally interacting with his teacher. However, his interactions, although silent, were evident in his compliance with all the teacher’s instructions. While students' silence may be interpreted as respect for the teacher, Endo (2010) has attributed immigrant students’ silence in the classroom to immigrant students feeling a sense of alienation from the learning experience because the teacher often avoided asking them questions. This avoidance, according to Endo

(2010) may be attributed to the teacher's inability to comprehend the immigrant students' responses because of their accents. Wickett (1997), on the other hand, interpreted this deliberate avoidance as the teacher allowing second language students more time to process the questions.

While silence is often construed negatively as unwillingness to interact with other participants in the classroom or a feeling of intimidation (Endo, 2010), Igoa (1995), Esmonde (2009) and Wickett (1997) suggest that silence is an important incubatory phase for some immigrant students to develop their language skills and confidence to communicate. During this phase when students seem to be "trapped in helpless silence" they begin to understand their own being in the world and develop greater listening skills in order to communicate with others and develop mainstream acculturation (Igoa, 1995, p. 38).

The interactions between Tim and Ian with their respective teachers may be attributed to their observed quiet nature and that they were, perhaps too self-conscious to communicate with the teacher while the other students were listening. According to Kirova (2001) immigrant students often exhibit self-conscious behaviour because of their inability to communicate effectively in the dominant language. However, contrary to Kaufman's (2004) study where immigrant students were too shy to ask for help from their tutors, both Ian and Tim approached their teachers seeking individual help.

Jess had always shown enthusiasm and confidence in her interactions with her mathematics teacher. However, an incident that occurred in her class seemed to have transformed her into a reserved and withdrawn student. The incident involved the teacher talking firmly to Jess and a group of students who had not brought an assessment file to school. While the other students in the group appeared to have gotten over the incident relatively quickly, Jess seemed to have been flustered the entire period. Jess' reaction to the incident and her thought about how she felt about it:

*I thought I was in trouble,*

provided an important understanding of her inner world of, perhaps, her feeling of shame for not being a model student (Igoa, 1995), and she would have decoded her teacher's message according to the background from which she had come (Kirova & Emme, 2010). Filipino students are raised with values that depict strong familial loyalty and non-confrontational interactions within the family and outside of the family environment (Salazar, Schludermann, Schludermann, 2000). Another important factor to consider from Jess' reaction was probably associated with how she believed the incident would affect her teacher's perception and assessment of her (Bishop, 2002).

The need for affirmation from the teacher was evident in the interactions between the students in this study and their respective mathematics teachers. Positive student achievement has been associated with teachers who are perceived to be cooperative by students while negative student achievement has been associated with teachers who are perceived to present oppositional behaviour by the students (Adedoyin, 2010). While Tim's admission to approach his teacher:

*to check the answer,*

and Annie's constant need to inform the teacher of what she had completed may seem to have reflected their desire to gain the teacher's approval, such behaviour may be considered advantageous to their own understanding because their mathematical reasoning becomes visible for the teacher to provide constructive feedback (Walshaw & Anthony, 2008). The interactions between the students and the teacher presented above may also be attributed to the students' attempts at building a relationship with their teachers because immigrant students are often faced with the dilemma of whether to trust their new teachers or not (Bishop, 2002; Igoa, 1995).

Andrew's interactions with the teacher involved the teacher constantly reminding him to get on with his work. In spite of a variety of reasons for his behaviour and of not having his way, Andrew had always shown respect for his teacher that is consistent with Kaufman's (2004) observation of polite and respectful immigrant students in classrooms in the United States compared to the noisy non-immigrant urban classrooms that were typical of the teacher and students yelling at each other. At other times Andrew had

displayed confusion while attempting tasks and his interaction with the teacher involved the teacher encouraging him to delve deeper and develop his understanding by presenting him with challenging questions. This kind of purposeful interaction between the teacher and students, according to Walshaw and Anthony (2008), is fundamental in stimulating and extending students' thinking.

In spite of the nature of the relationship being debatable, there appears to be a strong association between positive student-teacher relationships and favourable academic outcomes of students (McCollum & Yoder, 2011). The extent of influence that teachers have over the immigrant students may be associated with their own values, beliefs and perceptions (den Brok, Wubbels, Veldman, & van Tartwijk, 2009). The perceptions that the immigrant students develop of their teachers highlight the importance for teachers to be mindful, not only of their role as disseminators of knowledge and facilitators of learning but also as key players that orchestrate social interactions in their classrooms. Teachers are, after all, the role models to or the “educational parents” of (Igoa, 1995, p. 103) the students in their charge and through their position of power (Bishop, 2002) they are able to determine the ethos of the classroom environment (Kirova, 2001). Therefore it is of fundamental importance that teachers are always cognisant of teaching the students and not the subject (Brown, 2004).

### ***Interactions with Peers***

Peer groups and the interactions that immigrant students have with their peers influence their self-perception, academic achievement and engagement in their new classroom environment (Teaver, 2005). Peer relationships provide an avenue for group membership where immigrant students situate themselves socially with a sense of belonging (Teaver, 2005). Belonging to the peer group and forming peer relationships are essential elements to ensure immigrant students survival in the classroom environment (Bishop, 2002). Contrary to the assertion made in various studies that it is common for immigrant students to be exposed to criticism from their unwelcoming peers for being different and feeling a sense of intimidation, isolation and powerlessness (Endo, 2010; Kirova, 2001; Kirova-Petrova, 2000; Tanners, 1997), the students in this

study seem to have formed positive relationships with their peers. Another interesting factor that surfaced was that irrespective of whether they had been familiar or not with group work prior to their arrival in New Zealand, all the students in this study favoured peer study over individual study. This parallels social interdependence theory that posits peer learning as having the potential to enhance students' achievement and develop peer relationships (Johnson, Johnson, & Roseth, 2010).

According to Annie and Jess working in peer groups was an unfamiliar concept as suggested by Jess about group work:

*we rarely do it in the Philippines,*

and reiterated by Annie:

*we didn't study in pairs we studied alone [in the Philippines].*

It was interesting to note Annie and Jess' movement away from their peers within their proximity to establish new groups during group discussion sessions. Both students felt that working with their peers in groups was beneficial only if the members of the group contributed to their own learning as was asserted by Jess:

*I like to work with the people I know can help me the most.*

This implied that perhaps, Jess and Annie preferred to associate with an academically able, achievement-oriented peer group (Fuligni, 1997). This is consistent with the concept of positive interdependence that encompasses the idea of all members of the group benefiting by achieving their individual goals (Johnson, Johnson & Roseth, 2010). Annie too, claimed to work best with her friend who was also from the Philippines. Not only did it show that Annie felt comfortable working with a student with a similar cultural and linguistic background as her own (Yearwood, Brown, Karlik, 2002) but perhaps it may also have been indicative of the expectation that both Annie and Jess placed on their respective groups to function at a level they believed to be worthwhile (Bishop, 2002). This is also consistent the assertions of Bose and Choudhury (2010) and Parvanehnezhad and Clarkson (2008) that students are able to negotiate meanings by code switching and code mixing within their group members who share a common language other the language of instruction.

Another important factor in the choice of peer groups that Jess preferred to work with was that all members of the group had been able to communicate effectively in the group:

*we communicated in English and Filipino ... for better understanding,*

often by speaking the same language. Immigrant students having the opportunity to work in groups where other students speak a similar minority language is beneficial because they would be able to integrate it with English to help each other during group activities (Flores, 1997). My interpretation of the studies by Flores (1997) and Watkins and Melde (2010) is that being allowed and able to discuss mathematical concepts in their own minority language, not only shows inclusiveness and respect for the immigrant students' cultures (Watkins & Melde, 2010) but it also assists them in developing second language proficiency while still maintaining their proficiency in their first language (Flores, 1997). This notion is consistent with Vygotsky's (1978) sociocultural theory, which asserts that interactions with one's peers create a favourable environment for students to develop language skills and this assisted language development is referred to as the Zone of Proximal Development.

The fact that immigrant students have to leave their friends behind and make new ones in their new environment often creates a sense of loneliness and isolation (Rao & Yuan, 2006). This is especially relevant when these students attempt to join already established peer groups, as was the case with Annie who arrived midway through the year:

*I came in late it was hard to make friends because all of them had groups already.*

Timing could be a factor for socialising and perhaps an issue for immigrant students. While Karishma also experienced a sense of isolation, "*I felt like a loner,*" in her class when she was seated alone with nobody beside her, Van had been proactive in combating his feeling of isolation by shifting from the back of the room to the front where his friends had been seated. Perhaps this depicted Van's need to feel a sense of belonging and form new relationships. However, some studies have cautioned that new relationships with their peers have the potential to contribute positively or negatively to

immigrant students' sense of belonging in their new environment (Johnson, Johnson & Roseth, 2010; Kirova & Emme, 2010; Teaver, 2005).

Andrew's belief that Chinese students were smarter than New Zealand students:

*I think they [Chinese students are] smarter than New Zealand students,*

is indicative of him buying into the emergence of the "model minority stereotype" that Park and Lee (2010, p. 14) discuss in the United States context and seems to have spread globally. The model minority stereotype places all students of Asian origin into a category of high achievers implying that Asian immigrant students possess innate academic ability and therefore outperform local and immigrant students of other ethnic groups (Park & Lee, 2010; Watkins & Melde, 2010). The reason for Andrew not approaching his classroom peers for assistance:

*the students in my [New Zealand] class are lazy,*

showed that the negative opinion he had developed of them had influenced his interactions with them. Andrew's comment comparing the ability of Chinese students and New Zealand students was also suggestive of the wider perspective through which he viewed his own mathematics ability (Bishop, 2002).

Babeloo's frustration at the inability to concentrate due to the high level of noise made by the other students:

*I just don't concentrate that well when people are that loud around me,*

is consistent with Kaufman's (2004) assertion that immigrant students are not familiar with a rowdy classroom environment. At times she chose not to interact with other students, and at other times she interacted with them because she felt that her knowledge was superior to the other students and therefore:

*they come to me for help.*

Unlike Babeloo's attitude, Karishma expressed pleasure at being able to help other students:

*I enjoy helping them and they usually ask me for help.*

Van, on the other hand, viewed a student choosing to work with him as suspicious and perhaps, having an ulterior motive, as seen in his response to the student:

*“Why did you come here? Did you not have friends?”*

While the scenario was similar for the three students in the study who had been approached by their peers for assistance, interestingly each student presented a very different response to the situation. These interactions may be framed by the different cultural and individual worldviews that each student brings to the classroom (Croom, 1997; Tanners, 1997). Although being acknowledged by their peers may appear to be elevating for immigrant students, being accorded an elevated status may prevent them from being accepted by their peers and fitting in (Bishop, 2002).

In spite of the language barriers some students find other ways to interact with their peers. Van’s use of non-verbal gestures in his class was indicative of his ability to step out of his world of silence (Igoa, 1995) and interact with another student. In Abdulla’s case, his verbal interaction was confined to one student that was seated beside him who spoke his language, Arabic. Having this student next to him provided a channel of communication for Abdulla and counteracted a language negative environment where the learning would have been inaccessible (Parvanehnezhad & Clarkson, 2008). While acting as the mediator, this student provided Abdulla with the means to navigate his way in his new learning environment through language switching from his home language to English (Niesche, 2009). This idea supports the findings of Flores (1997) which concluded that students with greater proficiency in English and a minority language, spoken by immigrant students, would be able to act as mediators between the teacher and the immigrant student.

It is not always easy for immigrant students to assert themselves in their new environment and be able to interact and form relationships with new peers (Johnson, Johnson & Roseth, 2010; Teaver, 2005). This assertion may explain why Terry usually chose to work in silence without interacting with other students. However, when a new student arrived Terry accepted the teacher’s request to have the student sit next to him.



The interaction that occurred between them had been initiated by Terry and revolved around the school rules:

*... I'm not really good at English so I just say hello and tell him about the rules in class.*

This not only suggested Terry's self-consciousness about not being able to communicate adequately in English (Kirova, 2001; Secada, 1992), but is also consistent with what Emme, Kirova, Kamau and Kosanovich (2006, p. 171) refer to as "adult generated" rules that immigrant students feel necessary to impart to new students.

Another comment made by Terry about seeking help from a particular student:

*sometimes I ask [a student in the class] if I don't know [something],*

provided interesting information about his interactions with his peers. During the interview Terry had revealed that the student he had chosen had also been an immigrant. It may be deduced that Terry felt comfortable approaching that particular student for help because of the fact that both shared a common immigrant status. Their relationship may be seen as a survival mechanism in creating a sense of belonging in their mathematics classroom for both students (Bishop, 2002).

The interactions of immigrant students with their peers may also be influenced by their background experiences. As discussed before Ian's comment:

*I have to be quiet ... I'm not allowed to speak to another person,*

which was viewed in the context of appropriate classroom behaviour, may also provide vital information about his reluctance to interact with other students in the classroom. This innate worldview also seemed to have surfaced in the change in Karishma's interactions with her peers that had been observed when her teacher was in close proximity to her compared to when the teacher was further away from her. In the presence of the teacher she portrayed herself as a quiet and industrious student, however in the absence of the teacher she exhibited a playful personality when interacting with her peers. While this may be attributed to her preconceived idea of acceptable classroom behaviour both Ian's mannerisms and Karishma's mannerisms may be suggestive of

their belief that students ought to be silent in the classroom and should not be caught by the teacher interacting with other students (Baker, 2008).

The relationship that the immigrant students in this study formed with their teachers and their peers seemed to have been of vital importance in their transitional experience in their New Zealand classrooms. While the conservative immigrant students hold on to their past classroom experiences for fear of losing all that they value to be educationally sound, the more adventurous immigrant students perceive greater benefit in conforming to the new way of life in their classrooms through their relationships with their peers and teachers (Bishop, 2002). These relationships empower peers and teachers to either nurture the immigrant students' membership in their new environment or marginalise their experiences through exclusion (Teaver, 2005; Adedoyin, 2010) and may potentially influence how they position themselves in the classroom. Students' outcomes have been associated with their understanding of the learning environment and positive classroom relationships (den Brok, van Tartwijk, Wubbels & Veldman, 2010). Similarly understanding the classroom environment and building relationships together appeared to illuminate the amorphous and formless paths for the ten students in this study who were in pursuit of negotiating their own place in the mathematics classroom.

## **Chapter 9: Negotiating one's place**

This chapter, the third of the three discussion chapters, provides an interpretation of the ten immigrant students' attempts to find their own place in their mathematics classrooms. These lived experiences are placed alongside an array of national and international literature on the transitional experiences of immigrant students.

Finding one's place in a new classroom is often a daunting experience for immigrant students (Bishop, 2002) who are constantly juggling between their past experiences and their present experiences. This balancing act is dependent on the degree of acceptance or rejection between their past and present experiences and has multiple consequences in the form of acculturation, assimilation, and bicultural integration that immigrant students in a new environment often face (Berry, 2003; Shim & Schwartz, 2007). Acculturation occurs when the students modify their being by merging dissimilar past and present experiences (Moyerman & Forman, 1992; Wong-Rieger & Quintana, 1987). For some students assimilation is often an easier choice where they transform their being by completely accepting the present experiences and discarding their past experiences (Hastings, Clelland & Danielson, 1982). The third consequence presents itself as bicultural integration where the being exists in a parallel sphere that separates the past and the present experiences (Shim & Schwartz, 2007).

While the theories of transition present tidy categories, this study has shown that students lived experiences exhibit characteristics of singular or combined transitional theories at different times and in different situations. These transitional theories must, therefore, be viewed in the complexity of possible hybridities. The discussion that follows focuses on the aspirations and the self-concept of the ten students in this study in an attempt to understand their efforts in negotiating their respective places in their new environment.

### ***Attitudes, Aspirations and Assessments***

The attitudes that students possess towards mathematics and their academic self-concepts are shaped by their past and present experiences which in turn influences their self-efficacy with reference to their future aspirations and educational attainment (McCollum & Yoder, 2011; Walker & McCoy, 1997; Meaney, 2002).

The attitudes towards mathematics presented by Karishma:

*maths is a compulsory subject because we use maths in our everyday life,*

and Van:

*it's basis to other subjects and for basic living like economy and marketing,*

showed the importance they had attached to the subject which also mirrored the sentiments of Walker and McCoy (1997, p.78) who believed that students' need of mathematics in the education arena is as essential as one needing "air to breathe." Such attitudes also suggest that both Karishma and Van viewed mathematics as having a broader purpose than its classroom based context.

Terry believed that studying mathematics was:

*important because we have exam for maths.*

This comment was indicative of the future orientated, yet short term assessment-driven importance that he had attached to his mathematics learning. This statement may be interpreted as Terry placing importance on his short-term achievements that perhaps would have long-term benefits. This assessment driven motivation is consistent with the studies of Zheng (2006), and Wu and Zhang (2006) who asserted that Asian students' attitudes develop from their examination driven curriculum and learning approach that they are exposed to in Confucian Heritage Cultures. It is this attitude and motivation to succeed that results in immigrant students of Asian origin to be overrepresented in high achieving classes (Kaufman, 2004). Andrew, however had expressed the future educational benefits of studying mathematics:

*if you are good at maths you can go to a good school.*

Andrew's use of the term "good school", although not clarified by him, may be a speculated implication that he views mathematics based tertiary study to be better than other fields of study. Like, Andrew, Jess also felt that studying mathematics would give her the opportunity to pursue tertiary education:

*it is important [in New Zealand] because it gets me ready for the ... future schools that I will go to.*

This statement made by Jess may be interpreted as her desire to pursue a mathematics-based programme of study after completing her secondary education. The importance attached to mathematics by both Andrew and Jess is consistent with the assertion made by Meaney (2002) about mathematics playing a pivotal role in students' pursuing higher levels of education.

The status of mathematics was further amplified with regards to its vocational implications. While Annie believed that:

*mathematics can be good for the future if you want to have a good job when you grow up,*

she had not defined what she meant by a 'good job.' However, this may be interpreted as a high status job, a high paying job or a job that required mathematical skills, among other interpretations, that would be considered to be a good job by Annie (Marks, 2005). Ian also spoke about the vocational importance of mathematics. He perceived mathematics as being the key in him attaining:

*a good job.*

His motivation to succeed was portrayed in his assertion that he:

*will work hard to understand the work and get the answers correct because I want to be an engineer.*

The above statements made by Ian point to multiple interpretations of his perceptions. Firstly a deduction can be made that Ian viewed engineering as a 'good job.' Secondly he seemed to imply he is the only person responsible for his success in mathematics and therefore he needed to work hard to understand mathematics. Thirdly, Ian's perception of mathematics as an assessment driven discipline that measures a student's understanding by the number of correct answers a student provides, may also be inferred

by this statement. The notion of mathematics having vocational relevance as presented in the statements by Annie and Ian was consistent with assertions made in other studies about mathematics occupying a prestigious position in students aspiring to well-paid employment (Boado, 2008; Hirabayashi, 2003; Marks, 2005; Meaney, 2002). These studies have also asserted that immigrant families see education as an effective means for their social advancement in their new environment.

Academic achievement in the form of assessments may be an important factor in determining the level of adjustment of immigrant students in their new classroom and may serve as a predictor of their future success (Areepatamannil & Freeman, 2008). In a study that compared the academic progress of immigrant students to that of their native-born French counterparts Boado (2008) concluded that immigrant students, not only presented a faster rate of progress, but were also highly motivated. Babeloo was determined to fulfil her vocational ambition:

*I want to become a park ranger, I'll have to know distances ... maths is a really, really important subject.*

This statement may be interpreted as her, not only having a definite career plan to become a park ranger, but is also indicative of what skills she believed to be necessary in becoming a park ranger. Having knowledge of the requirements of her anticipated job (Boado, 2008) seemed to have influenced her high level of motivation to succeed in mathematics:

*I try to get excellence.*

This statement is similar to the one made by Ian and may be suggestive of Babeloo also being of the opinion that she was totally responsible for her success in mathematics.

An analysis of the students' expected examination grade versus their actual grades attained in the examination seemed to confirm McCollum and Yoder's (2011) assertion that students' perceptions of their ability have been found to have a profound effect on their academic achievements (McCollum & Yoder, 2011), however the inverse association between academic achievement and perceived ability have also been found to be inferred in this study. Although all the students in this study did not gain their

desired grades, Terry, Van, Annie and Andrew, who exhibited high expectations towards their performance in the examination, had successfully completed the examination by passing all their assessment tasks. The high expectations that these students presented seemed to align with Boado's (2008) finding that immigrant students have ambitious educational expectations.

Those students who exhibited an attitude of acceptance towards a lower grade than they had anticipated, as was evident in the almost identical responses expressed by Jess:

*I got two 'achieved' grades and a 'developing' grade ... I was hoping to get at least 'merits' but it's okay,*

by Babeloo:

*I'll be going for excellence but I will be glad if I get merit,*

and by Tim:

*I will be happy to get 'achieved' but will try for 'merit' or 'excellence' in the exam,*

had passed only some of the examination assessment tasks. All three statements may be interpreted as students lacking in confidence and perhaps their lowered academic expectations. This view parallels Kirova's (2001) assertion about the positive relationship between student expectations and academic outcomes, and low expectations often result in low academic outcomes.

The students attributed the lower than expected grades that they had attained in the examination to their own lack of effort. This was evident in the assertions by Babeloo:

*I got a developing because of my attitude,*

by Andrew:

*want to work harder than before,*

by Ian:

*I'm not happy, it's ["beginning" assessment grade] pretty low. I must listen to the teacher and know what to do to make it [the grade] better,*

and by Karishma:

*think I'll hope for excellence ... I get really confused ... I will work very hard next year.*

These statements seemed to indicate that the students felt that they were solely to blame for their achievements in mathematics. This implied assertion of self-blame has surfaced before and was consistent with the findings of Salazar, Schludermann, Schludermann and Huynh (2000) who posited that it was not innate ability but the immigrant students' internal attributions, such as effort and interest, that were responsible for their high academic success.

Internal attributes that some students possess are often associated with high expectations (Kirova, 2001). Despite their effort and interest in mathematics and their successful completion of the examination, Annie and Van's reactions to their achievement was indicative of their personal disappointment. As asserted by Annie:

*I thought I was pretty good but when it came to my exams, everything just falls down.*

and Van respectively:

*I am not very good in geometry ... I got only achieved in that topic.*

While superficially the above statement may be indicative of the students having failed the examination assessments, this had not actually been the case. Annie had, in fact, passed the examination assessments. However, having obtained grades lower than the highest attainable grade, in her view was perceived as a failure.

Van had also passed the examination assessments yet viewed his non-excellence grades as a reflection of his inadequate ability. These statements may also be interpreted as both of them having set very high expectations for their examination achievement and, in spite of their past self-belief in the subject, their less-than-perfect grades seemed to have punctured their self-confidence (Areepatamannil & Freeman, 2008).

Terry had displayed exceptionally high achievement by completing all his mathematics assessments and the examination with excellence. However, in spite of his perfect



achievement in gaining the highest possible grades, his response to how he had felt about the examination presented interesting interpretations:

*it's difficult but it's alright.*

One interpretation of this comment may be that Terry had possibly been pleased with the level of difficulty in the examination assessment. The second interpretation may be a reflection of his modest nature in spite of his high level of achievement, which perhaps stemmed from the belief that there is always room for improvement (Saran, 2010).

The mathematical aspirations that the ten immigrant students presented and their attitudes towards their assessments have provided a lens for the interpretation of their worldviews. These interpretations have offered an understanding of some of their transitional experiences with regards to their aspirations and attitudes. The students in this study seem to have exhibited high levels of academic aspirations. When considering their length of residence in New Zealand and English not being their first language, factors that be suggestive of varying degrees of integration into the new environment, this study seems to be positioned between the assertions made in other studies that focused on academic aspirations. Firstly, the studies by Suarez-Orozco (1995) and Tanners (1997) which found that the more immigrant student participated in and embraced the American life, the more they lose their motivation to excel and the lower their academic aspirations fall. Secondly, the study by Valencia and Johnson (2006) which asserted that high acculturation is strongly correlated with academic aspirations.

### ***Academic self-concept***

Areepatamannil and Freeman (2008) posited that a student's perceived academic ability is closely associated with their self-concept in the subject and their perceived academic self-concept develops from their perceptions of how others view their ability. The discussion that follows examined the immigrant students' perceived parents' rating of their ability, and concludes with perceived rating of their own ability combined with their perceived teachers' rating of their mathematics ability. The students' perceptions of how their parents and teachers would rate their ability may not necessarily be a manifestation of how their parents and teachers would actually rate them, but it does

offer insight into how they see themselves from the perspectives of the most influential adults in their lives (Civil, Planas, Quintos, 2005; Roer-Strier & Strier, 2007).

Parents' expectations have been found to have profound influence on immigrant students' academic success and their self-concept (Boado, 2008; Civil, Planas & Quintos, 2005). This study, however, did not investigate the parents' expectations but instead examined the students' perceptions of how their parents would have rated their mathematics ability, as one of three contributing factors to have influenced their academic self-concept in mathematics. The perceived parental ratings provided an understanding of how their cultural or home background impacts their self-concept while the other two factors being their own self-rated ability and their perceived teachers' ratings, provided an understanding of their self-concept within the classroom environment.

Terry's belief that his parents would have rated his ability as excellent both in China and in New Zealand because:

*they always help me ... they will help me check it.*

This statement offered many interpretations. One possible interpretation is that Terry believed that his parents had a good understanding of his ability because they seemed to have assisted him with his homework tasks. Thus implying that perhaps, they were active participants in his learning (Civil, Planas & Quintos, 2005), or perhaps another interpretation is that the high rating combined with his perfect examination achievement grades may be attributed to him feeling a sense of obligation to fulfil high expectations of academic success that his parents may have imposed on him (Boado, 2008).

High parental expectations surfaced in spite of the different perceived parental ratings Andrew provided for his mum and dad. He based his perceived dad's rating as below average because:

*he [dad] will give me some tests ... I don't want to do it so he thinks ... it means I don't know something.*

This assertion by Andrew may be indicative, not only of his dad's high expectations of him, but also his involvement in his mathematics learning (Civil, Planas & Quintos, 2005). It may also be interpreted as a hint of defiance from Andrew with him refusing to complete the mathematics tasks that his dad had given to him, rather than his inability that he believed would have shaped his dad's impression of his mathematics ability.

An interesting piece of information that Andrew shared when explaining why he had perceived his mum's rating to be average:

*my mum ask her Chinese friend to post Chinese [mathematics] tests to New Zealand then I will write them.*

Besides being suggestive of his mum's active involvement and her high expectations, this statement also seemed to imply that Andrew's mum felt that exposing him to Chinese mathematics would be beneficial. This may be interpreted as perhaps conservative, in her desire to hold on to what she valued (Bishop, 2002; Civil, Planas & Quintos, 2005), rather than allowing Andrew to only be exposed to New Zealand mathematics. In this way advancing the notion that some parents perceive their children to be cultured and learning anything of substance only if their children are engaged in learning their own language and content (Roer-Strier & Strier, 2007). In other words, they seem to want to preserve their home culture traditions which may sometimes be in conflict with their host culture (Roer-Strier & Strier, 2007). Andrew's perception of his mum's covert non-acceptance of New Zealand mathematics may not only have placed him in limbo between two worlds (Suarez-Orozco & Suarez-Orozco, 2001) but also impacted on his academic self-concept.

Parental influence had also emerged when Van had expressed why he had been reluctant to use his language dictionary in the classroom:

*my mum said if you don't use it very much or too much your English will improve.*

This statement may be interpreted as Van's mother overtly coaxing him to be adventurous and assimilate and adapt in his new learning environment in order to succeed in mathematics, while still exerting her own values on him (Bishop, 2002; Civil,

Planas & Quintos, 2005; Hastings, Clelland & Danielson, 1982). Van's belief that his parents would have rated his mathematics ability as average, may have been based on his limited English language proficiency, which in turn, may have affected his academic self-concept.

Perceived parental perceptions may sometimes be influenced by the lack of confidence that immigrant parents sometimes exhibit in their reactions to the children's homework tasks. Babeloo believed that her parents would have rated her mathematics ability in South Africa and in New Zealand as average because:

*I ask the a lot of questions but they don't understand it ... they had maths about 25 years ago.*

This statement was very important in providing an interpretation of Babeloo's parents' lack of confidence in helping her understand mathematical concepts. Their attitudes, from Babeloo's perspective, may be attributed to a combination of perhaps a different learning approach that they had been exposed to in South Africa and a generational gap (Civil, Planas & Quintos, 2005). Babeloo's perceived average parental rating may have stemmed from her own negative perception of asking too many questions, which perhaps would have influenced her own academic self-concept.

While Annie had also believed that her parents would have rated her mathematics ability as average, she had based this on her perception that:

*they don't know that I get merit and excellences.*

This lack of parental knowledge and involvement may have been attributed to language barriers which mirrors the assertion made by Valencia and Johnson (2006) that a parent's desire to be involved in their child's education may be hindered by language barriers which may also have an effect on the children's academic self-concept.

Unlike the perception held by Annie about her perceived parent's rating being based on their lack of knowledge about her academic achievement, Tim and Karishma believed that their perceived parents' ratings would have been attributed to their knowledge of their ability. Tim believed that his parents would have rated his ability as average both in

India and in New Zealand, based on the work he had done at home, thus suggestive of his own academic self-concept. Karishma's belief of her parents rating, on the other hand, was because:

*they think I'm a bit smarter here.*

This statement was perhaps indicative of the positive involvement that Karishma's parents may have had in her mathematics learning (Civil, Planas & Quintos, 2005). Ian's uncertainty in what his parents would have rated his ability was perhaps a reflection of their non-involvement in his learning and his own academic self-concept.

While the students' perceived ratings of their mathematics ability may not reflect what their parents' actual rating of their ability would have been, these perceptions offered an insight of how the students in this study had perceived themselves. The following two perceptions, their own self-rating and their perceived teachers' ratings provided two further dimensions in understanding the development of their academic self-concept in their New Zealand classrooms.

While Van believed that his teacher both in Thailand and in New Zealand would have rated his ability as average, he rated his own mathematics ability as being above average, both in Thailand and in New Zealand. However, there appeared to be a slight decline in his academic self-concept in New Zealand which he attributed to the differences in assessment grading in both countries. He also inferred that being awarded a percentage in Thailand perhaps, provided a clearer indication of his ability than being slotted into the broadly categorised grading system used at his New Zealand school. In spite of Van believing that:

*maths in New Zealand is easier,*

it was perhaps the uncertainty of not having a nominative test score that may have contributed to Van's lowered academic self-concept. This endorses what Bishop (2002) referred to as the dissimilar cultural norms and expectations that immigrant students often confront on their journey of transition in their new classroom environment.

The competitive nature of the immigrant students in the study by Gunderson (2000) surfaced when they spoke about knowing their own position in relation to the achievement of other students as being more beneficial than just being given a grade based on memorised information. This relational position appeared to have been important for Karishma who was accustomed to knowing her ranked position, which allowed her to compare her performance in written class assessments to her peers' performance:

*in Fiji we did not have grades we had positions ... if you had the highest mark, you'll come first.*

Karishma rated both her own perceived mathematics ability, as well as what she had perceived her teacher's rating of her ability would have been, as average in Fiji and above average in New Zealand. Knowledge of where she had been positioned in relation to her performance in mathematics assessments in her Fijian class combined with the thought of the teacher asking her to assist other students in her New Zealand mathematics classroom seemed to have helped her define her mathematics academic self-concept which is consistent with Cokley's (2000) assertion that academic self-concept evolves from students comparing their own attitudes and skills with their peers. It is in such a social environment where the perceptions that students have of their own ability and success, are influenced (Kaufman, 2004).

While Andrew had also presented a competitive nature, his self-concept seemed to have been affected by two contributing factors. Interestingly, however, he had rated his perceived mathematics ability slightly above average in both China and New Zealand, while he perceived his Chinese teacher's rating of his ability to be below average. The first contributing factor that may have had an effect on his self-concept was his belief that mathematics was easier to study in New Zealand than in China:

*Chinese maths is harder than New Zealand maths.*

This notion may have also contributed to his inference that New Zealand mathematics was not challenging enough (Kaufman, 2004; Suarez-Orozco & Suarez-Orozco, 2001) for him:

*because it is quite boring.*

The second factor that seemed to have affected his academic self-concept pertained to his preoccupation in trying to learn a new language at the cost of learning mathematics:

*in China you can learn [mathematics]... but now I want to speak English more.*

His lower than expected examination results mentioned before and his perception of a lower academic level in the New Zealand mathematics classroom combined with him trying to learn a new language may be indicative of Andrew's risk of lowering his standard of achievement. His need to want to speak English may be interpreted as his need to conform to his new environment (Hastings, Clelland & Danielson, 1982; Shim & Schwartz, 2007) and also as his desire for his academic success (Bishop, 2002). This phenomenon echoes the findings of Tanners (1997, p. 250) who found that immigrant students lower "their educational aspirations" through exposure to the culture of their adopted land.

Contrary to the assertion made by Tanner (1997) about immigrant students sometimes lowering their own aspirations when they are exposed to a different cultural environment, Annie and Babeloo's exposure to a new cultural environment seemed to have heightened their motivation to succeed. This inference has been drawn from their perceived below average ability in their home countries to their perceived above average ability in New Zealand. While Annie had perceived the teacher's rating of her ability as higher in New Zealand, Babeloo did not speculate about how she thought her teacher would have rated her ability. However, the inconsistency in Annie's expected examination result and her actual result seemed to have adversely affected her academic self-concept and contributed to her perception of being a failure:

*I got a merit and I can get an excellence. I got merit and it's not good so I'm not happy ... I failed.*

Therefore, Annie's experience presented a directional change in the association between students' perceptions of their ability and their academic achievement as asserted by McCollum and Yoder (2011). An inference that may be drawn from this experience is that academic achievements profound effect on a student's academic self-concept is also possible.

Like Annie, Babeloo's self-concept may be interpreted as having been framed by her perception of her ability:

*I didn't understand maths that well so I would say 2 ... I think I'm quite good at it now.*

However, the association she had made between her below average ability in South Africa and her poor understanding of mathematics and her increased above average self-rating in New Zealand may be interpreted on two levels. Firstly that her academic self-concept had emerged from her perception of her innate ability of understanding (Salazar, Schludermann, Schludermann & Huynh, 2000), and secondly this increased understanding has lifted her self-concept to a point where she believed that her mathematics ability to be above average in New Zealand.

Ian's academic self-concept, on the other hand, seemed to have emerged from his belief that irrespective of where it was studied:

*maths is too hard, I was not good at maths ... even when I came here I'm not good at maths.*

This belief combined with his below average rating of his ability and what he perceived to be his Nigerian teacher's rating of his ability advanced many interpretations of the view he held about himself in the mathematics classroom. Firstly his comment about mathematics being too difficult may be reflective of his experiences that were probably negative. Secondly in the absence of Ian advancing a reason for his belief that he was not good at mathematics, a speculative interpretation is that he probably based his ability on his unsuccessful academic outcomes as was evident in his examination results or that he believed that mathematics success is based on one's innate ability (Kaufman, 2004; Salazar, Schludermann, Schludermann & Huynh, 2000). Furthermore, the following comment:

*but I'm slightly better now,*

by Ian provided an important dimension to the development of his academic self-concept. Although, not explicitly stated, the words "better now" may be interpreted as growth in his confidence where he was probably making a comparison between his confidence in mathematics from the time he first arrived and his confidence to when the



interview was held. This is suggestive of Ian's positive transition in his new environment that may be attributed to his increased self-confidence (Bishop, 2002).

Tim and Jess, both of whom have rated their academic ability higher in New Zealand than in their respective home countries, also displayed this increased confidence in mathematics. In spite of his increased academic self-concept in New Zealand, based on his academic achievement (Bishop, 2002):

*I get very good grades,*

Tim believed that his mathematics teacher in India and in New Zealand would have rated his ability as average. This inconsistency in his self-rating compared to his perceived teachers' ratings of his ability may be interpreted as Tim feeling slightly devalued by his teacher or his perception that his New Zealand teacher had not really been aware of his ability (Bishop, 2002). Jess, on the other hand, offered almost identical self-rating and perceived teachers' ratings of her mathematics ability in the Philippines and in New Zealand. She had attributed the higher rating in New Zealand to:

*I find it easier to learn here.*

The assertion made by Jess about finding it easier to learn in New Zealand may be attributed to a number of speculative factors, such as, easier content, an environment that is more conducive to learning, more effort from her or perhaps the teacher's approach. Jess had evidently developed her academic self-concept from the level of difficulty she experienced in learning mathematics referred to as innate academic ability by Salazar, Schludermann, Schludermann and Huynh (2000), however her statement about finding it easier to learn in New Zealand alludes to the amount of time and effort she had expended (Kaufman, 2004).

Similarly, like Jess, Terry also attributed his self-rated mathematics ability to internal attributes (Kaufman, 2004; Salazar, Schludermann, Schludermann & Huynh, 2000), where he believed that his mathematics ability had been affected by his effort and the amount of time he had spent studying:

*... in China I did not work hard in maths ... I spent more time learning science or Chinese ... I'm not good at English so I work harder in New Zealand .*

In spite of Terry rating his ability from his own perception and his perceived teacher's perceptions as above average in China, he rated his ability in New Zealand higher. This may be interpreted as an increase in Terry's academic self-confidence that may have resulted from his "need to expend greater effort" (Bishop, 2002, p. 63) because of his perceived limited proficiency in English.

In Abdulla's case this study posits that his low self-concept may be attributed primarily to his limited language proficiency (Yushau, 2009) and his perceived low teacher expectation of his ability which according to Harris, Brown, Ford and Richardson (2004) is associated with academic underachievement of minority students. These factors combined may possibly have placed him at risk of feeling a sense of alienation from the learning experience (Endo, 2010) in his New Zealand mathematics classroom. Abdulla's non-attendance in the examination combined with the dramatic drop in his own perceived ability, his perceived teacher's and parent's rating of his ability in mathematics from above average in Saudi Arabia to below average in New Zealand was suggestive of his low self-concept which may also be associated with his limited English language proficiency, as evident in his comment:

*"I cannot pass because I do not understand anything. I will be better if I can understand."*

The interpretations of how the ten immigrant students in this study perceived their mathematics ability from their own perspective and from their perceived teachers' perspectives provided an understanding of how they positioned themselves in their mathematics classrooms. Additionally, an interpretation of the students' perceptions of how their parents would have rated their ability appeared to have added another dimension in understanding their self-concept because, as asserted by Civil, Planas and Quintos (2005), the perceptions held by the immigrant students of their parents' expectations often frame their learning success.

## Chapter 10: Concluding thoughts

### *Overview*

Through the voices of ten immigrant students this study has highlighted their multi-faceted lives in an attempt to understand how they brought together their past and present experiences, in forming relationships and in negotiating their own places in their New Zealand mathematics classrooms. While the presentation of the students' experiences alluded to common elements, each of the ten students made unique contributions to this study by providing an insight into their individually articulated ideas and experiences in their respective mathematics classrooms. In this study I have attempted to delve into their minds and better my understanding of their perceptions of their experiences by listening closely to what each student had to say. My understandings of these experiences emerged from a multitude of interpretations that the literature had offered.

Some important points need to be made with regards to the experiences presented in this study. The first is that the discussion is from my interpretation of the students' perceptions of their experiences, and as the researcher I acknowledge that other interpretations will also be possible. Secondly, while these experiences may seem to parallel the experiences of immigrant students in other studies, they are unique to the ten students in this study and have provided a rich source of information regarding the backgrounds, assumptions and perceptions that they had brought with them to their new mathematics learning environments. Thirdly, had the study recruited a different sample of immigrant students from countries similar to or different from those the immigrant students in this study had come from, perhaps other experiences would have been highlighted.

By employing a hermeneutic phenomenological methodology, the ontological assumption of the study is that there are multiple realities. This assumption is premised in the assertion made by Van Manen (1997) that human experiences are immeasurable and infinite because each experience offers a unique reality to each individual. These

realities have been offered from multiple perspectives: the perceived experiences of the ten immigrant students, the researcher's interpretations of the experiences, and the countless interpretations that may be extracted by the readers of this study (Cresswell, 1995), and they have the potential to offer new knowledge with each interpretation.

This final chapter articulates how the findings of this study resonate with other studies. It discusses some implications of the study. Furthermore, while acknowledging the study's limitations, it offers recommendations for further research investigations. The study draws to a conclusion with some final thoughts.

### ***How the findings resonate with other studies***

A summary of the main findings are presented below as responses to the three questions I set out to answer.

Firstly:

#### ***How do perceived similarities and differences between immigrant students' past and present experiences influence immigrant students' understandings of their mathematics classroom environment?***

While the students in this study alluded to mathematics content, assessments, teacher facilitated lessons, and a formal classroom environment to be some of the similarities that they had experienced in their past and present classroom environments, they seem to have been more focused on the differences that they had experienced.

Their perceptions of cross-cultural experiences surfaced in the form of the immigrant students experiencing different degrees of cultural shift in their new environment. Some of these cultural differences included, single-sex schools, use of corporal punishment to modify student behaviour, silent past classroom environment with reluctance to be involved in class discussion, and a strict non-confrontational classroom environment where the teacher is regarded as the transmitter of knowledge. These different cultural experiences in the mathematics classroom echo the findings of other international research studies, for example, studies that provided an understanding of the practice of corporal punishment as a means of correcting student misbehaviour in Nigeria (Chianu,

2000), in Korea (Brown, 2009), and in Asia to instil high academic expectations in accordance with Confucian Heritage culture (Krajewski, 2006; Han & Scull, 2010), the strict cultural background from which immigrant students often come (Tanners, 1997) and the subordinate position of the students and the high status accorded to teachers (Baker, 2008).

Although English was not the first language for all ten students in this study, their proficiency in the language varied. According to some of the students their language related difficulties included communication and understanding of the context for mathematics problems. These findings closely align with other studies (Bishop, 2002; Davidson & Kramer, 1997; Kirova, 2010; Roer-Strier & Strier, 2007; Tanners, 1997; Thomas, 1983; Valencia & Johnson, 2006). Despite English not being the first language for the students in this study, some of them felt that the number and symbol-rich nature of mathematics made learning the content easy. This notion confirmed Thomas' (1983) assertion that non-English speaking students often regard mathematics primarily as a subject involving the manipulation of symbols.

The students expressed different reactions to their experiences in coping with mathematics content. According to the students who experienced difficulties coping with the content, most of the problems had been associated with language difficulties that had in turn manifested in them not being able to understand, interpret and make inferences of the mathematics context in textbooks and assessments. The difficulties, according to some of the students, seemed to have affected their academic achievement.

These assertions of difficulties also echoed the findings in other studies about the multifaceted difficulties faced by immigrant students because of their lack of the dominant language proficiency (Flores, 1997; Harris, Brown, Ford & Richardson, 2004; Thomas, 1997), the inability of second language learners to make logical connections requiring a higher level of language skills (Gardner, 1980), and how different worldviews and cultural backgrounds affect the students' understandings of mathematics (Bishop, 2002; Thomas, 1997), and often result in the underachievement of minority and

immigrant students (Civil, Planas & Quintos, 2005; Rosenblum, Goldblatt & Moin, 2008; Luciak, 2008; Marks, 2005; & Gunderson, 2000; den Brok, van Tartwijk, Wubbels & Veldman, 2010).

Negative attitudes towards being placed in a differentiated classroom environment because of limited English language proficiency was briefly expressed by one student, and discussed within the arguments against ability grouping presented by Boaler (1997), Boaler and Wiliam (2001) and Slavin (1990), and the findings of Harris, Brown, Ford and Richardson (2004) concerning the over-representation of minority groups in special needs classes.

In spite of some of the difficulties that the ten immigrant students experienced in their new mathematics environment, some of them found studying mathematics in New Zealand enjoyable and easier than studying it in their respective home countries. Such positive assertions align with those of Gunderson (2000), Ng, Lee and Pak (2007), Salazar, Schludermann, Schludermann and Huynh (2000), Li (2009), and Wang and Goldschmidt (2003).

Secondly:

***How do immigrant students integrate past experiences into their present mathematics classroom environment with regards to forming relationships with their teachers and peers?***

This focus found its impetus in Heidegger's (1996) assertion about human connectedness through various relationships and Bishop's (2002) claim about the importance of the social milieu of the classroom in shaping the immigrant students' mathematics experiences. Interpretations of the ten students' perceptions of the role of the teacher, their interactions with their teacher, and their interactions with their peers provided an understanding with regards to them forming relationships.

While some students in this study asserted that New Zealand teachers had been more helpful than the teachers from their home countries, other students felt devalued and saw the help as excessive and indicative of a non-challenging environment that hindered their

intrinsic motivation to succeed. While the former assertion aligned within the claim posited by McCollum and Yoder, (2011), that students' positive views of the teachers were associated with their academic success, the latter assertion echoed the sentiments offered by Suarez-Orozco and Suarez-Orozco (2001) about immigrant students not being sufficiently challenged and by Kaufman (2004) that high achieving, intrinsically motivated immigrant students who preferred teachers with high expectations.

The students had offered other perceptions of the teacher such as an authority of knowledge and as always having the student's interest at heart. Such notions of the teacher reiterated the findings asserted of Bishop (2002), Igoa (1995), McCollum and Yoder (2011), Suarez-Orozco and Suarez Orozco (2001), and Tanners (1997).

The interactions between the immigrant students in this study and their respective mathematics teachers had ranged from silence to extroverted verbal exchanges. While the negative interpretation of the students' lack of interaction and silence towards the teacher paralleled Endo's (2010) about the association between immigrant students' silence and their feeling of isolation and alienation, and Kirova's (2001) interpretation of silence as self-conscious behaviour associated with lack of language proficiency, the positive interpretations were equally important in understanding silence as an incubatory period for the development of language skills and confidence (Igoa, 1995; Esmonde, 2009; Wickett, 1997).

Other interpretations of the interactions between the students and the teacher that surfaced in this study were attributed to the students' need for affirmation, building trust, and purposeful interactions between the teacher and student to steer students towards deeper thinking. These were consistent with the works of Bishop (2002), den Brok, Wubbels, Veldman, and van Tartwijk (2009), Kirova and Emme (2010), and Walshaw and Anthony (2008).

Although each of the ten students' interactions within their peer groups were unique, whether they had been exposed to peer group work in their home countries or not, all of them expressed positive attitudes towards peer group work in their New Zealand

classrooms. However, their perceived benefits for working within certain groups were varied: some spoke about exerting high expectations on their peer groups as in Bishop (2002); some who associated themselves with achievement oriented peer groups as in the findings of Fuligni (1997), others expressed the notion as reported by Johnson, Johnson and Roseth's (2010) of positive interdependence and social interdependence theory; and yet others found, as in Flores (1997), Watkins and Melde (2010) and Vygotsky (1978), the benefits of being able to converse in their own language.

Some students in this study seemed to have developed firm opinions about their peer groups such as: the group members had not been intelligent enough to work with; the group's dependence on the immigrant student for help; and talking in class is inappropriate. These notions aligned with the findings of Croom (1997) and Tanners (1997) that each student brings a different culture and worldview to the classroom and the sentiments of Johnson, Johnson and Roseth, (2010), Kirova (2001), Kirova and Emme (2010, Igoa (1995), Secada (1992), and Teaver (2005) who asserted that peer group interactions have the potential to negatively or positively impact immigrant students forming relationships.

From the above it seems fair to conclude that through the interactions of the students with their teachers and peers, the ten students had formed unique relationships with their teachers and peers in their mathematics classroom.

Thirdly:

***How do the past and present experiences of immigrant students affect their perceived academic self-concept in finding their place in the mathematics classroom?***

In the study my acknowledgement of the daunting task faced by immigrant students in making choices between their past and present lives, drew theoretical backing in the works of Bishop (2002), Shim and Schwartz (2007) and Berry (2003) who presented the multiple consequences of these choices for immigrant students in the form of acculturation, assimilation, and bicultural integration.



The attitudes that some of the students presented towards mathematics were that mathematics had a broader purpose than its classroom-based context, and it had the potential to enhance educational attainment and improve their job opportunities. These findings align with the assertions made by Walker and McCoy (1997) about the importance of mathematics in the educational arena, and by Meaney's (2002) assertion about the prestigious position of mathematics in attaining well-paid jobs.

In spite of the ten students having resided in New Zealand for less than two years, most of them exhibited high levels of academic aspiration and expectation that seemed to emerge from their intrinsic motivation which may have developed from their cultural background, past and present experiences, and their perceptions of significant persons in their lives about their academic ability. These expectations reflected similar assertions made by Areepatamanni and Freeman (2008), Boado (2008), Salazar, Schludermann, Schludermann and Huynh (2000), Saran (2010) that immigrant students have ambitious educational expectations.

The perceived parental ratings provided an understanding of how the immigrant students' cultural or home background impacted on their academic self-concept, while their own self-rated ability and their perceived teachers' ratings provided an understanding of their self-concept within the classroom environment. This observation was backed by the work of Civil, Planas and Quintos (2005), and Roer-Strier and Strier (2007).

Some of the high perceived parental ratings were attributed to: parents having knowledge of their child's ability because of communications and active involvement; their own sense of obligation to fulfil the high expectation of the parents; and perhaps, the parents imposing their own perceptions of education on their child. These assertions align with the studies of Civil, Planas and Quintos (2005) and Boado (2008).

Average and below average perceived parental ratings were associated with both negative and positive factors. Some of the negative perceptions were attributed to

language difficulties, the parents' lack of involvement and confidence in mathematics. These echoed the findings of Valencia and Johnson (2006). The positive ratings were attributed to the parents' knowledge of their children's ability and aligned with the work of (Civil, Planas & Quintos, 2005).

Lower New Zealand self-ratings were attributed to the uncertainty of the assessment criteria as alluded to by Bishop (2002), limited language proficiency, perceived low teacher expectations, and low academic self-concept in accordance with the findings of Harris, Brown, Ford and Richardson (2004).

The participants attributed higher self-ratings in New Zealand to internal attributes, such as more time and effort being expended by them to combat the language barriers. This was similar to the findings posited by Bishop (2002), Kaufman (2004) and, Salazar, Schludermann, Schludermann and Huynh (2000). However, in one student who initially had high expectations, low academic achievement produced a lowered academic self-concept. My interpretation is that academic achievement and academic self-concept have a bidirectional influence on each other, which extends McCollum and Yoder's (2011) assertion that academic achievement is influenced by a student's academic self-concept.

### ***Contributions***

While being mindful of the phenomenological nature of the study, I do not claim to provide an exhaustive depth of data to represent the lived experiences of immigrant students in their mathematics classrooms. However, my interpretations of the experiences from the perceptions of the ten immigrant students in the study mostly parallels what the many international studies, that have been cited in previous sections, have found with regards to immigrant students. This study has the potential to make contributions on the national as well as international educational arena.

In the New Zealand context this study offers placement of the unique experiences of the ten immigrant students in their mathematics classrooms in New Zealand on an

international platform of academic research on migrant students, thus adding new knowledge to the existing body of knowledge on immigrant students.

While the context of the study is the mathematics classroom, the conclusions arrived at in this study are anticipated to provide a point of departure for other researchers in the wider field of education.

This study is one of the first studies in New Zealand to have given immigrant students a voice to talk about their experiences in their mathematics classrooms. These experiences are unique and have, therefore, added new knowledge about some of the perceptions held by immigrant students of their lived experiences in the mathematics classroom. By drawing on the real experiences of real students, this study has the potential to make contributions to the New Zealand educational context.

### ***Implications of the study***

Firstly, it may have multiple implications for teachers:

- By providing an opportunity for teachers of immigrant students to reflect on their own teaching practice with regards to the students' access to learning opportunities, and equity in the classroom for diverse learners. The teaching approach that is currently being used in the classroom could include more group work that focuses perhaps on contextual or situation learning.
- By encouraging teachers to think about how their own background and culture may influence their teaching and learning environment.
- By creating awareness that immigrant students come into their new classroom environment with their own understandings and perceptions that have been influenced by their background and culture. This awareness may prompt teachers to consider whether the richness and strength of the different cultures are being affirmed in their classrooms.
- By making teachers aware that bi-lingual and multi-lingual students often use language switching as a means to negotiate meanings in the classroom. Perhaps

teachers may consider using other students or teachers that speak the language of immigrant students to help their understandings and transitional experiences.

- By providing all teachers of immigrant students, not just mathematics teachers, with a perspective of some of the transitional experiences of immigrant students in their New Zealand classrooms.
- I hope that the outcomes of this thesis will increase the awareness of teachers of the different worldviews that students bring into the classroom. This also has implications for pre-service teacher education which could well incorporate different socio and cultural perspectives into mathematics learning with regards to role of the teacher, learning theories, and classroom culture.
- Understanding different worldviews and being able to incorporate these into the teaching and learning experience is important. Such an understanding requires professional development that focuses on the variety of socio-cultural environments that impact on the learning of immigrant students. Additionally, the teachers' awareness of the influence of their own worldviews on the classroom environment and the experiences of students is important.

Secondly, this study may have implications for New Zealand schools that are attended by immigrant students by offering awareness and understandings of:

- Some of the barriers that the ten immigrant students' experienced in their mathematics learning environment thus prompting schools to consider providing support for the students and the teachers in addressing these barriers.
- Perceptions of immigrant students towards differential learning, in spite of its well intended practices. In this way schools may decide on whether such practices create greater divisions between the diverse student populations or help bridge the divide for immigrant students.
- The language problems that immigrant students may confront, which should not be mistaken for lack of ability that prevents their entry into academic mathematics courses. In addition, the schools may consider strategies to remove language barriers and promote the achievement of students with limited English language proficiency.

Thirdly, this study may have implications for government policy by encouraging curriculum planners to consider an inclusive mathematics curriculum that would accommodate the learning needs of the diverse immigrant students in New Zealand secondary schools. An inclusive curriculum could take the form of supplementary publications, for example, a focus on the contributions of mathematicians from different cultures and countries, or number systems of the world.

This study's affirmation of the multiple worldviews that immigrant students bring into the mathematics classroom combined with growing diversity of students in Auckland secondary schools (Ministry of Education, 2010), suggests the need for education policy makers to take an active role in promoting a smoother transitional experience of the students. Some of these initiatives may include New Zealand classrooms forming partnerships with classrooms in other parts of the world, encouraging teacher exchange programmes, and the establishment of a global teachers networking forum that encourages professional conversations on an international platform.

Fourthly, while this study may not be accessible to immigrant students in its complete form, the dissemination of the findings to the teachers through professional development talks and workshops is expected to have implications for schools and teachers and would inevitably have the greatest impact on the immigrant students. While the ten students provided an understanding of their perceptions of their lived experiences in their mathematics classrooms, it is anticipated that through these experiences teachers and schools would be able to meet the needs of immigrant students with new understandings.

Finally, the study has implications for me as a teacher and as a researcher. My own journey in this study cannot be understated with regards to interpreting the ten students' experiences. The methodology of the study offered me the freedom to shape the direction of this study by drawing on my own background and the students' backgrounds.

This study has been a deeply personal experience for me as a mathematics teacher, an immigrant teaching in New Zealand for 14 years, and a doctoral student. While my belief that I, as a teacher, have a significant role to play in the educational success of immigrant students in my class, has remained unaltered, my understanding of what immigrant students' might encounter on their transitional journey has been transformed; I am now mindful of the multiple realities that exist in my mathematics classroom and my own professional growth to meet the needs of immigrant students that I expect to meet as a mathematics teacher.

### ***Limitations***

While the hermeneutic phenomenological methodology was appropriate for the study, the experiences of the immigrant students as phenomena presented under emergent themes from the rich conversations and observation notes may be viewed as a limitation because its structure prevented the study from providing a holistic sense of each participant. Furthermore the complete narrative of the students' comments and elaborations seem to be lost within the structure of the thesis. For example, the reasons for comments such as, "*New Zealand maths is boring*" were not presented as a continuation of the student's narrative. Perhaps future studies may delve deeper into such valuable comments made by students.

The research being conducted at the school where the researcher teaches, may also be viewed as a limitation of the study by those in favour of outsider research, in spite of its potential to enhance researchers' knowledge of their practice (Mercer, 2007) and precautions put in place to address the potential issues and minimise their effects.

While the findings and conclusions drawn from this study may have an impact on teachers of immigrant students, generalisation is not intended because these experiences are unique to the ten immigrant students at the particular point in time of the study. Other similar studies that may replicate this study may produce different findings because the experiences of the different participants are anticipated to be different.

The study interpreted the experiences of ten immigrant students in their mathematics classrooms and as a result the applicability of the study to other disciplines may be limited. While some of these experiences may be transferable to other disciplines, future studies may benefit by focusing on the experiences of immigrant students in classrooms of other single subject areas or across the subjects studied by the students in order to understand some of the transitional experiences immigrant students encounter in their new school environments. For example, according to Cao, Seah, and Bishop (2006), Macintyre and Hamilton (2010), Park and Leung (2006), and Shan and Bailey (1991) mathematics teachers often rely on the textbook, which may not be the case in other subjects, and therefore, for students from a text-based educational context, change may not be as great in mathematics as in other subjects.

Another important focus of this study was to highlight the experiences of the ten year 9 and year 10 immigrant students, that is, students in their first two years of schooling at secondary school level in New Zealand. This specific age focus may not have relevance to teachers of younger immigrant students or older immigrant students. Adams and Shambleau (2006, p. 93) found that the strategies employed to help immigrant students cope in their new environment may be age-specific such as the child being allocated a "lunch buddy", a "work buddy" or a "playground buddy".

While this was appropriate for immigrant students at primary schools, it may not be appropriate for older students. Perhaps future studies could investigate the experiences of immigrant students at senior secondary school level, at intermediate school level or at primary school level to gain a perspective of some of their transitional experiences at different phases of schooling in New Zealand. In addition, perhaps the focus might be on the first few weeks rather than some months later.

The interactions between the immigrant students and their teachers were interpreted from the researcher's observations and from the perceptions that students had of their interactions with their teachers. The perceptions that students had of their teachers were elicited during the interviews. However, employing other methods, for example

Wubbels' (1993) internationally used questionnaire on teacher interactions (QTI), future studies may provide a comparative understanding of students' perceptions about the interactional behaviours of their teachers in the classroom (Adedoyin, 2010; den Brok, van Tartwijk, Wubbles & Veldman, 2010; McCollum & Yoder, 2011).

The aim of this study was to understand the immigrant students' experiences in their mathematics classrooms from their own perspectives. This single perspective may have been limiting because of its non-inclusion of the teachers and parents perspectives. Parents, teachers and students may provide different dimensions to the understandings of the transitional experiences of immigrant students in their new learning environment (Adams & Shambleau, 2006; Civil, Planas & Qunitos, 2005; Vidali & Adams, 2006).

Future studies in the New Zealand context may include the parents' perspectives to gain further understanding of parental and cultural expectations, and the background that immigrant students come from (Horst & Holmen, 2006). For example, Roer-Strier and Strier (2006) found that Ethiopian immigrant fathers residing in Israel provided valuable information about their expectations of the schools and of their children in adapting in their new educational environment. This knowledge was important in teachers understanding of the cultural conflicts that immigrant students may be faced with between the home environment and school expectations.

The study by Adams and Shambleau (2006) provided multi-perspective views from the teachers, the parents and the students, and the study found that the most important factor for teachers was to create an environment that made the newly arrived students feel welcome. Other studies could also include teacher perspectives of the immigrant students to gain an understanding of how the teachers view the immigrant students in the New Zealand classroom context.



### ***Concluding remarks***

All ten of the students in this study have come from families that had chosen to reside in New Zealand. According to Saran (2010) voluntary migration is usually associated with an expectation of a better life with high academic achievement being a priority. Therefore, to these immigrant students with diverse backgrounds, the barriers encountered appeared to be non-permanent obstacles to be overcome in their transitional experience.

As immigrant students form an integral part of New Zealand's student population this study is framed within the ideology that embracing the different worldviews that immigrant students bring into the classroom has the potential to enhance the learning experiences of all students in the mathematics classroom environment.

This study has brought to the fore some of the transitional experiences of a group of immigrant students in their New Zealand mathematics classrooms, by presenting their perceptions of their lived experiences in New Zealand compared to their home countries, as the phenomena. As the researcher, I have offered my interpretations of the phenomena and aver that the hermeneutic nature makes the study an on-going, cyclic process with each reader taking from it different and unique interpretations of these lived experiences.

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## Appendix A: Indicative questions for initial interview/conversations

(Prompts: teachers, classroom setting, books, students, group learning, and tasks).

1. What did you enjoy most about Maths in [country student has come from]?
2. What do you enjoy about Maths in New Zealand?
3. Can you tell me about what you found the same in New Zealand and [country student has come from] maths classrooms?
4. Are there any differences? What are some of the differences?
5. Before you came to New Zealand where would you have rated your maths ability on a scale of 1 to 5?

POOR	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT
1	2	3	4	5

Why?

6. Where would you rate your maths ability now?

POOR	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT
1	2	3	4	5

Why?

7. How would your parents rate your maths ability?

POOR	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT
1	2	3	4	5

Why?

8. How would your teacher rate your mathematics ability?

POOR	DEVELOPING	AVERAGE	GOOD	EXCELLENT
1	2	3	4	5

Why?

9. Did you think studying maths in [country student has come from] was?

Not important	SOMETIMES IMPORTANT	NOT SURE	IMPORTANT	VERY IMPORTANT
1	2	3	4	5

Why?

10. Do you think studying maths in New Zealand is

Not important	SOMETIMES IMPORTANT	NOT SURE	IMPORTANT	VERY IMPORTANT
1	2	3	4	5

Why?

11. Is there anything else about maths that you would like to talk about?

## Appendix B: Observation protocols spatial map

Student: ..... (Pseudonym)

Observation Number:.....

### Spatial map of the participants' positions in relation to the rest of the class

Key: ⊗ represents the student that was observed, S represented the other students in the classroom

Teacher's Desk		Front of classroom					
S	S	S	-	S		S	S
S	S	S	S	S		S	S
S	-	-	-	S		S	S
S	S	S	S	S		S	S
		-	-	⊗		S	S

Spatial map of Van's initial position in class

Teacher's Desk		Front of classroom					
S	S	S	⊗	S		S	S
S	S	S	S	S		S	S
S	S	-	S	S		S	S
S	S	S	S	-		S	-
		S	S	-		S	S

Spatial map of Van's subsequent position in class

Front of classroom				Teacher's Desk	
-	S	S	S	S	S
S	-	-	-	S	⊗
S	-	S	S	S	S
S	-	S	-	-	S
S	-	-	S		

Spatial map of Tim's position in class

Developed from Neuman's (2000) spatial maps

### Appendix C: Observation protocols - Direct Observation Recording Sheet

Direct observations		Inference	Personal Journal
Classroom Talk			
<b>Teacher Talk</b> Control – information - procedural	<b>Participant Talk</b> Solicited – unsolicited		
<b>Learning Strategies</b>			
<ul style="list-style-type: none"> <li>Engagement with text, other students, teacher</li> </ul>			
<ul style="list-style-type: none"> <li>Independence/Dependence</li> </ul>			
<ul style="list-style-type: none"> <li>Other</li> </ul>			

Developed from Hopkins' (1989) guide to classroom observations

## **Appendix D: Indicative Questions Interview/Conversations after Observations**

(Prompts: conversations will also be specific to observed interactions and lesson.

1. Do you often sit in the same place during you maths lesson?
2. What did you enjoy most about you maths lesson today?  
Why?
3. Did you find any of the work difficult to do during the lesson?
4. How did you find working from the text/activity sheet/tasks?
5. Do you discuss your work with other students in the class?  
Why
6. What do you do when you cannot understand something in class?
7. Is there anything you would like to tell me about your maths lesson today?