"And my heart is thinking": perceptions of new entrant children and their parents on transition to primary school numeracy.

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Abstract

This research project examines how new entrant children and their parents experience and interpret the transition from early childhood education to primary school learning of numeracy. It investigates children’s numeracy experiences in the context of the Early Numeracy Project (ENP) and within the constructivist environment of a numeracy classroom focussing on achievement of prescribed outcomes. This setting contrasts with early childhood education, where there is a greater focus on socio-cultural learning.

The research reported is a qualitative investigation and uses a multiple case study approach. The participants are five children from a new entrant classroom and their parents. The main sources of data are participant observation in the classroom and unstructured interviews. The interview discussion is stimulated in some instances by photographs taken by the children and on other occasions by children demonstrating to parents the use of numeracy equipment to support their learning.

The study illustrates how teacher beliefs and knowledge of numeracy pedagogy impact on the children’s interpretation of numeracy learning. The findings suggest that the ENP is limiting the range of meaningful numeracy experiences in the new entrant classroom and that the Numeracy Development Project should provide further information on the pedagogy of numeracy knowledge which could bridge early childhood and primary school numeracy learning. The findings also suggest that professional development in the form of coaching should support teachers following their introductory year of ENP.
In this study the primary school teacher and parents had little opportunity to explore the philosophy and discuss the content of the children’s early childhood education and experiences. Consequently the children were making the transition to school without the adults in their lives understanding the extent of the children’s transition. This study’s focus is the transition to learning school numeracy.

The study also finds that during the children’s first term at school parents gauged the content of the numeracy programme from the children’s play at home. Parents were impressed with their children’s enthusiasm and progress. During this period communication with the school about the children’s numeracy learning was largely initiated by parents and there was no opportunity for them to be involved in the numeracy programme at school.
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# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>1</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>1</td>
</tr>
<tr>
<td><strong>Chapter One: Introduction</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Chapter Two: Literature Review</strong></td>
<td>7</td>
</tr>
<tr>
<td>Introduction</td>
<td>7</td>
</tr>
<tr>
<td>The Early Numeracy Project</td>
<td>7</td>
</tr>
<tr>
<td><em>Te Whāriki</em> and <em>The New Zealand Curriculum Framework</em></td>
<td>12</td>
</tr>
<tr>
<td>Key Competencies</td>
<td>14</td>
</tr>
<tr>
<td>Transition to Classroom Numeracy</td>
<td>15</td>
</tr>
<tr>
<td>Becoming a Parent Member of the School Community</td>
<td>19</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>21</td>
</tr>
<tr>
<td><strong>Chapter Three: Methodology and Procedures</strong></td>
<td>23</td>
</tr>
<tr>
<td>Introduction</td>
<td>23</td>
</tr>
<tr>
<td>Methodology</td>
<td>23</td>
</tr>
<tr>
<td>A Feminist Voice</td>
<td>25</td>
</tr>
<tr>
<td>Method</td>
<td>28</td>
</tr>
<tr>
<td>Ethical Issues</td>
<td>30</td>
</tr>
<tr>
<td>Credibility and Dependability</td>
<td>32</td>
</tr>
<tr>
<td><em>Credibility</em></td>
<td></td>
</tr>
<tr>
<td><em>Dependability</em></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td>39</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>41</td>
</tr>
<tr>
<td><strong>Chapter Four: Interpreting the Data</strong></td>
<td>42</td>
</tr>
<tr>
<td>Introduction</td>
<td>42</td>
</tr>
<tr>
<td>The Setting</td>
<td>42</td>
</tr>
<tr>
<td>Negotiating the Culture of the Numeracy Classroom</td>
<td>46</td>
</tr>
<tr>
<td><em>Relating to Others</em></td>
<td></td>
</tr>
<tr>
<td><em>Managing Self</em></td>
<td></td>
</tr>
<tr>
<td><em>Participating and Contributing</em></td>
<td></td>
</tr>
<tr>
<td><em>Section Summary</em></td>
<td></td>
</tr>
<tr>
<td>A Child’s Numeracy Journey</td>
<td>60</td>
</tr>
<tr>
<td><em>Thinking, Using Language, Symbols and Text</em></td>
<td></td>
</tr>
<tr>
<td><em>Section Summary</em></td>
<td></td>
</tr>
<tr>
<td>Parents’ Perspectives</td>
<td>69</td>
</tr>
<tr>
<td><em>Background Information</em></td>
<td></td>
</tr>
<tr>
<td><em>Preparation for the Transition to School Numeracy</em></td>
<td>80</td>
</tr>
<tr>
<td><em>The Transition to School</em></td>
<td></td>
</tr>
<tr>
<td><em>Section Summary</em></td>
<td></td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>80</td>
</tr>
</tbody>
</table>
Chapter Five: Discussion
  Overview table 81
  Introduction 81
  My role as a Reflexive Researcher 82
  Negotiating the Classroom Culture 88
  Interpreting the Language, Symbols and Text of Numeracy 98

Chapter Six: Conclusion and Implications 113
  Introduction 113
  Summary 113
  Implications and Recommendations 115
    Communication
    Teacher Professional Development
    Adaptations to ENP
  Further Investigations 121

References 123

Appendices 137
  1. 1.1-1.8 Letters of consent and information for participants 138
  2. Sample pages of the classroom booklet, “Being Friends” 150
  3. Transcript of an unstructured interview with a parent 153
  4. Data analysis codes and categories 160

Glossary 162
Chapter One: Introduction

As children move from the home and the early childhood educational environment into the primary school setting, they and their families are confronted with unfamiliar pedagogical and social cultures. The children arrive at school with behaviour and beliefs that have been gradually shaped by a range of family and community experiences. From these culturally diverse entry points, the children enter the common culture of the classroom. Once at school, and while accomplishing socialisation into the classroom, they are also required to adapt their cognitive learning to that of the classroom. Bernstein (2000) states, “The process of adaptation involves children in acquiring the recognition and realization rules of the school’s discourse, which may differ substantially from the pedagogic discourse of their home,” (p. 32). The interpretation of the rules helps children to make sense of the way the learning is enacted in the classroom and then to act appropriately as learners.

In New Zealand, many children enter primary school with early childhood education experiences based on the socio-cultural, constructivist pedagogy of Te Whāriki: Early Childhood Curriculum (Ministry of Education, 1996). Te Whāriki highlights the place of the child, the child’s experiences, the physical and social environment, and reflects a child-centred and socio-cultural pedagogy. At primary school however, children meet a contrasting education system regulated by the New Zealand Curriculum Framework (Ministry of Education, 1993), which, in its drive for accountability and academic excellence, prescribes achievement aims and objectives (Mutch, 2003). Perhaps as a result of teachers’ focus on the achievement objectives of the outcomes based primary school curriculum the children experience a lessening of power and choice in their learning.
When outlining the early childhood education mathematics links with the primary school curriculum, *Te Whāriki* makes reference to content, and skills of number, space, measurement and reasoning. These skills are embedded within the aims of the communication and exploration strands. A more specific framework of mathematical skills which emerge during the preschool years has been outlined by Carr, Peters, and Young-Loveridge (1994a). Carr, Peters, and Young-Loveridge (1994b) believe there is a challenge for early childhood educators to provide opportunities for developing mathematical ideas which are accessible to all children. Their research project, *The Enhancing the Mathematics of Four-Year-Olds (EMI-4s Study)* signalled a high degree of variability in mathematical expertise among kindergarten children and relatively little mathematics activity at kindergartens. The study also found adult involvement increased the complexity of children’s play (Young-Loveridge, Carr & Peters, 1995).

Since 2000 *Mathematics in the New Zealand Curriculum* (Ministry of Education, 1992) has been supported by the Numeracy Development Project, a component of which is the Early Numeracy Project (ENP) for teachers of Y0-3 children. The Numeracy Development Project (NDP) is a Ministry of Education initiative to raise children’s achievement in numeracy, and is explained in more detail in the next chapter. The NDP focuses on the number strand of *Mathematics in the New Zealand Curriculum* (MiNZC). In this study I interpret numeracy according to the Numeracy Development Project definition of numeracy:

To be numerate is to have the ability and inclination to use mathematics effectively – at home, at work and in the community. (Ministry of Education, 2005a, back cover page)
The NDP is an evolving project and since recent statements from the draft Mathematics and Statistics Essence Statement, Ministry of Education (2005f) explain the meaning and aims of mathematics, I include them here.

Mathematics is the exploration and use of patterns and relationships in quantities, space and time.

[It aims] To develop the [students’] ability to think creatively, critically, strategically and logically, to structure and organise, to carry out procedures flexibly and with accuracy, to process and communicate information, and to have a positive disposition for intellectual challenge.

(Ministry of Education, 2005f, p. 1)

The Ministry of Education (MoE) has been tracing the patterns of numeracy performance and progress of children involved in the ENP (Thomas & Tagg, 2004; Thomas & Ward, 2002; Young-Loveridge, 2004); and more recent research has been reported in a compendium by Higgins, Irwin, Thomas, Trinicke, & Young-Loveridge (2005). There is however a void of documented information both on new entrant children’s interpretation of their numeracy learning, and of parents’ perspectives on their child’s transition to school numeracy, that is, child and parent ‘voice’ (Smith, Taylor, & Gollop, 2000). Yet, from a socio-cultural perspective, children as a social group are now recognised as having their own purposes and meanings, and the ability to articulate these (Michel, 1994; Smith, Taylor, & Gollop, 2000). Further, the actual process of seeking children’s views empowers them to take more control of their actions, particularly when they have been disempowered by a period of change, such as entry to school (Smith et al.). In this study, therefore, I use student and parent voice to explore children’s experiences and interpretation of the ENP content and pedagogy. I am curious about how the children and their parents interpret the change from the early childhood to the school environment in relation to numeracy learning.
My study draws attention to the complexities within the new entrant classroom, by examining the children’s perspectives on teaching and learning, in the context of the ENP. I explore their understanding of what constitutes mathematics; I also seek their explanation of the behaviour they associate with mathematics and their reasons for these associations. A second area of focus is the parents’ explanations of their experiences in relation to their child’s transition to school numeracy. Eyers and Young-Loveridge (2005) believe that parents’ commitment to the home/school partnership is a key factor in children’s success at school. The parents’ responses to their children’s interpretations deepen my understanding of the children’s formation of their beliefs and understanding. My investigation also provides insight into how parents interpret their role as numeracy educators, and how they negotiate the culture of their children’s numeracy learning environment.

The research questions guiding this study are:

- **How do new entrant children experience and interpret early numeracy during their first term of school?**
- **What are parents’ experiences and perceptions of their new entrant child’s early numeracy learning?**

My interest in children’s transition to early primary school numeracy has arisen from experiences as a classroom teacher of mathematics. The Beginning School Mathematics (BSM) resource influenced my mathematics teaching because of its cyclic approach and its emphasis on children constructing their understanding of mathematics through manipulation of materials, in meaningful contexts. More recently I have become involved in the facilitation of the Numeracy Development Project. This involves working in
classrooms with teachers introducing the Early Numeracy Project pedagogy into their practice. As a grandmother I have become aware of the disparity between the amazing socially cultural holistic numeracy learning of my young grandchildren in their everyday ‘happenings’, and the more structured, less meaningful environment of new entrant classrooms where teachers are practising the NDP pedagogy.

In this report the literature review in Chapter Two provides background information on the ENP and discusses its main content features. A brief comparison of the New Zealand Curriculum Framework (Ministry of Education, 1993) and Te Whāriki: He Whāriki Matauranga mo nga Mokopuna o Aotearoa: Early Childhood Curriculum (Te Whāriki) (Ministry of Education, 1996) is made, and the Ministry of Education’s (2005e) proposed key competencies are outlined. The review continues with discussion of issues related to transition to school numeracy, with particular reference to the role of parents. The third chapter describes the qualitative methodological design of the research involving case study procedures, ethical issues and methods of data collection and analysis. Chapter Four begins by reporting the analysis of the data and the emerging findings of the children’s social behaviour as it arose from their interpretation of their classroom experiences. This behaviour is described in the section entitled ‘Negotiating the Culture of the Classroom’. Other findings tracing one child’s cognitive development and her construction of an understanding of what constitutes mathematics are recorded in the section, ‘The Numeracy Journey of One Child’. The findings on parents’ perspectives complete Chapter Four. The first two categories of findings are reported using the proposed key competencies as a framework (Ministry of Educaton 2005e). The findings are discussed in Chapter Five. The aims of the fifth chapter are to explain the reflexive practices of my research and to respond to the study’s two research questions. The final chapter includes a summary of the report,
outlines implications for teaching and learning practice and suggests directions for further research.
Chapter Two: Literature Review

Introduction

This review scopes the principal areas of research and theory in relation to this study. The review begins by tracing the development of the Early Numeracy Project, including the theories underpinning the teaching approaches and project resources. This is followed by discussion on the pedagogical relationships between The Numeracy Development Project, The New Zealand Curriculum Framework (Ministry of Education, 1993), Te Whāriki (Ministry of Education, 1996) and the proposed Key Competencies (Ministry of Education, 2005b). Lastly, the review outlines the research literature concerned with the transition from early childhood education to the primary school classroom. Early childhood educators have raised numerous issues in relation to the transition and this review discusses the social, curricula, pedagogical and parent issues, as they relate to new entrants’ numeracy learning.

The Early Numeracy Project

The Early Numeracy Project (ENP) is positioned within the context of the Ministry of Education’s Literacy and Numeracy strategy. The ENP is for teachers of Y0-3, and is one of five projects that form the Numeracy Development Project. The other projects are Advanced Numeracy Project, (ANP) for teachers of Y4-6, Intermediate Numeracy Project (INP) for teachers of Y7 and 8, and the Senior Numeracy Project, (SNP) for teachers of Y9 and 10, and Te Poutama Tau (Maori-medium project). The project’s development began in response to the 1994 Third International Mathematics and Science Study (TIMSS) results that identified New Zealand students’ achievement in mathematics as below international averages (Ministry of Education, 2001). A key element of the NDP is the provision of an
evolving national professional development programme for all teachers of Years 0-10 students, thus enacting recommendations made to government by the Mathematics and Science Taskforce (Ministry of Education, 2001).

As a result of the professional development programme which began in 2001 (Ministry of Education, 2001), many teachers are basing their numeracy teaching on the NDP's two number frameworks. The knowledge framework outlines stages of student conceptual development in early number knowledge, while the strategy framework outlines stages of computational learning (Ministry of Education, 2004). The frameworks were written by P. Hughes and V. Wright (Peter Hughes, personal communication, 19 January, 2005) with support from a reference group and other writers (Ministry of Education, 2006a). The progression of children’s counting methods outlined in the frameworks is influenced by many researchers. These include Steffe, von Glasersfeld, Richards, and Cobb (1983), Steffe, Cobb and von Glasersfeld (1988), R.Wright and others (as cited in Ministry of Education 2006a). The frameworks have been developed from the Count Me in Too material adapted by R. Wright (1994) from his Mathematics Recovery Programme in New South Wales, Australia. Fuson’s (1988) study of number word sequence and cardinality influences the content of the early stages of the frameworks. The frameworks also reflect New Zealand researchers’ work on early primary school children’s acquisition of number, particularly findings from the School Entry Assessment (SEA) programme (Anderson, Lindsey, Schul, Monsieur & Meiers, 2002) and Young-Loveridge (1999).

The strategy teaching is supported by Hughes’ adaptation of a teaching model based on the recursive theory of the growth of mathematical understanding (Hughes 2002; Pirie & Kieren, 1989, 1992, 1994; Pirie & Martin, 2000). Hughes’ model incorporates Steffe et al.’s (1983), and Steffe et al.’s (1988) theory of counting types that children use to solve
number problems. This predominantly European approach assumes that counting comes before quantification, and may, according to Pinxten (1994 as cited in Young-Loveridge, 2004), disadvantage learners from other cultures. Bobis’s (1996) work on visualisation led to the inclusion of an imaging stage in the frameworks and an imaging phase in the teaching model. As learners construct their understanding of a new concept, imaging, or visualisation, bridges their use of materials and the abstraction phase.

There are varying views on the status of the knowledge and strategy frameworks. Peters (2005) believes that the developmental progressions underpinning the numeracy projects result in early school mathematics education being more prescribed than in early childhood, and consequently the assessment of achievement being against narrower targets. She relates the frameworks to “universal decontextualised developmental theories” which create maps of “typical” children, and argues that there are many possible ways of constructing learning (Peters, 2005, p. 10). According to Chamberlain (2001) and V. Wright (2000), frameworks provide possible learning progressions, while Timperley, Robinson and Bullard (1999, as cited in Peters, 2005) and Thomas and Ward (2002) believe many teachers have found specific frameworks useful in guiding practice, particularly in the provision of programmes that aligned with children’s stages of development. There is debate also among some numeracy facilitators about the relevance of distinguishing knowledge from strategy teaching. E. Burt (personal communication 24 January, 2006) believes the separation clarifies for teachers, the ideas children are required to understand, the intention being that teachers will eventually meld the knowledge and strategy teaching together. Beishuizen (1998) highlights the distinction between mental recall and mental strategies stating that mental recall, or knowledge, is an important basis for the development of mental strategies. For example, children who recall basic facts well are better equipped to use increasingly
advanced mental strategies. In *Getting Started* (Ministry of Education, 2006a) the writer adds that quick recall of knowledge items avoids the constraint of “mental working space” when solving mathematical problems mentally (Ministry of Education, 2006a, p.10). I note that although place value is part of the knowledge framework, its activities are included among the strategising activities of addition and subtraction. Inclusion among strategy rather than knowledge activities challenges the traditional method of teaching place value concepts using ‘base ten’ equipment. It reflects the views of those who encourage children to invent their own procedures, such as the use of the empty number line to construct understanding of place value and demonstrates the connections rather than distinctions between knowledge and strategy (Beishuizen, 1998; Kamii, as cited in Wright, Martland, Stafford & Stranger, 2002).

The numeracy project aims to help teachers to become better teachers of mathematics by providing teacher resource booklets that outline children’s learning and thinking strategies in early mathematics, and effective identification of, and response to, children’s learning needs (Ministry of Education, 2001). In-class modeling and support by facilitators demonstrate the project’s pedagogical approach. Although not documented in the ministerial resources as a teaching approach until 2006, Higgins (2004) states that the Advanced Numeracy Project strategy teaching is reflecting Fraivillig, Murphy and Fuson’s (1999) pedagogical framework, Advancing Children’s Thinking (ACT). ACT promotes teacher intervention to advance students’ mathematical thinking by using an inquiry method based on a constructivist theory of learning (Cobb, Yackel & Wood, 1993; Greeno, 1988; Simon, 1995; von Glasersfeld, 1987; as cited in Fraivillig, Murphy, & Fuson, 1999) and the Vygotskian idea of creating zones of proximal development (Vygotsky, 1978). Other researchers have influenced the pedagogy of NDP. They believe children can,
without direct instruction, construct viable solutions to problems, and promote this practice using the term, cognitively guided instruction, CGI (Carpenter, Fennema, Franke, Levi, & Empson, 1999). While the NDP aligns with the MiNZC philosophically, it requires shifts in teachers’ thinking away from teaching rules, procedures and algorithms. It promotes the idea that there are often many possible solution strategies for a problem and that reasoning and justification for those strategies are important (Young-Loveridge, 2004). I believe Wenger’s (1999, p. 279) notion of cognitive learning theory with its pedagogical focus on “the processing and transmission of information through communication, explanation, recombination, contrast, inference, and problem solving”, also aligns with ACT and CGI.

The numeracy knowledge framework includes eight stages of each of the following domains; number identification, number sequence, grouping and place value, basic facts and written recording. The strategy framework includes eight stages of the addition and subtraction, multiplication and division, and proportions and ratios domains (Ministry of Education, 2004). As previously described writers of the project provide a model to support the teaching of strategies, but because of the assumption that teachers are successfully teaching knowledge currently (Hughes, 2002) excluded models and guidance for knowledge teaching. Consequently, new entrant teachers, because they are mostly teaching children at stages zero, one and two of the knowledge framework, are provided with content, but no documented theoretically based pedagogy on the teaching of knowledge. Hughes acknowledged this void (Peter Hughes, personal communication, 19 January, 2005), while Burt (Eleanor Burt, personal communication April, 2004) advocates the use of the Beginning School Mathematics, (BSM) (Department of Education, 1985) resource to fill the gap. This highlights tensions. Firstly, recently trained teachers are unfamiliar with the BSM resource. Secondly, while BSM is useful in promoting the language of
mathematics its concept development does not exactly align with that outlined in the NDP knowledge framework. The NDP grouping and place value domain emphasis on groupings with five and ten, and the number identification domain are at variance with BSM. Teachers, particularly those working with children at the lower stages, therefore require additional explicit information and guidance on the interpretation of the knowledge framework and the teaching of knowledge.

Te Whāriki and The New Zealand Curriculum Framework

The New Zealand early childhood’s integrated curriculum Te Whāriki (Ministry of Education, 1996) contrasts with The New Zealand Curriculum Framework (NZCF) (Ministry of Education, 1993) which identifies the essential learning areas and the essential skills separately. Achievement aims and objectives for student outcomes detail the essential learning areas and essential skills in separate national statements for each curriculum. The integrated nature of the early childhood curriculum is reflected in the socio-cultural and holistic pedagogy of early childhood education programmes. Teachers and learners construct the learning together (Nuttal, 2003), and assessment is holistic, viewing the child’s learning as complex and contextual (Carr, Hatherly, Lee, & Ramsey, 2003). At primary school, while there is a merging of some curricula, the nature of the achievement objectives means that knowledge and skills are usually assessed, recorded and reported under each essential learning area (Mutch, 2003).

The New Zealand early childhood curriculum document, Te Whāriki (1996), outlines its connections with strands, essential learning areas, and essential skills of the school curricula. However, Mathematics in the New Zealand Curriculum (MiNZ), (Ministry of Education 1992) being written before Te Whāriki (Ministry of Education 1996) does not
state any connections with early childhood programmes. New entrant teachers therefore, may be unaware of the links and differences between the two documents. Teachers may also be unaware that children’s early childhood education embeds mathematics within the aims of communication and exploration, and that new entrant children may not have experienced numeracy as a separate curriculum. Young-Loveridge, Carr and Peters (1995) found a relatively low incidence of mathematics occurred in the kindergarten context. The Education Review Office (1998) criticised Te Whāriki for failing to identify the relationship between early childhood and school education. The Office believed there were ramifications for children’s readiness for school literacy and numeracy programmes.

Carr et al’s. (1994a) discussion on Ginsburg’s framework for early childhood mathematics adds meaning to Te Whāriki’s broad mathematical guidelines. The writers explain Ginsburg’s three levels of progression of mathematical thinking; the informal and natural, the informal and cultural, and the formal and cultural, the latter level usually being met at school. Once at the informal and cultural stage, that is, the counting stage of development, children learn the system and its uses from “experts” within their culture (Carr et al., p. 264). The “experts” identify as families and other early childhood educators and fulfil an important role as they develop awareness of numeracy and its purposes. They do this when they incorporate numeracy into children’s everyday happenings, discussions and problem solving. To assist the children within the three levels and as they transition from one to another would require both early childhood and early primary school educators to identify the characteristics of young children’s understanding and behaviour at the various levels. It is also important that educators understand the significance of the counting principles of one-to-one, sequencing and cardinality. Hughes (1986) highlights the difficulties new entrant children face when confronted with the formal symbols and mathematical language.
of school, especially alongside a void of meaningful context. According to Carr et al. (1994b) children’s mathematical activities need to be at an appropriate difficulty level or challenge. The child’s familiarity with the context, her/his level of understanding of the purpose, and the level of complexity of the mathematical content all influence the task’s degree of difficulty. The findings of the EMI 4’s study (Young-Loveridge et al., 1995) indicated that many kindergarten children were, presumably without formal instruction, strategising comparably with stage two of the NDP strategy framework (Ministry of Education, 2005a), while the ability of some to visualise addition and subtraction of small numbers is comparable with early stage three development. Researchers of cognitively guided instruction believe children arrive at school with a great deal of intuitive knowledge of mathematics, including problem solving processes, which can serve as a basis for understanding the primary school mathematics curriculum (Carpenter, Fennema, Franke, Levi, & Empson, 1999).

**Key Competencies**

In response to the 2002 *Curriculum Stocktake Report* the Ministry of Education has recommended changes be made to the essential skills in the NZCF. Currently, the Ministry of Education is proposing that the essential skills be replaced with the five key competencies of; managing self, relating to others, contributing and participating, thinking, and using languages, symbols and texts (Ministry of Education, 2005e). Also under consideration are issues of attitude, motivation, values, belonging and thinking and their connections with the key competencies. The key competencies listed are a New Zealand adaptation of the OECD competencies influenced by Rychen (2003) and Rychen and Salganik (2003). Achievement within the areas of the key competencies is thought to contribute to a successful life and well-functioning society. The key competencies are
relevant across different spheres of life, and are important for all individuals. Carr and Peters (2005, as cited in Peters, 2005) found work by teachers exploring what the key competencies might mean in practice indicated that the key competencies fitted with the teachers’ existing ‘big ideas’ of teaching. Teachers wove learning areas through the competency framework. Parents also supported the teaching approaches the competency framework fostered.

Peters (2005) believes that although the strands of Te Whāriki are not the same as the proposed key competencies (Ministry of Education, 2005e), they do provide a link between the early childhood strands and the school curriculum. Carr and Peters (2005, as cited in Peters, 2005) believe the key competencies provide a common language for teachers of both sectors to talk about children’s learning, and advise that frameworks for linking Te Whāriki and the proposed competencies have been developed.

**Transition to Classroom Numeracy**

On entry to school, along with a new physical environment, the child has to adapt to different roles, rules and relationships (Brofenbrenner, 1979). Pollard (1996) identified the complexity of the social influences on learning. These included peer and family influences, and remind us that the “transition to school is not just a process of the child adapting to school” (Peters, 1999a, p. 4), but that it is a “dynamic, multifaceted, interactive process between all participants involved” (Ghaye & Pascal, 1988, p. 206). The child in transition to school occupies three environments or micro-systems; their home world, the pre-school world and the school world (Bronfenbrenner, 1979). Dunlop and Fabian (2002) believe the relationships between the settings, the interconnections or meso-systems (Bronfenbrenner, 1979) are important for the child. While starting school is regarded as a rite of passage for
children in many societies, there are issues associated with this transition. It is often the first time the child and his/her family come into contact with the formal education system. This experience can be highly different for each child. As Pollard points out:

> each child experiences the classroom in the light of their particular structural position, learning stance, interests, strategies, identity and cultural background. The ways in which each child interprets the classroom setting, acts and learns is bound to reflect this differential positioning and to lead, in consequence, to differential experiences and outcomes.


Jackson (1987) described the process of making sense of school as largely one of developing social competence. Cullen (1992; 1998) believes children develop social learning strategies in early childhood, but because of school’s formal structure, new entrant children have few opportunities to develop and practise them. Carr (1998) suggests that one of the key things that children take to school from early childhood is a set of learning dispositions. She believes the dispositions of courage, playfulness, perseverance, communication and responsibility are for learning throughout one’s life.

In addition to the social issues there are other influences impacting on the new entrant’s mathematical learning. These include different teaching philosophies (Ledger, Smith & Rich, 1998), curriculum content, and delivery (Cullen 2003; Mutch, 2003; Nuttal, 2003; Peters, 1999b). Dunlop and Fabian (2002) warn that curriculum demands can diminish school children’s competence. They believe it is important to consider pedagogies which allow children time to develop as children and not always be in pursuit of adulthood. Dunlop (2002) found that while pre-school and primary school educators used the same language, their meanings of the concepts varied according to the sector in which the staff member taught, and their personal philosophy. The staff from the two sectors also held
differing views on the capabilities of the children entering primary school. Dunlop (2002) believes ways need to be found for educators of the various sectors to “share policies, understand each other’s ideologies and respect but integrate them, to experience each sector that children themselves experience and to know and value the powerful learning that children bring with them to pre-school and school” (p.108).

A number of studies have identified the teacher, as the greatest source of variance that can make a difference to students’ learning (Alton-Lee, 2003; Hattie, 2002). Others claim that effective teacher-student relationships help students to learn (Bishop, 2002; Bishop, Berryman, Tiakiwai & Richards, 2003; Hawk, Cowley, Hill & Sutherland, 2003; Macfarlane, 2004). In her paper discussing the relationship between children’s identity and involvement in their classroom activity, L. Black (2002) concludes that the verbal classroom interactions among teachers and pupils contribute to the kind of self identity the pupils construct. She argues that in successful learning, learners see themselves becoming full participants in classroom learning processes. According to Lave and Wenger (1991) learning can be seen as the transition of one’s identity from novice to participant or expert within a specific community. The interpretations of self as a learner are, according to Lave and Wenger (1991), in relation to the goals of the institution. Wenger (1999) describes the process:

Because learning transforms who we are and what we can do, it is an experience of identity. It is not just an accumulation of skills and information but a process of becoming - to become a certain person or, conversely, to avoid becoming a certain person... we accumulate skills and information, not in the abstract as ends in themselves, but in the service of an identity.

(Wenger, 1999, p. 215)

Pollard & Filer regard identity as part of the “spiral of learning” as learners discover: “Who is learning? What is to be learned? How supportive is the context? What are the outcomes?
Who is learning?” (Pollard & Filer 1996, p. 284). They add that personal identity develops from interaction with others, and that children become effective learners when the presentation of their strategies and identity mesh with the classroom norms.

While Dunlop and Fabian (2002) state that behaviour patterns of early childhood transition from one place to another influence later transitions, other writers affirm that the nature of the school transition has implications for success at school (Early, Pianta & Cox, 1999; Margetts, 2002; Mc Naughton, 2002). Children who have problems adjusting to school at the beginning have difficulty catching up, while successful school performance is likely to follow a smooth transition to school. According to Young-Loveridge (1991) and Wylie and Thompson (1998), this trend is particularly marked in mathematics procedures. Wylie and Thompson found that early childhood education impacts on children’s early and later school performance in mathematics and communication.

Carr (1998) and Pramling and Williams-Graneld (1993) believe some degree of discontinuity between early childhood and school experiences provides a challenge, which, if at an appropriate level, leads to child development. It is important to facilitate and scaffold the new entrant in coping with the discontinuity, by helping the child to negotiate and make connections, (Bronfenbrenner, 1979; Brostrom, 2002; Margetts, 2002; Peters, 1999a; Sanchez & Thorp, 1998; Smith, 1998; Vygotsky, 1978). Griebel and Neisel (2002) perceive transition from a life-long perspective. They state that transition is a process involving a change in identity, roles and relations, as participants of various settings commute from one to the other. As children and adults work through the transition process together, the personal world of the child should not be deformed by the adult’s perspective and vice versa.
Research about new entrant children suggests that once at school, different groups of children can be identified as attaining differently from others and that schooling may differentiate children’s success as well. Young-Loveridge’s (1989) findings showed a relationship between home and school mathematical experiences. The children from families with a strong orientation towards mathematics began school with advanced numeracy concepts. Later research findings illustrated that new entrant children from low socio-economic families, particularly girls, achieved poorly (Young-Loveridge, 1991). These girls developed an attitude of despair towards mathematics. Young-Loveridge suggested the girls’ lack of progress resulted from their being treated differently from other students. Compared with boys, they had less interaction with the teacher, less feedback and praise, less encouragement from parents, and fewer opportunities to practise numeracy in leisure activities. Young-Loveridge also suggested there could be a link between girl’s lack of early spatial visualisation ability and difficulty with large numbers at year three. Lower achieving girls also found the increase in symbolic representation at year three difficult.

When analysing the 2004 NDP student achievement data Young-Loveridge noted a reversal of the trend of students in higher decile schools making greater progress than those in lower decile schools, and suggested it may have been partly due to the additional resourcing provided to lower decile schools through school improvement initiatives (Young-Loveridge, 2004).

**Becoming a Parent Member of the School Community**

Becoming a parent member of the school community is a daunting experience for some parents, but once involved parents benefit children, themselves, the school system and the community (Olmsted, 1991; Whalley, 1999). The New Zealand Literary Taskforce (1999) report asserted that children’s learning, particularly in mathematics, is enhanced by
effective partnerships between home and school. Eyers and Young-Loveridge (2005) reported that while parents acknowledged their role in supporting their child’s literacy development they were reluctant to do so in relation to mathematics. Olmsted (1991) also found many parents had not perceived themselves as teachers and implemented a parent education programme which drew awareness to the teaching aspects that underlie adult-child interactions. The programme included homework tasks that promoted positive interactions and conversations among family members. Olmsted concluded that when approached appropriately, all parents wanted to be involved in the education of their children. Other authors believe that when professionals work together in partnership it is possible to significantly improve children’s early educational attainment (De Lurdes Cardoso, 2003; Eason et al., 1992, cited in Whalley, 1999; and Whalley, 1999). According to Eason et al. (1992) parents provide a personal perspective of their child which when considered along with the teacher’s professional knowledge builds a broad and true picture of the child’s development. My focus area of parent involvement is the relationship between the teacher and parent, since it is greatly concerned with student transition and numeracy achievement.

Hughes, Andrews, Feiler, Greenhough, Johnson, McNess, et al. (2003), in the United Kingdom, make a distinction between school-to-home and home-to-school activities. They reason that in England governmental pressures influence the pedagogy, diminishing teachers’ professional autonomy and limiting their ability to address the social and affective needs of their children. This pedagogy results in the role of parents as largely support for existing curriculum and teaching methods, and therefore there is a preference for school to home activities. Contrastingly, the Welsh teachers’ autonomy over their choice of teaching methods results in homework activities where the flow of information is
primarily from home to school, thus, reinforcing the individuality of children. Hughes noted a stronger tradition for parental involvement in the literacy strand than in the numeracy strand. Other writers believe much more emphasis needs to be put on bringing experience from *home to school*, using the home culture and its sense of security and belonging as a basis for learning (Alexander, 1997, as cited in de Lurdes Cardoso, 2003; Silverstone, 1994; Solomon, 1994). Solomon adds that parents’ aspirations produce substantial and varying effects on their children’s school achievement.

Whilst I’ve outlined that parents can play a significant part in their child’s transition to school, Peters (1999a) believes that the teacher ultimately holds the power within the classroom and has a vital role in facilitating the transition to school. It is important therefore that teachers become aware of the issues, particularly from the children’s point of view. Carr (2000, p. 53) is clear that “the children’s perspectives are inseparable ingredients in the chemistry of the teaching and learning process and that the teaching and learning process consists of complex reciprocal constructions and transactions”.

Carr suggests that adults involved in early childhood education or classrooms should seek the children’s perspectives and understand their own. My study, while focusing on the children’s perceptions of their construction and interaction within the numeracy learning process, also explores parents’ perceptions of their children’s numeracy learning.

**Chapter Summary**

In this review I have explained the Early Numeracy Project as one of the Numeracy Development Project’s professional development programmes for teachers. Features of the Numeracy Project include a framework outlining children’s stages of numeracy
development and the construction of concepts through problem solving. I have discussed the contrasting philosophies and pedagogies of *Te Whāriki*, the ENP, and the proposed key competencies, especially in relation to the new entrant children’s transition from the early childhood education setting to numeracy learning at primary school. I have highlighted the teacher’s influence in building relationships with new entrant children and their parents as they enter the school ‘culture’. The review has also considered the teacher’s roles in developing the child’s identity as a numeracy learner and fostering parents as teachers of their children.

The next chapter describes the methodology and design of this study as I sought child and parent voice in relation to the child’s transition to early primary school numeracy.
Chapter Three: Methodology and Procedures

The study explores the numeracy experiences of five new entrant children and their parents during the children’s first term at school. It seeks to describe the children’s and parents’ interpretation of their child’s transition from early childhood education to numeracy learning in the context of an Early Numeracy Project classroom environment. Child and parent voices provide insight into their interpretations. This chapter describes the emergence of the research design information through a sequence of sections. Firstly I background the study’s qualitative methodology and discuss my perspective as a feminist researcher. I then describe the case study data collection methods and the grounded theory process used. Next I outline and explain how I managed the ethical issues. I raise issues of credibility and dependability in relation to my case study method and conclude the chapter detailing the process and techniques I used to generate and analyse the data. To preserve the participants’ anonymity, they and the school are given pseudonyms throughout the report.

Methodology

This is a qualitative study of the social influences on the numeracy learning of children in a Christchurch primary school new entrant classroom. Using an ethnographic approach, I seek children’s perspectives on their experiences of numeracy as a new entrant, and interpretation of these from their parents. To deepen my appreciation of the children’s perspectives, I explore parents’ explanations of their roles in their child’s learning of numeracy, particularly in relation to the transition to primary school. I use Delamont’s (2000) and Bryman’s (2004) interpretation of the term, ethnography, where ethnography means observational research and implies that as a researcher, I value the views,
perspectives, opinions, prejudices and beliefs of the participants. According to Davidson & Tolich (2003) and Neuman (2000), qualitative methods are effective when the researcher is investigating the perspectives and understanding of people, and their interactions, within an authentic setting.

Current research emphasising “multiple realities” rather than “singular truths” uses a qualitative approach (Burns, 2000, p. 388). In this study I am attempting to gather from the participants, evidence that will reveal their understandings, priorities and values, thus reflecting “multiple realities” of their experiences during the new entrant child’s transition to school numeracy. The study exhibits features of qualitative research as described by several writers (Bogdan & Biklen, 1998; Burns, 2000; Davidson & Tolich, 1999; Neuman, 2000). It is naturalistic in that the research takes place in the actual settings that provide the source of the data, in this instance mostly in the classroom and on occasions in the case study children’s homes. Since qualitative researchers assume that behaviour is influenced by the setting in which it occurs it is important that I collect the data in the actual locations mentioned. As the researcher I am the key instrument in seeking the data and my insight is the key instrument in its analysis. Davidson and Tolich (1999, p. 92) explain that “research design for qualitative researchers is a mix of life experience and formal training”. As the research instrument, the researcher identifies and collects relevant issues, tentatively analysing these on the spot (Davidson & Tolich, 1999; Neuman, 2000). Accordingly qualitative research is an inductive process with the research design adaptations occurring throughout the study. Another feature of the study common to qualitative research is the descriptive data which emerges from my detailed observation, open ended discussions and close examination of relevant objects. My aim is to use the descriptive data to construct understanding of the children’s and parents’ interpretations of their experiences. Qualitative
researchers are concerned with process rather than just outcomes. In this study I am exploring the process of how children develop an understanding of the term mathematics and how they interpreted their experiences in the context of NDP. At the same time I am exploring the process of how parents arrive at their perceptions of the children's experiences. As mentioned, qualitative approach is also concerned with meaning, that is, how different people make sense of their lives (Bogdan & Biklen, 1998; Burns, 2000). This study explores ways in which children interpreted their experiences and understood their numeracy. Another feature of qualitative research is the inductive analysis of the data. As this report illustrates, the theory emerges by connecting or making sense of the many pieces of information gathered.

A Feminist Voice

Roman and Apple (1990, as cited in Cohen, Manion & Morrison, 2000), argue that ethnographic research does not necessarily challenge oppression or power imbalances, and that this is the role of feminist research. My voice, therefore, is that of a feminist researcher. Alice (2003, p. 62) explains feminist research as aiming to investigate social inequalities that may assist the improvement of the research subject's social location. Cohen et al. (2000) claim that feminist research empowers oppressed and otherwise invisible groups. I make connections with feminist research in this study in three ways. Firstly, feminist research tells the story from the perspectives of powerless people in society, in this instance, largely the new entrant children and their parents. Secondly, much of the responsibility for the day to day education of the new entrant children lies within the role of females, and therefore situates this study in a feminist context. Thirdly, I am concerned that there is inequality in the amount of professional development the Ministry of Education Numeracy Development Project provides for teachers. In the latter
consideration I deem teachers to be the unheard group. The Ministry of Education allocated teachers working in the NDP in 2003, 12.5 hours of facilitated professional development per teacher. In 2004 teachers of ENP and ANP were allocated 15.5 hours while teachers of INP were allocated 19 hours (Parsons, 2005).

By providing a forum for the previously unheard voices of the children and parents, I intend this study to empower the children and their parents. However, as Millen (1997, as cited in Alice, 2003) argues, not all women see themselves as oppressed, and so although I consider this study could result in improved lives for children and parents, I am not assuming that all the women involved feel powerless. Empowerment, according to Alice (2003) generally indicates the researcher’s intent is to encourage the subjects to analyse their experiences and initiate change themselves. In this instance, the parents would need to take the initiative for change on their children’s behalf, because the children are probably too young to articulate their experience in depth and have insufficient status to improve their situation.

Feminist research acknowledges the value-laden nature of research. That is, issues of reflexivity are taken seriously. Researchers Cohen et al. (2000) and Delamont (2002) explain that reflexivity recognises that the researcher cannot escape the social world she is studying, or eliminate “investigator effects” (Delamont, 2002, p. 8) but that she should concentrate on understanding these effects. They add that the researcher should expose the ways in which she does her exploration at all stages of the research – from design to writing up. As a researcher I have aimed to be constantly aware of my role, my interactions, and my accumulating theoretical and empirical material.
Delamont (2002) and Middleton (1998) believe feminist research to be highly attuned to the relationship between the investigator and the respondents. Middleton argues that the relationship may affect the accuracy and consistency of the respondent’s story’s accuracy and consistency, and that it is the investigator’s role to ensure consistency of the story by revising and interpreting the material in subsequent interactions. In building trusting relationships therefore, it was important that the parents and children in my study knew that the school principal and the classroom teacher had given their permission for my research, and also understood my background as a Numeracy Project facilitator. I acknowledge that the nature of my positions of Numeracy Project facilitator and researcher placed me in a position of power. I aimed to minimise the power relationship in the classroom by intertwining the role of observer and participant, sometimes observing from a distance, and other times helping the children, or responding to their requests to ‘join in’. Gans (1968, as cited in Bryman, 2004) classifies this role as a researcher-participant. That is, I became semi-involved in the classroom activity so that I could function as a researcher.

This study, by deliberately providing parents with an opportunity to have voice, and the child with the opportunity to be heard by parents, placed them in unfamiliar roles. I was aware, that in order to get authentic responses from them, I needed to create a non-threatening atmosphere for discussion. Therefore, I attempted to facilitate discussion with parents by sharing my own feelings and experiences. According to Coffey and Delamont (2000, p. 124)

Feminist perspectives contribute to the demystification of social research, making problematic the stance of researcher and researched as unattached and objective instruments. Instead, research is recast as personal, emotional, sensitive, reflective and situated in existing cultural and structural contexts.
Delamont (2002, p.9) adds "that as long as qualitative researchers are reflexive, making all their processes explicit, then issues of reliability and validity are served". My role as a reflexive researcher, including discussion on my relationships with the participants, is reported in Chapter Five.

**Method**

Using an ethnographic approach I adopted multiple case study procedures to explore the understandings of five children within the one classroom setting. These are five individual case studies, each study concerned with one child and his/her parent(s).

A case study is a study focussing on a bounded object, usually a person, group, setting, or concept (Cohen et al. 2000; Mutch 2005; Stake 2003). The case study entails a detailed and intensive analysis of a single entity, or in this instance, multiple entities of the five children and their parents. While the methodology of this study has been identified as qualitative, it is the choice of what is being studied that determines it as a case study (Burns, 2000; Stake 2003). Neumann (2000, p. 148) describes case study design as “messy” because it is constructed in a natural setting, with many factors and events occurring at the same time. In other words, the context of the real life setting and the content of the study influence each other. In this instance the day to day happenings and changes occurring in the classroom, for example, timetable variations, visitors to the room, children withdrawing from the room for individual tuition, and children’s interesting behaviour episodes resulted in my making many ‘on the spot’ changes to intended data collection procedures. Davidson and Tolich say 'confused' may be a better description of the ‘messy’ state researchers experience as they are required to adapt to situations and the process of qualitative research. The reality is that “society and social research are ….. complex” (Davidson & Tolich, 1999, p. 20).
The case study data collection techniques involving observation, participation and development of personal rapport provided a means to attempt to understand the perspectives and actions of the children and their parents. Typically, in addition to observing in the field, ethnographical practice allowed me to gather additional data through interviews and collection of documents (Pollard & Filer, 1996).

The detailed qualitative information collected through this ethnographical research provided the basis for the emerging grounded theory (Glaser & Strauss, 1968). According to Charmaz (2003) most grounded theory studies are based on information collected during ethnographical research. Charmaz argues a constructivist approach to grounded theory, stating that its strategies need not be rigid or prescriptive, but should focus on meaning which furthers, rather than limits, interpretive understanding. Constructivism, according to Guba and Lincoln (1994) and Schwandt (1994), acknowledges the connections between multiple social realities and recognises the mutual creation of knowledge by the viewer and the viewed. Charmaz believes that in seeking the respondents’ meanings it is necessary to look beyond surface or presumed meanings to views, values, acts and facts. It necessitates the development of a relationship with the respondents and involves open listening to their stories. Throughout this study, using grounded theory procedure, I made analytical interpretations of the respondents’ stories to lead me into further data collection, which in turn, informed and refined my developing theoretical analyses. For example, when the children indicated that relationships were important to their numeracy learning, I included their classroom topic and wall displays which focused on social behaviour, as an additional data source to verify their beliefs. Another reason for describing my study as using grounded theory is because it explores part of the classroom social structure, as it
influences the five children’s learning of numeracy, rather than the whole classroom, or the school community and its complete educational programme.

Ethical Issues

This section outlines the consent process and discusses issues of anonymity which arose in this study, confidentiality, honesty, and security of data.

I worked according to the principles common to most codes of ethics, as outlined by Davidson and Tolich (2003). These include doing no harm, ensuring participation is voluntary, preserving the anonymity or confidentiality of participants, avoiding deceit and analysing and reporting data faithfully.

Following an initial discussion exploring the school principal’s interest in my study, formal letters of invitation and information outlining the study’s purposes, procedures and ethical considerations were sent to the principal, classroom teacher, the five case study children and their parents. I introduced myself to the class and provided the whole class with an oral explanation of the purpose of my visits and my involvement with the case study children. I attempted to reduce the imbalance of power that can exist between researchers and participants, and between adults and children, by introducing myself as a family and child-oriented person. I talked about my background as a teacher and showed large coloured photographs of my home and family, particularly the child members. The principal, the classroom teacher, the parents of the five case study children and the five children indicated agreement of their involvement in the project by signing a consent form, the children’s being in pictorial format. The parents of the case study children also gave consent for their child’s participation. I had a verbal agreement with the principal that he would act “in loco
parentis” for the non-case study children in the class. This meant that in place of the other parents giving written consent the principal would take responsibility for the well-being of the children. Participation was voluntary and all participants knew that they were free to withdraw from the project if that were their wish. (See Appendix 1 for information provided and consent forms, including the consent form signed by the five case study children.)

Anonymity, beyond the classroom, was preserved as far as possible by the use of pseudonyms for the school, the teacher, and all participants. To avoiding harming people I have not revealed information that I believe respondents would not wish to have shared with others. However, I became aware that because the parents lived in the same location, some of them being close neighbours, the families knew one another well. Consequently, I am concerned that the parents may be able to identify each other in my report of the study. In the future I will adopt a more sceptical stance towards the notion of informed consent particularly in qualitative study which involves working among participants within a small community, such as a school. Use of Zeni’s (2001) series, “Questions for Review and Reflection”, may heighten awareness of possible ethical dilemmas and assist the researcher to predict conflict that may arise from particular questions. Malone (2003) believes that truly informed consent is not possible in qualitative research. She states that ethical review boards should take note of the new paradigm of qualitative research (Lincoln & Guba, 1985, as cited in Malone, 2003) and replace conventions of “validity and reliability with credibility, transferability, dependability, and confirmability” (Malone, 2003, p. 812).

I identified myself as a researcher to all participants. As explained previously, I introduced myself to the children and explained the purpose of my study as learning about their
mathematics lessons, during my first visit to the classroom. I explained that I would be watching and talking to them about mathematics in their classroom. Before beginning the data collection and to make the process meaningful for the children, I explained the scenario of them helping me to make a book about their classroom, for prospective new entrants. Since telling the participants the book of photographs would also be part of my thesis, I have decided, for reasons of anonymity, to include only a small sample that excludes people or features that would identify the school. (See Appendix 2.)

The research assistant agreed to respect confidentiality. The data is stored on a computer that has a password known only to me, and the Christchurch College of Education information technology staff. Data will be kept for three years and will be used only for this thesis and subsequent publications. As a Numeracy Project facilitator, I may share findings with teachers, other facilitators, and writers of the Numeracy Projects.

**Credibility and Dependability**

Selection of case study participants was an important consideration for the validity of the information I was seeking. Criteria for my choice of classroom were that the classroom numeracy programme was based on the Early Numeracy Project framework (Ministry of Education, 2003a) and that the teacher used the Project’s numPA diagnostic tool (Ministry of Education, 2003b) to determine children’s strategy levels. I chose to research at Count School (pseudonym) where the teacher, Ms Tahi (pseudonym), in her third year of using the Early Numeracy Project Programme, is considered by my numeracy advisor colleague, to be an experienced and effective numeracy teacher of new entrant children. Additional reasons for selecting Count School were the principal’s empathy with in-school research,
his willingness for me to work in his school, and the school's reasonable proximity to my work place.

On visiting the school, I found Ms Tahi to be most welcoming. She was very interested in my research and was keen to support me wherever possible. Another factor which determined my classroom selection was that it was one in which I had not worked as a numeracy facilitator. Facilitators hold a position of power which may have compromised my relationship with the teacher and children. I needed the relationship to be as natural as possible (Snook, 1999) and as mentioned, when appropriate, I involved myself with the children and their activities. In appreciation of Ms Tahi's support and interest in my project I discussed my observations with her, both informally, and occasionally at planned meetings.

During a preliminary visit to the school to meet the principal and Ms Tahi, I sought Ms Tahi's advice in selecting the five case study children. They were selected to represent a range of children's attitudes towards transition to school and a range of numeracy achievement levels. The NDP diagnostic interview (numPA) results influenced the selection of Ann and Jan, Stage 0, Sue and Bob, Stage 1, and Rex, Stage 2. These three stages, 0-2, spanned the strategy achievement levels of the entire class. The case study group included both boys and girls. Written approval of participation in the study from the children and their parents confirmed the children's and consequently the parents' selection.

Observations of and discussions with the children took place during their numeracy lessons, over the period of one school term.
Credibility

As a qualitative researcher uncovering the constructed meanings of the participants in the study, my aim was to gather a rich description of their interpretation of numeracy in the new entrant classroom (Mutch, 2005). The detail came from using a range of sources and data gathering techniques. In interpretive research the use of multiple sources of data, that is 'triangulation' of data, validates the information gathered. Therefore, in this study a variety of sources of data collection were used (Davidson & Tolich, 2003). These included:

- observing, participating and developing personal rapport as a means of understanding how the children create meaning in their classroom during their designated numeracy learning time.
- informally interviewing the case study children either in small groups or occasionally individually. Small group discussions helped recreate the relationships and cultural meanings of the classroom (Davies, 1982; Walsh, Tobin & Graue, 1993).
- photographs taken by the children represented their 'voice', and acted as a stimulus and a conduit for communication during discussions with their parents, with peers, and with me. Prosser (1998) believes photographs trigger memories and stimulate discussion on participants’ values, beliefs, attitudes and meanings.
- facilitating a discussion between each case study child and their parents.
- an unstructured interview with the parents of the case study children
- recording content of classroom wall displays.
- scheduled and unscheduled informal discussions with the teacher.

The content of unstructured interviews is shaped by what the respondents tell the researcher (Davidson & Tolich, 1999). The interviews with the parents were loosely structured to fulfil my purpose of exploring parents’ explanations of their role in their child’s school
numeracy learning. The interviews were also constructed to elicit a response to the children’s demonstrations to the parents. Opie (1999) suggests that because of its open-endedness, it is inappropriate to pilot an informal interview schedule. Rather the researcher’s guide, or list of prompts, encourages a variety of responses and relies on interviewing skills to probe sensitively for elaboration of comments. (See Appendix 3 for an example of a transcript of my discussion with a parent.)

It will become apparent to the reader that I adapted my data collection in response to unexpected practicalities and theme emergence. For example, my original intention, once the children had been selected, was to focus on data collection from the children and parents, and not the teacher. However, because of her high interest level, the teacher and I had informal chats which provided background information on the case study children and their families. I recorded information she shared on her philosophy as a teacher of new entrants, because it provided insight into my observations of the children’s behaviour. Although Rex had numerous ideas of what he thought should be photographed for the class booklet, he did not find time to take the photographs. Again, I diverged from the original plan and took some of Rex’s photographs for him. Allegiance to his peers and involvement in their numeracy games seemed more important to him than completing his photography task. I sensed that his involvement with the numeracy games and peers aligned more closely with his identity of himself as a learner, than taking photographs. Yet another adaptation took place when the “being friends” theme emerged. I attempted to understand its origin by paying more attention to school themes and previous classroom topics. I then used the classroom displays associated with the topics as an additional source of data. These exemplify Sisson’s (1999, p. 260) idea that, “serendipitous occurrences, immediacy and uncertainty seemed to hold sway”.
**Dependability**

I outline the data collection procedure as a means of ensuring dependability of the data. When talking with participants during the data collection process, I used the word “maths” when referring to mathematics or numeracy. “Maths” is the term used in the classroom and seemed to be most easily understood by all participants.

The recording of data took various forms. I recorded fourteen visits to the classroom during numeracy lessons as observational field notes. Some of the notes provided contextual information of general classroom events, routines and episodes, but most were records of focused numeracy activity of the five case study children. Their numeracy activity included working independently, working with a numeracy group friend, and working with the teacher during whole class or group instruction.

Two visits were made to talk to the whole class. The purpose of the first visit was to introduce myself to the children and explain my role as a researcher. My second visit was to assist the case study children to introduce their booklet of photographs to the class.

To capture conversation on tape I required a quiet place, so on occasions I withdrew one or two case study children from the classroom and held informal interviews with them. These chats included discussions about what constituted mathematics, and what would be important to photograph for a class booklet to portray numeracy in Room One at Count School. Other discussions with the children involved the selection and discarding of photographs for the booklet. The children took approximately sixty five photographs and I, as explained previously, took approximately fifteen. Once I had collated twenty five of the
photographs into the booklet and captioned them according to the children's comments I presented the booklet to the five case study children for a group editing session. After the final edit the children and I explained the purpose of the booklet to the whole class, read it to them, and asked for feedback. Most of the discussions held throughout the preparation of the booklet were audio taped and transcribed, and others, because of their unpredictability of timing, were written as field notes. Making the booklet served two purposes. Firstly, it provided the children with a purpose for their involvement. They were helping me to make a booklet to teach prospective new entrants about mathematics in their classroom. Secondly, their photograph selections and comments provided insight into the children's perceptions of mathematics.

Informal meetings lasting approximately one hour were held with the five case study children and their parents. Three families chose to meet me at school and two in their home. Four of the meetings were with mother and child, while the fifth included the father as well. The children explained the content of their photographs to their parents and then showed how pieces of numeracy equipment were used at school. After each child's demonstration I talked with the parents to seek their response to their child's numeracy learning. The demonstrations and semi-structured interviews with parents were audiotaped and transcribed. While the numeracy equipment and photographs prompted the child-led discussions, or demonstrations, with their parents, there were occasions when I clarified points or prompted to keep the discussion flowing. During the demonstrations I believe the children were cementing their own understanding of their numeracy. The parents were developing their understanding of their child’s numeracy knowledge and the content of the school curriculum. I was clarifying my understanding of the children’s knowledge and gaining insight into the parent’s attitudes and knowledge of their child’s numeracy
learning. Throughout the discussions therefore I was facilitating the reconstruction of my understanding as well as those of the other participants, whilst making my own and the other participants’ values explicit. The demonstrations also acted as stimuli for the subsequent discussions I had with the parents. Throughout each demonstration my participation was intense as I interpreted and unobtrusively directed proceedings. At another level I was observing and interpreting these happenings from a researcher’s viewpoint. The events described, exemplify my voice as an interpretive and constructive researcher (Denzin & Lincoln, 1998) and as a “passionate participant” (Lincoln, 1991, as cited in Denzin & Lincoln, 1998, p. 215).

I sent a precis of the transcripts to parents to ensure I had interpreted them accurately and to clarify details. Two were adapted and returned to me.

In summary the data was recorded as:

- transcripts
  - informal interviews with small groups children,
  - child demonstrations to parents
  - informal interviews with parents

- field notes
  - classroom observation of events
  - classroom discussion
  - classroom and school wall displays
  - teacher comments

- photographs of ‘maths’ activities and equipment
Data analysis

I used the qualitative strategy of thematic analysis, described previously as grounded theory (Charmaz, 2003), or constant comparative analysis (Le Compte & Preissle, 1993, as cited in Mutch, 2005), to analyse the data. According to Charmaz, in the grounded theory process, the researcher’s interpretation of the data shapes the emergent codes.

My analysis began tentatively as I diaried reflections on my field observations and discussions, and returned to the field to confirm or reject the analysis. Once my research assistant had transcribed the taped informal discussions and I had typed my field notes, I made jottings of possible codes in the margins of the transcripts and field notes. These were photocopied several times to provide for codes that would match multiple categories. After comparing the jottings I established the most frequent and relevant themes as codes. The coding began the chain of theory development and facilitated making comparisons, which according to Charmaz, is a major technique in grounded theory. I manually collated the data under category headings using where relevant, the Ministry of Education’s (2005b) proposed key competency headings as category headings. (An outline of codes and categories is found in Appendix 4.)

There were dilemmas regarding selection and categorisation of the data. A large quantity of data relating, for example, that relating to classroom routines and behaviour, seems, because of its repetitive content, disproportionately represented by a few categories. I selected other data because it related to participants’ strong views, feelings, or reactions, as for example, one parent’s anger at her daughter’s poor preparation for school. Other data was chosen because it was typical of the group or because it highlighted a difference between groups of participants. The concerns of parents of children first in the family to
attend school were different from those of parents with older children. Whilst I collected information on the five case study children’s development of their interpretation of the term ‘maths’ and their numerical understanding, I chose to report in depth on the cognitive development of just one child, the child for whom I had the most detailed information.

In this study I retell as vignettes, events recorded in my field notes, or extracted from transcripts of conversations. Often the vignettes represent one of the case study participant’s experience or interpretation. Other times multiple vignettes illustrate several participant’s experiences, highlighting contrasting or similar interpretations. Together the vignettes help to illustrate my interpretation of the participants’ experience and understanding. Many of the vignettes related in Chapter Four represent core issues which are revisited and discussed in Chapter Five. Miles and Huberman (1994, p. 81) describe a vignette as “a focused description of a series of events taken to be representative, typical, or emblematic in the case you are doing”.

Because vignettes fitted more than one category there were further dilemmas in selecting the category the vignette most closely portrayed. Hence the reporting of “and my heart is thinking” vignette under two categories; relationships and teacher’s pedagogical knowledge, although it could also have illustrated the child’s numerical cognitive development. As well the vignette was used to illustrate the inter-relationships of the key competencies.

I reported the data analysis using three themes. Social matters are reported under the heading, *Negotiating the Culture of the Classroom*. The cognitive numeracy development of the children is reported as *A Child’s Numeracy Journey*. Parents’ interpretations of their
child's transition to primary school numeracy are reported intermittently throughout the first two sections and in more detail in the section, Parents' Perspectives. These three themes are described in the next chapter.

Chapter Summary

In this chapter I have described the qualitative methodology of this study, its ethnographic approach and the case study method used. I have acknowledged my voice as a feminist researcher and related implications. The ethical issues have been considered. I detailed the particular data generation techniques employed, the recording of the data and the analysis procedure. The chapter concludes by stating the emerged themes which will be discussed in the next two chapters.
Chapter Four: Interpreting the Data

Introduction

This chapter is structured in four sections to report the analysis and emerging findings of the data. Firstly I background the study by describing the classroom setting in which it was undertaken. Secondly I report the children’s interpretation of their numeracy experiences under the heading, Negotiating the Culture of the Classroom, and thirdly in the section entitled A Child’s Numeracy Journey, I trace the numeracy development of one of the case study children. The second and third sections are reported within the framework of the Ministry of Education’s (2005e) proposed key competencies, as discussed in the Chapter Two. The fourth section, Parent Perspectives, relates the parents’ experiences and interpretations of their child’s transition to school numeracy learning. Where relevant, parent perspectives are also woven into the second and third sections.

The Setting

The five case study children were members of a new entrant class at Count School, Christchurch, New Zealand. Count School is a state co-educational primary school. According to the principal, “a feature of the school is the active parent participation in, and support of all aspects of the school life, including classroom assistance, attendance at functions and fundraising activities for the provision of further facilities” (Count School Information Leaflet, February, 2005, p. 1).

A school motto encouraged the children to develop positive habits of mind, information skills, deep thinking and enthusiasm for learning, and reminded them to
be aware of rights and responsibilities. Posters in classrooms and about the school reminded the school community of these principles.

Ms Tahi communicated with the local early childhood providers by providing parent sessions at the centres, informing parents about their child’s entry to school. She was unfamiliar with the early childhood curriculum, *Te Whāriki*. Parents and the children who were about to start school attended three pre-entry visits to the Room One classroom, two with a literacy focus, and one on maths. The pre-entry visitors were invited to join in with the class’s teacher-led lessons. Ms Tahi also provided information for parents on a notice board in the classroom, but during my observation time there was no information about the mathematics curriculum.

The Year 0-3 syndicate has been working on the Early Numeracy Project Programme since the teachers’ training in 2003. The Numeracy project is an evolving programme, and because there has been limited follow-up for ENP teachers who receive one year’s training, there have been recent project developments about which Ms. Tahi is un-informed. For example, at the time of Ms Tahi’s training place value and basic facts were categorised as one domain, whereas the current knowledge framework distinguishes between place value and basic facts by giving them separate domains under the headings, grouping and place value, and basic facts. Within stages two and three of the framework grouping and place value domain there is now a suggested sequence for teaching groupings of numbers, which was not the case when Ms Tahi completed her training (Jenny Alexander personal communication 26 January, 2006). At Count School, when children are five years old they join classes in either Room One or Room Two, to begin their official schooling. The Room One teacher, Ms. Tahi, is an experienced teacher, the junior school syndicate leader and numeracy lead
teacher. Room One and Room Two classes work together for specific projects such as the Perceptual Motor Programme (PMP) and some topic work. The classes usually have numeracy lessons in their own room, but occasionally there is a merging of the Rooms One and Two children, with children of both classes working together in one or both rooms.

The timing of this study is important. Because the focus is on the new entrant child, I began observations while the children were in their first months of primary school. Four of the case study children began school during the last weeks of 2004, and Rex in term one, 2005. At the beginning of 2005 Ms Tahi used the Numeracy Development Project diagnostic interview to test the children and consequently organised them into groups according to strategy stage levels. There were twelve children in the class at the beginning of my study, increasing to sixteen during my observation time, of one term.

The layout of the classroom was typical of junior classrooms, with a mat area for whole class sessions and children’s desks arranged in groups. Learning centres about the room included the maths shelf, numeracy group boxes, the library corner, a letter of the week display, dress ups, a home corner, a display for parents, and other changing displays. The wall displays reflected the class topics and school themes. Although large maths oriented shapes and number activities were painted on the asphalt, outside the classroom, they were not used during class time. Neither was their connection with numeracy discussed with the children. They seemed to be provided for children to play on just during their breaks.
In the classroom was the range of numeracy equipment typically found in new entrant classrooms working on the NDP. Each child was also provided with a numeracy kit, which was a zipped plastic bag containing a number fan, two 1-6 dotted dice, approximately twenty counters, approximately twenty buttons, 9 card digit labels 1-9, and a 10cm ruler. The teacher used some of the equipment to support the children’s learning during teacher led whole class and group demonstrations, while other items were manipulated by the children during whole class, group instruction and independent activity session. In this new entrant classroom, because the children were working at the early stages of the frameworks, the equipment was used to help teach knowledge and strategy concepts to all the children.

The children were grouped according to ability, their ranking having been established by the results of the NDP diagnostic interview results. Ann and Jan, at stage zero, were members of the Triangle group, Sue and Bob, at stage one, belonged to the Square group, and Rex at stage two was in the Circle group.

Room One’s daily numeracy format followed the suggested ENP model of a whole class knowledge teaching session, followed by two instructional group sessions with the teacher, and closing with a brief reflection time. Altogether this took approximately forty-five minutes. While one instructional group worked with the teacher the other two groups of children chose activities from specified areas such as their group box, the maths shelf, maths book, or worked with their numeracy kit. On Fridays the group teaching was replaced with a whole class problem solving lesson, reminding the children that strategies such as using equipment, acting out, or drawing, assist in finding solutions. As I commenced working in the school the children’s Perceptual Motor Programme started, and this resulted in a reduction and re-
timetabling of Room One's numeracy programme. The length of the numeracy lessons I experienced, ranged from twenty to forty-five minutes per session.

I made seventeen visits to the classroom between 25 February 2005 and the 15 May 2005. I saw many whole class sessions of approximately twenty minutes each visit, but probably due to the re-timetabling for PMP, I observed fewer group lessons. On many occasions I was unable to stay to observe the group teaching sessions Ms Tahi, the classroom teacher, indicated would continue after the morning break.

At the time of my study Ms Tahi's professional development topic was information technology (IT), with photography as the focus. The usual numeracy programme was modified when a relief teacher was employed to teach during Ms. Tahi's absence while she attended a two day course, and abandoned on one occasion when the class was preparing for an IT celebratory occasion among parents and children. A bonus of the IT involvement was that the children used cameras confidently, and therefore quickly learned to photograph with the cameras I provided.

**Negotiating the Culture of the Numeracy Classroom**

This section describes how the case study children identified social factors as being significant in their transition to the early numeracy classroom. Whilst grappling with their role as a learner in a new environment, ways of relating to others were uppermost in the children's minds. They were also learning to manage themselves, and to participate and communicate in whole class and small group settings. Using the framework of the first three key competencies (Ministry of Education, 2005e) the vignettes that follow tell of the children's experiences and my observations, and suggest interdependence of the key competencies.
This section reports the findings according to the categories of relating to others, managing self, and participating and contributing. Data was drawn from field notes describing classroom observations and transcripts of informal interviews with the children. The field notes mostly described the case study children’s behaviour, particularly their interaction with the teacher and peers as they worked in whole class and small group activities. Artefacts such as class room displays and the children’s photographs also informed the field notes. Viv, in the transcript quotations refers to me, the researcher.

*Relating to others*

From my first conversations with the children I learned that at the early stage of their new entrant year they regarded being friendly towards one another as the most important aspect of learning mathematics.

> Sue: Friends. A friend would help you if you don’t know what to do.

> Bob: You have to be friends. Play with your friends to make your friends feel happy.

(Transcript quotations, February, 2005)

And on other occasions Bob added that being friendly meant “not hurting people” and “being kind”. Rex wanted the class booklet to include photographs of the maths groups and name each child, so newcomers to the classroom would know everyone’s name. According to Rose, Rex’s Mother, Rex’s early childhood, Montesorri experiences influenced his belief that knowing and using people’s names was important. Ms Tahi was pleased that the children thought friendship was important and said it reflected her belief that new entrant children needed to be happy for learning to happen. Ms Tahi’s philosophy and the school motto were also reflected in quotations recorded on the classroom wall display, “Our Happy Classroom”. The
display related to the class’s unit of work on appropriate classroom behaviour. Ms Tahi’s written messages were:

Be careful, be prompt, be fair, be honest, be alert, be polite, be neat, be kind.

The children’s ideas which also formed part of the wall display largely reflected Ms Tahi’s and the school’s motto, and read:

Jan: I am fantastic at cleaning up at tidy up time in Room One.
Ms Tahi: Jan is a good friend. She tries to do her best work, helps clean up, and loves her teacher.
Ann: I am always nice to children.
Ms. Tahi: Ann has a beautiful smile. She is a deep thinker, is very good at school sitting. She is an excellent listener, is great at sharing and taking turns. She always puts her hands up.
Ms Tahi: Sue is always friendly. She plays nicely, shares and takes turns. She hugs the teachers, is good at deep thinking, and tries hard with her work.
Bob: I am good at teaching others new games.
Ms Tahi: Bob is a great school sitter and an enthusiastic learner. He puts his hand up and is a deep thinker.
Ms Tahi: Rex is a great help at tidy up time. He always treats others with respect and invites others into his games. He is good at sharing and taking turns.

While the statements were written at the beginning of term, many closely reflected the behaviour and comments of the children I observed throughout the term. For example, I often saw Jan tidying up. In a later episode I describe Bob’s efforts at teaching a peer a game, while Sue appeared keen to play the “school girl” role of pleasing the teacher, completing her tasks, and placing herself in the middle of the front row on the mat ready to focus on numeracy. The ‘deep thinking’ term links with the school motto.

Parents also considered friendship an important aspect of school life. Ann’s Mother’s commented that “although Ann is an introvert she’s good at making friends”. Bob’s
Mother, Beth, thought the difficulty she had settling Bob into school each morning was because he had been separated from the friends he had made in December, 2004. Beth said,

....and everyday he wanted to play with his friends but they weren’t in his class any more. So that was really hard because he doesn’t like change. We’ve been through days when he’s screaming when I leave, but when I come to pick him up he doesn’t want to go home because he’s having such a great time [perhaps with new friends]. So it hasn’t been easy.

Rex appeared eager to work with his peers but a closer examination showed he had difficulty relating to them. The following vignette illustrates Rex’s unsuccessful attempt to instigate conversation with a group of classmates:

(Rex attempted to join a conversation with a group sitting at table during a Friday problem solving lesson.)

Rex: I’m colouring all of my frogs. I’ve done five green.
Rex held up his work for everyone in the group to see but they didn’t look.
Viv: How about writing the equation the way Ms Toru (relief teacher) showed you?
Rex wasn’t interested. Probably he hadn’t understood the relief teacher’s equations because she had written addition equations while demonstrating subtraction. Another reason could be that Rex hadn’t given the relief teacher his complete attention because he had not built up as respectful a relationship with her as he had with Ms Tahi. Or else, perhaps unknowingly, his motivation was to become part of the group.
Rex: These three [frogs] have to jump on the pad. [One frog was dark green and two were light green].
The group members ignored his comment and kept working.
Rex: My leaf is colourful.
No response.
Rex: Who wants to be the best person in the world?
No response. The other children were intent on colouring their frogs.
Rex: Everyone wants to.
(The other children just kept colouring. Rex moved away to another activity without either having learned mathematics from the frog activity, or receiving communication from his peers.)

Learning to relate to others includes not only the relationship between the children but also that between the child and the teacher. Because Ms Tahi had the authority of the teacher role, that is, the power position, the children had learned that as numeracy learners they were expected to follow her instructions. The children respected Ms Tahi and were happy to follow her classroom rules. The following vignette illustrates a dilemma which arose from Rex’s perception of this relationship with his teacher.

Rex, whose numeracy development, according to the diagnostic interview was at stage two and therefore in the top range of the class, often seemed to be in a position of knowing the answers to Ms Tahi’s questions and having to wait while the less advanced children found solutions. He interpreted his learner role as not giving him the authority to explain to Ms Tahi that he was unchallenged by the problems she gave. For example, during a group instruction session, rather than using the teacher’s method and the equipment provided, Rex quickly found the solution his own way.

There was no communication between Rex and the teacher about how he was solving the problems. While he waited for the rest of the group to work out the answer, he became restless and muttered comments to his unresponsive peer:

I know. I already knew. I didn’t need to count.

These comments were not acknowledged, but later in the session, during another problem solving episode he used a part-wholing procedure which did receive feedback. Rex successfully deduced, without the use of counters, $5+4=9$ because $5+5=10$. He was delighted when Ms Tahi acknowledged his effort and boosted his sense of self by saying, “Your brain is really thinking.” His proud response, “And my
heart is thinking” illustrated both his satisfaction at achieving at a high level and having his achievement acknowledged. Ms Tahi, however, did not provide feedback specifically on Rex’s excellent use of his doubles basic facts knowledge. From Ms Tahi’s perspective as a busy classroom teacher, Rex was achieving well. From Rex’s point of view using materials to solve problems was not challenging him, but he saw his compliance as appropriate behaviour, and complied rather than instigating change.

Managing Self

Two following vignettes illustrate Bob’s ability to take different roles in different situations. They also illustrate the interdependence of skills of relating to others and managing self. In the first episode Bob and Roy, relating well, successfully used a mancala set to create a numeracy activity, stay on task, and apparently manage their learning. I say, apparently, because it’s impossible to gauge exactly what learning took place. The children may have been developing their number sense in relation to equal sharing, or developing a concept of the size of groups of up to nineteen objects.

The vignette:

During an independent activity time, Bob and Roy chose a mancala set from the number shelf. They took the stones and board from the box and Roy instigated sharing the stones, one by one into two piles, one pile for each child. Each time they added a stone to their pile Roy said, “we have to count how many we’ve got.” [Roy was checking that they were getting an equal share.] Both children counted their stones after each sharing, until Bob was unable to count his pile of sixteen.

Roy: (After counting his pile) Have you got sixteen?
Bob: I don’t know.

Roy counted Bob’s stones aloud for him. Meantime Bob became restless, wriggled about the floor, looked at, and played with the box lid. Roy continued to share the stones fairly but Bob had lost interest. Once the stones were all shared, (nineteen each), they took turns at putting their stones on the mancala board. Each turn, Bob put the same number of stones on as Roy.
Their next activity involved regrouping the stones one in each space, then two, then three and so on.

Bob: I’m copying you.

(They were interrupted by lots of teacher instructions on tidying up and what to do next.
The boys obediently packed away the mancala set and returned it to the maths shelf.)

During this incident with Roy in the leadership role, Bob’s instances of cooperation, that is, sharing the stones fairly and moving the same number of stones as Roy, demonstrated his understanding that relating to others implies following the rules. We don’t know where Bob learned that following the rules is a requirement of working successfully with others. Perhaps it was through his experiences at pre-school, or from playing with his older brother at home. Maybe this is one of the characteristics Beth, his Mother, was referring to when she said, “At play-centre he learned to be a learner”.

The mancala episode also illustrated that Bob determined he had insufficient knowledge to count his sixteen stones. His response was to wriggle about and divert his attention elsewhere rather than taking responsibility for his own learning and focussing on how to learn to count above fifteen, by listening to Roy. A later discussion about photographs also indicated Bob was still not able to count beyond fifteen.

In the second episode, Bob, when playing in the next door classroom with a younger friend Sam, proudly switched to the role of leader:

Ben: I’m playing a new game. I don’t know what it’s called. I made it up.

Roll the dice. Find the number on the fan. Put the cards in order. I’m not learning. [He presumably means that he’s the leader giving the instructions.] I made it up.
Sam watches but doesn’t follow the instructions.

Bob: He’s learning from me.

Bob threw a one and a five with the dice and counted the six dots from one to six. He put six buttons on digits.

They were distracted by an interruption from another child.

Bob then put one counter on the one digit, two on the two digit, and three on the three digit.

Viv: Where are your six counters?

Bob: Oh! He then puts one counter on each digit up to six.

Viv: How many counters have you got there?

Bob: Six.

Viv: Is that what you wanted?

Bob: Yes.

(But he continues putting one counter on each ticket to eight.)

Jacob interrupts.

Bob: Jacob, you won’t get a lucky dip. Jacob, Jacob, how many lucky dips have you got? Five or six?

(Jacob moves away.)

The Room Two teacher walked buy, glanced at Bob and Sam, and said: I love your work.

Sam.

(Sam was observing Bob’s activity but not engaged.)

Bob: I’ve got one hundred [lucky dips].

Sam: I’ve got one hundred and sixteen.

Bob: I’ve got one hundred at my home

Sam: I’ve got everything.

(Ben persevered with his leadership role but there were numerous interruptions. The session ended with an argument over a card. Ben resolved the spat by handing the card over to Sam.)

The above episode took place in Room Two where behaviour rules were more relaxed than in Room One. Many interruptions made it difficult for Bob to stay in role. He often referred to the lucky dip reward system, once copying the teacher and
using it as a bribe, but most times these comments detracted from Bob’s numeracy activity. Because Bob was flitting on and off task, it was impossible for Sam to make sense of his invented games and to copy Bob’s rules as Bob had done when he was playing the learner role in the mancala episode described above. While Bob’s games were confusing and provided little numeracy gain for Sam, the episode showed a strengthening of Bob’s personal identity and confidence when compared with the mancala episode, and his more vulnerable disposition described later in this chapter. Bob’s game also confirmed his enjoyment in relating to others, this time in a leadership role. Perhaps his memories of his 2004 friendships made him more confident in taking on a leadership role in the Room Two classroom than in his 2005 classroom.

Most of the children gained confidence in managing themselves as the term progressed. However, Bob’s anxiety about his ability to succeed in the classroom indicated a lack of self-belief as he attempted to negotiate the classroom rules and routines. For example after unintentionally breaking a plastic bag, he anxiously looked at me and commented, “Oh look! I’ve broken it. Viv, could you do the bag up please?” And then after successfully opening the digit label bag without ripping it, he, in relief said, “Good. I didn’t break it this time.”

Another day, although Bob knew where to find paper, anxious that he might do the wrong thing, checked with me before taking a piece. And on another day, Bob explained that it was important to know about ‘school sitting’:

Bob….‘school sitting’ and not to sit on your knees.

Viv [in summarising our discussion]: So when you’re school sitting you have to sit on the floor with your arms and your legs crossed?
Bob: Yes.
Viv: Why do you have to do that?
Bob: Ummmm.
Viv: Why do you have to do school sitting at school?
Bob: ‘Cause you get told off [if you don’t].

Bob’s reason for complying with the ‘school sitting’ routine, avoidance of castigation from the teacher, suggested he was unable to understand the purpose of the routine. His negative response also hinted that his relationship with Ms Tahi was less positive than the other children’s. They appeared to want to please her and willingly responded to her requests, whereas Bob was concerned about keeping out of trouble because he anticipated an unpleasant consequence if he didn’t. It seems Bob’s inability to understand the reasons for some classroom behaviour may have been harming his identity as a ‘school boy’. His comments and behaviour suggest he may have perceived himself as a powerless conformist.

Sue’s behaviour exhibited the fragility of her ability to manage the change involved in interpreting and adopting appropriate ‘school girl’ behaviour. On the one hand she was a highly motivated learner displaying the Te Whāriki notion of a “sense of belonging” (Ministry of Education, 1996, p. 54), by sitting up the front of the class, concentrating fully, and believing she and everyone else was at school to be a learner, as the following incident demonstrates.

Sue was describing to me, a photograph she had taken of Bob showing his ability to image numbers by making finger patterns above his head.
Viv: Now what have we got here?
Sue: We’ve got Bob with his hands up, looking like a moose again.
Viv: Why is he doing that?
Sue: Because.
Viv: OK.

Sue: Because everyone knows [everyone] wants to count to ten backwards or forwards.

(Sue’s tone of voice implied my question was unnecessary, because she thought I should know that everyone wants to learn to count.)

On the other hand, Sue’s management of her learning was easily disrupted. For instance, she complained that she couldn’t concentrate because noises outside the classroom disturbed her, and on another occasion when her father left the school after helping with PMP, she was upset and tearful, and had to be comforted by the teacher. At this stage of the year parents were not invited to stay on and help with the numeracy sessions. On a third occasion, when the relief teacher was present, she also looked anxious and less happy than usual. After a few more weeks Sue was learning to manage herself and was gaining independence as a worker. She knew how to find the tools she needed and was enjoying creating activities. I noted an incident when she mentioned she needed a pencil, but without any direction from me, returned with a pencil and paper to do the activity she had created.

Another characteristic of children who manage themselves well is resourcefulness in accessing help appropriately. Jan exemplified this by seeking a little adult help from me, and then discovering a solution herself, and later checking to see if she was correct, as the following vignette illustrates.

Jan had arranged the digit labels one to six in correct sequence. Six was upside down. She wanted to know if the sequence was correct.

Jan to Viv: Is that right?

Viv: Have you got a number line you could check with?

(I looked around the room and could only see one too far away to be useful.)

Jan: My number fans.

She took the number fan and used it to check the sequence of her digits and to turn the six up the correct way.
Later when playing with buttons Jan arranged them in an array of nine and said: There are nine buttons. Do you like that?

I believe that again she was looking for assurance that she was correct. Jan’s outgoing personality and confidence allowed her to readily ask for adult help. A further characteristic which exhibited Jan’s ability to manage herself was her self-motivation and ‘can do’ attitude. As soon as pack-up time was announced she would quickly put away her activity and then help Ann and Rebecca to pack away as well. Happy Class Display comments about Jan are further evidence of her confident ‘can do’ attitude:

I am fantastic at cleaning up at tidy up time in Room One.

Jan is a good friend, tries to do her best, helps to clean up, loves her teacher.

Another observation of Jan’s behaviour indicated that she avoided some activities because she believed them too difficult:

Jan is discussing a photograph of Number Bingo.

Viv: So would you choose to play with that [Number Bingo] at maths time?

Jan: No

Viv: Why not?

Jan: Because they are just playing with a dot there.

Viv: Because what?

Jan: I don’t know.

Viv: Can you just tell me again why you would not play with it?

Jan: Because I don’t know what to do.

Jan’s contrasting ‘can’ and ‘can’t do’ behaviour raises the question of her inclination to take responsibility for her own learning, a managing self quality. Although on the surface she appeared, in the earlier vignettes, outgoing and confident, her tactic of avoiding the unknown raises questions for later discussion.
Participating and Contributing

The children interpreted the many rules and routines they had to learn to be able to participate and contribute in the numeracy programme in Room One, as an important aspect of mathematics. Ms Tahi seized numerous opportunities to reinforce classroom organisation. At times it seemed as though maths was used as a context for teaching the rules. For example, in response to my question asking what he had learned at school, Bob replied, “I don’t know. I’ve learned not to go into the classroom when the teacher says.”

Along with the explicit organisational messages, new entrants were expected to learn how to respond appropriately to the teacher’s implicit signals. For example, they had to learn to distinguish whether the teacher’s instruction referred to all children or whether, because it referred to individuals, they should wait for a child to be named before responding. The intonation of the teacher’s voice seemed to be the cue, as illustrated here:

Each child was taking her/his number fan out of the numeracy kit.

Ms Tahi: Remember to zip your kit up carefully. Have you got your number fan? Hold it like this.

Teacher demonstrates.

Ms Tahi: Find the number I am showing.

(For a time the teacher read the numbers, while the children searched for the appropriate number on their number fans. Later, the activity changed.)

Ms Tahi: Which number is it?

(I learned the teacher’s tone of voice suggested everyone was to answer)

All children: Six.

Ms Tahi: Make the number in the air.

(Again the instruction was intended for all the children.)
In addition to learning how to follow instructions the new entrant children were learning to interpret classroom terminology. Ms Tahi gave very specific instructions which the children agreeably fulfilled. The following extract shows the girls were learning organisational skills but found the terminology difficult:

Ms Tahi reminded the children what a tens frame looked like: See the five spaces at the top and five at the bottom. That makes ten spaces.

Then Ms Tahi moved on to explaining how to read the task board: Triangles [Jan and Ann], your picture is of the maths shelf. What are you going to do today?

Jan and Ann: They both pointed to the maths shelf but didn’t use the word, maths shelf, even though the teacher had just used it.

[Maybe they were unsure of the term, ‘maths’.

Other language peculiar to the Count School setting included, ‘twinkling fingers’, which indicated the children should stop work and listen to the teacher and ‘school sitting’, which I have referred to in another episode. I noted the use of the term ‘deep thinking’ on the school posters and heard Ms Tahi use it on occasions, often when children could not answer a question, or when someone answered a question Ms Tahi thought was difficult for the children.

A classroom display entitled “Learning about Learning” indicated expected routines and behaviour the children were learning: For example Sue’s comment read, “I always put my hand up to talk on the mat,” while Ben’s read, “I ask for help from an adult if I’m not sure about something.” Later incidents recall that he frequently asked for my help. By ensuring that the children learned the classroom organisation and acceptable behaviour patterns, Ms Tahi believed she was preparing them for future orderly participation in their numeracy learning.
Section Summary

The findings reported so far illustrate the new entrant children’s experiences and interpretation of their numeracy learning at school. The children identified the social skills of being friendly towards others and following the classroom organisation, as important factors. In addition to the skills the children identified, my observations of their actions and interactions suggest their ability to relate to others, manage themselves, and to participate and contribute, influenced their accession of numeracy learning.

A Child’s Numeracy Journey

Thinking, Using Language, Symbols and Text

To illustrate how the children experience and interpret the teaching and learning of numeracy concepts, I am describing experiences of one child, Ann. Reporting on one, rather than the five children avoids repetition of ideas and allows me to focus more deeply on one child’s development. I have several reasons for choosing Ann as the focus child. Firstly, she was the child with whom I had most contact and observation. I had frequent access to her, because while I was in the classroom, she had less interaction than her peers, with other children, and her group had fewer instructional sessions with the teacher. She could well be representative of the quietly, cooperative, new entrant girls Young-Loveridge’s (1991) research highlighted. Secondly, Ann and her Mother, Amy, have found the transition from early childhood education to school difficult, and Amy believes, damaging to Ann’s confidence. Thirdly, the NDP research shows that children who enter school at stage zero to one of the framework are slow to make progress in the grouping and place value domain. This is significant because knowledge of grouping appears to be an important factor in determining levels of progression in strategy development (Thomas & Tagg, 2004).
While the previous section reports mostly on the social key competencies, the results reported in this section mostly align with the two key competencies, Thinking, and Using languages, symbols and texts. However, the social key competencies also feature, as Ann’s development of her interpretation of the word ‘maths’ and her numeracy learning are traced. The section outlines her early childhood mathematics experiences, and details her numeracy learning experiences during her first term at school. These include her involvement in whole class and group instruction, and independent learning activities.

Ann has no siblings and lives with her Mother, Amy. She began school in mid December, 2004, after attending nursery school for three and a half years where the programme was free play interspersed with story reading and lots of singing. Amy does not recall any nursery school counting or numeracy activities, but at home she counted and played dice games with Ann. Amy described Ann’s personality as introverted and said that she would chat with people only when she felt comfortable with them. At school she was a quiet, co-operative student, but did not speak in whole class lessons. According to Ms Tahi’s diagnostic interview results of February, 2005, Ann scored at stage zero of the Numeracy Project strategy framework. That is, she was unable to:

- sequence numbers 1-10 forwards or backwards
- recognise numerals 1-10
- count objects in a set.

My earliest observations of Ann suggested she could make groups of three and that she was attempting to count the six dots on the dice. She did not seem to recognise any numerals. Miss Tahi grouped Ann, in the ‘Triangles’, the lowest ability group in the class, together with another stage zero girl, Jan, and an autistic child who is
accompanied by a teacher-aide. As other new entrant children arrived at school they were temporally placed in the ‘Triangles’ group, and then were assigned to a group according to their diagnostic interview results.

According to the knowledge framework, the concepts Ann could be expected to develop next include, counting (sequencing numbers one to ten), recognition of number symbols one to ten, number patterns to five, and associated numeracy vocabulary. However, I saw her exposed to activities beyond this level, particularly in whole class sessions. In the course of classroom numeracy activities, she was also developing an understanding of the term, mathematics. As previously mentioned, alongside the numeracy learning, and often given greater emphasis, was the adoption of classroom vocabulary, routines, matters of organisation, and appropriate ways to work and relate to others.

At the beginning of numeracy lessons, Ann, along with the other class members, spent fifteen to twenty minutes sitting on the mat doing knowledge activities, directed by Ms Tahi. Ann’s attention waxed and waned during these sessions. Knowledge activities involved the use of a variety of equipment to teach sequencing of numbers, numeral identification and groupings of numbers (sets). Often, to cater for the children who were learning numbers in the 1-100 range, Ms Tahi used the one hundreds board. The children rote counted forwards from any number between one and one hundred and backwards from twenty to zero. They were also asked to show the finger patterns of the numbers one to ten, randomly. In a February session, I observed Ann successfully making patterns for one and two, and biting her finger nails when unable to do ten, nine and seven. When asked by the teacher to show four, Ann did not respond. Another grouping activity involved showing finger patterns to
match the tens frames which Ms Tahi displayed. Ann had to be reminded by the teacher to participate.

Ann seemed emotionally uncomfortable during some whole class lessons. This is illustrated by a session in March when everyone was using number fans to learn number identification. To begin, the teacher showed numbers between one and ten and the children found the corresponding numbers on their number fan. Ann’s confusion of digit nine for six went uncorrected. Later the numbers were read and the children found the given number. Ann was praised for correctly finding number two, the number after one. However when the numbers were beyond her range, that is the one to four span, Ann seemed anxious about being unable to participate fully. At times she glanced at other children’s number fans in an attempt to get the correct number and other times she awkwardly moved the numbers on her fan knowing it was too difficult for her.

Ann’s interpretation of the term, ‘maths’, developed according to her numeracy time experiences. She spent much of her numeracy time working on independent activities, usually using equipment in her numeracy kit, and occasionally choosing equipment and games from the mathematics shelf. She often played by herself alongside her two group members and the teacher aide. In February, Ann was unable to name equipment in her numeracy kit, for example, the number fan, and didn’t know what the ruler, buttons, dice and digit labels were for. On the same occasion she played with the digit labels in a haphazard fashion, but when using the buttons put them in rows of three. “I’m trying to make them turn into a line of three.” Shortly the activity with the buttons changed to making a flower. Ann emptied the counters out of the bag and said, “I’m making a really, really, really, really, really, big flower”. The
change of activity indicated that Ann had some understanding of what the teacher expected her to do at numeracy time, that is, that numeracy was about counting groups of objects, but that she was not able to generate numeracy activities for the whole session. On another occasion Ann and her group friend, Jan, diverted from their numeracy kits to dressing up in clothes from the dress up box. The teacher reminded them that dress ups were not for maths time. Later in the week when Ms Tahi was teaching the Triangle Group how to read the task board, she reminded Ann and Jan that when they were doing the day’s activity of using the numeracy kits, they were not to play dress ups.

An adult’s presence in the group helped keep Ann on task and scaffold her learning. Three days after I had noted Ann’s lack of knowledge of what to do with the digit cards, the teacher aide helped her to count and arrange the digits one to eight in sequence. Ann then threw the five dice and pointed to five. The teacher aide affirmed that she was correct. The teacher aide suggested they play the game joining two dice, as mentioned earlier by the teacher. Ann threw the dice and counted the dots from one on each dice. The teacher aide asked her to join the dice and count how many altogether, “four dots and two dots”. Ann still counted “one, two, three, four” and “one, two” separately showing she did not understand the concept of joining sets. The episode continued with Ann throwing the dice and counting the dots. She counted the six dots correctly, understood the cardinal value of the six dice, located the six digit label, but could not locate the five when required. Ann diverted to another group briefly to look at a boy’s whistle. When asked by Ms Tahi at the end of the session what she had been doing she gave no verbal response, but held up the digit labels. She did not respond to the teacher’s question, “did the numbers end up in the right order?” This was a difficult question for her to answer since she probably had no way of
checking whether she was correct, and she may not have understood the teacher’s question. Ann’s willingness to talk to the teacher aide and me, but not to Ms Tahi, showed she had confidence when working in the small group but not in the whole class situation. To summarise her numerical understanding at this point, I observed that although she was having difficulty with number five, she was making progress with reading the digits to ten, she could count objects to six, and she understood cardinal value of number. The possible factors influencing Ann’s learning are discussed later.

The teacher’s deliberate statements and acts illustrated that she expected the children to learn the classroom routines, names of equipment and characteristics of acceptable classroom behaviour intermingled with their learning of numeracy concepts and vocabulary. For example, during a whole class session in March, the children were making finger patterns to match tens frames. The lesson began with Ms Tahi emphasising the name, ‘tens frames’, and the fact that they were kept in a particular box. Ann successfully made the patterns for four, three, and two but was confused when asked to repeat four. Perhaps Ann thought because she was asked to make four a second time that her first attempt had been incorrect. She became distracted and was unable to make six, eight, and nine. In the following day’s whole class session when jumping on numbers one to twenty, Ann successfully jumped on numbers two and seven and the number before three. These activities did not require her to speak. Part way through, Ms Tahi had interrupted this lesson to praise Jan for returning to the classroom so quietly. At the end of the lesson Ms Tahi drew attention to the mathematical content, and told the class that they were doing a good job with their backwards counting and naming of numbers that come before another number. In two sessions the children had been exposed to a wide range of learning including the
naming of equipment, routines, appropriate behaviour, and numeracy concepts of patterns of numbers, reading digits, and the concepts ‘before’ and ‘after’ a given number.

Gosh, what a lot of learning for Ann in two sessions! Equipment name and routine, to enter the room quietly, maths concepts of patterns of numbers, reading numbers, and the before and after concept. Once again Ms Tahi took the opportunity to reinforce the kind of behaviour she expected. Ms Tahi seems to be attempting to improve Ann’s confidence by asking her to do things that she can do correctly. Also, by making explicit what the children had been learning she was helping the children to clarify their conception of what constituted mathematics content.

(Field notes, 22 March 2005)

At times Ms Tahi’s emphasis on appropriate maths behaviour, routines and organisation seemed to over-shadow the mathematical content of the lesson, thus influencing children’s understanding of the term, mathematics. The children interpreted the routines and classroom behaviour as being ‘maths’. This was exemplified during a whole class session using number fans when a child thanked Ms Tahi for handing her the number fan. Ms Tahi responded, “[I] love your manners”. Many more “thank you” comments from the children followed. Later the teacher commented “Well done, you’re following the instructions perfectly. In the same episode, “I love those people doing it so quietly,” and at the end, “are you still sitting beautifully while I’m collecting the number fans?” The establishment of appropriate behaviour patterns seemed to take priority over the reading of the digits.

The depth of the teacher’s understanding of both the learning intention of teacher directed knowledge activities, and the stage of the children’s development in relation to the numeracy framework, influenced the student’s concept development. On the
one occasion when I observed Ann taking part in a five to ten minute group
instruction session, the children were predicting how many bears were in Ms Tahi’s
hand. Ann predicted five when the answer was six. The other children in the group
were correct. Ms Tahi arranged the bears in rows of five and one to align with the tens
frame pattern and the stage two learning objective, groupings with five. The
connection with the tens frame was not explained to the children. When Ms Tahi took
a handful of twelve bears Ann predicted seven or nine. The other children in this
group were closer in their predictions. When Jan lined up the twelve bears to count
them, she put them in one row rather than using the five row pattern shown previously
by the teacher. I was unclear as to whether the teacher was teaching the children to
develop a sense of the number patterns, for example what six objects looks like, or
whether she was teaching groupings with five. Working with numbers beyond Ann’s
stage range made the lesson difficult for her and I suspect beyond her learning zone.
According to Ann’s diagnostic interview results and her classroom achievements she
could have been expected to have been working in the number range 0-10. To use
Vygotsky’s term, her ‘zone of proximal development’ is at stage 0-1 of the knowledge
framework.

Discussions with Ann about her photographs in early April illustrated development in
her concept of what mathematics means. She was, however, unable to recall why she
had taken some of the photographs. Ann confidently described the previously
mentioned activity of making sets to match digit labels and understood it to be a
mathematical activity. Other photographs indicated she clearly understood that
counting, reading and writing or to use her vocabulary, “drawing” numbers,
constituted mathematics, but that colouring in did not. Ann’s reserved manner may
have prevented her from voicing her opinion when the other case study children
agreed that colouring neatly was important for the learning of mathematics, and consequently decided a photograph of colouring in should be included in the class booklet for new entrants.

Not surprisingly, after spending much mathematics time with her numeracy kit, Ann identified playing with the numeracy kit as a mathematics activity. At the end of the term she was able to name most of the contents, but not the ruler. Other photographs confirmed that positioning of equipment on the maths shelf in the classroom influenced Ann’s interpretation of what mathematics is. She believed all the games, equipment, and construction materials on the maths shelf were related to mathematics.

By the end of her first term at school Ann’s interpretation of mathematics included counting, reading and writing numbers, making sets, cardinal value of number, working with her numeracy kit, using equipment and games from the classroom maths shelf. While her perception of what constituted mathematics was developing, her confidence in using numbers was also growing. Her ability to successfully subitise the dice patterns one to six, join the sets of two dice, distinguish one number as bigger than another, for example five is bigger than three, name the number ‘after’ another, for example six comes after five, count to ten on the abacus and demonstrate the matching finger patterns to her Mother, indicated Ann had made progress since her diagnostic interview and my beginning of term observations. The setting of Ann’s demonstration of her abilities, that is, the non-threatening environment of her home, and to a small group, her Mother and me, may have made her confident to attempt things she would not have risked in the whole class setting. Ann’s Mother stated that she had noted much numeracy development, particularly in Ann’s ability to read and write numbers.
Section Summary

This section has traced one child's journey as she formed early understanding of the term 'maths'. The shift in the child's interpretation was based on her classroom numeracy experiences which were greatly influenced by the teacher. She changed from thinking relationships and classroom organisation were most significant, to including numbers, counting, number patterns and numeracy equipment in her interpretation of what constituted 'maths'. By comparison, the other children still regarded social aspects and routines as very important at the end of term one. Alongside the development in her interpretation of "maths", Ann's numeracy cognition progressed, although at times, she appeared to find her whole class numeracy experiences worrisome.

Parent Perspectives

In reporting parent perspectives on children's transition to school numeracy learning, I begin by describing the parents and their children's attitudes towards having a "voice". I then describe some of the interactions between the children and their parents. Lastly I report the parents' discussion of their child's early childhood experiences and their transition to school, in relation to numeracy. The ideas here are in addition to those mentioned in the previous sections of this chapter.

Background Information

Ann's mother, Amy, was a single parent with a professional career. She was keen to contribute to my research although it was difficult to schedule a time in her busy life. I visited Amy and Ann in their home early one evening, after Amy had finished work for the day. Sue's parents invited me to their home after school, where Sue their elder child, proudly demonstrated her learning to both parents, Sam and Sally. Rex's
mother, Rose, who is a mathematics teacher, Jan’s mother, Judith, and Bob’s mother, Beth, all arranged to meet me at Count School. Rex and Bob are the second child in their families, while Jan is the third. Due to illness, my meeting with Bob and Beth was postponed until July. Of the five case study children, two, Ann and Sue were the first child in their families to begin primary school, whereas the other three children had an older sibling or siblings at school.

The parents of the five case study children were pleased to be part of my research for two main reasons. Firstly they were eager to support my work because they valued children’s education and believed my study may result in educational benefits for their child and other children. Their involvement in early childhood education centres as parent helpers and on committees, and similarly, but to a lesser extent, at school, illustrated their interest in education. They were most obliging at making themselves available for our discussions. Secondly the parents were most appreciative of having the opportunity to tell their experiences about educating their children. During their child’s demonstration, the parents interacted enthusiastically and praised their children with comments such as Beth’s, “far out!” and Amy’s, “fantastic, Ann”. In the following vignette Rose is interacting with Rex as he explains a photograph of the fly flips equipment, and the addition “change unknown” operation, for example 5+? = 8.

Viv: Now this is some teaching that’s happening on the mat with a group of children and Miss Tahi. Can you explain to Mum what’s happening there?

Rex: You do these, and you have to do it and you have to figure out in the middle how much makes eight, and I said five and we put the three in there to make it eight.

Rose: That’s quick.

Viv: It is isn’t it? So on the back of this fly flip, there would be how many flies Rex?

Rex: Three.
Rose: Very good.

_Child/Parent Demonstrations_

The children enjoyed having the opportunity to show their parents the photographs they had taken and to explain why they had taken them. They proudly used numeracy equipment such as their numeracy kit, number fans, tens frames, the Slavonic abacus or bead frame, and the one hundreds board to demonstrate their learning. During these sessions the children led the discussion.

Without prompting both Jan and Sue set up teacher/pupil role plays involving themselves, a parent and me. This vignette exemplifies Jan’s role play incidents:

Jan: Mum, you, [Viv] you be the kids. I be the teacher. Show the finger pattern. (Jan is holding up tens frames for her Mother and me to pattern with our fingers).

Judith: (We put up five fingers). So that one is five – are we correct?

Jan: You count – one, two, three, four

Judith: Yes, we’re right.

Jan: (Holds up the seven tens frame.)

Viv: We’re going to need two hands are we?

Jan: Need to count. [She counted the dots to herself]

Viv: O.K. you’re checking first.

Judith: You want us to do this one? Show us.

Jan: No, like that. (Jan demonstrates how to make seven with two hands.)

Viv: I think I’ve got it right.

Jan: O.K.

Viv: So that is…… What number?

Jan: Seven. Five and two make seven.
I'm thinking, but five and two make seven” is a Stage 2 concept. Jan has made progress since her diagnostic interview. I wonder if she'd understand this using different equipment or whether it has been learned by rote during whole class sessions.

(Field notes, 13 April, 2005)

In whole class sessions the children had used their fingers to show groupings with five, they recited together the appropriate number sentence, for example, five and two make seven. I'm curious as to whether the children had sufficient understanding of the groupings to apply them in authentic contexts and to demonstrate them with other equipment.

Sue’s counting had progressed since her entry to school, but errors that are not easily detected when the whole class counts together, were apparent. For example, when using the one hundred board and skip counting in tens she said, “sixteen, seventeen, eighteen, nineteen,” instead of “sixty, seventy, eighty, ninety”. It was evident that Jan was having difficulty with other numeracy terminology as well, particularly naming equipment.

Ann was pleased to show her Mother what she had been learning at school and did so in a quiet, natural manner. I found she needed much prompting at first, but gained confidence as the meeting progressed. As Ann demonstrated her numeracy knowledge to her Mother, Amy made many quietly encouraging comments to her. She later explained that she was praising Ann to boost her confidence because she thought it had been harmed during her transition to school.
Rex seemed pleased to be showing his learning, but appeared fidgety and uncomfortable in the role of leading the discussion with his mother. His mother thought his diversion from the task and fiddling with the equipment was not typical of his behaviour.

Bob was also very proud to show his Mother his numeracy learning, but because his demonstration took place in July, and he began school in 2004 it portrays a much longer period than his early transition to school. He presented his knowledge confidently to us and I was surprised by his great progress in numeracy learning since my visits in the first term of 2005. Bob’s ability to skip count forwards and backwards in twos, fives and tens, and to use this knowledge to count beads on the Slavonic abacus suggests that he had understood the teacher led whole class learning sessions well and that they were an effective learning format for him.

*Preparation for the Transition to School Numeracy*

I experienced a range of responses when I introduced the topic of pre-school mathematical experiences to the parents. I sensed an element of surprise and uneasiness from Amy, Sam and Sally. It seemed that they expected the early childhood educational centres to be their child’s main educator and that although they were involved in educating their children through home activities such as cooking, they had not realised the significance of their role as teachers of mathematics.

Parents of the children who had older siblings at school were more relaxed about their child’s numeracy development and thought their children mostly learned their pre-school mathematics from family interactions, particularly from the older siblings. Although there was little mention made of the holistic nature of early childhood
education or the development of dispositions which support learning, their comments suggested that parents believed their children learned numeracy concepts in the context of everyday happenings as the following discussion with Judith illustrates. This discussion occurred following our main discussion suggesting Judith may have thought it was not relevant to my study because it is not formal instruction. I turned the tape on again to capture:

Judith: We play shops at home all the time.
Viv: [Excitedly] Oh do you?
Judith: We’ve got a cash register.
Viv: We had one of those too, for my kids.
Judith: And with fake money, we do a lot of grocery shopping at home. And [Jan’s] favourite place to go in the world is the supermarket.
Viv: In real life?
Judith: In real life. She gets so excited and I hate the place.
Viv: It could be because she’s just suddenly become aware, and knows that she knows what the numbers are, and that she can count now - that it’s all so exciting because she can match it [school numeracy] up with the real world.
Judith: Yes, she walks round, say at the jam, and says there’s two five, two and, but she loves it. She’d rather go there than to the $2 Shop. [Perhaps because there are more numbers to read at the supermarket?]
Viv: But of course that’s one of the things that you can do at home, it’s easier done at home that is orient the maths [to real life]. At school we’ve got the equipment and stuff, but at home you can make it really live, real life maths, which is something we can’t do at school as well.
Judith: No.

Some of the parents did not consider the early childhood provider’s influence on the child’s development as a learner, let alone a mathematics learner, when selecting the centre for their child. Amy, Sam and Sally chose early childhood centres for their convenience, that is, proximity to home and suitability in
matching parents' work hours. Judith and Beth took their children to the local early childhood facility. Being a committee member Judith instigated some formality into the pre-school programme by suggesting a “mat time” for story telling, and themes or topics of interest in which the children were encouraged to contribute. Rose, after experiencing the free play at kindergarten took Rex to Montesorri pre-school because she preferred its structured equipment and format. Sam and Judith could identify a few early childhood centre counting activities their children had participated in that they thought were a preparation for school mathematics. Beth couldn’t recall any particular numeracy activities at the early childhood centre but believed Bob was being prepared for school by learning to be a learner. Parents’ perceptions of what their children learned in numeracy was confusing because although they integrated numeracy, for example counting, into their child’s home life many of them expected school numeracy to be formally structured and involving recording. Bob’s Mother explains her expectations and experiences:

Beth: I think it’s amazing how they teach them because it’s so much fun. I’m sure it wasn’t fun when I was at school. And it’s fantastic. And so many different things, and so many different ways to show them the same thing. I think it’s great.

Viv: The equipment?

Beth: Mmm.

Viv: Yes and they do see things in many different ways. And they even use their fingers now. You are surprised that it’s so much fun and there’s so much variety.

Beth: Yes, I think it’s great.

Viv: Is he learning what you expected, if you can think back to when he first came to school?

[Beth seemed hesitant and unsure]

Viv: Or did you know what was going on in maths?

Beth: Not when he first started – no.

Viv: So he wasn’t doing anything at home that would tell you what he might be doing?
Beth: A few months into it he had a piece of paper and a pen and he drew some little groups and put some little dots in there like that, so he used to do a few things like that and maybe five plus and then a square, because he gets that off [older brother] as well.

Ann’s Mother, Amy, experienced frustration with the lack of communication about Ann’s learning. From the age of eighteen months, Ann attended nursery school five days a week where she took part in experiential free play interspersed with story reading and lots of singing. The nursery school reported Ann’s progress in terms of active play and creativity, exploration, public communication, and working with others. Amy didn’t recall any counting or mathematics taking place at nursery school. She thought the nursery school play environment contrasted with the structured new entrant classroom learning environment. Whilst she had been extremely interested in the philosophy of the nursery school programme, attending parent sessions whenever they were on offer, and being in close contact with the supervisor, Amy had not been made aware of the principles of Te Whāriki (Ministry of Education, 1996).

Amy wanted to prepare Ann for school but was unaware of what was required and expected that school would do the teaching. At home mathematics activities included rote counting, counting objects and playing dice games. It was Amy’s strong belief that parents of four year olds should be given information about preparing their children for school and suggested that it should be the role of the early childhood educators. She believed that Ann’s confidence was damaged at the school pre-entry visits when she was placed in the formality of the school classroom setting without appropriate preparation.
The Transition to School

Ms Tahi provided three pre-entry visits to the classroom for the prospective new entrants and their parents. Although Ms Tahi explained to me that one of the sessions had a numeracy focus, none of the parents recalled numeracy content. Amy and Ann found the three pre-entry school visits frightening experiences because they did not know the people, and because the tasks were formal, threatening, and too difficult for Ann. Ann had not wanted to attend the latter sessions, or begin school, but her situation improved once she began school. Amy is pleased with the teaching, and says Ann has gained confidence and is now happy to be at school.

Bob’s transition to school has also been difficult. Beth reported a behaviour modification system, “Smiles at Nine” she has put into place to change Bob’s negative attitude towards beginning school in the mornings. Beth believes Bob’s transition has been unhappy because he changed to a different new entrant class at the beginning of 2005, and then had to establish a new set of friends. Bob had been happier in 2004. Ms Tahi’s story was different. She explained that Bob was so disruptive last year that she had moved him into her room for 2005.

Although most of the parents were unsure as to what numeracy achievement level they expected of their children once at school, they were pleased with the children’s progress and positive attitude towards their numeracy learning. Judith commented, “I’m quite stoked with how she’s doing with maths and how excited she is about it…….. I hope it [the positive attitude] remains.”
Amy and Roy were surprised that their children were reading and recording numbers after such a short time at school.

Roy: I've noticed that with numbers and letters, in the six to eight weeks she's been at school [her knowledge of symbols] has escalated a huge amount – what she recognises on signs or in books, or if I'm writing. She's starting to be more aware. She would never have noticed it [the symbols] before............... I mean I didn't really have any ideas [expectations] until they [school] started it all off, but I am surprised about how much she has been absorbing so far.

The initiative for communication about mathematics between the school and home is largely reliant on the parent. Opportunities for first time parents of new entrants to learn about their child's mathematics learning are less apparent than in some other curricula. For example, Ms Tahi provides literacy, but no numeracy homework. Amy, however, keeps in touch with Ms Tahi by visiting the classroom before school, and has been told Ann's numeracy goal is to learn to count to twenty. She is also able to gauge some of the learning as Ann integrates her numeracy knowledge into home activities and play. The school instigates communication with parents through formal parent/teacher interviews and a student portfolio system. Parents also talk informally with Ms Tahi, before, or after school. There have been invitations for parents to help with the PMP but no invitations yet to help with numeracy this year. The Room One notice board for parents had no information about the mathematics curriculum.

The communication of curriculum content to parents of new entrants took various formats but did not reach all parents. Until taking part in my research, parents of the children who were the oldest or only sibling were unaware of the Numeracy Development Project. Sam and Sally read all the school newsletters but did not
recall any information about numeracy. Ms Tahi explained that the school held a parent evening, in 2004, following the teachers’ Numeracy Development Project professional development programme. Rose, the mathematics teacher and mother of Rex, attended the evening and said:

Each of the teachers showed us these activities that they were doing with the children. I, as a parent, thought that was fabulous because I now know what the children are doing at school so if anything comes up at home, like the finger pattern, I know and I can extend it. [I] understand what they are on about, because it is not always easy to pick up exactly what the children [mean]. Making seven like this. (Rose demonstrated with her fingers.) You’ve got the finer points there as well.

Rose also learned about the numeracy programme when her older son began school. She learned through helping prepare materials and working in the classroom. Rose is impressed with the understanding of number children develop through being taught the numeracy project way, but believes maths homework activities would help parents and children to make connections between school mathematics and the real world. Her homework example was, “Go to a shop, or look in the junk mail, and find out the price of something.”

Section Summary

In summary most of the parents were unsure of the role they and the early childhood providers play in mathematics education. They have not had the opportunity to learn about the philosophy of Te Whāriki (Ministry of Education, 1996) and make connections with their children’s learning. The transition to the school classroom was an unhappy experience for two of the children and their parents. There were few opportunities for parents to learn about the school mathematics curriculum and to be involved in their child’s numeracy. They considered numeracy to be counting and reading and writing numbers. Mostly, parents learned about the mathematics
curriculum by observing and participating in their child’s play at home. The parents were pleased with their children’s achievement but some were surprised at the formality of the lessons. Parents of new entrant children who are the eldest in the family were less informed about the mathematics curriculum than other parents.

Chapter Summary

The Negotiating the Culture of the Classroom section of the results chapter highlighted how the teacher’s foci on relating to others and classroom organisation was reflected in the children’s interpretation of the term ‘maths’. The section, Thinking and Using Language Symbols and Text, in tracing the numeracy experiences and development of one new entrant child, illustrated the significance of a teacher’s philosophy and pedagogical knowledge on children’s early numeracy learning. The vignettes reported demonstrated that children’s knowledge, skills, attitudes, values and motivation (qualities of the key competencies) are inextricably linked. Lastly, in the Parent’s Perspectives I reported that parents appreciated the opportunity to talk and learn about their children’s numeracy. There was a range of happy and unhappy experiences in relation to their children’s negotiation of the classroom culture. Parents, particularly of children who were the first in the family to attend school, seemed uninformed about how to support their child’s numeracy learning. I suggested there were few structures for creating understanding and communication about numeracy between the early childhood and primary school education sectors, and between the education providers and parents.
Chapter Five: Overview

A. My Role as a Reflexive Researcher

B. Negotiating the Culture of the Classroom
- Relating to others
- Managing self
- Participating and contributing
- Transition from play to structured numeracy
- Combining key competencies
- Specific key competency components

C. Interpreting the Cultural Tools of Numeracy
- Thinking, Using language, symbols and text
- Teacher's interpretation of ENP
  - programme content and structure, diagnostic interview
  - Scaffolding cognitive development
- Professional development - theory - 'big ideas', further support and resources
- Identity
- Learning through play

D. Parents' Perspectives
- Opportunity for communication
- Lack of communication with the E.C. and school
- Involvement with school numeracy
- Achievement expectations and progress

Key Competencies
Relating to others, Managing self, Participating and communicating,
Thinking, Using language, symbols and texts

Components of the Key Competencies
Attitudes, values, motivation, belonging, identity
Chapter Five: Discussion

Introduction

This chapter begins with a discussion on my role as a reflexive researcher. Using the data reported and analysed in the previous chapter I discuss how the new entrant children in this study experienced and interpreted their numeracy learning. By examining this information through the lenses of the proposed key competencies I make apparent the complexity of the competencies' inter-connections. I conclude the chapter with discussion on the issues associated with the parents' perspectives on their children's transition to school numeracy learning.

My role as a reflexive researcher

In this section I raise issues related to being a reflexive researcher. Firstly I discuss the difficulty of providing an impartial forum for the participants' viewpoints to be heard whilst protecting the stakeholders without 'voice' in the study. This is followed by discussions on relationships with and between participants, retaining anonymity, trust and confidence of adult participants. I also discuss the dilemmas posed when working with child participants. These include their vulnerability, the support they require, and the credibility of their information.

The results of this interpretive research are susceptible to factors such as the nature of the sample case itself, the quality of the relationships I built, the range and validity of the data I collected, and the analytical approaches I employed to interpret the data. I am aware that the selection of vignettes chosen to illustrate events is influenced by my interpretation of the issues raised by the children and parents involved in the study. My interpretation is coloured by previous work as a teacher and more recently by experiences as a numeracy
project facilitator working with teachers and children. There have been dilemmas regarding selection, categorisation and discussion of the data, because many of the vignettes, that is excerpts of interview transcripts and observations, fall into more than one category.

Throughout the study I was constructing relationships with and between participants. Guba and Lincoln (1989, p. 132) believe that the face to face contact of constructivist inquiry, “provides for intensive and often tenuous and fragile relationships, which are subject... to shading the truth, to misunderstandings regarding the purposes or relationships with other respondents on site.”

An impartial approach to eliciting information was required. Causing acrimony between home and school was contrary to my aim, so, when raising the question of opportunity for parental involvement in their child’s numeracy learning, I was aware that I was alerting the parents to an issue which had the potential to cause disharmony between parents and school. According to Guba and Lincoln, the researcher is responsible for eliciting the stakeholders’, in this case parents’, views on the home and school partnership, but to do it in an open-ended way that guarantees that the stakeholders’ view emerges rather than the researcher’s. In considering the school’s viewpoint, I acknowledge the heavy workload of the new entrant teacher, the short time frame of one term in which to build home and school communication in numeracy, and that the teacher’s curriculum focus was technology, not numeracy. On the other hand, since the school has recently had two years of professional development, 2003 and 2004, in the numeracy project, I believe it is reasonable to expect that ongoing communication and involvement of parents in their children’s learning of numeracy would now be part of the programme.
I have also been aware of my relationship with Ms Tahi. She provided practical support and along with her class, always made me feel welcome in her classroom. Had I anticipated her high interest in my research, and had the scope of the study not been restricted to comply with assessment procedures, inclusion of Ms Tahi’s perspective on the children’s transition in more detail would have added another interesting dimension. In the interest of credibility of the data and in respect of the preservation of Ms Tahi’s professionalism I raised possible reasons for her actions. At the same time, my feminist voice reminded me that I was providing a forum for the previously unheard voices of the children, parents and teacher, and therefore it was important that I reported honestly. And of course, if I edited, or omitted data gathered from the participants, their involvement would have been pointless.

Developing rapport with the children seemed a natural process which flowed from my self-introduction and my work with the children. The case study children were proud to be involved in my research and all the class members were used to having visitors in their classroom. My level of involvement in the classroom waxed and waned. During my first observations I was unsure, as a participant observer, as to how much I should interact with the children. I soon realised that involvement with the children, if it were responding to their questions, or asking them to explain their activity, provided richer data than observation alone. I was aware of the importance of maintaining a low profile and keeping the setting as natural as possible. However the inclusive atmosphere of the classroom, particularly the friendliness of the children towards me, made interacting with them seem natural and unobtrusive.
I have been conscientious about providing privacy and confidentiality to the participants, though Guba and Lincoln (1989) warn that this is difficult. At the beginning of the study I naively believed I could guarantee parents, the teacher and the school anonymity. I also believed that by providing the participants with information about the study, I was ensuring that they were entering the project with ‘informed consent’. In fact, I could not predict the events that would unfold. I did not, at first, appreciate the closeness of the Count School community which resulted in some parent participants identifying other participants.

Malone (2003) argues that the construct of ‘informed consent’ fails to address the dilemmas that can unexpectedly arise in qualitative inquiry. It is crucial now that I maintain each parent’s trust by reporting their comments honestly and include only comments that I consider will not harm them in any way. To ensure accurate portrayal of their ideas I sent summaries of my transcripts to each parent asking them to amend any inaccuracies. Two families adapted and returned them to me. Amy confirmed my précis as accurate and added further explanation about Ann talking confidently with adults she knew. Sue’s parents clarified the length of time she spent at pre-school education and added that they were unsure about whether or not numeracy was explained at school pre-entry visits because there was so much new information for parents to understand.

I sensed that to retain the trust and confidence of parents and because my relationship with them was short term, it was inappropriate to probe discussion deeply. I sensed the parents had not considered themselves as numeracy educators of their children and that discussing this role was difficult for them. To avoid ruining rapport and the continuity of our discussion I avoided asking for detailed explanations about the role. One such discussion was when Beth commented that Bob was learning to be a learner. While I wanted more explanation because she was the only parent who suggested there was numeracy learning in
children's play, I felt it was inappropriate to delve further because I thought she may have 
been uncomfortable providing more information. I surmised that Beth believed that through 
the informality of his early childhood education programme Bob was developing the 
dispositions of courage, playfulness, perseverance, communication and responsibility 
described by Carr (1998) as being used for learning throughout one's life.

As a teacher, parent and grandparent I am aware of the vulnerability of children and as a 
researcher I am aware of my responsibility to protect them. Their willingness and frankness 
in sharing their ideas, while easing my data collection process, exposed their vulnerability. 
To this end I listened to them sincerely, and as reported in the results section, facilitated 
their discussions with their parents and others, as sensitively as possible. Guba and Lincoln 
(1989) comment that violation of trust is a risk in interpretive inquiry and state that:

this form of inquiry is built on an almost axiomatic assumption of intense and non-manipulative trust 
between researchers... and their research participants and stakeholders......Because some 
evaluation efforts require short time frames (relatively speaking), achieving trust, building rapport, 
and engaging in negotiation from positions of mutual power are sometimes difficult to achieve.

(Guba & Lincoln, 1989, p. 134)

I took on several roles during the discussions when the children were explaining their 
numeracy learning to parents. I was scaffolding the children's discussion so that parents 
interpreted the child's ideas accurately, while allowing the child to be in control of the 
content of the discussion. As indicated previously, the children enjoyed their position of 
power although Sue's and Rex's self-conscious behaviour indicated it was a new 
experience for them. The parents responded with praise and intense interest in their child's 
learning. Bronfenbrenner believes that:

Learning and development are facilitated by the participation of the developing person in 
progressively more complex patterns of reciprocal activity with someone with whom that person has
developed a strong and enduring emotional attachment and when the balance of power gradually shifts in favour of the developing person.  

(Bronfenbrenner, 1979, p. 60)

At the same time as the children were in the power position and providing a picture of their numeracy knowledge, I was noting their numeracy development, in order to triangulate the information I had gathered in the classroom.

It was also my responsibility to represent the views of all the main participants. I found collecting information from such young children raised the issue of credibility. The limitation of the children’s language development, especially mathematics terminology, made it difficult for them to express their thinking. I was concerned therefore that the ideas the children provided, particularly in relation to their understanding of the term mathematics, were sketchy and not detailed. The data became more detailed and credible as the various sources and techniques of collection were employed. For example, the photographs taken by the children, their explanation of them to me, their choice of which to include in the class booklet, and later their explanation and demonstrations to their parents, helped me to confirm information about their understanding of maths. Credibility of data was a concern when the children couldn’t remember or kept changing their minds, for example, why they took certain photographs, or as reported in Sue’s moose vignette, when I had to ‘read between her lines’. As Delamont says:

Research is a series of interactions, and good research is highly tuned to the interrelationship of the investigator with the respondents. Each researcher is her own best-data collection instrument, as long as she is constantly self-conscious about her role, her interactions and her theoretical and empirical material as it accumulates. As long as qualitative researchers are reflexive, making all their processes explicit, then issues of reliability and validity are served.

(Delamont, 2002, p. 8)
The children’s changing ideas, and their inability to express their early interpretation of ‘maths’ raised the issue of credibility of the information they provided. At the same time the changing content of the data was illustrating the children’s development as their comments shifted from sketchy utterances to clearer descriptions and interpretations of their maths experiences. Their discarding of photographs originally taken to represent ‘maths’ also indicated a change in their understanding.

**Section introduction**

In the following two sections, *Negotiating the Classroom Culture* and *Interpreting Language, Symbols and Text*, I discuss the results of this study in relation to the first research question: *How do new entrant children experience and interpret early numeracy in their first term of school?* The section, *Negotiating the Classroom Culture*, is concerned with the social issues new entrant children and their families face, and connects with the key competencies of *Relating to others, Managing self*, and *Participating and contributing*. The second section, *Interpreting Language, Symbols and Text*, deals with the key competency, *Interpreting language, symbols and text*, and discusses children’s involvement in, and interpretation of, activities designed to enhance their cognitive development in numeracy. The latter section also considers children’s growth in identifying themselves as learners.

**Negotiating the Classroom Culture**

How the five new entrant children experienced numeracy, and constructed their meaning of the term ‘maths’, was largely dependent on their teacher’s interpretation of the ENP and its related pedagogy, together with her philosophy on the teaching of new entrants. The ideas underpinning the school’s motto also influenced their experiences. Ms Tahi provided
numeracy teaching and learning experiences based on her beliefs and knowledge gained through her NDP professional development. As recorded in the results section, the children's first comments about numeracy were related to the competency of *Relating to others*, in particular, 'being friends', reflecting Ms Tahi’s aim of creating a cooperative, friendly, class culture. The class's early year topic study, 'Our Happy Class', included themes of cooperation and friendliness, and provided an opportunity to make links to the school’s motto, thus creating an environment which fostered positive habits of mind, knowledge of rights and responsibilities, deep thinking and enthusiastic learning. Pollard says, "When teachers and pupils have negotiated a mutual understanding of the social rules and expectations which underpin classroom order, then the risk to pupils acting or engaging in academic tasks within the boundaries is relatively contained" (Pollard & Filer, 1996, p. 309).

Because the children were expected to work with a partner when working independently of the teacher and in groups during some instruction times, knowledge of social rules and use of relationship skills influenced the effectiveness of these learning experiences. Adapting to the culture of the numeracy classroom also involved the children in learning the language of mathematics, classroom routines, organisation of and equipment usage. Since this was the children's first experience of formal numeracy instruction they had to learn the meaning of the terminology used at 'maths' time and then use the words themselves, in other words, become literate in mathematics. This included mathematical terms and the names of the large variety of equipment. Alongside the literacy there were many organisational issues to manage, particularly those in relation to group activities, and accessing and returning equipment independently.
The children’s interpretation of ‘maths’ as including their ability to participate and contribute, that is their ability to follow the classroom organisation, probably arose because of Ms Tahi’s belief in the importance of establishing classroom routines. She believed establishing routines would ensure firstly that everyone understood which tasks were appropriate for maths time, and secondly, that everyone stayed on task. Also, as the class size grew it would become increasingly important for the children to know how to work independently. Ms Tahi’s emphasis on the naming and caring of numeracy equipment, the reading of the task board, and other organisational routines showed she believed that this early training underpinned classroom order necessary for the successful completion of academic tasks. She made her classroom social rules and organisational expectations very explicit. Her habit of frequently interspersing behavioural instructions into the numeracy lessons explains how the children came to realise the behaviour was integral to “maths”. This mingling of messages, that is, behaviour and numeracy content, was evident when Ms Tahi used the task board to organise the group activities. In addition to organisation, the children were learning which activities were classified as maths activities, thus constructing their knowledge of the term ‘maths’. As well, the “Learning about Learning” chart displayed on the wall outlined appropriate ways of behaving in the classroom. In fact, there was in the children’s minds, a blurring, rather than a distinction between the social and cultural capital as described by Brooker:

- *social capital*, to be effective, requires possession of the recognition and realization rules of the *regulative discourse*;
- *cultural capital*, to be effective, requires possession of the recognition and realization rules of the *instructional discourse*.

(Brooker, 2002, p. 162)
The Numeracy Project’s alignment with the outcomes based nature of MiNZC also influenced the children’s school numeracy experiences. Since the mandating of the MiNZC and other current curriculum statements teachers have felt under pressure to cover all the achievement objectives and report on children’s achievement. This has resulted in a formal approach to teaching and learning providing little opportunity for flexibility and play. Ms Tahi’s responsibility for the children’s achievement of the prescribed achievement objectives caused her to develop a numeracy programme in which there was a predetermined progression of teaching and learning. The NDP frameworks provided the basis for this progression. From the children’s perspective, they were experiencing a shift from the free play early childhood education of Te Whāriki to the structured environment of the Numeracy Project classroom, that is, from predominantly socio-cultural to predominantly constructivist learning. I found it alarming that they were making this shift without their teacher and parents having sound knowledge of the difference in philosophy of the early childhood and school environments. It should not surprise us therefore that occasionally children lost interest in their intended independent numeracy activities and reverted to known behaviours outside Ms Tahi’s expected numeracy task boundaries. Jan’s and Ann’s ‘dressing up’, Ann’s ‘making a flower with counters’, and Bob’s ‘discussing the lucky dip rewards’ vignettes mentioned previously, exemplified children straying from their numeracy tasks. Ann’s and Bob’s episodes went undetected and although Jan’s and Ann’s reasons for dressing up were not discussed, Ms Tahi reminded the girls that ‘dress ups’ was not an appropriate activity for maths time. I sensed Ms Tahi was embarrassed that the ‘dressing up’ episode took place when I, a researcher, was (supposedly) observing numeracy.
However, I suggest that play could well add a useful dimension to new entrant’s numeracy learning. While ‘dressing up’ was not in the teacher’s numeracy work plan for the day, from the child’s point of view, dressing up and taking on roles could have made working with the numeracy kit much more fun. Further, what an excellent context for learning numeracy, dressing up and playing in the home corner (situated beside the dress ups) with the pots and pans, cups, plates, cutlery and the three dimensional halved egg shapes could have been. Maybe the opportunity for imaginary play itself would have been beneficial especially since Jan’s mother commented that play formed an important part of Jan’s numeracy at home. Vygotsky (1978) believed that opportunities to engage in imaginary situations were valuable because they allowed the child’s thinking to extend into higher abstract thought. Play allowed the child to develop rules based on ideas and meanings rather than on objects. Further, Vygotsky thought because a child could detach meanings from the real concrete situation, she acted beyond her average age in play.

I believe there are several possible explanations for the Jan and Ann’s interlude with the ‘dress ups’. From Ms Tahi’s perspective they were off task but the children’s interpretation may have been different. Perhaps Jan and Ann had exhausted their repertoire of numeracy kit activities, so, using their initiative and reverting to the free choice habit of their early childhood centre days, chose to play at dressing up. Bob’s straying from his invented game may have been caused by the numerous interruptions from his peers or because he was unclear about the structure of his invented maths activity. Another possible explanation for the ‘dipping in and out’ of maths is that the children were in the early stages of constructing an understanding of what constitutes ‘maths’, and at that point, their interpretation didn’t align with the teacher’s. After all, the children had probably met the terms ‘maths’ and ‘numeracy’ for the first time, upon their entry to school.
The results section reported the children's interpretation of their numeracy experiences in terms of the Ministry of Education's (2005e) proposed five key competency areas. The interdependent nature of the key competencies mirrors the holistic approach of *Te Whāriki.* According to Hipkins (2005) the competencies are intended to align with the dispositions that underpin *Te Whāriki.* On reflection, because of the key competencies' interdependence, my examination of the children's experiences through the individual lenses of each of the key competencies became an increasingly unrealistic task. To portray insight into the complexity, or holistic nature, of a child's experiences I now unravel the inter-twining of the key competencies as apparent in Rex's 'and my heart is thinking' vignette.

Rex had sufficient knowledge of the *Relating to others, Managing self, and Participating and contributing* competencies to know that it was appropriate for him to wait for the other group members to speak before taking his turn to answer. At the same time he was using his knowledge of mathematical language and symbols, another key competency area, to interpret the numeracy problem. Also, at the same time, Rex's mumblings demonstrated his ongoing issue of wanting to be noticed by his peers, and his frustration at his lack of opportunity to relate his problem solving ability to Ms Tahi, that is, his difficulty with an aspect of the *Relating to others* key competency. Rex's lack of interest in his peers' and teacher's problem solving strategies, suggested that he did not value the sharing of each another's problem solving strategies. Sharing of ideas is an important component of the ACT pedagogical framework (Fraivillig et al., 1999) underpinning the pedagogy of the numeracy project and could also be classified under the key competencies of *Relating to others* and *Participating and contributing.* Highlighting the complexity of this episode was Rex's enthusiastic outburst, "and my heart is thinking." The outburst exemplified his desire
to know and understand, one of the important characteristics of the *Thinking* key competency (Ministry of Education, 2005e). Rex illustrated how in real life people use combinations of key, or generic competencies and specific competencies related to subject-based skills and knowledge. Rex used generic skills related to being in the learner role while using number knowledge competencies specific to numeracy. The combining of key competencies and specific competencies is documented in the proposed New Zealand framework as one of the concepts and principles of key competencies (Rutherford, 2005).

In this study, adult intervention assisted children to make sense of their independent numeracy activities. Being reliant on learning from classroom peers was not always effective. Learning from peers requires skills in relating to others and confidence to seek help. Already mentioned was the progress Ann made when the teacher-aide gave her some guidance while she was working with her numeracy kit. Jan’s avoidance of unknown equipment and activities suggests her learning would also have been advanced if someone had supported her with the unknown activities. In the mancala vignette, Bob’s following of Roy’s rules indicated he had learned some of the skills required when working with others, but he was not in that instance able to use them to manage his learning of counting beyond fifteen. An episode later in the term confirmed he was still unable to count past fifteen. The question of how to encourage Bob to learn from others arises. The *Te Whāriki* (1996) solution of providing “sensitive interventions and encouragement,” (p. 69) presumably in this instance, adult intervention, reflects again the idea of scaffolding within the zone of proximal development (Bruner, 1985; Vygotsky, 1978). I believe the intervention requires the presence of a tutor with astute observation skills, knowledge of the child’s stage of development, and the ability to provide a level of support which allows the learner to remain in charge of his learning. Teachers and other adults therefore, need to be available,
at times, to support learners individually, rather than the teacher being involved in group or whole class instruction throughout the entire numeracy session. The availability of adults to scaffold children’s learning raises two issues. Firstly, the ratio of twenty-three children to one teacher (Ministry of Education, 2005c) in new entrant classrooms greatly exceeds the ratio the children experience in the early childhood sector (Ministry of Education, 2006d). Secondly, educating adults to help the children puts yet another demand on the busy classroom teacher.

Contrasting Bob’s vignette, Jan’s incident of using her number fan to check sequence of numbers, exemplifies a successful responsive learning context. Jan’s success followed a small intervention by an adult. Responsive learning experiences encourage children to be in control, take the initiative and become independent learners, (Glynn, 1986; Wheldall & Glynn, 1988). Glynn’s responsive learning experiences are similar to Bronfenbrenner’s (1979) primary development contexts in which children experience reciprocal interaction, including balance of power, in warm relationships. The responsive learning notion aligns with Vygotsky’s (1978) theory that children are capable of more advanced and complex behaviour when they are guided by skilled learners.

According to the New Zealand framework proposed by the Ministry of Education and noted by Rutherford (2005) “The components of competencies (knowledge, skills, attitudes, values, and motivation) are inextricably interconnected” (p. 217). I believe Jan’s incident also illustrates that the components of the key competencies cannot be separated. Jan’s independent generation of her goal to write the numbers to 10 in sequences indicated she was motivated to achieve and that she valued her learning. Her motivation was
supported by her positive ‘can do’ attitude. As well, her skill in relating to others, seeking help, and using her initiative to solve her problem resulted in achievement of her goal.

Brewerton’s 2004 model, (Rutherford, 2005) promotes the inclusion of ‘belonging’, a *Te Whāriki* strand, within the key competency framework. According to Rutherford (2005) issues of identity, identities and relationships have emerged in recent New Zealand debate on the significance of ‘belonging’. The experiences of this study of transition to primary school have caused me to reflect on the significance of belonging in relation to the new entrant children’s new environments of formal numeracy learning and the primary school classroom community. Ms Tahi’s emphasis on creating a caring, friendly classroom environment encouraged the development of the children’s and to a lesser extent their parents’ sense of belonging. I assume that for many children the thorough establishment of routines and organisation also contributed to this by creating stability. I sensed that underlying Jan’s successful incident outlined above was her feeling of belonging to the learning community during ‘maths’ time, and related to this was her belief in herself, that is, she identified as a learner. Rex too had confidence in himself as a learner, but appeared to be struggling with belonging, as evidenced by his difficulty in relating to others during group activities.

Rutherford (2005) outlines various views on the positioning of ‘thinking’ with the key competency group. Some authors promote the idea of ‘thinking’ as a prerequisite for all the key competencies (Compton, 2004, as cited in Rutherford, 2005; Rychen & Salganik, 2003). However, Brewerton (2004, as cited in Rutherford 2005) includes thinking as one of four interactive and interdependent key competency groups. In reporting the results of this study within the five key competency areas previously listed, the dilemma arose of where
to position the *Thinking* key competency. I have grouped the three key competencies, *Managing self*, *Relating to others* and *Participating and contributing* together as social key competencies. Whilst agreeing with those who state that thinking is a mental prerequisite of all competencies, I was influenced by the comment that thinking relates to the skill “pursuing knowledge and information” (Hipkins, 2005 p. 37) and grouped *Thinking* with the *Interpreting the language, symbols and text* competency.

Summary

As new entrants, the children’s perception of what constituted maths merged with their interpretation of how to behave during maths time. Much of their maths lesson time was spent practising social and organisational skills. The children’s levels of use of social skills, particularly those of relating to others, demonstrated there had been previous learning at home and at early childhood centres. The children were gaining confidence in managing themselves and their ability to contribute and participate. This confidence coincided with the children’s familiarisation with the learning culture of the classroom, and as will be discussed further, their interpretations of themselves as learners. The children’s experiences in numeracy were largely influenced by the teacher’s beliefs and understanding of the ENP.

The section used the children’s numeracy activities to illustrate the combining of several key competencies within one activity or experience. Also the interconnections between the components of competencies; knowledge, skills, attitudes, values, and motivation were discussed. I raised two other issues related to key competencies, namely the senses of belonging and identity.
Interpreting the Language, Symbols and Text of Numeracy

The discussion now focuses on the children’s interpretation of their numeracy experiences particularly in relation to acquisition of number knowledge and problem solving strategies. I categorise these experiences under the Ministry of Education two key competencies; Thinking, and Using languages, symbols and text. Previously I have related vignettes describing children’s acquisition of number to inform discussion about the children’s use of social competency skills in the numeracy context. Now the focus shifts to discussion about the acquisition of number in relation to the Thinking and the Using languages, symbols and text competencies. It will become apparent however, that the children’s thinking and use of the cultural tools of numeracy, are also dependent on social skills as illustrated by discussion about Ann’s and other children’s activities reported earlier.

Once again, the teacher’s numeracy teaching beliefs, knowledge and skills were reflected in the depth of understanding the children constructed from their numeracy experiences. Ms Tahi’s programme and practice and appeared to be strongly influenced by the content of the ENP professional development. This resulted in Ms Tahi regarding daily whole class knowledge sessions to be important, even though the range of children’s abilities caused her to work across stages zero, one, two, three and four of the knowledge framework. During the knowledge teaching sessions the children were learning rote counting backwards and forwards, reading number symbols in the zero to one hundred number range, and using their fingers to illustrate the stage two concept of the grouping domain, grouping with five. As Rex and Ann’s experiences show, it was difficult to hold the interest of the children whose understanding was at the upper or lower stages of the framework. Although whole class knowledge teaching has been promoted in the numeracy project, I question the relevance of the teaching of the grouping domain, in a whole class situation.
where children are often watching, rather than manipulating equipment, and which is
devoid of a context relevant to the children. According to Smith, “the greater the richness
of activities and interactions in which children participate, the greater their knowledge and
understanding will be” (Smith, 1998, p. 2). Wheldall and Glynn (1988) remind us that in
the world outside the classroom the children learn skills and knowledge in many different
ways. Wheldall and Glynn’s behavioural interactionist perspective promotes the use of
natural learning situations rather than the construction of artificial ones.

As mentioned in the previous chapter, much of the content of the whole class sessions was
beyond Ann’s ability, resulting in her avoiding verbal responses. Crozier (2003) found that
shy children’s responses are constrained by their concerns about evaluation and that
shyness affects verbal behaviour in situations that are more structured than routine
conversations. I suspect that Ann’s shyness was caused by her perception of her inability to
succeed, and together with her early childhood experience of playing by herself or learning
in small groups, made her reluctant to participate, and to withdraw from large group
conversations. She had not adjusted to the culture of speaking and learning in a group as
large as the whole class.

I am revisiting Rex’s vignette to discuss how the teacher’s knowledge of pedagogical
content influenced the child’s interpretation of numeracy. To cater for the range of
children’s abilities teachers are required to interpret and respond effectively at a range of
stages of the strategy framework. Is this a realistic expectation when the professional
development programme offers no in-class numeracy facilitator support and only two brief
workshops in the teacher’s second year of the ENP? Rex’s “and my heart is thinking”
episode highlighted the importance of teacher expertise in providing the appropriate
feedback to support Rex’s learning. Rex, working with a group of children at the stage two instructional strategy level, had used the early stage five strategy of using his knowledge of addition doubles 5+5=10, to solve 5+4=9. Specific feedback from Ms Tahi restating Rex’s use of the doubles strategy could have made him aware of the particular strategy he had used, and confirmed its appropriateness, thus encouraging him to apply it in the future. Instead, the feedback Ms Tahi gave was, “your brain is really thinking.” Ms Tahi may have chosen the general comment to avoid confusion in the other children’s minds. However, it’s likely, since Ms Tahi is a new entrant teacher, that the ENP training did not provide her with the knowledge and opportunity to practise and become a confident practitioner with children working at the stage five strategy level. As a result, Rex’s interpretation of problem solving remained as achieving the correct answer to the problem, whereas the numeracy project’s aim is for children to learn problem solving strategies so as to select the most effective strategy for the situation.

The scope of this study is too narrow to discuss ‘where to next’ for Rex, but it is hoped that in the future he will be grouped with other children closer to his stage of development. Moving him to a more advanced group or some other way of catering for Rex’s mathematical ability should happen while he is still enthusiastic about learning; to use Rex’s words, before his “heart” stops “thinking.” Vygotsky (1978) believed that instead of matching teaching to existing development, teaching had to proceed ahead of development and that children advance to higher stages of development by being stimulated and guided by others at the outside limits of their skill. For Rex to take ownership of his knowledge, and to move towards increasing mastery of expertise, may require a strengthening of his role in determining his learning. It’s important his thinking is interpreted and used as the basis for his next learning.
Rex’s classroom use of strategies beyond his diagnostic interview rating of stage two raises questions as to the accuracy of the interview results, and further questions as to why the results may be inaccurate. Since the diagnostic interview results provide a ‘snapshot’ of a child’s numeracy development, that is, information on only some of the frameworks’ content, there is a requirement that teachers’ formative assessment practices supplement the information provided during the interview (Ministry of Education, 2006a). Rex’s numeracy behaviour suggests he is making rapid progress or that his learning is not in accordance with the linear progression as outlined in the project frameworks, or that maybe he underperformed on the day he was interviewed. Rex’s ability to strategise by counting on, in some situations, and part wholing numbers at other times indicates that he can strategise at stages four and five of the framework and that the context determines the strategy he uses. This is well beyond his February school entrance diagnostic interview result which placed him at stage two of the strategy framework. I note also that while he liked to learn about numbers in the 1-100 range, which is at stage four of the knowledge framework he is unsure of how to record numbers in the stage two 1-20 range. The NDP acknowledges that children’s knowledge and strategy stages may be “mismatched” (Ministry of Education, 2006a, p. 10).

The teacher’s pedagogical expertise was critical in influencing the success rate of the children who were working at the beginning stages of the knowledge framework. Ann required the early stages of the framework to be broken down into small steps. Bruner (1985) used the metaphor scaffolding to describe the guidance and interaction given by the teacher when working in the learner’s zone of proximal development (Vygotsky, 1978). Contrary to the assumption by the writers’ of the numeracy project that teachers were confident in their teaching of numeracy knowledge (Hughes, personal communication, Jan
2005), I believe teachers, particularly those of children making slow progress at the early stages of the frameworks, require guidance in how to teach knowledge. I refer now to the ‘prediction with the teddy bears’ lesson described in the results section. For Ann to successfully develop an understanding of numbers, she required her instruction sessions to be broken down into small logically progressive steps and to be revisited regularly. I acknowledge that while it may be impossible for a teacher to know all the children in her class’s known number range, it is important to have precise information about the number knowledge of children working at stages zero and one. A. Smith wrote, “Teachers need to know learners well so they can provide the right level of guidance, and gradually withdraw it as the child comes to understand and perform the task alone” (Smith, 1998, p. 10).

Ms Tahi and the children required a clear understanding of the prediction lesson’s learning intention. I note the teacher’s resource does not provide learning intentions for the stages zero and one activities as it does for stage two and beyond (Ministry of Education, 2006c). The purpose of the lesson was unclear to me, but I presumed it was to provide an opportunity for the children to practise counting discrete objects one to one and taking into account the zero to one development stage of the children, to develop their number sense of numbers in the range zero to ten. Ms Tahi introduced another idea, grouping with five, which the children did not seem to assimilate although they may have if the tens frames or their fingers had been used. Alternatively, since the groupings with five ideas seemed an aside, it could have been introduced at a later date. Perhaps to cater for the more able children in the group Ms Tahi introduced large numbers in the prediction activity. These numbers were beyond Ann’s counting range and she struggled with the lesson. I suggest Ann’s learning may have been enhanced if the guidance had used numbers within her zone of proximal development, that is, the 1-10 number range. There is a need for information to
guide teachers in how to teach knowledge, especially to children at the lower stages of the framework. Teachers need to appreciate the importance of their role in guiding the learners towards being able to reconstruct the task through their own understanding (Smith, 1998). Presently, the NDP provides a list of knowledge activities and instructions with no theory on the teaching of knowledge.

I believe that for teachers to provide classroom programmes which provide relevant learning experiences it is critical that their professional development programmes explain the ‘big ideas’ rather than prescribe a series of activities or experiences. Ms Tahi’s class programme included some activities that were not relevant to the children’s stages of development, in particular the Friday problem solving sessions. While the inclusion of the problem solving sessions in the numeracy programme is promoted by some numeracy project facilitators, I believe it undermines the principles of cognitively guided instruction which is the underpinning pedagogy of the NDP. Once children are strategising they are problem solving as part of their normal programme and do not require separate lessons to learn how to problem solve. Since most of the children in the class were working at stages zero, one and early stage two and not showing evidence of strategising, the introduction of problem solving techniques seemed inappropriate. I suspect Ms Tahi was following design features of the project rather than interpreting the project’s big ideas (Higgins, 2005). Did the ENP professional development time frame provide sufficient time for her to interpret, experiment with, and reflect on the pedagogies of young children’s construction of knowledge and cognitively guided instruction?

It appears Ms Tahi’s involvement in the ENP programme, while providing her with a helpful framework of children’s acquisition of numeracy concepts, is restricting her use of
numeracy activities, to those that directly link with her interpretation of the framework outcomes. For example, Ms Tahi was concerned that because the construction equipment, mobilo, was stored in the maths area, the children thought of construction materials as maths. Although construction did not match Ms Tahi’s schema of numeracy, I believe that while the children were playing with the mobilo, it’s likely they were developing their number sense together with other mathematical concepts and applying them in practical ways. Ms Tahi expressed concern that she had not had time to teach the children the number games on the maths shelf, for example, mancala. As explained previously, I observed an excellent sharing and counting activity with the mancala equipment. Through play the children were assimilating and accommodating ideas according to their own investigation and at their own levels of knowledge and understanding, thus according to Holton, Ahmed, Williams and Hill (2001), demonstrating the importance of play and experimentation in situations where there is no closed mathematical goal. The children’s enjoyment of the play opportunities during maths time may be explained by their confidence in working at their choice of activity and being supported by peers. Enjoyment of maths shelf games could be explained by the connection with the children’s early childhood experiences which allowed them to choose and explore activities. According to the tertiary education discussion document’s (Ministry of Education, 2005d) comparison of the draft New Zealand curriculum key competencies and Te Whāriki, the early childhood exploration theme aligns with the proposed Thinking key competency of the primary school sector.

New entrant children are faced with constructing their identities as numeracy learners. As mentioned, some writers believe learning is an experience of identity because it transforms who we are and what we can do (Black, 2002; Lave & Wenger, 1991). I have already
discussed the fragility of Sue’s identity, Jan’s picture of herself as a classroom helper and learner, and the shift from Ann’s tarnished self image to that of a student gradually gaining numeracy knowledge and a growing confidence as a learner.

According to Black (2002) learners need to construct their identity as learners. Bob’s identity as a learner appears fluid. His experiences in the mancala and Sam vignettes demonstrate identities of “full participant” and “temporary exclusion” (Black, 2002, p. 1). As the mancala tasks became too difficult, Bob withdrew from interaction with Roy, suggesting “temporary exclusion”. However in a different classroom, and identifying himself in the power position of a teaching role with Sam, I sensed Bob felt a “full participant”. In a different situation, that of complying with the classroom rules, Bob complied to avoid castigation from the teacher, whereas most other children did so because they wanted to be cooperative class members. Complying to avoid punishment could lead to an identity of “permanent exclusion” which Black suggests may cause future learning to be problematic. Perhaps Bob’s reluctance to come to school is linked with his inability to construct his identity as a “full participant” in the classroom learning process. A Te Whāriki contribution goal is for children to “experience an environment where they are affirmed as individuals” and the related outcome is that “children develop a sense of ‘who they are’, their place in the wider world of relationships, and the ways in which these are valued” (Ministry of Education, Te Whāriki, p. 68).

Rex’s “and my heart is thinking” vignette indicated some frustration in his conformist role. His interpretation of his place as a new entrant child, that is his identity as a learner, made it difficult for his thinking to be heard, acknowledged and understood. It is important that Rex has opportunity to negotiate shared numerical understanding, that is, to co-construct his learning with his colleagues and teacher. The negotiation, while stretching his
understanding, would also be constructing his identity as a mathematical learner. Shared numerical understanding, of course, implies that the teacher understands the child’s ideas and is able to extend his learning. To be able to extend children’s learning requires the teacher, in this instance, to have knowledge of a wide range of stages of the numeracy project and the ability to interpret its pedagogy well. This is a high expectation considering the amount of professional development time Ms Tahi was allocated.

Contrary to Cullen’s belief (1992, 1998), the school programme does provide opportunity for children to use and practise the social learning strategies developed in early childhood; although new entrant teachers unfamiliar with Te Whāriki may not link these with the children’s early childhood education. I have related vignettes of new entrant children interacting with others, learning to manage their learning, and participating and contributing in the classroom. The proposed key competencies’ emphasis on learning for life will draw further attention to social learning strategies in the primary school setting.

Interestingly, in the constructivist environment of primary school numeracy learning, the children were developing a sense of ‘maths’ in a socio-cultural manner. They were achieving this understanding through the language and experiences of numeracy lessons. For example, the provision of equipment stored under the label, ‘maths shelf’, and that in their numeracy kits, furthered their interpretation of ‘maths’. More importantly the time set aside to use the equipment echoed the children’s early education experiences by providing opportunity for exploration and learning with others; a time for learning through play. As discussed, the tertiary education discussion document (Ministry of Education, 2005d), aligns early childhood exploration with the Thinking key competency. Griffiths (2005) believes play, by providing purpose and motivation, meaningful contexts, child control and
responsibility, and time for assimilation of new ideas, advances mathematical learning. At maths shelf time the children’s choice of equipment allowed them some control over their own learning. However, because the teacher was always working with another group of children, there was no opportunity for her to interact with the children working independently. Wheldan and Glynn (1988) also found that teachers were unable to respond interactively to children’s initiations because they were engaged in instruction or in classroom routines. Yet Glynn’s study (1986) shows that natural social contexts promoting responsive rather than corrective feedback between teacher and learner are powerful contexts for independent learning. They are particularly effective when the activity or learning is child initiated, though Glynn acknowledges that unfortunately this does not frequently occur in schools. In Room One, the children’s feedback was reliant on interactions with peers, the occasional adult classroom visitor, and in the Triangle group’s instance, the teacher aide. The provision of a numeracy kit for each child, rather than sharing equipment, resulted in Jan working ‘alongside’ others, instead of her seeking a partner to work with. I use the term alongside to describe working in the vicinity of others and distinguish this from interacting and working with group members. Jan’s working happily by herself may have limited her opportunity for learning, as expressed in the ideas of many socio-cultural theorists who believe that interaction with others increases opportunities for learning (Bruner, 1985, Holzman, 1995; Tharp & Gallimore, 1988; as cited in Smith, 1998; and Vygotsky, 1978).

Summary

This section discussed how the teacher’s knowledge and teaching expertise influenced the children’s ability to understand new concepts. I suggested the ENP resources and professional development programme provide insufficient guidance on the teaching of knowledge, particularly for the early stages. I also suggested the time frame of ENP
professional development doesn’t allow for teachers to develop a comprehensive understanding of the strategy framework, cognitively guided instruction and theory underpinning the NDP. I raised issues related to the classification of children’s achievement levels according to the diagnostic interview. The section included discussion on children’s developing identities as numeracy learners. I discussed the intertwining of social key competencies in the Learning of the language, symbols and text of numeracy and commented that within the formal classroom programme, there were opportunities for children to develop an understanding of the cultural tools of numeracy in a socio-cultural manner.

Parents’ Perspectives

In the section that follows I discuss issues related to the second question of this study: What are parent’s experiences and perceptions of their new entrant child’s early numeracy learning? I explore possible causes and effects of the lack of communication between the early childhood and primary school education sectors, and between the two sectors and the parents.

As previously discussed, the first stages of the Room One children’s transition to school numeracy were largely concerned with the key competencies of Relating to others, Managing self, Participating and contributing, all of which closely align with the Te Whāriki strands. At early childhood centres, the children had been developing key competency capabilities which they need to live, to learn and to make a contribution as active members of their communities (Ministry of Education, 2005c). In this study however, the parents seemed interested in the children’s numeracy concept development, and probably because I was researching school numeracy, assumed that would be of interest to me. Wright and Molloy (2005) found that primary school teachers were
interested in children’s learning in terms of achievement of actual skills and abilities, whereas early childhood teachers valued learning in a holistic way, paying more attention to relationships and how the children were learning.

Parents seemed unaware of the difference in numeracy learning approaches their children experienced when they moved from the early childhood centre to primary school. This lack of awareness is likely to have arisen because they had no explicit information about the differences. The paucity of information can be explained by the two educational sectors’ lack of understanding of each others’ beliefs and practices. Ms Tahi was unfamiliar with the socio-cultural learning philosophy of the early childhood curriculum and how it contrasts with the co-constructive, cognitively guided instruction of the primary school’s teaching and learning of numeracy. *Te Whāriki* defines curriculum as: “the sum total of the experiences, activities, and events, whether direct or indirect, which occur in an environment designed to foster children’s learning and development.” (Ministry of Education, 1996, p. 10).

Several explanations for the lack of communication from the early childhood sector have been offered. McNaughton (1996) was concerned about the lack of clarity and coherence of ideas in *Te Whāriki*, and Cullen (1996) argued that many early childhood teachers did not have the necessary theoretical knowledge to implement *Te Whāriki* as the authors intended. Consequently, early childhood teachers may not be able to articulate the *Te Whāriki* philosophy to new entrant teachers or parents. Parents were therefore uninformed because of the lack of understanding and communication on two fronts. Firstly their children’s educational providers, that is, some early childhood centres and the school, did not communicate effectively with one another, and secondly, more communication was
required between parents and their children’s educational providers, be it early childhood or primary school.

Some parents were able to make connections between the socio-cultural learning environment of early childhood centres, their home environment and the learning of numeracy. Parents interpreted early numeracy as learning to count and made links between numeracy and family activities such as shopping, baking, playing boards, reading street numbers, telling the time. However, because they saw little or no formal maths, such as counting, happening at early childhood centres, they believed their children had been ill-prepared for school numeracy. In contrast, Beth’s comment that before entering school “Bob was learning to be a learner,” did as discussed earlier suggest she had an understanding of the social skills and the holistic development involved in becoming a learner. The notion of preparing children for the transition to school by developing their sense of self worth, belonging, contribution, communication and exploration was not mentioned by any parents. Teachers in the early childhood sector believe that rather than being a preparation for the learner’s next step in the education system a child’s education should be developing the child fully at whatever their stage of development. Cullen (2003) believes the ‘downward push’ from formal schooling has fuelled debate on this topic. This idea is supported by the fact that most of the parents in this study saw early childhood education as a preparation for primary school and were inferring a formal preparation rather than the holistic development of their children. Amy, surprised by the formality of primary school, was frustrated by the lack of advice she had received on how to prepare Ann for school numeracy.
As detailed in the previous section of this report, the parents of children who had older siblings had the advantage of previous experiences of school numeracy and usually seemed relaxed about their child’s early numeracy development. Judith, Rose and Beth (Jan, Rex and Bob’s mothers respectively) had learned about the Numeracy Project through their older child’s involvement. Rose and Beth had been involved at the classroom level and Rose had attended a parent evening. For the parents of new entrant children who were the oldest or only sibling in the family, experiencing and interpreting their child’s school numeracy learning was like negotiating unknown territory with few signposts along the way. Stu, Sally and Amy (Sue and Ann’s parents respectively) learned about the content of the numeracy programme by observing their children’s play at home. Stu and Amy expressed surprise that their children were learning to read numbers at such a young age. Despite the lack of information all parents commented that they were pleased with their child’s positive attitude towards maths and the progress they had made since beginning school. The children’s use of the word ‘play’ suggested they regarded numeracy activities as play, rather than maths work, and may explain the reason for their enjoyment.

Unless they visited the school to informally discuss their child’s progress with the teacher, there has been no opportunity for parents to learn about their child’s numeracy learning, or the role they could play in supporting this learning. Opportunities for parents to be involved have arisen in other curriculum areas such as PMP and reading, but not in numeracy.

Summary

This section discussed parents’ interpretations of their experiences in relation to their new entrant children’s transition to primary school numeracy. It outlined the parent’s appreciation of this study as a forum for their voice and discussed communication issues
between the early childhood and primary school sectors, and between parents and the two sectors. Communication difficulties resulted in parents, particularly those whose child was the first in the family to attend school, not distinguishing the different philosophies of their children's early childhood and primary school education. While parents were pleased with their children's progress and attitude towards 'maths', they had fewer opportunities to be involved in, and interpret their children's school numeracy experiences than in some other curriculum areas.
Chapter Six: Conclusion and Implications

Introduction

This final chapter begins with a summary of how the new entrant children and their parents experienced and interpreted the children’s transition to primary school numeracy. Implications of the study’s findings are then discussed, and the chapter concludes by outlining opportunities for further related investigations.

Summary

So how did the new entrant children experience and interpret numeracy? I conclude that the teacher’s beliefs and understanding of the ENP primarily determined the events which the children experienced and consequently interpreted as numeracy. Upon entering school the children began to engage with the culture of their classroom, where much emphasis was given, in this classroom, to experiences of relating to others, managing self, and participating and contributing. This emphasis influenced the children’s first interpretation of numeracy as being the social factors and routines of the numeracy classroom.

The children continued to construct an understanding of numeracy, or to use their term ‘maths’, through learning numeracy concepts of the NDP frameworks. The teacher’s interpretation of the pedagogical content of ENP influenced the effectiveness of the children’s learning. The concepts were usually presented in a structured lesson format which contrasted with the emphasis in Te Whāriki on children’s early childhood socio-cultural learning. There were however, opportunities to learn with others when equipment was used to stimulate self-generated activities, and when playing ‘maths’ games. The children developed an understanding of numeracy through the language, symbols and
terminology used daily during whole class and group instructional sessions led by the teacher.

The case study findings highlighted the interconnectedness of the key competencies. Vignettes of classroom events demonstrated how the children combined the use of the social key competencies to access the language, symbols and text of numeracy. In doing this, the children were linking the key competencies to learn numeracy. This illustrated that the proposed five key competencies are used in combination in classroom situations.

And how did parents experience and interpret their child’s early primary school learning of numeracy? Parents were unaware that their children were experiencing a transition between educational sectors with differing philosophies. They were unaware of the extent of their children’s shift as they moved from the holistic learning environment of early childhood to the constructivist school environment where learning focused on achievement of prescribed objectives within separate curricula. Most parents interpreted early childhood education as play, and school numeracy as the formal learning of numbers, particularly reading and writing the numerals and counting.

The parents appreciated the opportunity this study provided for them to be heard and to learn about their child’s learning. Mostly parents had learned about their child’s numeracy progress through observing their play at home. They had no specific expectations of their children’s numeracy development but were pleased with the progress their children were making and the positive attitude they had developed towards numeracy since entering school.
Parents, particularly those of children the first in the family to attend school, were required to take the initiative to gain access to information about their new entrant child's numeracy programme and achievement. Yet in some other curriculum areas the school invited and supported parents to contribute to their child's learning.

Implications and Recommendations

In this study, because the teacher played a most significant role in the children's transition to numeracy learning, the implications I discuss are largely related to teacher practice. I recommend greater communication between the educational sectors, increased communication with parents, improved professional development for teachers of Y0-3 children and adaptations to the NDP.

Communication

Communication between the early childhood educational providers and primary school could enhance new entrant children's transition to school. Sharing information about the children and each other's educational settings would help teachers to understand the changes the new entrant children experience. The children need a feeling of well being and belonging (Brostrom, 2002). They should feel secure, relaxed, and comfortable in their new environment. I propose schools consider Margetts' (2002) planned transition approach. Margetts describes transition programmes which involve activities initiated by schools and early childhood educational providers, to create links between home, pre-school and school. A team representing all parties, and supported by administrators from both educational sectors, establishes goals to cater for the challenges children and parents face. The team develops a written plan, and strategies for mastering the challenges. Key
elements of the plan include; preparation of the children for school, involvement of parents in the transition, communication and collaboration between early childhood and school staff, and programme continuity.

In this study social adjustments were of great significance to the children transitioning to school numeracy. Therefore, it is important that teachers of new entrants appreciate the social changes the children are experiencing. I suggest teachers’ understanding of their prospective pupils’ social habits and routines may be enhanced if they visited the early childhood centres during sessions to familiarise themselves with the children’s experiences. Visiting the centres during operational hours would also provide an opportunity for the teacher to interact with the parents and their children, in a known setting. These visits could be incorporated into the transition plan mentioned above. “Schools which have a clear awareness of what the transfer or transition can mean for pupils can plan support strategies to help them cope with the new demands and sustain a positive sense of self as a learner” (Ruddock, 2004, p. 3).

To ease children’s transition to school, it is important that New Zealand new entrant teachers understand the philosophy of the learning environment from which their new entrant children have come. Peters (2005) suggests that the proposed key competency framework will be an avenue for closer links between early childhood and school learning. I believe the key competencies will draw the primary school sector’s attention to the importance of educating holistically and result in its closer alignment with the early childhood curriculum. Fostering the links between early childhood and the primary school sectors will require the educators to understand each other’s underpinning documents and
philosophies and this does not seem to be the case at present. I recommend therefore that
teachers of new entrant children read and reflect on the content and pedagogy of
Te Whāriki, in order to understand its links with the proposed key competencies.
Discussion on the key competencies could well provide a forum for interaction between the
early childhood and primary school sectors.

It has long been recognised that the quality of home-school partnerships is associated with
children’s achievement of educational outcomes (Beveridge, 2005). According to Wheldal
and Glynn (1988), adult interaction with children is valuable because adults focus on
broader issues than just the schooling. They say that parents can be highly skilled tutors of
academic subjects, providing authentic social contexts and spending a great deal of time in
reciprocal one-to-one interaction with their children. I believe it is important to ensure that
parents understand Te Whāriki, and that they appreciate the life long competencies children
are developing at early childhood centres. I regard educating parents about Te Whāriki as
the role of the early childhood rather that the primary school sector. With information on
the holistic nature of early childhood education parents would then be in an informed
position to discuss with teachers of both sectors the holistic nature of their child’s learning,
in addition to curriculum skills and abilities.

Curriculum Update 47 (Ministry of Education, 2001) and initiatives such as the successful
literacy and numeracy programme and The Home School Partnership, (Ministry of
Education, 2006e) promote school support and encouragement of parent involvement in
their children’s learning. Parents involved in my research wanted to become more involved
in their children’s numeracy learning. Schools need to explore ways to educate parents
about the content of the school numeracy programme and how they can best help their
children. Sustainable school systems are required to ensure ongoing support for parents, with particular provision for parents of children first in the family to begin school. To support parents, teachers require confidence in their understanding of the school's numeracy programme.

*Teacher Professional Development*

I now outline reasons for improving and increasing professional development time for teachers of Y0-3. According to Higgins (2005a), teachers’ extent of knowledge of numeracy, progressions in numeracy learning and pedagogy influence their practice and children’s learning. Writers of the NDP acknowledging that quality teaching is critical to the improvement of student outcomes say:

> It is essential that you [teachers] know the mathematical content that you are teaching and understand the conceptual difficulties that your students may have in learning this mathematics. This is central to your ability to create coherent, targeted planning to assist this learning. The NDP materials provide several tools to help you to develop your pedagogical and content knowledge.

(Ministry of Education, 2006a, p. 4)

Wheldal and Glynn (1988) believe the complex professional skills required of teachers should be recognised and that attempting to produce ‘teacher-proof’ instructional materials devalues the professional role of teachers. Higgins (2005a) concludes that teachers are likely to gain confidence, and that numeracy development is likely to be sustained if teachers are introduced to a framework of ideas rather than adherence to teacher guide books. I believe that with increased pedagogical knowledge, teachers of Y0-3 may feel confident to create meaningful learning opportunities for young children, together with stimulating and diverse numeracy environments.
Meade (1998) found it was much harder to lift adult interactions with children than it was to enrich the activities in the programme. Many researchers believe the provision of appropriate feedback is vital in furthering children’s learning (Askew & Lodge, 2000; Black, Harrison, Lee, Marshall, & Wiliam, 2002; Clarke, 2001; Sadler, 1989). For teacher and child interaction to improve learning and for children to receive appropriate ‘feedback’ about their work and play, teachers require knowledge of the range of possible progressions of numeracy learning. Teachers of Y0-3 therefore need to understand progressions of the whole NDP framework, and their professional development should support them to understand all the stages of the framework.

Guskey (2002) argues that change is a gradual and difficult process for teachers and that to modify experienced teachers’ beliefs requires them to experience improved student achievement. To do this teachers need follow-up time to put new ideas into practice, regular feedback on student progress and opportunity for monitoring and mentoring. I suggest sustainable change in teacher practice is unlikely to be achieved in a professional development programme providing one year’s facilitation followed in the subsequent year by two brief workshops. I believe that teachers of Y0-3 children would benefit from in-class support from a numeracy facilitator in their second year of professional development.

Higgins (2004) states that the facilitation of the pedagogy of the NDP in classrooms uses an interactive approach between facilitator and teacher. It is important that numeracy facilitators have sufficient time to engage in effective interaction with teachers. Quality discussion time should not be compromised because of a high ratio of teachers per facilitator.
Adaptations to ENP

It is my recommendation that the numeracy project provide teachers with guidance on the teaching of numeracy knowledge. Grouping and place value concepts of the knowledge domain underpin many of the mathematical concepts associated with numerical thinking (Trinick & Stephenson, 2005). M. Hughes (1986) noted that new entrant children had difficulty with the formality of the school mathematics culture because it is separated from real life contexts. Bishop, Berryman, Tikakiwai and Richardson (2003, as cited in Higgins, 2005b) suggested in reference to Maori students that they needed a holistic, flexible and complex pedagogy that acknowledged children’s individual and collective diversities. Rote whole class learning and adherence to the activities provided in the resource materials (Ministry of Education, 2006c) do not provide all young children with authentic social contexts for learning. Whole class demonstrations with the teacher in control of the equipment are less effective than children manipulating the materials to support their learning.

While the NDP frameworks indicate progressions of learning, teachers of new entrants require additional guidance in making the knowledge progressions manageable for young children. I suggest both early childhood and school education would benefit from a resource bridging early childhood and school mathematics. The resource while supporting holistic principles could explain theory related to teaching numeracy knowledge, and suggest practical ways for linking theory and practice. For example, although not discussed in the NDP resources, the provision and value of play in numeracy learning could be highlighted. Play fosters cognitive gain by empowering the learner to initiate their learning and to assimilate ideas recently introduced to them (Holton, Ahmed, Williams & Hill, 2001). The present NDP lesson formats while allowing for choice of independent activities
and exploration with materials do not explain the reasons for the exploration. I suggest numeracy lessons in schools could be extended to provide time for the teacher to carefully observe and talk with children about their play, individually or in small groups, with a view to providing feedback to scaffold their learning.

As mentioned, an area requiring increased focus is the grouping and place value domain. Information for teachers on the early stages of the grouping and place value domain could well be supported by the notion of partitioning and combining explained in *Teaching Number: Advancing Skills and Strategies* (Wright, Martland, Stafford & Stranger, 2002).

**Further Investigations**

As this study involved only five children from one school, further investigation could include more children from a range of schools’ new entrant classrooms. This would provide information on variations of experience of transition according to different classroom settings. While this study focussed on child and parent voice, a future study could also include teachers’ perspectives on transition to school numeracy.

A longitudinal project could research the relationships between the children’s early school experiences and later numeracy learning. This would provide information on the long term effects of the children’s transition to school.

An action research study could explore how to support parent involvement in their children’s numeracy development. The research would answer questions related to what parents interpret as ‘maths’, how they can best help their children, and what resources or programmes might inform parents appropriately. It could also explore how well schools
and early childhood providers educate parents, whether their confidence in presenting ideas is an issue, and additional support they may require.

A study of the 2006 trial Numeracy Home School Partnership programmes would provide information on issues in relation to parent involvement in numeracy. It would record changes, if any, teachers note in the attitude and achievement of students whose parents are involved in the programme.

In light of the experiences of the participants in this study, I now share my aspirations for new entrant children embarking on school numeracy learning. My hope for my grandchildren is that once at school, they will continue to experience the excitement of their early childhood learning and that their learning environment will provide interesting, meaningful contexts. I would like the adults in their lives, that is, early childhood teachers, school teachers, and family members, to appreciate the significance of each others’ roles in the children’s early learning. It is also my wish that they will deeply interpret, and together ease the children’s transition to school. I hope that the parents will feel part of the school community and have the opportunity to learn about, and continue to be involved in, their children’s learning of numeracy. In anticipation of the fulfilment of these hopes for my family and indeed all families, “my heart is thinking”.
References


Appendices

Appendix 1. Samples of Letters and Information for Participants

Appendix 1.1: Information for principal
Appendix 1.2: Principal’s consent form
Appendix 1.3: Information for teacher
Appendix 1.4: Teacher’s consent form
Appendix 1.5: Information for parents
Appendix 1.6: Parents’ consent form
Appendix 1.7: Information for the new entrant children, including the case study participants
Appendix 1.8: Case study children’s consent form

Appendix 2. Sample Pages of the Classroom Booklet, “Being Friends”.
Appendix 3. Transcript of a Semi-structured Interview with a Parent
Appendix 4. Data Analysis Codes and Categories
Appendix 1.1 Information for the Principal

The Principal
... School address

1 March 2005

Dear [First name]

As we have previously discussed, I would like to work with students from the new entrant class in your school as participants in a research project. This project is a requirement of a Master of Teaching and Learning degree, which I am currently undertaking at the Christchurch College of Education. I will be working under the supervision of Dr Jane McChesney phone; 345 8102, and Ruth Millar phone; 345 8459, senior lecturers at the college.

My project is called: New entrant children’s perspectives of numeracy, in the context of the New Zealand Early Numeracy Project. The aim of my study is to gain understanding of how new entrant children are making sense of the transition from early childhood education to primary school numeracy. To do this requires me to observe new entrants during their numeracy lessons. My activity in the classroom will involve:

i. being a participant observer in the new entrant classroom during numeracy lessons, over the course of one school term. Times would be negotiated with the teacher.

ii. focusing my observation on five children selected by the teacher as my case study subjects

iii. holding and audio taping discussions with these children

iv. these children photographing their numeracy work

v. on a few occasions, photographing the children doing numeracy work

vi. facilitating a discussion between each case study child and their parents. This may occur at home or at school, depending on the parents’ choice.

vii. reading school documentation related to transition to school and parent information about early numeracy.

After collecting the data, I would like to share and discuss this with the children’s teacher.

No findings that could identify any individual participant will be published. As I collect data it will be stored on a computer with a password known only to me, and College staff information communication technicians. Data will, according to college regulations, be stored for five years in a secure place. The findings of this research project will be written as an unpublished thesis, and held in the Christchurch College of Education library. Further publications may be drawn from this.
Participation in the research project is, of course, entirely voluntary. Participants who agree to participate can withdraw at any time by contacting me. They may also choose not to answer some questions.

The Christchurch College of Education Ethics Committee has reviewed and approved this study.

Complaints Procedure
The College requires that all participants be informed that if they have any complaint concerning the manner in which a research project is conducted, it may be given to the researcher, or, if an independent person is preferred, to:

The Chair
Ethical Clearance Committee
Christchurch College of Education
P O Box 31-065
Christchurch
Phone: (03) 345 8390

Please contact me if you have any other queries or concerns about the project or would like to be informed of the aggregate research finding. I can be reached by phone on: 03 349 1366 or by email: viv.belcher@cce.ac.nz

Thank you

Viv Belcher
Appendix 1.2 Principal's Consent Form

Declaration of Consent

I consent to my school’s involvement in Viv Belcher’s research assignment relating to new entrants’ perceptions of primary school numeracy.

I have read and understood the information concerning the research project and what will be required of the school.

I understand that the information provided to the researcher will be treated as confidential, and that no findings that could identify the school or any participants, will be published.

I understand that the school’s participation in the project is voluntary, and that any of the participants may withdraw from the project at any time without incurring any penalty.

School: __________________________

Principal: _________________________ Date: __________
Appendix 1.3 Information for the classroom teacher

Teacher's name and address

1 March 2005

Dear [First name]

As we have previously discussed, I would like to work with students from your new entrant class as participants in a research project. This project is a requirement of a Master of Teaching and Learning degree, which I am currently undertaking at the Christchurch College of Education. I will be working under the supervision of Dr Jane McChesney and Ruth Millar, senior lecturers at the college.

My project is called: New entrant children's perspectives of numeracy, in the context of the New Zealand Early Numeracy Project. The aim of my study is to gain understanding of how new entrant children are making sense of the transition from early childhood education to primary school numeracy. To do this requires me to observe new entrants during their numeracy lessons. My activity in the classroom will involve:

i. being a participant observer in the new entrant classroom during numeracy lessons, over the course of a school term. I would negotiate these times with you.

ii. focusing my observation on five children selected by the teacher as my case study subjects

iii. holding and audio taping discussions with these children

iv. allowing these children to photograph their numeracy work

v. on a few occasions, photographing the children doing numeracy work

vi. facilitating a discussion between each case study child and their parents. This may occur at home or school depending on the parent’s preference

vii. reading school documentation related to transition to school, and parent information about early numeracy.

After collecting the data, I would like to share and discuss this with you as the classroom teacher.

No findings that could identify any individual participant will be published. As I collect data it will stored on a computer with a password known only to me and college staff information communication technicians. Data will, according to college regulations, be stored for five years in a secure place. The findings of this research project will be written as an unpublished thesis, and held in the Christchurch College of Education library. Further publications may be drawn from this.
Participation in the research project is, of course, entirely voluntary. You can withdraw from the project at any time, by contacting me. You may also choose not to answer some questions.

The Christchurch College of Education Ethics Committee has reviewed and approved this study.

Complaints Procedure
The College requires that all participants be informed that if they have any complaint concerning the manner in which a research project is conducted, it may be given to the researcher, or, if an independent person is preferred, to:

The Chair  
Ethical Clearance Committee  
Christchurch College of Education  
P O Box 31-065  
Christchurch  
Phone: (03) 345 8390

Please contact me if you have any other queries or concerns about the project or would like to be informed of the research findings. I can be reached by phone on: 03 349 1366 or by email: viv.belcher@coe.ac.nz

Thank you

Viv Belcher
Appendix 1.4 Teachers’ consent form

Declaration of Consent

I consent to participate in Viv Belcher’s research assignment relating to new entrants’ perceptions of numeracy.

I have read and understood the information provided to me concerning the research project and what will be required of me as a participant in the project.

I understand that the information I provide to the researcher will be treated as confidential and that no findings that could identify either me, or my school, will be published.

I understand that my participation in the project is voluntary and that I may withdraw from the project at any time without incurring any penalty.

Name: ___________________________ Date: ___________________________

Signature: ___________________________
Appendix 1.5 Information for Parents

Explanatory Statement for Parents of Primary School Students

1 March 2005

Project Title: New entrant children’s perspectives of numeracy, in the context of the New Zealand Early Numeracy Project.

My name is Viv Belcher. I am working under the supervision of Dr Jane Mc Chesney and Ruth Millar, lecturers in the School of Professional Development, while studying for a Master of Teaching and Learning degree at Christchurch College of Education.

I work as a Numeracy Project Facilitator for the College of Education. The Numeracy Project is a nationwide, professional development programme up-skilling teachers in their teaching of numeracy. Your child’s teacher bases her numeracy teaching on resources provided by the Numeracy Project. The aim of this research is to gain an understanding of how new entrants’ interpret the maths lessons they are now experiencing at school. It is anticipated that findings from the research will help teachers understand their students better and therefore teach more effectively.

I have discussed my research project with principal’s name and teacher’s name and intend to observe and work with children in teacher’s name classroom. I shall be visiting the class during maths lessons over the course of a school term, to observe and talk with five children. The teacher, name, has suggested child’s name, as a child I could work with, providing you agree of course. It would involve my:

- observing child’s name during maths lessons
- talking with her/him about maths
- providing her/him with a disposable camera to take photos to instigate our discussion
- facilitating a discussion between child’s name and you about her/his maths learning
- having a 15-30 minute follow up discussion with you
- sharing my findings with the teacher

No findings that could identify any individual participant will be published. The school and all participants will be given pseudonyms. The data must be stored for at least five years according to university regulations. The findings of this research project will be written as an unpublished thesis, and held in the Christchurch College of Education library.

If you agree to take part, you or your child can withdraw at any time by contacting me.

If you have any queries, or would like to be informed of the research findings, please contact me by telephone: 03 349 1366 or fax 03 349 1351.
The Christchurch College of Education Ethics Committee has reviewed and approved this study.

Should you have any complaint concerning the manner in which this research project number is conducted, please do not hesitate to contact the Ethical Clearance Committee.

The Chair
Ethical Clearance Committee
Christchurch College of Education
P O Box 31-065
Christchurch 8030

Telephone: (03) 348 2059
Email: janinka.greenwood@cce.ac.nz

Thank you.

(Distribute photocopies to potential participants; use of original letterhead is unnecessary)

Viv Belcher

Phone 03 349 1366
Appendix 1. 6 Consent Form for Parents

Declaration of Consent

I consent to participate in Viv Belcher's research assignment relating to new entrants' perceptions of numeracy.

I have read and understood the information provided to me concerning the research project and what will be required of me and my child, as participants in the project.

I understand that the information I provide to the researcher will be treated as confidential and that no findings that could identify me, my child, or the school, will be published.

I understand that my participation in the project is voluntary and that I may withdraw from the project at any time without incurring any penalty.

Name: ________________________ Date: ______________

Signature: ____________________

Signature: ____________________
Appendix 1. 7 Information for the children

Explanatory Information for the New Entrant Case Study Students

My name is Viv Belcher and I am studying at the Christchurch College of Education. (Show photographs of my home and family so that the children perceive me as a family person rather than a teacher.) I’m a researcher. That means I want to find out about things. (Check with teacher about how she wants the children to address me.)

One of the things I want to learn about is what five year olds think about their school maths. I would like you to help me by letting me watch your maths lessons for a few weeks and when I ask you, explain to me what you think is happening. Sometimes I might do some maths with you, and occasionally, I’ll take a photograph in the classroom. I also want (name children) to take some photographs of your maths, so that you can show me and your parents what maths is all about. We’ll put your ideas in a book to help children starting school learn what happens at maths time.

Sometimes I’ll ask (name children) and a friend to talk to me, and because it is important that I get what you said right, I’ll tape it on a cassette. The College rules say I have to keep the cassettes at the College for at least five years, but it won’t have your name on it, so unless someone knows you really well, they won’t know it’s you speaking on it. No one but my teacher, my typist and I will be able to listen to the cassettes - they will be kept locked up. The things that are written down when I listen to the cassettes won’t have your name on them either. I’m just interested in your ideas so I don’t need your name.

If you start to talk to me and you don’t want to any more, that’s fine, too. All you have to do is, say so, and you can go back to your work. It is really up to you if you want to talk to me or not and nothing will happen if you don’t want to. If you do decide to talk to me, and you are unhappy about anything that happens, you can talk to your teacher, or your parents, or whoever looks after you, and they will know what to do about it. No one will get mad at you.

Your mother or father or whoever looks after you (name children) have been told about my work and they don’t mind if I watch and talk to you. Your teacher will be interested to know what you think about maths, but I won’t tell her anything you don’t want me to.

Does anyone have any questions? (answer any questions) OK. If you think of any questions you want to ask when I’ve gone, you can ask me when I come back, or you can ask your teacher or your parents or the person who looks after you. Thank you for listening to me. I hope I will get to talk to some of you when I come back next week.
The Christchurch College of Education Ethics Committee has reviewed and approved this study.

Should you have any complaint concerning the manner in which this research project number is conducted, please do not hesitate to contact the Ethical Clearance Committee.

The Chair
Ethical Clearance Committee
Christchurch College of Education
P O Box 31-065
Christchurch 8030

Telephone: (03) 348 2059
Email: janinka.greenwood@cce.ac.nz

Thank you.

__________________________ (my signature) (Distribute photocopies to potential participants; use of original letterhead is unnecessary)

Viv Belcher

Phone: 03 349 1366
Child's Consent Form:

The project Viv Belcher wants to do on maths has been explained to me. If I have any questions, I can ask my teacher.

➢ I am happy to be part of the project and to talk to Viv, so I have ticked the happy face

Or

➢ I don't want to take part so I have ticked the sad face.

If I want to, I can change my mind and not take part. I can tell my teacher or Viv.

Signed:
"Being Friends":
Maths in Room One

Photographs by Ann, Bob, Jan, Rex, Sue, and Viv.
The fly flips have five flies and a number on one side. We put our hands up to say how many flies are on the back. Some one said, "three", and they were right.
Bob's favourite maths activity is building with the mobilo. It is kept by the Maths Shelf.
Appendix 3. Transcript of an Informal Interview with a Parent

This is a transcript of the discussion I had with Jan’s mother, Judith, following Jan’s explanation of her ‘maths’ photographs and demonstration with ‘maths’ equipment.

Viv: I’d really like to say thank you very much for coming along and doing this for me, it’s really going to help me understand where children are at when they come to school in so far as what they understand about maths, and that’s what I’m interested in, that transition from early childhood, playcentre, or wherever, to school. And I also want to talk a little bit about what it’s like for you being a parent and how much information you get about what’s going on at school as far as maths goes. Is what you’ve seen today and been told by Jan what you expected would be going on at school or have there been any surprises?

Judith: It is what I expected as far the counting, counting down in tens, like writing things out to 100 is more than I expected.

Viv: She’s working with higher numbers than you would have thought?

Judith: Not correctly all the time.

Viv: But they are learning

Judith: But she’s definitely trying.

Viv: Yes she is. So she’s obviously doing work at home that follows on from what she does at school?

Judith: She continues school when she comes home.

Viv: Oh I see, that would give you quite a good picture of what’s going on.

Judith: Yes.

Viv: The sorts of things that she was doing, the counting up to ten, well most of what she’s showed us was counting in ones backwards or forwards, everything pretty much she’s shown us today has been counting - so how does that compare with what went on at early childhood for her? Did she have playcentre or what?

Judith: She went to pre-school, just locally.

Viv: Was there anything like this there, did she do anything that you would have called maths?

Judith: They did incorporate it into a lot of their play, talking about numbers, counting everything around them. It has helped - she did a lot of that before she got here. But still the penny didn’t drop until she got here [school] and worked with it more. Up until she started she still wasn’t counting to ten properly. Still very muddled.
Viv: The way she was learning at pre-school was just incidentally whilst she was playing, and now that she’s come to school you’ll see this formal maths lesson?

Judith: Yes

Viv: And that’s what I’m really interested in. Do you think that’s a change for the children?

Judith: Oh yes because everything in play school was in play.

Viv: And that’s not what it’s like here at all. You can see there’s a lot of whole class work or there’s some in groups and then when they go away in groups they are virtually told what they are allowed to use and what they are not allowed to use, whereas I imagine at pre-school she wasn’t directed.

Judith: It seems to be almost free-play – where if your sick of that you just get up and move on

Viv: So the teachers just take whatever opportunity they can to incorporate number, if it seems appropriate?

Judith: Yes. Jumping back to school – because she’s actually just getting it now.

Viv: And you think she’s actually catching on to what’s going on at school? What sort of things went on at home or are going on now that might have helped her learn to count or do her maths. Was there anything much at home, has she got brothers, sisters or...

Judith: She’s got [Information deleted to preserve anonymity]

Viv: And would they have influenced her?

Judith: [Information deleted] yes, everything at home is probably counting, she’s always trying to get [Information deleted] to count as well. In Jan’s room she’s always counting and doing the alphabet. Whilst we’re setting the table she’s always counting, counting, knives and everythink. Her sister though tells her one plus one and that confuses Jan. Because that’s not how you do it, it’s one and another one.

Viv: She hasn’t been using the plus language much at school.

Judith: No. That’s not how you do it. [Chuckle inferring Jan likes to use the counting method she knows.]

Viv: So were you involved at pre-school with her learning or was it just mostly the people that teach there – the teachers?

Judith: Mostly the teachers

Viv: As parents were you familiar with Te Whāriki?

Judith: Only because I was on the committee and you actually get to see a copy.
Viv: So not many people would get to see the curriculum document?

You would know then of the strands then like they have like wellbeing, belonging, contribution, communication and exploration?

Judith: Mmm.

Viv: Can you see any links to what goes on at early childhood and then what is happening at school as far as maths goes. You’ve pretty much shown me that it’s different. Can you see any connections that the children would be able to make?

Judith: No

Viv: That’s interesting.

Judith: It is different.

Viv: I suppose you had some expectation of what it was going to be like at school because you have an older child. Did you do anything to prepare Jan for the sort of maths that would be happening at school?

Judith: We had lots of pretend play with that at home.

Viv: Like she was doing here. [during the demonstration]

Judith: Yes, at the desk – copying numbers, just the general counting, and with the sister being the teacher. That’s all we’d do.

Viv: That would be more closely aligned with school than with what was going on at pre-school. Because she just seemed to regard pre-school as play, but at home she would practice playing being at school. I used to do that when I was a kid. So you thought that the counting numbers would be important preparation for school?

Judith: Yes

Viv: Anything else that you thought might be important?

Judith: Yes – the alphabet

Viv: So now that she’s at school, apart from today, how do you find out about what’s going on in her learning at school. I imagine at pre-school you could just stay and watch if you wanted to, so what’s it like now? How do you know what’s going on now?

Judith: Well they’ve got their little folders/boxes in the classroom.

Viv: Oh yes? [Other parents don’t seem to know about these.]
Judith: So in the morning I come in and I go through her little boxes – the reading folder and the poetry
So you can go in in the morning and have a look and see what’s going on – and she’s always telling me. And she likes to show you what’s going on.
She’s always talking. (chuckle) She’s got an outgoing personality – likes to share what she’s doing)

Viv: Is much of it maths, or is it story writing, reading and drawing?

Judith: No a fair amount of it is maths.

Viv: Is it? What sort of maths is it.

Judith: When she comes home she’s always doing the numbers with the hands

Viv: She’s showing you that.

Judith: All the time – it’s been a big thing the last month.

Viv: That’s great. So she doesn’t come home with formal maths things, she’s not told she has to do this for homework. I imagine she comes home with a reading book?

Viv: She comes home with a reading book each time and her alphabet book is her homework.

Viv: The maths is incidental. She just likes to do it so she does it?

Judith: Yes.

Viv: So have you been involved in any classroom maths activities? I know that some people come in and help with PMP and other things in the classroom. Have you been involved in anything in the classroom?

Judith: Not this term. Next term I’ll be doing parent help.

Viv: So will that be at maths or …

Judith: I don’t know, that depends on Miss Tahi setting up her roster.

Viv: I’ve seen people come to do PMP, which is that motor skills programme.

Judith: I did that last year with [other daughter].

Viv: You don’t know if she has help in other curriculum areas?

Judith: No

Viv: OK. Did you know about the numeracy project, the one that I’m involved in, my job at College? Last year this school, the teachers in the junior school were learning the numeracy project. Have you heard anything about it?
Judith: No

Viv: Nothing – OK. So there haven’t been any parent sessions, or evenings or afternoons?

Judith: Look, there possibly could have been … I didn’t get involved in that part of it. Jan’s only been there this term so I haven’t picked up on them.

Viv: There’s not been any tidbits in newsletters telling you what it was?

Judith: No

Viv: You probably would have noticed. Is there anything else that has struck you about maths at school that we haven’t talked about that I might be interested in? Anything else of particular interest to you? Any surprises?

Judith: I’m quite stoked with how she’s doing with maths and how excited she is about it.

Viv: Yes her attitude is wonderful isn’t it, she is really excited.

Judith: She is and that’s great. I hope it remains

Viv: I have a feeling it will whilst – it’s common that the children’s attitude is really positive.

Judith: That’s great.

Viv: There’s a lot of activity involved. Jan is she’s always busy.

Judith: She is very busy. She is so excited about the whole school thing. She’s just loving every minute of it.

Viv: That’s great isn’t it?

Judith: And now my older daughter she’s enjoying maths again.

Viv: She’ll be doing the project this year?

Judith: And she’s really understanding maths.

Viv: That’s the idea behind it - that they understand maths. Jan is probably still at the stage where she’s just learning to count and not really using numbers to solve problems, but once they get into that stage they just love it.

Turned tape off but the conversation continued so I turned it on again.

Viv: So once you were on the committee you asked for a mat time so there could be a little bit of structure because you thought that would help ease the children into school.
Judith: Well yes, 'cause at school you can only eat your lunch at a certain time and you have to sit on the mat when the teacher says. You can't say, "well I'll play on the swing now." - and that's what they did. So we brought it in that they had structured mat time, where they had story telling, they brought in that they'd do certain things each week (topics) and they'd bring that interest in at that certain time. That made a difference.

Viv: They weren't quite so free? [to do whatever they liked]

Judith: There were obviously some that [didn't join in].

My reflection: I don't know if Miss Tahi has times here when there's free choice. I sometimes think perhaps both school and pre-school could make a few shifts in regard to programme content so that children are meeting appropriate challenges – perhaps focused guidance at early childhood and more choice activities in the new entrant classroom.

There is still a lot of learning that can happen at maths time - that is not necessarily sitting up the front with the teacher watching her use the maths equipment.

Viv: Kids can play and learn as well (independently).

Judith: Oh well, they can go and collect acorns. That would be exciting counting them.

Viv: There are other things too like dress-up corner, playing shops and house - they can learn a lot of maths that way as well.

Judith: We play shops at home all the time.

Viv: (Excitedly) Oh do you?

Judith: We've got a cash register.

Viv: We had one of those too, for my kids.

Judith: And with fake money, we do a lot of grocery shopping at home. And [Jan's] favourite place to go in the world is the supermarket.

Viv: In real life?

Judith: In real life. She gets so excited and I hate the place.
Viv: It could be because she’s just suddenly become aware, and knows that she knows what the numbers are, and that she can count now - that it’s all so exciting, because she can match it [school numeracy] up with the real world.

Judith: Yes, she walks round, say at the jam, and says there’s two five, two and, but she loves it - she’d rather go there than to the $2 Shop.

Viv: [Perhaps because there are more numbers to read at the supermarket?]

Viv: But of course that’s one of the things that you can do at home, it’s easier done at home... orient the maths [to real life]. At school we’ve got the equipment and stuff, but at home you can make it really live, real life maths, which is something we can’t do at school as well.

Judith: No.

My Reflection

The “real world” (supermarket) story didn’t emerge until after the main discussion. Parents may be unaware of the significance of ‘orienting’ maths (Young-Loveridge). They are restricted to thinking about maths as counting and writing numbers. They aren’t aware of the maths abounding in everyday living or don’t make the connections between this and teaching children about numbers. I wonder if their concept of children’s mathematical learning is that it’s more about concepts than reality - applying maths in our lives.

Conversation seemed to flow better after the tape recorder was turned off. I seemed to do most of the talking at first. I suppose talking to a researcher about her child’s maths learning was a new experience for Judith. She seemed keen to participate though and very interested in her children’s education.
Appendix 4. Data Codes and Categories  
(led to Theoretical Constructs)

**Socialisation**

*Relating to others*
- "being friends"
- change of class
- learning alongside/with others
- respecting the leader

*Managing Self*
- concept of self as a “school girl/boy”
- working independently
- finding a new activity
- concept of own capability
- on/off task

*Participating and Contributing*
- classroom rules, routines and organisation
- classroom language

**Numeracy Development**

*Thinking/Using language, symbols and texts*
Developing a concept of what constitutes ‘mathematics’.

*Language*
- equipment
- numeracy according to the numeracy project

*Using equipment*
- exploration
- construction of number patterns
- reading symbols
- reinforcement of learning

*Knowledge Framework*
- Number identification – reading and writing
- Number sequence
- Number grouping

*Strategy Framework*
- Problem solving – addition and subtraction

*Teacher practices*
- whole class rote learning
- group instruction
- independent activities
- problem solving
Parents’ Experiences and Issues

Knowledge of Curricula
- Early Childhood Curriculum
- Numeracy project

Parents as Teachers
- at home
- at early childhood
- at school

Transition to school
- home preparation
- pre-entry visits
- communication between home and school
- numeracy achievement expectations
- place in family

Children as Teachers
- home play informs parents
- demonstration of their learning
# Glossary of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Advancing Children’s Thinking – see CGI</td>
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<tr>
<td>BSM</td>
<td>Beginning School Mathematics</td>
</tr>
<tr>
<td>CGI</td>
<td>Cognitively Guided Instruction – instruction using learner’s problem solving strategies</td>
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<tr>
<td>EC</td>
<td>Early Childhood</td>
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<tr>
<td>EMI-4s</td>
<td>The Enhancing the Mathematics of Four-Year-Olds Study</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Education (New Zealand)</td>
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<tr>
<td>MiNZC</td>
<td><em>Mathematics in the New Zealand Curriculum</em> (Curriculum statement)</td>
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| NDP          | Numeracy Development Project which includes:
| ENP          | Early Numeracy Project |
| ANP          | Advanced Numeracy Project |
| INP          | Intermediate Numeracy Project |
| SNP          | Senior Numeracy Project |
| NZCF         | New Zealand Curriculum Framework |
| OECD         | Organisations for European Co-operation and Development |
| TIMSS        | Third International Mathematics and Science Study |
| Te Whāriki   | *Te Whāriki: He Whāriki Matauranga mo nga Mokopuna o Aotearoa: Early Childhood Curriculum*. The New Zealand Early Childhood Curriculum Statement |