

IMPLEMENTING MANDATED CURRICULUM REFORM: SOURCES OF SUPPORT FOR TEACHER MEANING- MAKING

Submitted by

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Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award of this or any other higher education institution. To the best of my knowledge and belief, this thesis contains no materials previously published or written by another person except where due reference is made. All research procedures reported in this thesis received the approval of the University Ethics Committee.

Signed: -----
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Abstract

The impetus for this study was a pragmatic concern for the implementation of the *Mathematics Year 1-10 Syllabus* (Queensland Studies Authority, 2004) at Hillside Primary School (pseudonym). The researcher's involvement with this school was as the Support Teacher: Learning Difficulties 2002-2004. During this time the researcher assisted teachers by working with students who had difficulty acquiring the necessary mathematical skills which enabled them to keep pace with their peers, and actively participate in their environment. During these collaborations it became evident that the teachers had a general unease with the teaching of mathematics, and this became heightened as draft versions of the reform mathematics syllabus became available. Their concern specifically related to the introduction of a range of new content to the primary school syllabus, including a new strand, Patterns and Algebra, as well as the requirement of an investigative pedagogy. The researcher's interest in how teachers make meaning of this mandated curriculum reform was heightened by these concerns. This led the researcher to seek a more informed and sophisticated understanding of how the teachers at Hillside Primary School make sense of, and respond to, mandated curriculum reform. To this end this research study is situated within the research paradigm of constructivism, and informed by the research methodology of symbolic interactionism. This methodology requires the adoption of two distinct stages within the study: "exploration" and "inspection" (Blumer, 1998, p. 40). The exploration stage is a familiarisation stage, which initially involved interviewing both the school's Principal and Head of Curriculum. From these interviews an instrument was developed and administered to all teachers. Analysis of these data led to the inspection stage of the study where individual interviews were conducted with all teachers as a way to isolate significant elements within this research site. In this way, this study relied on a mixed methods approach. Analysis of these data led to a series of theoretical perspectives being proposed, which in turn led to the generation of this study's recommendations. Engagement in this two-stage inquiry process has drawn attention to the importance of collaboration between the Principal and teachers in a professional learning community as they make meaning of mandated curriculum reform.

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List of Abbreviations

CCT:	Co-ordinated Curriculum Time
DEA:	Department of Education and the Arts [February, 2004-September, 2006]
DET:	Department of Education and Training [March, 2009]
DETA:	Department of Education Training and the Arts [September, 2006- March, 2009]
EQ:	Education Queensland [prior to February 2004]
HOC:	Head of Curriculum
HSEU:	Head of Special Education Unit
KLA:	Key Learning Area
LOTE:	Languages Other Than English
PD:	Professional Development
QCAR:	Queensland Curriculum Assessment and Reporting
QSA:	Queensland Studies Authority
SEU:	Special Education Unit
ST: LD:	Support Teacher: Learning Difficulties

Chapter One: Introduction

1.1 INTRODUCTION

The impetus for this study was a pragmatic concern for the implementation of mandated curriculum reform. The context of this study was Hillside Primary School (pseudonym) with a particular interest in the implementation of the reform mathematics syllabus, the *Mathematics Year 1-10 Syllabus* (Queensland Studies Authority [QSA], 2004), between 2003 and 2007. The sources of support for teacher meaning-making with respect to this example of mandated curriculum reform became the primary focus of this study, and the perspectives of the teachers and administration team at Hillside Primary School offered an appropriate source of data.

Hillside Primary School was opened on 18 May 1963, and is located in a quiet and secluded suburb of Brisbane (Education Queensland., 1999). The current enrolment is almost 700 students, and there are 25 classes made up of four each of Years 1 and 2, and three each of Years 3, 4, 5, 6, and 7. In addition, there are two composite classes, Years 3/4 and Years 6/7. Hillside Primary School also has a Special Education Unit (SEU) with a further five teachers. There are 9 specialist teachers at the school, including the teacher of Languages Other Than English (LOTE) and the Support Teacher Learning Difficulties (STLD). Hillside Primary School also has a further 18 visiting specialists attending on various days. The administration team overseeing student academic performance consists of the Principal, Deputy Principal, Head of Special Education and Head of Curriculum.

Between 2002 and 2004, I was a member of staff at Hillside Primary School as Support Teacher Learning Difficulties. In this position, I assisted teachers with students who had difficulty acquiring the necessary mathematical skills enabling them to keep pace with their peers and to actively participate in their environment. This role placed me in a privileged position where I was able to work directly with all teachers in the school. This collaboration enabled the identification of specific areas of student difficulty, leading to the writing of suitable programs that provided opportunities for maximum growth for these students.

During the course of this collaboration with teachers, it became clear that teachers in the school were generally uneasy with the teaching of mathematics. Moreover, their concerns grew as the draft versions of the *Mathematics Year 1 – 10 Syllabus* (QSA, 2004) became available. In response to this document, teachers noted a broad range of pedagogical changes: a move towards outcomes based education, an investigative pedagogy for teaching mathematics as well as a variety of new content. This new content included mental computation, chance and data in the early years, transformational geometry, and an entirely new strand, patterns and algebra. It soon became obvious that the implementation of the reform syllabus by 2007 would challenge teachers at Hillside Primary School.

My interest in mandated curriculum reform in mathematics was heightened by these circumstances, and when I left my position at Hillside Primary School at the conclusion of the 2004 school year, I watched from a distance as the teachers struggled with curriculum reform in mathematics. Over time the teachers' apprehension regarding the reform mathematics syllabus grew. They expressed their belief that the teaching of new content and the requirement of changed pedagogy placed too much pressure on them and their students. Moreover, they were concerned about the lack of support from the Department of Education and Training (DET¹) during the early stage of implementing the syllabus. The only professional development they had was a session provided on a pupil free day in January 2006, where a reform textbook series was distributed to all teachers who were instructed to follow the proposed sequence outlined in this text. Due to the lack of any specific or substantial support, many teachers found it difficult to address the requirements of the reform syllabus.

Apprehension also grew as teachers reacted to new demands for teacher accountability. Historically, there were no formal performance management structures within the school as it had always had a good reputation in the local community as a result of performing

¹ This department of education has been variously titled. Prior to 1996, it was called The Department of Education. In 1996 it became Education Queensland. In 1998 its name reverted to Department of Education. From this time, confusion seems to reign with Education Queensland (EQ) being used by many to refer to state schools only (DETA, October 2008). However, in 2004, the Department of Education was renamed the Department of Education and the Arts (DEA). Following the state election in September 2006 the name was again changed to the Department of Education Training and the Arts (DETA). Then it became the Department of Education and Training (DET) following the 2009 election. These changes reflect the significant change that the department itself is undergoing.

above state average on the Year 3, 5, 7 state run tests developed by the Queensland Statutory Authority. However, in 2006, Hillside Primary School's Year 3 students returned results that were below state average on the state tests and this result sent shockwaves through the school. At this point many teachers looked outside the school to place blame arguing that there was conflict between the reform syllabus and the state test.

The publication of additional curriculum documents: *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the support document *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d), further complicated matters. These policy documents seemed to be welcomed by teachers, even though by specifying content, student achievement standards, assessment procedures and reporting requirements in mathematics, they left few decisions for the teacher in the classroom. Indeed the teachers' reading of these documents was that they gave them 'permission' to put to one side, curriculum reform in mathematics, with its emphasis on investigative pedagogy, and return to traditional, transmission approaches in the classroom.

1.2 PRIOR RESEARCH

This experience of teacher concern for mandated curriculum reform has been consistently identified in prior research (Fullan, 2001), and reform in mathematics is no exception (e.g., Smylie & Perry, 2005). Handal and Herrington (2003) highlight this argument by specifically listing research on mathematics reform where research findings indicate that the implementation of innovations were flawed and as a consequence have failed to be successfully implemented:

...use of Cuisenaire rods (Hassall, 1986), the New Math(s) (Clements & Ellerton 1996), mastery learning (Herrington & Wolf, 1985), teaching in themes (Clements, 1987; Henderson & Landesman 1995), teaching for problem solving (Hembree & Marsh, 1993; Schroeder & Lester, 1989), teaching metacognitive skills (Schoenfeld, 1992) and outcomes based education (Clements & Thomas, 1996). (p. 63)

Explaining this high failure rate, researchers point to the teacher and note a number of inhibitors to their performance. For example, noting that the majority of primary teachers are women who may not have pursued higher mathematics study, there is an argument that teachers do not have the depth and breadth of content knowledge to successfully

implement curriculum reform in mathematics (D. L. Ball & Bass, 2003; Lamb, 2003; Ma, 1999; White, Mitchelmore, Branca, & Maxon, 2005). Furthermore, it is argued that teachers' beliefs and attitudes about teaching mathematics are often formed from their own school experience that reflected a traditional style of teaching (Brosnan, Edwards, & Erickson, 1996). Emulating this traditional style of teaching is said to give the teacher a sense of security and control. It provides insecure teachers with a comfortable teaching environment; they are, therefore, reluctant to relinquish control of the lesson to their students as is expected with the current belief in co-constructive pedagogy in mathematics (Davis, 1990; Schoenfeld, 2000). Recognising these inhibitors to curriculum change in mathematics, there is a call in the literature for teachers to 'unlearn' their own school experiences in order to be open to change (D. L. Ball, 1996; D. L. Ball & Bass, 2003; D. L. Ball, Lubienski, & Mewborn, 2001). However, resistance to curriculum reform in mathematics remains common, and such resistance is seen to undermine the implementation of reform in the classroom (Carroll, 1998, July; Cuban, 1993; Martin, 1993; Memon, 1997; Smylie & Perry, 2005).

Interestingly, the use of textbooks designed to support curriculum change may either enable or inhibit curriculum reform in the classroom as teachers react differently to this resource. When a textbook is mandated, teachers may direct all their planning and teaching practices to its authority or alternatively, they may see the textbook simply as a resource that supplements existing resources and, therefore, acts as a support for planning and teaching practices (Remillard, 2000). These findings are echoed by Reys, Reys and Chavez (2004):

Given the limited preparation in mathematics of most primary teachers and the shortage of teachers certified to teach mathematics at secondary schools, the mathematics textbook becomes the mathematics program for a large segment of the teaching corp. (p. 64)

This same position has been documented in a recent study on the use of textbooks written to support the reform Queensland syllabus where "teachers who felt constrained by the textbook were seen to teach in a teacher-directed manner..., [while] teachers who saw the textbook as a guide were seen to take a more student-centred approach, adapting the lessons and supplementing the lesson with other materials and activities (Heirdsfield, Warren, & Dole, 2008, p. 8). This finding supports previous studies (e.g., Collopy, 2003)

that agree that teachers' lessons may not always reflect the intentions of the educational reform that prompted the new textbook development.

Despite these findings, curriculum reforms continue to be mandated, and teachers continue to be expected to be the agents of that change, most often without consideration for their beliefs and experience (Handal & Herrington, 2003). Consequently, there is a clear line of argument in the literature that teachers' beliefs and experience need to be addressed, and that appropriate access to professional development that attends to content and pedagogy needs to be provided. Without these, a continued failure to accept change can be expected because teachers will not be confident about what needs to be changed or how to go about it (Brown, Askew, Millett, & Rhodes, 2003; Buzeika, 1996, July; Fullan & Stegelbauer, 1991).

1.3 RESEARCH PROBLEM AND PURPOSE

This review of prior research illustrates the problematic nature of mandated curriculum reform in mathematics. However, the research problem was further defined when the challenge of implementing curriculum reform at Hillside Primary School was situated within the institutional context of public education in Queensland and the wider socio-cultural context of globalisation and curriculum reform. The contextual analysis that follows (see Chapter Two), points out that the desire for economic competitiveness has meant that for mathematics education, a "global curriculum" (Atweh & Clarkson, 2002, p. 3) has developed which has supported a new international testing regime (Carnoy, 1995; Mundy, 2005). Queensland, like other states/nations around the world, is attempting to keep pace with globalisation by implementing a reform mathematics syllabus, *Mathematics Year 1-10 Syllabus* (QSA, 2004).

The publication of the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the supporting document *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d) were also in response to the demands of globalisation. Here it was recognised that globalisation brings with it "a climate of uncertainty, not to say apprehension" (Delors cited in QSA, 2007d, p. 5). Responding to this issue, the *Essential Learnings* framework aims to specify "what is essential for all students to know and be able to do" (pp. 10-11) in a global context. At the same time, this new policy took a new direction from the previous reform mathematics syllabus by specifying content, student achievement standards,

assessment procedures and reporting requirements, leaving few decisions for the teacher. This difference resulted because the QSA did not have the statutory authority to specify assessment or reporting methods in the KLA syllabuses. However, one fact remained – officially the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) had not replaced the *Mathematics Year 1-10 Syllabus* (QSA, 2004), and there was an expectation that teachers were to implement both policy documents in the classroom.

Thus, within this study, the research problem was framed in terms of mandated curriculum reform in mathematics, and the purpose of this study was to gain a more informed and sophisticated understanding of how the teachers at Hillside Primary School make sense of and respond to such reform. Prior research (e.g., D. L. Ball, et al., 2001) has found that primary teachers are generally resistant to curriculum reform in mathematics. However, in the contemporary era of globalisation motivating a global curriculum and international test regime, curriculum reform is particularly problematic, as teachers deal with conflicting policy agendas and demands for teacher accountability.

1.4 RESEARCH QUESTION

One research question was to guide the various moments of data collection, analysis and interpretation within this study:

What are the sources of support for teachers' meaning-making in the context of the implementation of the Mathematics Year 1-10 Syllabus (QSA, 2004) at Hillside Primary School?

The identification of this research question followed a review of the literature with respect to educational change, teacher professionalism and professional development. Here it was found that emergent theories in each of these areas coalesced around the concept of the professional learning community described in terms of collaborative relationships, shared vision and values and the active promotion of learning. As a consequence, the literature presents strong support for situating curriculum reform within the context of a professional learning community. Moreover, this literature also alerts us to the impediments in developing a professional learning community: inappropriate structures, inadequate social capital and sustainability, as well as inhibitors to successful professional learning.

This review of the literature also explores curriculum reform in mathematics and highlights Millett and Bibby's (2004) model for discussing change. This model identifies the professional learning community as "the situation" (p. 3) in which the teacher is most likely to positively respond to curriculum reform. In addition, this model, by drawing attention to the "zone of enactment" (p. 4) as the space where each teacher makes sense of curriculum reform as they interact with their professional learning community, reminds us of the importance of teacher meaning-making in the context of curriculum reform. Finally, this model alerts us to the impact of internal and external factors that act as a source of support for curriculum reform, and in doing so, puts a positive slant on the impediments to the development of the professional learning community, noted elsewhere (e.g., S. Ball, 2003; Blackmore, 2004; Blase & Blase, 2005; McLaughlin & Talbert, 2007; Smeed, Kinmber, Millwater, & Ehrich, 2009).

In light of this review of the literature, the research question is focussed on sources of support for teachers' meaning-making with respect to mandated curriculum reform in mathematics. This research question acknowledges Millett and Bibby's (2004) model for analysing the context of curriculum reform: that both internal and external factors act as sources of support for curriculum reform in the context of the school environment. In addition, this research question focuses attention on 'teacher meaning-making' in the context of curriculum reform. In doing so, this thesis accepts the 'meaning hypothesis' advanced by Fullan and Stiegelbauer (1991) in their seminal work, *The new meaning of educational change*. Here they argue that "if reforms are to be successful, individuals and groups must find meaning concerning what should change as well as *how* to go about it" (p. xi). This concern for meaning-making is also reflected in Spillane, Reiser, and Reimer's (2002) "process of human sense-making" (p. 419) with respect to teacher efficacy, as well as Millett and Bibby's (2004) understanding of the "zone of enactment" as "the space in which the individual makes sense of reform or change initiatives" (p. 1).

1.5 RESEARCH PARADIGM AND DESIGN

In line with the recommendations of O'Donoghue (2007) and Crotty (1998), this research question guided the data collection, analysis and interpretation within this study. Given the nature and focus of this study's research question, constructivism was chosen as the research paradigm. As with other research paradigms, constructivism offers its own ontology, epistemology and methodology. From an ontological perspective,

constructivism “assumes multiple, apprehendable, and somewhat conflicting social realities that are the products of human intellects, but that may change as their constructors become more informed and sophisticated” (Guba & Lincoln, 1994, pp. 111-112). Therefore, this research paradigm recognises that ‘reality’ is relative to an individual’s experiences and the environment in which they live. Further, individuals seek to understand that environment and how it relates to the actuality of their participation within that environment. In this way, the ontology of constructivism directly supports the research question that teachers’ experiences may offer alternative realities impacting on the meaning-making they each internalise. This leads to the epistemological beliefs of constructivism, which focus on the knower or would-be knower, and what is known as a consequence of knowledge being constructed through interaction within a social environment (Guba & Lincoln, 1994; Sarantakos, 2005). This further supports the use of constructivism as the research paradigm for this study, as it acknowledges that interpretation can be created through interaction between participants and researcher.

This research paradigm points to a particular category of research methodology, symbolic interactionism (Blumer, 1998). This methodology as perspective is useful when interpreting a social situation such as the situation at Hillside Primary Hill. Symbolic interactionism, as methodology, requires the adoption of two distinct stages within the study: “exploration” and “inspection” (Blumer, 1998, p. 40). The exploration stage allows the researcher to construct meaning about “what’s going on around here” (Charon, 2007, p. 194), as well as to identify issues for further investigation during the inspection stage. Within this study, the school’s Principal and Head of Curriculum (HOC) were interviewed. From this interview data, an instrument in the form of a questionnaire was developed, administered to all classroom teachers, validated and the data analysed. This analysis raised a number of issues that led the investigation into the inspection stage of the study. Here, focus group interviews were conducted with each year level of teachers. This was followed by further clarification of the issues with individual interviews involving each of the four members of the administrative team, the Principal, Deputy Principal, Head of Special Education Unit (HSEU) and Head of Curriculum (HOC). In this way this study relied on a “mixed methods” (Creswell & Plano Clark, 2007) approach to data collection that included individual and group semi-structured interviews as well as a survey of participants. This two-stage data collection

process was supported by a three step iterative process of data analysis termed as first, second and third order interpretation (Neuman, 2007, p. 160). The first-order interpretation is from the perspective of the participants being studied. The second-order interpretation stems from the perspective of the researcher, and involves eliciting the underlying coherence or sense of meaning in the data. Third-order interpretation involves the researcher assigning general theoretical significance to the data.

1.6 SIGNIFICANCE OF THE STUDY

The Queensland Department of Education and Training has, over the last few years, presented schools with a series of mandated curriculum reforms, such as the *Mathematics Years 1-10 Syllabus* (QSA, 2004). This study was significant in understanding how one school, Hillside Primary School, implemented a mandated curriculum reform which was just one of many such mandated reforms (see Chapter 2). The significance of this study may also rest in its contribution to research not just confined to education in Queensland, as all schools across Australia will soon begin to implement the Australian curriculum for English, Mathematics, Science and History. These curricula will ultimately mean more change is required to be implemented across each curriculum area. Moreover, this phenomenon of many mandated curriculum reforms being demanded at one time is not restricted to Queensland or Australia, but is evident around the world and has been identified in the literature as an “avalanche” of policy (Millett & Bibby, 2004, p. 9). It is within this context that the significance of the way one school addresses the issues of implementing many mandated curriculum reforms may provide insights for principals and teachers in other schools.

The significance of this study also rests with the detailed account of the practical problems associated with supporting the implementation of one-among-many mandated curriculum reforms. The professional learning community is beginning to dominate the literature as a mechanism for sustaining school reform and as a way of alleviating many barriers to reform (Harris, 2009; Kruse & Seashore Louis, 2007; Millett & Bibby, 2004). However, attention is also drawn to the lack of robust research that provides sufficient detail on the functioning of the professional leaning community (Hord, 2004). The significance of this study is that it does provide “fine enough detail” (Bolam, et al., 2005, p. 27) to permit the reader to locate the practical problems that will act as impediments to

mandated curriculum reform while at the same time it extends Millett and Bibby's (2004) model for analysing the context for mandated curriculum reform.

1.7 STRUCTURE OF THE THESIS

The remaining chapters of this thesis serve specific functions providing more detail for the reader on each aspect discussed above.

Chapter Two situates the problem of implementing mandated curriculum reform in mathematics at Hillside Primary School, within the institutional context of public education as well as the wider socio-cultural context. In doing so, this chapter serves to clarify the research problem by suggesting that the implementation of mandated curriculum reform is particularly problematic in the contemporary era of globalisation. Through this chapter it becomes evident that, teachers generally resistant to curriculum reform in mathematics, are now forced to deal with conflicting policy agendas and new demands regarding teacher accountability.

Chapter Three builds on the literature discussed in Chapter Two by focusing on educational change, professional development, teacher professionalism and mandated curriculum reform. Observations from this literature are drawn together in recent writings, and coalesce around the notion of the professional learning community. Here the literature identifies how the concept of the professional learning community may be instrumental in supporting curriculum reform. Moreover, the literature highlights the importance of teacher meaning-making in the context of curriculum reform, as well as identifying external and internal sources of support and barriers for teachers engaging in curriculum reform. In this way, this literature review served to identify the research question that would guide the choice of research paradigm and the design of this study.

In Chapter Four, a case is made for situating this study within the research paradigm of constructivism, with the methodological choice being symbolic interactionism. This chapter also provides details with respect to the choice of a mixed methods approach to data collection that involved the use of individual and focus group interviews as well as a survey of participants. The three step iterative process of data analysis and interpretation employed in the study is also explained.

Chapters Five, Six and Seven display the data collected during the exploration and inspection stages of this study. Chapter Five displays the initial data collected during the

exploration stage of the study, and focuses on the initial interview with the Principal and HOC which lead to the development and validation of the survey instrument. Chapter Six focuses on the use of this instrument. Both Chapter Five and Six are consistent with Neuman's (2007) first order of interpretation culminating in a number of unresolved issues being displayed at the conclusion to Chapter Six. These unresolved issues formed the basis of the next stage of this study which involved focus group interviews with the teachers. Chapter Seven displays this interview data associated with the second stage of this study, inspection. This incorporated Neuman's (2007) second order of interpretation where a number of research findings are detailed at the conclusion of the chapter. These data build on the unresolved issues displayed at the conclusion of Chapter Six.

Chapter Eight explores the theoretical significance of the research findings. This incorporated Neuman's third order interpretation through a discussion of each of these findings with reference to the literature discussed in Chapters Two and Three. Following this discussion, it was then possible to propose a series of theoretical propositions.

Chapter Nine answers the research question by discussing the research findings supported by the theoretical propositions proposed in Chapter Eight. This discussion leads to the display of a theoretical model for supporting curriculum reform. The chapter details a series of recommendations for supporting mandated curriculum reform as well as recommendations for further research.

Chapter Two: The Problem Defined

2.1 INTRODUCTION

As identified in Chapter One, the impetus for this study was a pragmatic concern for mandated curriculum reform in primary school mathematics. The purpose of this second chapter is to clarify the research problem that underpins this study by placing it in the larger context. From the outset, this study focussed on the implementation of the reform *Mathematics Year 1-10 Syllabus* (Queensland Studies Authority [QSA], 2004) at Hillside Primary School. However, in the course of this study, a number of interrelated problems proved difficult to isolate or clearly identify. Therefore, following the recommendation of systems analyst, Checkland (2000), this chapter seeks to clarify the research problem by developing a ‘rich’ picture of the context surrounding the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) in Queensland primary schools. To this end, it was accepted that a human activity, such as teaching with a view to implementing a reform mathematics syllabus, occurs within a number of interrelated contexts². These contexts include the immediate environment of the primary school, the institutional environment of educational policy and practice, and finally, the wider socio-cultural context (Figure 2.1).

² Bronfenbrenner’s “Social Ecological Model” (1979) identifies three such contexts: the immediate environment in which the human activity is situated, the institutional environment that supports or curtails the human activity, and the wider context of social and cultural change. Together, these interconnected contexts suggest a framework for cultural analysis that, in turn, allows the researcher to gain a richer appreciation of a problem situation.



Figure 2.1 Social Ecological Model

Source: This model has been adapted from *Bronfenbrenner (1979)*

In Figure 2.1 the mathematics teacher is placed at the centre of a series of interrelated circles representing the various contexts in which the teacher works. The first circle represents the school environment which this study names as Hillside Primary School. Here the teacher's response to the implementation of the reform mathematics syllabus is influenced, amongst other things, by the daily life of the school. The second circle represents the institutional context in which the school is situated. For example, Hillside Primary School is situated within the system of public education in the state of Queensland. The reform mathematics syllabus emanates from this system of public education and consequently, directly influences the daily life of the school and the work of the teacher. The final contextual layer in this model represents the wider socio-cultural context in which Queensland public education, Hillside Primary School and the teacher are ultimately situated. Impulses within the wider socio-cultural context, in turn,

influence developments in the institutional context and indirectly influence the school and the teacher. This model suggests that an exploration of the direct and indirect influence of each circle on the teacher would provide a ‘rich’ picture of the context surrounding the implementation of the *Mathematics Year 1-10 Syllabus (QSA, 2004)* in Queensland primary schools and this ‘rich’ picture would serve to clarify the research problem that would underpin this study.

Bronfenbrenner’s (1979) social ecology model provides the structure for this chapter which is comprised of four sections. Section 2.2 provides an examination of the environment in which the teacher operates, Hillside Primary School. Section 2.3 places Hillside Primary School within the context of public education in Queensland. This section guides the reader through a discussion of the various bodies that promote initiatives and support directives from the Department of Education and Training (DET) that impact on public schools in Queensland. The role these initiatives and directives developed within DET is set within a wider socio-cultural context in Section 2.4. This context draws on an understanding of globalisation and how global pressures impact on local issues. This discussion leads to the identification of the research problem in Section 2.5.

2.2 HILLSIDE PRIMARY SCHOOL

As discussed above, an analysis of the immediate school environment develops our understanding of the immediate context in which the teacher works. As this environment impacts directly on the teacher, it shapes the teacher’s response to curriculum change; at the same time the teacher’s response directly impacts on the day to day running of the school.

As noted in Chapter 1, Hillside Primary School was opened in 1963 as a primary school providing public education in Queensland. The mission for Hillside Primary School is to “provide a learning environment where each student will have the best possible opportunities to fulfil his or her potential”. With this mission in mind, school documents outline that the school “strives to offer curriculum programs that cater for the academic, cultural, physical and social needs of all students”. Overall, Hillside Primary School has strong academic results for both literacy and numeracy as reflected in the Year 3, 5, 7 state tests conducted each year in Queensland schools. For the seven years (1999-2005) prior to the conduct of this study, Hillside Primary School has consistently outperformed

‘like’ schools in each of the strands tested: reading, writing and numeracy. However, in 2006 the Year 3 students’ performance on the state tests indicated that these students had unexpectedly performed below the state average. This result sent a shockwave through the school. In contrast, the Year 5 and Year 7 tests results were consistent with previous years.

Over time, Hillside Primary School has demonstrated a strong commitment to curriculum innovation. For example, Hillside Primary School has been very proactive in the development of the early years of learning, developing their Early Years Learning Philosophy to support the curriculum in preschool to year 3. In addition, this school acknowledges the importance of the middle years of schooling, by developing policy and support structures around the Middle Phase of Learning, years 4 and 5. These initiatives support the other facets of this school’s environment: the Special Education Unit (SEU), the team of Advisory Visiting Teachers (AVT) based at the school as well as an Information Communication Technology Program (ICT) that supports 22 trainees. All of these school-based curriculum innovations operated alongside the mandated curriculum reform that is required of all schools in the Queensland education system. For example, syllabi were released: 2002 for Study of Society and the Environment, The Arts in 2002, Technology in 2003 and Mathematics in 2004. During this time there were a series of ongoing changes to English and Science syllabi, as well as other policy initiatives such as the expectation that each school introduce a daily Health and Physical Education session.

At this point, it is interesting to note that, in the period 1999-2007, Hillside Primary School had also undergone considerable transformation in its administrative structures. School-based management was introduced into Queensland schools in 1999 (Moran, 1999), with the intention of providing schools with the capacity to respond to specific local needs. Here it is argued that school-based management stems from the notion that a more responsive planning and collaborative decision-making process controlled by teachers, should encourage the development of innovative practices where teachers could take on leadership roles.

Of special significance to this study, the Principal established a new fulltime role of Head of Curriculum (HOC) in 2006. From this time and as part of this new role, a former classroom teacher was made responsible for the quarterly curriculum forum, the

fortnightly year level coordinators meeting, and the planning day and moderation half-day that were each held once per semester. These activities have been organised on an ongoing basis with cooperation from the seven year level coordinators who are senior teachers³. In addition to these curriculum leadership responsibilities, the HOC, along with other members of the administration team, support the fortnightly staff meeting and year level meetings by their input to the agenda and contribution to discussions. See Figure 2.2 for the management structure at Hillside Primary School.

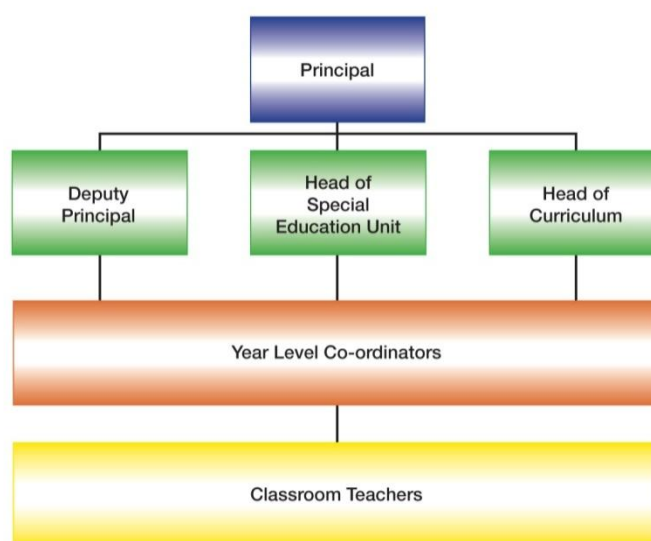


Figure 2.2 Management structure at Hillside Primary School

The top two layers of this figure, namely the Principal, the Deputy Principal, HSEU and HOC, form the administration team referred to throughout this thesis. Within this new administrative structure the school's Deputy, HSEU and the HOC were directly accountable to the Principal and each was given specific responsibilities within the school. In this way, new 'layers' of administrative hierarchy were placed between the Principal and classroom teacher. At the same time, there were new opportunities for teacher leadership as some classroom teachers accepted new administrative roles and responsibilities.

In addition to these new administrative structures, Hillside Primary School was also recognised for its commitment to a teacher-parent partnership through its committee

³ Senior teachers are recognised by DET as experienced teachers who are given extra responsibilities and are remunerated for this extra responsibility.

work. In 2004, Hillside Primary School completed its first triennial school review⁴. This review presents a favourable view of the school, with staff involvement in school activities and support for collaborative partnerships receiving special review notes; staff involvement in school activities can best be seen by participation in a range of committees⁵ that focus on both improving student learning outcomes and promoting and developing the school ethos. The review reports that teacher participation in committee work is high, with 70% of teachers sitting on at least one committee. Consequently, teachers provide many hours of ‘out of classroom’ time as they work in collaborative partnerships with other teachers, parents and community members. This review states, “Staff members are enthusiastic and are involved in decision making. They share leadership responsibilities” (Department of Education Training and the Arts, 2005, p. 7). Teacher participation is also acknowledged by the local community with the findings from the questionnaire data showing that: “the community acknowledges the commitment of school staff and that a learning partnership and trust based relationship contribute to student success” (p. 7).

In summary, this overview of Hillside Primary School shows an on-going commitment to curriculum innovation in support of student learning. In addition, during the last decade, there has been a transformation in administrative structures as new administrative roles and responsibilities were offered to teacher leaders and committee work enabled teachers and parents to work together in partnership. On the face of it, these features of Hillside Primary School would bode well for the implementation of the reform syllabus in mathematics. After all, the teachers at Hillside Primary School appear to be open to curriculum change, shared leadership and collaborative partnerships appear to have followed recommendations in the literature on curriculum change and school

⁴ New policies specifically with respect to school-based management resulted in the Department of Education and Training (DET) instigating stronger accountability processes. New policies such as the School Improvement and Accountability Framework (DETA, 2006) "School improvement and accountability framework 2006-2008." It was now mandatory for schools to plan, monitor and review their performance in terms of the strategies and targets in the Destination 2010 (DETA, 2006)." As a way to meet these targets, schools report on student and school performance and then develop a school strategic plan that identifies where the school is, where it wants to be at a point in the future and the path it will take to get there.

⁵ The range of committees operating at Hillside Primary include: Early Phase of Learning Committee, Middle Phase of Learning Action Plan, Special Needs Committee, Environment Committee, School Council, Local Consultative Committee and the Workplace Health and Safety Committee.

improvement (e.g., Andrews, Crowther, Hann, & McMaster, 2002; Crowther, Kaagan, Ferguson, & Hann, 2002).

However, as discussed in Chapter One the teachers at Hillside Primary School voiced their concerns when the reform *Mathematics Year 1 – 10 Syllabus* (QSA) was published in 2004. Apprehension was held for the new content, pedagogy and assessment/reporting processes, and the teachers looked for professional development support from the school administration and the Department of Education and Training (DET) during the early stage of implementing the syllabus. At the same time, the first triennial school review in 2004 found that opportunities for professional development were limited, and not fully aligned to the school plan. Consequently, it was recommended that professional development be aligned to the school plan, and that teachers be given opportunities to enhance their understanding of the subjects taught, including mathematics.

To further appreciate the issues around the implementation of the reform syllabus in mathematics at Hillside Primary School, it is useful to situate this school and its teachers within the institutional context of public education in Queensland. In doing so, we find that the reform mathematics syllabus in Queensland is just one aspect of the curriculum reform agenda in Queensland public education.

2.3 PUBLIC EDUCATION IN QUEENSLAND

As noted above, Hillside Primary School is situated within the institutional context of public education in the State of Queensland. Public education in Queensland is administered by the state government and its department of education, the Department of Education and Training (DET) with a division, Education Queensland, that only administers state schools.

Public Education policy in Queensland is directed by statutory authorities⁶. The statutory authority of importance to this study is the Queensland Studies Authority (QSA). The QSA has been responsible for the writing of the Year 3, 5, 7, 9 state tests⁷ and the

⁶ Statutory authorities are organisations that have been established under an act of the Queensland Parliament for a public purpose. Several statutory authorities provide advice to the Minister for Education and Training to ensure that the goals and targets of the government-funded education objectives are met.

⁷ In 2008 state testing in the primary school at Years 3, 5, 7 ceased as the National Assessment Program: Literacy and Numeracy (NAPLAN) was introduced for these year levels.

syllabus for each Key Learning Area (KLA)⁸. All the syllabi for each of the eight KLAs have been rewritten and delivered between 2001 and 2007. It is important to acknowledge at this point that historically it takes approximately five years to construct and deliver a new syllabus; the implication being that new syllabus construction has been a high priority activity of the QSA for more than a decade.

As discussed in Chapter One, the QSA released the *Mathematics Year 1-10 Syllabus* (QSA, 2004) with the intention of fully implementing this syllabus by 2007. This reform mathematics syllabus represents a significant shift in the teaching of mathematics from the previous syllabus (Department of Education, 1987). Firstly, this new syllabus introduced a wide array of new content including a new strand, Patterns and Algebra, previously restricted to secondary schools as well as a greater emphasis on strategies in mental computation. Secondly, this syllabus requires an investigative approach to teaching mathematics. This approach is described in the syllabus as an investigative pedagogy where “students use knowledge, procedures, strategies and technologies to answer questions posed by themselves and others” (QSA, 2004, p. 39). Thirdly, this syllabus introduces outcomes-based education to mathematics. This change enables learning outcomes to provide a framework to support planning for learning, teaching and assessing. An overarching approach encompasses the overall learning outcomes where attributes of the life-long-learner are described. This is supported by key learning outcomes unique to mathematics that outline how students think, reason and work mathematically, while the core learning outcomes outline what students should know and do with what they know for the strands of Number, Patterns and Algebra, Measurement, Chance and Data and Space. Direct support for assessment and reporting was not provided in this syllabus.

To support this curriculum reform agenda, including the implementation of the reform syllabus in mathematics, DET introduced the new role of the HOC in primary education. Although some schools had already established this position, DET formalised this role when 300 positions were advertised in September, 2006. The list of responsibilities for the Head of Curriculum was obtained from the Human Resource Department within DET on 30 May, 2006. This list included the following responsibilities:

⁸ A national curriculum for each KLA is in the planning stage during 2008 and 2010. The new national curriculum is expected to be implemented in 2011.

...Contributing to the coordination and maintenance of the school's curriculum framework...identification and delivery of professional development needs...providing demonstration lessons... assist teachers in ensuring the learning needs of all students are addressed...co-ordination of resources...raising community awareness and understanding of current school curriculum, pedagogy, and assessment and reporting initiatives. (Human Resource Department DETA, 2006, p. 1)

The responsibilities associated with the position are extensive and require a large time commitment in order that each aspect of accountability within the job description is met, and so consequently, justifies the funding of this position. The Head of Curriculum position can range from a three day teacher release position to no release time, depending on the budget and size of the school. DET will fund the teaching portion of an employment contract, but each school must fund the Head of Curriculum position from their own self-managed budgets.

Associated with this change in syllabus and creation of the Head of Curriculum position, there was also a new emphasis on professional development within Queensland public education. As the document *Professional Development Agenda 2005-2006* (Department of Education and the Arts [DEA], n.d.) outlines, the responsibility for the professional development of teachers fundamentally rests with the principal in each school. In this document, professional development in support of the new mathematics syllabus is listed as a key priority, and by December 2005, “at least one teacher or principal from every Band 5-7⁹ school and two from every Band 8-11¹⁰ school will attend a workshop suitable to meet their implementation needs” (p. 5). This document goes on to list professional development expectations for all mathematics teachers during 2006 and 2007. The document states: “all teachers of mathematics will spend a minimum of five hours up to June 2006 to learn about, and plan from, the mathematics syllabus, utilising a range of strategies including CCT (co-ordinated curriculum time), teacher release, and student free days.” (p. 5). The document, the *Professional Development Agenda 2005-2006*, also states, “All teachers of Mathematics will spend a minimum of five hours up to June 2007 embedding the new Syllabus into their curriculum planning and teaching, utilising a range of strategies including CCT, teacher release and student free days” (p.

⁹ Band 5-7 means the schools have a range of student enrolments to a maximum of 300.

¹⁰ Band 8-11 has enrolments from 301 students with maximum enrolment capped at 1300 students.

5). This directive from DET informs principals that they are to fund the required hours from their own self-managed budgets.

To assist the schools in meeting these professional development requirements DET employed five Education Officers (Mathematics). The major responsibility of this small team was to support teachers of mathematics by organising professional development seminars and workshops across the state of Queensland. The focus of these workshops was 'Understanding and Implementing the New Syllabus'. However, the number of professional development sessions provided by the Education Officers (Mathematics) was limited¹¹. Consequently, Queensland's teachers had minimal access to professional development opportunities provided by DET that specifically focussed on the reform syllabus (QSA, 2004).

However, before too long the Queensland Statutory Authority published a second set of documents titled *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) that specified content, student achievement standards, assessment procedures and reporting requirements, supported by the background paper, *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d). By 2007, teachers in Queensland were expected to meet the requirements of both the reform syllabus in mathematics and the newer Essential Learnings framework in mathematics. As discussed above, the reform mathematics syllabus (QSA, 2004) represents a significant shift in the teaching of mathematics from the previous syllabus (Department of Education, 1987). Where the 1987 syllabus prescribes a list of content to be taught, the reform mathematics syllabus listed student outcomes, with the expectation that teachers determine the content with a view to achieving these outcomes. The *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) specify content, leaving fewer decisions to the teacher in the classroom. Although the content was intended to reflected student needs in the 21st Century, the *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (Queensland Studies Authority., 2007d) framework seemed to be justifying a return to higher levels of specification evident in the 1987 syllabus. Although the reform mathematics syllabus

¹¹ Two separate workshops have been prepared by QSA: Introduction to the Mathematics Syllabus and Planning with the Mathematics Syllabus. Both workshops were offered during first semester 2006, and involved 30 sites around Queensland. Eight sessions of the first workshop were cancelled along with five sessions of the second workshop, reducing the total of the state's teacher preparation for the new syllabus to 47 one-day workshops.

and the framework offered conflicting advice, teachers were expected to implement both simultaneously.

To further appreciate the issues surrounding the implementation of the new mathematics syllabus at Hillside Primary School, it is useful to situate public education in Queensland and consequently Hillside Primary School, within the wider socio-cultural context. By examining this context it can be argued that the new mathematics syllabus in Queensland stems from the wider socio-cultural context of globalisation.

2.4 THE WIDER SOCIO-CULTURAL CONTEXT

Within the literature, scholars have sought to explain international influences on education policy and practice, such as those described above, in terms of the growing impact of globalisation (Burbules & Torres, 2000; Priestley, 2002). In general, globalisation represents a “world-wide economic, scientific, cultural and political interdependence” that “is becoming ever more securely established” (Delors, 1996, p. 39). For some, globalisation can be accurately described in terms of global capitalism supported by worldwide access to information and communication technologies (e.g., MacBeath, 2006; Wiseman, 1995, July). For others (e.g., Holmes, Hughes, & Julian, 2003) globalisation offers conflicting accounts of the world. On one hand, cultural globalisation acknowledges ethnic diversity and promotes an appreciation of difference, diversity and civic pluralism. On the other hand, there is capitalist globalisation that favours standardisation and homogenisation of difference in the name of consumer monoculture.

Regardless of the definition of globalisation, there is general agreement that we have seen the emergence of the knowledge economy in which “production and services are based on knowledge-intensive activities ... The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources” (Powell & Snellman, 2004, p. 199). Moreover, it has become fashionable to specify the capabilities of the ideal worker in these knowledge-intensive industries of the future (e.g., P. Brown & Lauder, 2004). Thus the Australian Council of Deans of Education (2004) argues that the skills and knowledge of the workforce are perceived as determining competitive advantage, and calls for new approaches to teaching and learning in response to global forces.

Given this context it is hardly surprising that education is definitely in a 'state of change', and that this change can be directly related to the influences of globalisation (P Brown & Lauder, 1992; Henry, Lingard, Rizvi, & Taylor, 2001; Whitty, Power, & Halpin, 1998). Moreover, the migration of policies around the world has lead to a 'global curriculum' (Atweh & Clarkson, 2002, p. 3). This global curriculum is especially evident within the field of mathematics education, where the similarity between the various curriculum documents and textbooks is clearly evident (Clements & Ellerton, 1996). Thus it can be argued that developments in mathematics education in Queensland public education reflect the trends in international research and theoretical development. For example, the new content in the reform of the Queensland mathematics syllabus is in line with research by Beishuizen (1993), Watson, Collis and Moritz (1995), Fox (2000) and Herscovics and Linchevski (1994) respectively. It includes mental computation, chance and data in the early years, transformational geometry, and an entirely new strand in the primary school syllabus, patterns and algebra. In addition, new pedagogy and assessment processes reflect Bernstein's (1971) early work, and were based on the theory that an investigative pedagogy will produce "human capital that is inquisitive, creative, and entrepreneurial, ...able to compete globally" (McNeil, 2006, p. 250).

In this era of globalisation, Australian national policies have also been influenced in particular by international testing and judgement of student performance against international standards (Carnoy, 1995; Mundy, 2005). Across the board, there have been concerns regarding the standard of mathematics education in Australia and, in particular, Queensland. Australia has participated in a range of international science and mathematics tests¹², and analysis of the 1964, 1978 and 1994 mathematics studies showed that "the mathematics achievement level of Australian Year 8 students had declined over the 30 year period" (Afrassa & Keeves, 1999, p. 15). Moreover, the greatest decline was in Queensland, from the top performing state in 1964 to equal poorest performer in 1994 with the Northern Territory (Marks & Creswell, 2005).

The fallout from these international tests have resulted in changes to policy and practice directions from DET. To improve the standard of mathematics achievement in

¹² Australian school students have participated in the First International Mathematics Study (FIMS) in 1964; the Second International Mathematics Study (SIMS) in 1978; the Third International Mathematics and Science Study (TIMSS) in 1994; Trends in International Science and Mathematics Study (TIMSS) in 2003; a Program for International Student Assessment (PISA) in 2000.

Queensland's schools, it was argued that reform was needed at the system level (Doig, 2001). There were recommendations for curriculum reform in mathematics and the Queensland Study Authority (QSA) released the *Mathematics Year 1-10 Syllabus* (QSA, 2004). Moreover, a clear line can be drawn between the analysis of the Trends in International Science and Mathematics Study (TIMSS) data; the resulting interpretation being that there is a link between investigative pedagogy in their mathematics classrooms and student performance, and Queensland's reform mathematics syllabus that now has investigations as its pedagogic focus (McNeil, 2006).

The publication of the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the supporting document *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d), was also a response to the demands of globalisation. In presenting this framework it was accepted that because of the effects of globalisation in the 21st Century we need to be 'providing young people with the knowledge, skills and understandings and self-confidence they need to play a part in shaping their lives and communities at a global level' (QSA, 2007d, p. 5). Moreover, it was recognised that globalisation brings with it "a climate of uncertainty, not to say apprehension" (Delors in QSA, 2007d, p. 5), and that "the central issue here for education is how to respond to this uncertainty when providing curriculum for schools and learning experiences for students" (QSA, 2007d, p. 5). Responding to this central issue, the Essential Learnings framework aims to specify the knowledge that is necessary for the 21st century.

Determining what is essential for all students to know and be able to do, is perhaps the most critical debate in education...This debate is emerging from a general concern about the learning necessary to live in a world characterised by globalisation and the emerging knowledge economies" (pp. 10-11).

In short, the Essential Learnings framework addresses the recommendations of prior research (Queensland Department of Education Training and the Arts., 2004 [New Basics Project]; Queensland Department of Education., 1999, 2001; 2003 [Assessment and Reporting Framework]) that call for an 'uncluttered curriculum'. This addressed the concern that syllabi had expanded beyond the traditional focus on discipline knowledge, to include "broader life competencies" and "cross-curricular skills" (QSA, 2007d, p. 10). The Essential Learnings framework took seriously the concerns that "the curriculum in compulsory years is fragmented...[and that] entire syllabus strands or at least many

concepts within the syllabus have disappeared from the enacted curriculum (Queensland Department of Education., 2003, p. 3) and instead focussed on closing the gap between “the expectations of the syllabus (the intended curriculum) and what is actually taught in classrooms” (QSA, 2007d, p. 10). To this end the Essential Learnings framework specified content, student achievement standards, assessment procedures and reporting requirements in all KLAs including mathematics.

This new direction in public education in Queensland is further understood if we situate this within the wider political agenda of the time. In 2002, Queenslanders were introduced to a new state government strategy to ensure that Queensland remained internationally competitive. In short, documents (e.g., Queensland Department of Premier and Cabinet., 2005) voiced an interest in reinventing Queensland as a knowledge economy. As the Queensland Premier, Peter Beattie (2006) states in an open letter:

If we don't change, we won't create the jobs of tomorrow. Unemployment will rise and once again we will start exporting our brains interstate and overseas. If we don't change, our standard of living will—for the worse. We must move with a new spirit of enterprise and new programs in our education, culture and industry, or we stand still and fall back. We have the willingness to do this. We need the skills as well. All of us have a responsibility to contribute our talents, our labours and our ideas – for the benefit of our great State. (p. 1)

The Queensland Premier's inspiring words challenge Queenslanders to confront the challenge of globalisation. He acknowledges that his desire for Queensland to develop the capacity to compete both locally and internationally for world markets will only be possible if there is a concerted effort of change, and in particular within education. This change will develop new skills and thereby create an atmosphere of entrepreneurial spirit, where Queensland would be identified as “an important site in which new ‘knowledge economies’ might build and invest successfully” (Ailwood & Follers, 2002). Thus the publication of the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) represented a response to a political agenda that, in turn, was driven by the wider socio-cultural context of globalisation.

2.5 THE RESEARCH PROBLEM

So far this chapter has presented a ‘rich’ picture of the context in which curriculum change with respect to the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) at Hillside Primary School is situated. This school is positioned within the institutional context of public education in Queensland, and is therefore directly impacted by the curriculum reform agenda in Queensland public education. This was the case in 2004 when a reform mathematics syllabus, *Mathematics Year 1-10 Syllabus* (QSA, 2004) was promulgated. For Hillside Primary School, this syllabus represents just one amongst many curriculum changes that has impacted upon the school in recent times. Hillside Primary School has undergone considerable transformation since school based management was introduced into Queensland public schools. This reform mathematics syllabus represented a significant shift in the teaching of mathematics from the previous syllabus (Department of Education, 1987), and by 2006 the reform syllabus had begun to impact upon the teaching of mathematics at Hillside Primary School. Although, historically, the teachers at Hillside Primary School had demonstrated a commitment to curriculum innovation, this time, as noted in Chapter One, teachers at Hillside Primary School voiced their concerns about the demands of the implementation of the reform mathematics syllabus.

However, as the contextual analysis in this chapter has shown, developments in the wider socio-cultural context beyond Hillside Primary School and Queensland public education were also influencing curriculum reform in Queensland and at Hillside Primary School. The desire for economic competitiveness has meant that for mathematics education, a “global curriculum” (Atweh & Clarkson, 2002, p. 3) has developed. Queensland, like other states/nations around the world, is attempting to keep pace with globalisation by implementing a reform mathematics syllabus, *Mathematics Year 1-10 Syllabus* (QSA, 2004), that incorporates changes that have been implemented abroad (e.g., mental computation, chance and data in the early years, transformational geometry, and patterns and algebra as well as investigative pedagogy) and that is linked to the National Council of Mathematics Teachers Standards (NCTM, 2000). More recently, and again in response to globalisation and the concerns for the knowledge economy, Queensland public education published the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) along with the support document *Queensland Curriculum*

Assessment and Reporting Framework: Developing Essential Learnings for Queensland (QSA, 2007d).

This *Essential Learnings* framework offered a new direction for public education in Queensland that aimed to prepare students for the global world of the 21st century. To this end, this framework went against the ‘spirit’ of the previous reform mathematics syllabus (QSA, 2004) by specifying content, student achievement standards, assessment procedures and reporting requirements in mathematics. Whereas the reform mathematics syllabus listed student outcomes, with the expectation that teachers achieve these outcomes by determining content, the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) framework specifies the content, leaving fewer decisions to the teacher in the classroom. Unfortunately, the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) had not replaced the 2004 reform mathematics syllabus, and there was an expectation that teachers would work with both policy documents in the classroom.

The contextual analysis in this chapter raises questions of how teachers and principals deal with mandated curriculum reform when there are conflicting policy agendas. Conflicting policy directives are commonplace (e.g., Hess, 1999; Knapp, Copland, & Talbert, 2003; McLaughlin & Talbert, 2003), as research has found that lack of consultation between departments within Education Departments or School Districts has resulted in a lack of coherence in policy initiatives. This constant generation of new initiatives and policies, is a direct result of global pressure to perform internationally and/or reactive in response to poor performance. The intention is to influence local practices to ensure higher student performance (McLaughlin & Talbert, 2003). However, the results reported in the literature indicate that there is a great deal of difficulty coordinating initiatives or policies. This ultimately leads to reduced performance: the opposite effect to that intended (Knapp, et al., 2003). As a consequence, principals are left to decide which initiative or policy is worth implementing (Madda, Halverson, & Gomez, 2007). At the same time, Australian research (e.g., Smyth, 2002) has found that the role of the principal has evolved into the role of chief executive while the classroom teacher has an increased managerial role focussed on accountability and paperwork rather than one offering curriculum leadership.

Thus within this study, the research problem was framed in terms of the implementation of mandated curriculum reform in mathematics, and the purpose of this study was to gain a more informed and sophisticated understanding of how the teachers at Hillside Primary School make sense of and respond to such reform. Prior research has found that primary teachers are generally resistant to curriculum reform in mathematics. However, in the contemporary era of globalisation driving a global curriculum and an international testing regime, mandated curriculum reform is particularly problematic as teachers deal with conflicting policy agendas and demands for teacher accountability. This clarification of the research problem and the purpose of this study provided direction to the next stage in this research study, the review of the literature presented in Chapter 3.

Chapter Three: Literature Review

3.1 INTRODUCTION

This study frames the research problem in terms of the implementation of mandated curriculum reform in mathematics in the form of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) at Hillside Primary School and the purpose of this study was to gain a more informed and sophisticated understanding of how the teachers at Hillside Primary School make sense of such reform and, as a consequence, respond to it. This chapter continues the exploration of this research problem by engaging in a review of the research literature.

This chapter continues the exploration of this research problem by engaging in a review of the research literature.

In general, this review of the literature seeks to fulfil the four goals of a literature review to:

1. demonstrate a familiarity with a body of knowledge and establish credibility;
2. show the path of prior research and how the current project is linked to it;
3. integrate and summarize what is known in an area;
4. learn from others and stimulate new ideas. (Neuman, 2000, p. 111)

In addition, this review of the literature seeks to identify the research questions that will inform the researcher's methodological choices and the design of this research study (Hart, 1998). To this end, this review of the literature begins by situating the research problem within the theoretical debate generated by the phenomenon of curriculum reform. Figure 3.1 summarises this review of the literature into a conceptual framework. It demonstrates the bringing together of the literature on educational change, teacher professionalism and professional development to the professional learning community within the context of mandated curriculum reform.

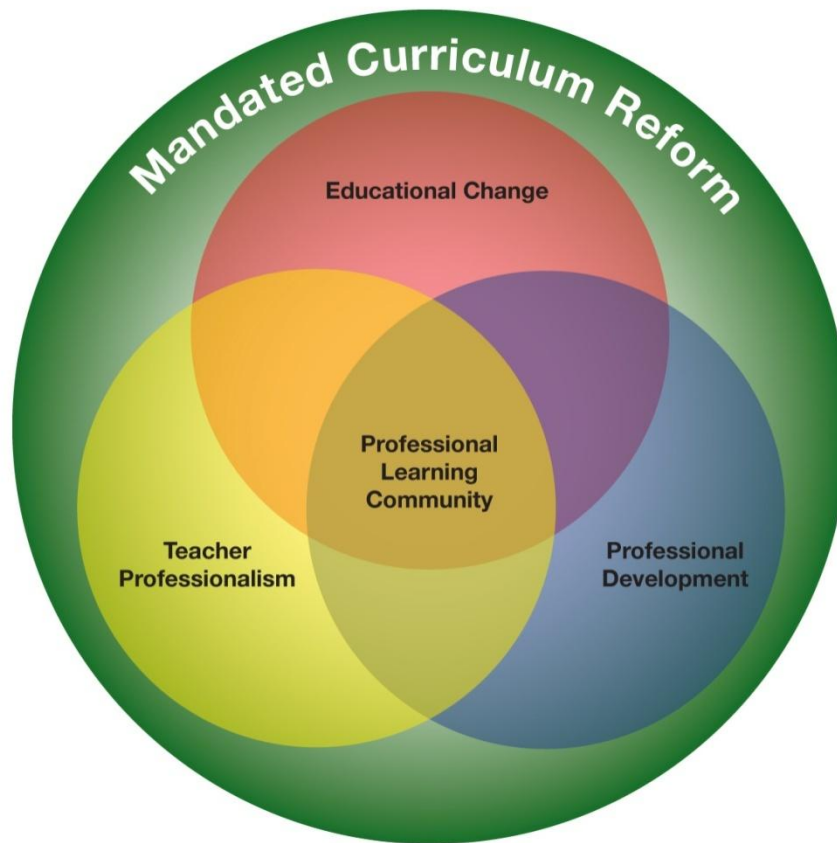


Figure 3.1 Conceptual framework of literature review

Here it is accepted that educational change has, over time, influenced and is influenced by theoretical developments with respect to teacher professionalism and professional development. Whilst theorists have worked independently to address the challenges of educational change, teacher professionalism and professional development, emergent theories in each of these areas have generally coalesced around the concept of the professional learning community (PLC). In short, the professional learning community, by emphasising professional activism and learning, assists teachers to understand educational change, and suggests the way forward with respect to leading the implementation of a curriculum reform.

This conceptual framework of the literature supports the structure of this chapter. The chapter begins with a discussion of curriculum reform in Section 3.2. Following this discussion, Sections 3.3, 3.4 and 3.5 explore theoretical developments with respect to educational change, teacher professionalism and professional development, before reviewing contemporary writing of the concepts of the professional learning community

in Section 3.6. This section is followed by a discussion on leading the professional learning community in Section 3.7. The threads from each of these sections are drawn together in a discussion on implementing curriculum reform in the professional learning community in Section 3.8. The research question and conclusion to this chapter are outlined in Section 3.9.

3.2 CURRICULUM REFORM

The literature has identified the consistent failure of curriculum reform with respect to mathematics (Handal & Herrington, 2003), and it seems that there are a number of specific inhibitors to curriculum reform within this teaching area. These inhibitors include a lack of content knowledge (D. L. Ball & Bass, 2003; Lamb, 2003; Ma, 1999; White, et al., 2005), an insecurity with respect to newer pedagogies in mathematics (Davis, 1990; Schoenfeld, 2000), as well as a resistance to curriculum reform (Carroll, 1998, July; Cuban, 1993; Martin, 1993; Memon, 1997; Smylie & Perry, 2005).

However, this failure of curriculum reform in mathematics reflects the challenge of implementing curriculum reform. As MacDonald (2003) writes:

When visiting friends and watching their chookhouse, I was reminded of the chaos currently occurring in the light of a proposed curriculum change in Australian schools. With no disrespect to educators or teachers in schools, or curriculum theorists who inform the innovation, it seemed that this particular innovation was lobbed on to schools, whereupon the principal, that is the rooster, and the teachers, that is the chickens, went into a flurry of activity. However, like the modernist school system¹³ in which entrenched knowledge and practices often override the innovative ideal, the chookhouse quickly returns to its normal routine. (p. 139)

Explaining this failure of curriculum reform, Fullan (1999) contends that “we are in the very early stages of appreciating the nature and complexity of educational reform on a large-scale” (p.6). It seems that curriculum reform is neither ‘clear cut’ nor simple due to contextual factors that conspire to inhibit implementation (Adams, 2000; Eisner, 2000; Fullan, 1999; McGinn, 1999). These contextual factors include the proliferation of precise objectives and standards that are tending to swamp teachers’ capacity to deal

¹³ Miller (2000) describes the modernist education system in terms of a vision of schooling that is highly regulated; views knowledge as rational and linear able to be divided into discrete segments; views students and their parents as consumers; and aims for a regulated, democratic and egalitarian social order.

with them, so that teachers tend not to be involved with shaping curricula. Consequently professional development is less likely to be effective, and it seems that the “institution is more likely to change the incoming message than the message the institution” (Eisner, 2000, p. 347) Moreover, Eisner (2000) argues that curriculum is directly impacted by the educational environment in which it is expected to function. Given these contextual factors, it is hardly surprising that there seems to be “chaos” in the “chookhouse” (MacDonald, 2003, p.139).

Beyond these contextual factors, the literature also calls for a new model of curriculum reform that relies on collaborative partnerships. Thus it is argued that curriculum reforms are most effective when both “top-down” and “bottom up” approaches to curriculum reform are employed (MacDonald, 2003, p. 142). Consequently, the literature recommends a new model of curriculum reform, a “partnership” (MacDonald, 2003) model, that relies on “collaborative relationships between administrators, curriculum developers, professional associations, researchers, teacher educators, teachers, and parents” (p. 142). For Fullan (1999), such partnerships involve “cross-boundary collaborations” as the range of stakeholders from various levels of the school and education system hierarchies work together.

Later, recognising the need for large-scale sustainable curriculum change, Fullan (2005a) also identifies the importance of leadership at all levels of the school and system: “If a system is to be mobilized in the direction of sustainability, leadership at all levels must be the primary engine...we need a system laced with leaders who are trained to think in bigger terms and act in ways that affect the larger parts of the system as a whole” (p. 27). Thus scholars now recognise the teachers’ leadership role in achieving sustainable curriculum reform at the school level. “Teachers are central to the improvement of schooling, and need to have a substantial role in shaping the direction, content and form of the changes being proposed. Teachers are, as they say, stakeholders and they are stakeholders of fundamental importance” (Eisner, 2000, p. 347). However, despite this support, opportunities for teacher participation are in reality limited, and “most [teachers] will not contribute to the construction of the institutional discourse” (Kirk & MacDonald, 2001, p. 565). In effect, partnership approaches to curriculum reform represent “pseudo-participation and quasi-democracy” (Smyth, 1998, p. 23) as teachers’ work is increasingly shaped by central policy makers. “At the level of constructing the

Profile, a Syllabus, or some curriculum document, most teachers *cannot* win the process and the resultant product” (Kirk & MacDonald, 2001, p. 565).

This review of the literature on curriculum reform alerts us to the impact of contextual factors on the success or otherwise of this reform. Likewise, this review of the literature confirmed the importance of teacher leadership and collaborative partnerships in support of curriculum reform. To further appreciate the position of teachers in an environment of curriculum reform, this review of the literature turned to theoretical developments in educational change, the teacher as professional and the issue of professional development. Here it was anticipated that this body of literature would point to a way forward with respect to meaningful curriculum reform.

3.3 EDUCATIONAL CHANGE

Since the 1950s, educational change has developed from a minor field of study to one of prominence (Miles, 2005). Over time, the literature identifies a series of distinct phases of educational change (Fullan, 2005b; Lieberman, 2005; Miles, 2005). Generally the 1960s was a period of wholesale “adoption” (Fullan, 1998b, p. 217) of innovations stimulated by the race for supremacy as the Cold War became entrenched. By the 1970s, the phase of ‘adoption’ of innovations was widely viewed as a failure (Fullan, 1998a), and scholars turned their attention to the implementation of change. It was during this “implementation” (Lieberman, 2005, p. 5) phase that researchers realised that change was a process, and the change process rested with the teacher. A sharp decline in government spending on education saw a new phase of educational change in the decade of the 1980s (Istance, 2001; Vongalis-Macrow, 2006, November-December), and theorists searched for new, cost-efficient ways of conducting educational change and, subsequently, identified the importance of meaning-making within the implementation process. As Fullan (1992) argues:

We have to know what change looks like from the point of view of the individual teacher, student, parent, and administrator if we are to understand the actions and reactions of each; and if we are to comprehend the big picture, we must combine the aggregate knowledge of these individual situations with an understanding of organizations and interorganizational factors which influence the process of change as government departments, intermediate agencies, universities, teacher federations, school systems and schools interact (p. ix)

In the 1990's, this appreciation of the importance of meaning-making was extended as theorists focussed on the moral purpose of educational change. It was in the early 1990s when Fullan realised that "moral purpose was a critical change theme ... [and that] ... moral purpose and change agency made perfect partners" (1998a, p. 222). Moral purpose encompasses the whole education system where enhanced student outcomes provide opportunities for students to learn in an environment that seeks to insure that "the gap between high and low performance becomes greatly reduced, and what people learn enables them to be successful citizens" (Fullan, 2003, p. 29). When moral purpose is at the forefront, meaning and purpose for change is established, leading to an enhanced capacity for change (Fullan, 2005a).

Beyond this concern for moral purpose, theorists also focused on centrally driven, large-scale educational change. Studies (e.g., Snipes, Doolittle, & Herlihy, 2002; Togneri & Anderson, 2003) highlight the importance of such strategies as improving instruction, ensuring relevant professional development and maintaining a commitment to distributed leadership at all levels. In addition, researchers (e.g., Earl, Levin, Leithwood, Fullan, & Watson, 2001; Leithwood, Jantzi, & Mascall, 2002) list seven essential criteria for successful curriculum change:

- A unifying vision and goals for the reform;
- Standards for judging the performance of students and others;
- Curriculum frameworks and related materials to assist in meeting the standards;
- A focus on teaching and learning, including teacher learning;
- Coherent aligned policies that reinforce standards and support the initiative;
- An agent who acts on information about accountability and incentives linked to performance; and
- Sufficient funding and workable governance structures.

Together, these criteria identify the need for comprehensive infrastructure to support change in both classroom and school practice. It is argued that by building teacher capacity to implement the reforms, it is possible to foster the development of school cultures that will sustain improved practices (Earl, et al., 2001). In short, there is a concern for "developing the collective ability – dispositions, skills, knowledge,

motivation, and resources – to act together to bring about positive change” (Fullan, 2005a, p. 4).

In a similar vein, Fullan (2005a) voiced a concern for achieving sustainability in educational change. Here sustainability is defined in terms of “the capacity of a system to engage in the complexities of continuous improvement consistent with deep values of human purpose” (p. ix). As a way forward, Fullan recommends professional learning as “the entry point” for leadership in the midst of educational change, and he also recommends the pedagogy of “reflective practice” (2005a, p. 48) as well as “developmental leadership that promotes progressive interaction that evokes the exchange of good ideas and fosters the cohesiveness of the group” (p. 24). In this way, schools become “collaborative cultures of inquiry that alter the cultures of learning in the organization away from dysfunctional and non-relationships towards the daily development of culture that can solve difficult or adaptive problems” (p. 23).

Developing this thought, others (e.g., Stoll, Bolam, McMahon, Wallace, & Thomas, 2006) promote the professional learning community with a view to building cultures of continuous improvement based on the collective analysis of student achievement data, and the application of teacher professional learning from reflective dialogue and inquiry (DuFour, DuFour, Eaker, & Many, 2006; Hord, 2004). Thus the emphasis is on collaborative inquiry into work practices which focus on “the action implications of what is known together” (Louis, 2008, p. 52). This active and participatory collaborative inquiry is identified in Little’s (2003) study of professional learning communities where groups of teachers:

...demonstrably reserve time to identify and examine problems of practice; they elaborate on those problems in ways that open up new considerations and possibilities; they readily disclose their uncertainties and dilemmas and invite comment and advice from others; and artefacts of classroom practice (student work, lesson plans, and the like) are made accessible. In all these ways, the groups display dispositions, norms, and habits conducive to teacher learning and the improvement of teaching practice. (p. 938)

In summary, this review of the literature indicates that our understanding of educational change has come a long way, yet it also seems that “nothing tried so far really works” (Fullan, 2005a, p. 13). In particular, emergent theory of educational change emphasises professional learning in the context of collaborative cultures of inquiry or professional

learning communities. Given this vision for the future, it is interesting to note parallel theoretical developments with respect to the concepts of teacher professionalism and professional development.

3.4 TEACHER PROFESSIONALISM

Understanding the changes that have occurred in teacher professionalism over time sheds further light on understanding its relationship with educational change. In the last 40 years there has been growing interest within the literature on the role of the teacher, and in the last decade there has been a call for teacher professionalism (O'Donnell, 2001). Structural functionalism dominated discussions on the role of the teacher until the 1970s, and remnants of this theory continue to surface from time to time (B. Preston, 1996). The basis of this theory is that within a structure each part has a function. The teachers' function was to be the "regulated servant" (Vick, 2001, p. 68) or "technician" (O'Donnell, 2001, p. 85) responsible for adopting the decisions of others. It was argued very early on in Australian teaching history that "if we allowed teachers to come up with their own idea of what is required there would be a state of confusion" (Vick, 2001, p. 68). This view of the teachers' role persisted in some circles where:

...quite recently, a prominent spokesman [sic] for employers in the independent schools sector in New South Wales remarked that he did not consider teachers to be professionals. Teachers, he said, were technicians who were good at implementing curricula and following practices and policies that are determined by others. (O'Donnell, 2001, p. 85)

The decentralisation of the management of education, and the subsequent school-based management, has in recent times also 'opened the door' to new forms of teacher professionalism. Decentralisation of the management of education to school based management in the 1990s has resulted in principals being in a position to legitimately delegate responsibility to their teachers (Moran, 1999). Consequently there are now strong arguments for "distributed leadership" (Harris, 2003, p. 313) or "parallel leadership" (Crowther, Kaagen, Ferguson, & Hann, 2002, p. 38) that allows teachers to move beyond being a servant or technician to assume a more proactive stance in school decision-making (Caldwell, 2005).

Paradoxically, at this time, a new quality agenda in education threatened further "de-professionalization" (Hargreaves, 2000, p. 176) of the teaching profession. In short, the

quality agenda assumes that Australia's economic competitiveness depends on a 'quality' workforce that, in turn, depends on 'quality' education and 'quality' teaching. This general concern for the quality of teaching encouraged education authorities to consider teacher registration, accreditation and certification (O'Donnell, n.d., p. 6).

Recognising this development, Sachs (2001) warns that:

Recent reforms particularly concerning devolution and marketization have given rise to a set of paradoxes about the nature of teaching as a profession and about the professional identity and professional development of teachers. First, is that the call for teacher professionalism related to a revisioning of occupational identity, is occurring at a time when there is evidence that teachers are being deskilled and their work intensified. Second, is that while it is acknowledged that rethinking classroom practice is exceptionally demanding, fewer resources are being allocated to teacher learning. Third, the teaching profession is being exhorted to be autonomous while at the same time it is under increasing pressure from politicians and the community to be more accountable and to maintain standards. As a consequence of the paradoxes underpinning the changes in education policy and practice the very idea of teacher professionalism and professional identity needs to be debated and resolved. (p. 150)

Moreover, Sachs (2001) alerts us to two contrasting discourses that advance two distinct forms of teacher professional identity.

The managerialist discourse fosters an entrepreneurial identity in which market and issues of accountability, economy, efficiency and effectiveness shape how teachers individually and collectively construct their professional identities. Alternatively, democratic discourses, which are in distinct contrast to managerialist ones, support an activist professionalism in which collaborative cultures are an integral part of the teachers' work practices. These democratic discourses provide conditions for the development of communities of learning or practice. (p. 134)

Noting the struggle for meaning between managerialist and democratic discourses, Sachs (2000a) advances "activist professionalism" (p. 8) or "transformative professionalism" (Sachs, 2003, p. 119) as the way forward. This new form of professionalism is founded on five principles of "learning, participation, collaboration, cooperation and activism" (pp. 31-35). Here, teachers actively work with key stakeholders, school administrators, parents, students and the wider community to address educational issues. This collaboration supports professional "knowledge generation and learning" (p. 119), as well as creating "active trust" (Sachs, 2003, p. 140) and "generative politics" (p.144). This view of teachers actively collaborating with stakeholders and bringing about change

is said to enhance the teachers' professional standing as they lead their immediate and wider community to a more informed position on the purpose of education. Here, meaning for teachers rests with their personal commitment and motivation to proactively address their moral purpose (S. Ball, 1999). Moreover, "knowledge generation and learning go hand in hand with establishing a transformative professionalism. Learning transforms who we are and what we do, and consequently involves the development of new teacher identities" (Sachs, 2003, p. 119).

In summary, this review of the literature on teacher professionalism illustrates how a particular identity for teachers was constructed, that of "regulated servants" (Vick, 2001, p. 68) or "technician[s]" (O'Donnell, 2001, p. 85) who follow instructions. In recent times, whilst there has been support for teacher professionalism, teachers paradoxically are caught between managerialist and democratic interpretations of professionalism. It seems that politicians and policy makers support managerialist forms of professionalism based on market principles of "accountability, economy, efficiency and effectiveness" (Sachs, 2003, p. 134). In contrast, the literature (e.g. Sachs, 2003) argues for a democratic understanding of teacher professionalism based on principles of "learning, participation, collaboration and cooperation and activism" (pp. 31-34). In other words, this new democratic teacher professionalism has been linked to the practices that scholars now associate with the professional learning community and cultures associated with continuous school improvement (Stoll, Bolam, McMahon, Wallace, et al., 2006) and educational change (Fullan, 2001).

3.5 PROFESSIONAL DEVELOPMENT

Over time our understanding of teacher professional development has been influenced by both the discourses around teacher professionalism and the theoretical developments with respect to educational change. In particular, it is acknowledged that teachers not only need to change their own educational practices, but that as activist professionals they are also the most significant change agents to bring about change within the education system (Villegas-Reimers, 2003). In response to this understanding the focus of professional development has, since the 1960s, tended to reflect the purpose of educational change and target how teachers learn and respond to change.

Since the 1960s, professional development has been understood in terms of a deficit model in which "knowledge was generated by experts and transmitted to teachers"

(Peters, 2001). Most often, professional development was provided through one-day workshops where the teachers were expected to return to the classroom and teach the new material in the way demonstrated (McLaughlin, 1997). This model of teacher professional development required a predominantly passive response from the teacher recipient (Hager, 2005; Joyner, 2001; Shuell, 1986). Theorists criticised this deficit model, saying it stems from the flawed assumptions about how adults learn (Christopher Day, 2000; Lieberman & Grolnick, 1997; Retallick, 1997). These assumptions include the premise that teachers' knowledge needs to be 'topped up', and that this is possible while they continue to work in isolation. It is also argued that theorists who utilise the deficit model have overlooked the way teachers learn and process information, arguing for a model that allows for co-constructing and reflecting with their peers, a practice that has traditionally been denied to teachers (D. L. Ball, 1996; Lieberman, 1995; Skyes, 1999).

Whilst this understanding of professional development continued to dominate during the 1970s, and the focus in the educational change literature shifted to implementation, theorists focussed on the social context of professional development. At this time, Lortie's (1975) seminal research showed that the style of professional development was inappropriate in inspiring educational change if teachers worked in isolation. Thus he argued that teacher professional development required not only 'private' cognitive activity, but also learning with others as a way to limit individualism and conservative practices that encourage short term thinking. By the 1980s, researchers no longer saw teachers as "objects or targets" ready to adopt new innovations, but rather as "agents of change" needing to be supported in a collegial environment (Sleegers, Bolhuis, & Geijssel, 2005, p. 533). Thus professional development was linked to reflective and collaborative practice within a particular context (Darling-Hammond, 1998; Ganser, 2000; McLaughlin, 1997).

In the decade of the 1990s, professional learning within a community was well recognised as an important component for educational change, but was not widely utilised (Fullan, 2005a; Ingvarson, Meiers, & Beavis, 2005; Smylie & Perry, 2005). However, researchers (e.g., Hawley & Valli, 1999) continued to find that the professional development was wasteful and ineffective because it did not address the adult learners' needs. Success was confined to individual schools, and in the main, these schools were associated with specific research projects rather than being evident across

the board (Cochran-Smith, 2005; Ingvarson, et al., 2005). Moreover, there was strong criticism levelled at educational authorities who failed to provide appropriate teacher professional learning (Smylie, 1995). Consequently, voices in support of a collaborative culture for teacher learning within the school environment became louder during the 1990s and into the new millennium. For example, Joyce and Showers (1995) posit that:

...without companionship, help in reflecting on practice, and instruction of fresh teaching strategies, most people can make very few changes in their behaviour, however well-intended they are” (p.6).

McLaughlin (1997) agrees: “like students, teachers learn by doing, reading, reflecting, and collaborating with other teachers” (p. 82). At the same time, Eisner (2000), reflecting on past experience, strongly criticises “passive” (p.347) forms of teacher in-service that fail to appreciate “the concrete conditions within which the teacher works” (p.347), and argues against the assumption that “the golden tongues of orators will penetrate the teacher’s cortex and transform the teacher from a pedagogical mediocrity into a pedagogical expert” (p.347).

There is a strong interest in developing different models of professional development that link professional learning and reflective, collaborative practice with a view to supporting educational change. As a result, theorists have studied professional development in the context of school networks and collegial groups as well as action research projects (Sachs, 2000b). The teacher networks model focuses on bringing teachers together to reflect on their practices (Huberman, 2001; Lieberman, 1999); the collegial development model encouraged teachers to collaborate specifically to ensure quality of curriculum development and implementation (Glatthorn, 1995); while the action research model, where teachers adopted the role of researcher, was also espoused (Stokes, 2001). In short, theorists recommend active professional development opportunities that are linked to educational change projects (Lingard, et al., 2001).

Recognising these theoretical developments, theorists (e.g., Lee, 2005) were now in a position to list the characteristics of successful professional development:

- Teachers to construct new instructional materials and strategies that are coherent with other learning activities translating theory into practice;
- The promotion of concrete tasks of teaching, assessment, observation and reflection by looking at students work or case studies collaboratively;

- The duration of the activity will have a significant effect on teacher learning, and must be grounded in inquiry, reflection, and experimentation that are participant-driven with the view to creating new knowledge;
- Allow for collective and collaborative participation from the same school, subject area or grade to sustain their learning;
- Focus on content knowledge; and
- Enhance the professional learning community.

In this way, professional development is not seen as the provision of a set, specific activity or piece of information, as is the case with the deficit model, but as an ongoing process that influences the quality and expertise in the practice of teaching (Darling-Hammond & McLaughlin, 1999). Capacity building within the school is deemed to be critical, and must involve participation from a range of players who can support community and “provide the critical friendship that will enable them to develop confidence and independence to gather and use evidence wisely to enhance and sustain improvements in students’ learning” (Stoll & Stobart, 2005, p. 169).

In short, this model of professional development presupposes a professional learning community with “a specialized and technical knowledge base” (Stoll & Seashore Louis, 2007, p. 2), and to develop this knowledge base, researchers recommend collective or “networked learning” for professionals. It seems that collective learning is the distinguishing feature of the professional community, and is also likely to be the last to be developed, since it generally requires a significant paradigm shift in how teachers and schools approach professional learning (Hord & Sommers, 2008). By challenging the traditional isolationist norms of teaching and requiring high levels of mutual trust, collective learning represents the deprivatisation of teacher practice (Lieberman, 2007). This collective professional learning embodies joint knowledge creation, and involves practices such as “peers helping peers”, regular visiting of each other’s classrooms for observation and feedback, peer mentoring and coaching (DuFour, et al., 2006; Hord, 2004). At the same time other formal and informal shared practice activities allows peers to understand “how the teacher sees herself as a professional, her views about general pedagogical issues and how these have developed over time (her career and experience)” (Millett & Bibby, 2004, p. 6).

These formal and informal shared practices remind us of the importance of the cyclical nature of developing teacher efficacy through professional development (Schatz, 2006; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998) . With every new task, teachers need to go through a process: from unconscious incompetence where a position of comfort is experienced, to conscious incompetence where they will certainly experience a sense of insecurity, before entering a state of conscious competence before entering a state of unconscious competence. They will then have no need to dwell on their competency level (Schatz, 2006). In short, “the proficiency of performance creates a new mastery” (p. 228). However, this process will require greater effort and persistence.

Greater efficacy leads to greater effort and persistence, which leads to better performance, which in turn leads to greater efficacy. The reverse is also true. Lower efficacy leads to less effort and giving up easily, which leads to poor teaching outcomes, which then produce decreased efficacy. Thus, a teaching performance that was accomplished with a level of effort and persistence influenced by the performer's sense of efficacy, when completed, becomes the past and a source of future efficacy beliefs. Over time this process stabilizes into a relatively enduring set of efficacy beliefs. (p. 228)

At the same time, this process is facilitated if there are opportunities for the individual and groups to access various “sources of self-efficacy information” (Schatz, 2006, p. 228), including “mastery experiences”, “physiological and emotional clues”, “vicarious experiences”, “verbal persuasion” and “cognitive processes” (pp.229-230). In brief, mastery experience is the most powerful source of support of efficacy, as success breeds both self-efficacy and confidence for the future. In addition, “feelings of relaxation and positive emotions signal self-assurance and the anticipation of future success” (p. 229). The outcomes of professional development, classroom observation, collegial dialogue, vicarious experiences and verbal persuasion contribute to information and provide specific performance feedback. This “cognitive processing determines how the sources of information will be weighed and how they will influence the analysis of the teaching task and the assessment of personal teaching competence” (p. 230). In short, a teacher’s engagement with a new task, such as teaching a new curriculum in mathematics, will depend on his/her assessment of teaching efficacy and the availability of various sources of self-efficacy information.

However, for some time, there have been concerns that in an era of managerialism, there are fewer possibilities for professional development within the professional learning community. For example, Gilbert (1994) concludes that in an era of managerialism in New Zealand, education authorities search for “new and powerful ways of achieving the compliance of teachers” (p. 511). By the new century, Bolam (2000), reviewing “the impact of broader [education] policy changes in England and Wales – rooted in the raising standards and managerialist projects of continuing professional development” - argues that “the pendulum has swung too far towards system-led training” (p. 267). Investigating this development, research (e.g., Bolam, 2000; Patrick, Forde, & McPhee, 2003) has found this approach “counter-productive and non-cost effective” (Bolam, 2000, p. 278) in terms of implementing curriculum reform and improving student learning. “The issue has been, and still is, how to strike an appropriate balance between meeting the needs of individual professionals on one hand, and of the school and national policy on the other” (p. 278). To this end the “focus should be on strengthening opportunities for individual teachers to meet their professional needs” (p. 278). Consequently, it is argued that “teacher education must move from technicist emphases, to a model that integrates the social processes of change within society and schools with the individual development and empowerment of teachers” (p. 273). Again, such claims suggest the need to nurture a school-based professional learning community.

In conclusion, this review of the literature on educational change, teacher professionalism and professional development suggests a strong link between educational change, teacher professionalism, and teacher learning in the context of a professional community. Recognising the challenge of educational change, there are calls for a ‘new professionalism’ coupled with a commitment to teacher learning. Moreover, the case is made for new models of professional development that support development and empowerment of the individual teacher as well as meeting societal and school needs. These theoretical developments are displayed in Table 3.1

Table 3.1 Trends in the context of teaching as occurring within a professional learning community

Phase	Educational Change	Teacher Professionalism	Professional Development
1960s	Adoption of Innovations (Fullan, 1998)	Teacher as regulated servants (Vick, 2001)	Deficit Model (Day, 2000) Innovation adoption (Shuell, 1986)
1970s	Implementation process rests with teacher (Lieberman, 2005) Teacher-proof innovations (Lieberman, 2005) Supported implementation (Miles, 2005)	Teacher as technician (Lortie, 1975)	PD in isolation (Lortie, 1975)
1980s	Worldwide recession leads to reduction in public funding (Vongalis-Macrow, 2006) Cost efficient methods and meaning-making (Fullan, 2003)	Teachers as change agents (Fullan, 1993)	Teachers seen as agents of change (Sleggers et al, 2005) PD changed from individual to school responsibility (Sleggers et al, 2005)
1990s	Moral purpose (Fullan, 1998) Centrally driven large scale reform (Leithwood et al, 2002) Building teachers' capacity (Fullan, 2005) School culture to sustain improved practice (Earl et al, 2001)	Decentralisation (Moran, 1999) Teachers with managerial roles (Sachs, 1997) New professionals (Hargraves, 1994) Distributed leadership (Harris, 2003) Managerial discourses along with marketisation and privatisation (Blackmore, 2004)	The provision of different learning experiences (Fullan & Stegelbauer, 1999) Collaborative learning (Joyce & Showers, 1995)
Current	Continuous school improvement in the context of the professional learning community (Stoll, Bolam, McMahon, Thomas, et al., 2006)(Stoll et al, 2006)	Learning community of activist professionals (Sachs, 2003)	Capacity building within a professional learning community (Stoll & Stobart, 2005; Hord & Sommers, 2008)

Table 3.1 provides an overview of the literature with respect to educational change, teacher professionalism and professional development and by comprehensively studying this body of literature it seems that theoretical developments highlighted the importance of collaboration, capacity building and sustainability being shared by all three. Collectively these ideas seem to suggest the need to situate curriculum reform within the context of what theorists now refer to as the professional learning community.

3.6 PROFESSIONAL LEARNING COMMUNITY

A precise definition for the professional learning community is not provided in the literature, although it has been characterised in many ways (Hord & Sommers, 2008) with “shades of interpretation in different contexts” (Stoll, Bolam, McMahon, Thomas, et al., 2006; Stoll, Bolam, McMahon, Wallace, et al., 2006). However, “there is general consensus that you will know one exists, when you see a group of teachers sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth promoting way” (Stoll & Seashore Louis, 2007, p. 1). Here, teachers as professionals see their work in terms of a collective project (King & Newmann, 2001). Moreover, their focus is on their collective purpose of enhancing student learning (Bolam, et al., 2005).

The professional learning community is typically referred to in terms of:

...an inclusive group of people, motivated by a shared learning vision, who support and work with each other, finding ways, inside and outside their immediate community, to enquire on their practice and together learn new and better approaches that will enhance all pupils’ learning. (Stoll, Bolam, McMahon, Thomas, et al., 2006, p. 1)

Moreover, researchers generally agree that shared vision and values represent central characteristics of a professional learning community. Together, shared vision and values offer a lens through which a school views and directs school improvement, and represents the “collective commitment to guiding principles that articulate what the people in the school believe and what they seek to create and are embedded in the hearts and minds of people throughout the school” (DuFour & Eaker, 1998, p. 25). In a professional learning community, this shared vision and values “lead to binding norms of behaviour that the staff supports”, and can be both enabling and constraining to what goes on in that school, as evidenced by the school staff culture (Hord, 1997, p. 2). In short, shared vision and values direct the teachers’ work and learning, and a sense of work efficacy develops which directly impacts on classroom practice (Andrews & Lewis, 2007).

Professional learning communities are also characterised as relational school cultures in which professionals are prepared to support and work with each other (Stoll, Bolam, McMahon, Thomas, et al., 2006). A relational school culture is expressed in

different ways in the literature, but all emphasise relationships among teachers of mutual care, trust and respect that spontaneously develop from interactions between teachers; without this culture it is impossible to build a professional learning community (Hipp & Huffman, 2003). Thus the literature highlights the importance of developing physical conditions and organisational structures (e.g. time) that enable staff to regularly come together in ways which encourage and sustain a collegial atmosphere (Hord, 1997, 2004). Consequently, Toole and Louis (2002, p. 249) identify the underpinning central idea of a professional learning community as “the existence of a social architecture to school organizations that helps to shape both teachers’ attitudes and practice” (p. 249), and which is manifest in the day to day work lives of teachers, including their commitment to professional learning. This is the micropolitical context in which the teachers’ work is done (Smeed, et al., 2009).

Finally, in seeking to define professional learning communities, researchers have identified the role played by external stakeholders in the establishment and development of professional learning communities (Stoll & Seashore Louis, 2007). In particular, there is concern that local professional learning communities of teachers extend their knowledge base by accessing “external stakeholders with specific expert knowledge that schools either call on or who, through critical friendship or creating ‘urgency’, may generate the impetus for developing PLCs[professional learning community]” (p.4). Thus it is argued that “professional learning communities can cross boundaries, both the fuzzy social differentiations that develop within the school, and the clearer borders that separate the school’s members from those in the community and in other schools” (p.4). Here the micropolitical environment of the professional learning community interacts with the macropolitical context that operates beyond the school (Smeed, et al., 2009).

3.6.1 Impediments to the Professional Learning Community

Despite strong arguments in support of the professional learning community and a growing knowledge base around this phenomenon, researchers continue to identify the gap between the vision and reality of the professional learning community. In particular, the literature identifies four types of impediments and inhibitors to the professional learning community and to successful professional learning: inappropriate structures, inadequate social capital, sustainability and inhibitors to successful professional learning.

Structures

A number of structural impediments have been identified in the literature. For example, documented “structural impediments” (McLaughlin & Talbert, 2007, p. 152) to teachers’ professional learning communities include “paperwork, classroom management tasks, and multiple course preparations draw[ing] teachers’ time and energy away from getting to know the students personally, and working with colleagues on instruction” (p.152). Closely associated with this line of argument is the premise that external contexts are influencing the work of the professional learning community, because “high stakes accountability systems that press for immediate test-score gains in literacy and mathematics, affect high school teachers’ choices as they do their colleagues at elementary and middle school levels” (p.153).

Underpinning these features of contemporary school life, deeper issues are at play. Global competitiveness has resulted in the rise of performativity and presentism. Typically, scholars (e.g., J. Miller, 2000) rely on Lyotard’s (1984, Translation from French by Geoff Bennington and Brian Massumi) appreciation of the postmodern condition as extreme capitalism, and his explanation of “performativity” (p.17) that links technologies (particularly information technologies). Therefore, performativity is viewed in terms of high stakes accountability that relates to immediate gains in test scores. It has been described as:

a new mode of state regulation which makes it possible to govern in an ‘advanced liberal’ way. It requires individual practitioners to organize themselves in response to targets, indicators and evaluations. To set aside personal beliefs and commitments and live an existence of calculations. The new performative worker is a promiscuous self, an enterprising self, with a passion for excellence. (S. Ball, 2003, p. 215).

Consequently, schools are being pushed more and more to demonstrate improving levels of performance as they are judged and compared in the media according to key performance indicators. As a consequence, the school has become the commodity in the market, and with this commodification of the education sector, the culture of self interest and survival intensifies (Luke, 2004).

In dealing with performativity growing evidence of presentism has been documented with Lortie (2002) first describing presentism as the short term thinking that teachers

adopted when dealing with issues as they presented. His research described a situation in which teachers are either unable or unwilling to work collaboratively, develop a school vision and implement this vision for long term systemic change. Consequently he associated presentism with individualism, conservatism and isolation.

Moreover, as global pressures to compete internationally have heightened, a culture of immediacy of policy reforms has resulted in an “avalanche” (Millett & Bibby, 2004, p. 9) of policy reform, originating from education departments and impacting on the way teachers implement change. Consequently, research indicates that presentism has only grown in intensity, with “addictive presentism” (Hargreaves & Shirley, 2009, p. 9) reflecting the apparent obsession by the school community with short term gains at the expense of long term planning, resulting in a narrow view of the purpose of education reform being promoted (Hargreaves, 2009). This short term perspective is directly linked to performativity.

In line with heightened performativity and presentism, there is increasing evidence of managerialism in education, a tool through which an entrepreneurial competitive culture within and between schools can be created (Bernstein, 1996, p. 75). Instead of nurturing the professional learning community, the discourse of managerialism has, in fact, resulted in a “new moral environment” that is created around the growing “culture of self interest” (S. Ball, 1999, p. 4). Stephen Ball draws on market theory to support this position (e.g., Benton, 1992; Plant, 1992). He interprets market theory and its application to education, as a culture where both consumers’ and producers’ personal motives are prominent and are advanced by the rewards of market forces. Here, competitive behaviour creates the struggle for advantage. Global pressures of performativity and presentism have prompted managerialism to enter the education sector as the “key mechanism of political reform and cultural re-engineering of the public [education] sector” (S. Ball, 1999, p. 6). For Ball, managerialism works from the inside out, while the agenda of performativity in the form of test scores and league tables has forced this culture of self interest from the “outside-in” (S. Ball, 1999, p.6). These arguments continue in the literature with Blackmore (2004) arguing that

...the tools that calibrate this [school machine] are the audit, the review, evaluations, standardised tests and exit scores. These measures provide a

level of visibility that satisfies the media and market demand for data, while being seen to manage risk and efficiency...Performativity is first about efficiency, but it is also about image or being seen to be doing something. (p. 22).

Moreover, it is argued that principals taking on this managerialist role are resorting to 'power over' approaches, where the principal can force teachers to behave in a certain manner (Fennell, 1999). Even though it is well recognised in the literature that 'power over' practices are destructive of relationships (Blase & Blase, 2005), they have come into prominence in order to meet contractual accountability requirements (Smeed, et al., 2009). This practice challenges teachers' professional judgements as survival techniques and can be seen in the form of "educational triage" (Booher-Jennings, 2005, p. 231), where recourses for students are rationed depending on how they have been categorised – "safe cases, suitable cases for treatment, and hopeless cases" (Booher-Jennings, 2005, pp. 232-233). At the same time there is also evidence of a commitment to educational innovation, as funding models are now "premised upon enrolments and mobilised by discourses of choice". Consequently, this environment creates disincentives for teachers to spend time collaborating with colleagues and stakeholders or investing in professional development (McLaughlin & Talbert, 2007, p. 152).

Social capital

Beyond these structural impediments, research also highlights the issue of developing "social capital [that] underpins successful collaborations and partnership" (Stoll & Seashore Louis, 2007, p. 150) within the professional learning community. According to Mulford (2007), "the importance of bonding social capital has clearly been illustrated. Collective efficacy has also been shown to be a precursor to the professional learning community" (p. 171). However, a number of factors have been found to challenge the development of appropriate social capital. These challenges include "personal autonomy, the inevitability of conflict, the fact that not everyone benefits, its use for political purposes, the stage of staff development and the possibility of group think, accountability pressure and the lack of school ownership or control over its actions" (p. 171). Of these challenges the political dimension of school culture is considered particularly problematic. Mulford (2007) argues that as

schools “become more collaborative, collegial and democratic, they become more political” (p. 170). However, Achinstein (2002) warns that conflict is central to community and how teachers manage this conflict; whether they suppress or embrace their differences will ultimately affect the professional learning community’s potential for learning and change.

Sustainability

There are warnings in the literature with respect to the long term sustainability of the professional learning community, when members of this community forget their core purpose of learning (i.e. student learning and professional learning). Developing this thought, Hargreaves (2007) argues that “from their promising beginnings, so-called professional development communities are increasingly turning into something else” due to “ideological and legislative emphases on only literacy and numeracy as a focus of improvement, and on test achievement as the only way to measure it” (p. 183). Consequently, “instead of being intelligently informed by evidence in deep and demanding cultures of trusted relationships that press for success, professional learning communities are turning into add-on teams that are driven by data in cultures of fear that demand instant results” (p. 183), and where principals exercise power over the teachers so that the school meets its “contractual accountability” requirements (Smeed, et al., 2009, p. 34). Thus:

A sustainable professional learning community is not a team of teachers meeting after an exhausting day’s school, under the watchful eye of a matriarchal or patriarchal school principal to disaggregate data of tested achievement as a way to devise quick-fix increases in test scores... Sustainable professional learning communities, rather, make deep and broad learning their priority. They put learning first – before achievement and testing – and get better achievement as a consequence. They distribute leadership widely and wisely in trusted and also challenging communities that are dedicated to improving learning and achievement. They do not depend on the parental authority figure of the school principal, but plan for the succession of principals and change champions, creating a strong, resilient and distributed teacher culture that will smooth the path of succession events. (Hargreaves, 2007, p. 192)

In order for this perspective on sustainability to be realised, a paradigm shift for teachers from “Me and My Class” to “Us and Our School” (Schatz, 2006, p. 44) is required. The success of this shift rests with teacher readiness to leave the security of their own ways

as they journey through a “process of human sense-making” (Spillane, et al., 2002, p. 419). As discussed earlier, teachers need to go through this process as they move from a state of unconscious incompetence, where a position of comfort is experienced, to conscious incompetence where they will certainly experience a sense of insecurity. This state usually forces teachers to respond in a way that results in the acquisition of newly acquired knowledge. Teachers then experience a feeling of confidence as they move into a phase of conscious competence, before entering a state of unconscious competence where they have no need to dwell on their competency level (Schratz, 2006). Such pedagogical development largely depends on the level of teacher professional learning.

Professional learning

As discussed earlier, professional development has been understood in terms of a deficit model in which “knowledge was generated by experts and transmitted to teachers” (Peters, 2001, p. 1), most often through one-day workshops where the teachers were expected to return to the classroom and teach the new material in the way demonstrated (McLaughlin, 1997). Researchers note that this model of teacher professional development required a predominantly passive response from the teacher recipient (Hager, 2005; Joyner, 2001; Shuell, 1986)

However, in recent times, theorists (e.g., Senge, et al., 2000) have made the link between organizational change and the need for professional learning. Most significantly, Senge and his colleagues have identified the relationship between “organizational architecture: the domain of action” and the “deep learning cycle: the domain of enduring change” (p. 26). In this understanding, enduring educational change requires a deep learning cycle in which

Learning takes place when new skills and capabilities (e.g. skills in productive conversation or systems thinking), new awareness and sensibilities (e.g. awareness of our aspirations, current reality and mental models), and new attitudes and beliefs (values and assumptions about the world) reinforce each other. (p. 26)

Developing this thought, Fullan (2005a) recommends professional learning as “the entry point” (p. ix) for leadership in the midst of educational change. As a way forward, he recommends the pedagogy of “reflective practice” (p. 48), as well as “developmental

leadership that promotes progressive interaction that evokes the exchange of good ideas and fosters the cohesiveness of the group” (p. 24). Together,

Progressive interactions and the language of transformation find value in certain kinds of conflict and deal with it productively; provide feedback that is conducive to learning; access good knowledge on an ongoing basis; make people feel committed; generate patterns of cumulative coherence; help people to focus collectively; are reflective-action oriented (strong on doing); and give people experiences outside themselves that foster system thinking in action. (p. 49)

Recognising these impediments to the development of school-based professional learning community, researchers have moved beyond seeking to define the professional learning community and its challenges, to focusing on gaining a deeper understanding of how professional learning communities develop. Thus the issue of leading the professional learning community has become a major focus within the literature.

3.7 LEADING THE PROFESSIONAL LEARNING COMMUNITY

Contemporary literature suggests a direct link between transformational and distributed leadership and the professional learning community. Mulford (2007) writes that:

Transformational leadership (made up of individual support, culture, structure, vision and goals, performance expectations, and intellectual stimulation); distributed leadership and organisational learning (made up of a trusting and collaborative climate, a shared and monitored mission and taking initiatives and risks with ongoing, relevant professional development) and student outcomes measured by participation in and engagement in the school. Both the principal’s transformational leadership, and the schools’ distributed leadership, contributed to organisational learning. (p.14)

In addition, leading the professional learning community is usually identified in terms of creating and sustaining the essential characteristics of the professional learning community. Thus leadership in the professional learning community is associated with developing shared vision and values (Silins & Mulford, 2005), establishing a supportive school culture (Collard, 2004), focussing attention on student learning (Bolam, et al., 2005; Huffman & Hipp, 2003), encouraging teacher professional learning (Fitzgerald & Gunter, 2006) and supporting continuous improvement (Andrews & Lewis, 2007). In short, leading the professional learning community requires leadership capabilities with respect to “changing the context, helping create new settings conducive to learning and sharing that learning” (Fullan, 2002, p. 411).

Reflecting these various thoughts, Mitchell and Sackney (2000) advance “adaptive leadership” that is characterised by

...adaptability and the ability to respond nimbly to challenges and issues. Such an approach to leadership: . . . is collaborative and values teamwork; actively engages parents as partners; seeks student participation and involvement in decision making; utilizes community resources and expertise. The school leadership team’s mandate is to create the conditions for growth and change to occur. In order to do so, they must develop the culture, structures, and processes to support, facilitate, and lead vibrant learning communities that take an active, reflective, collaborative, learning-oriented, and growth promoting approach toward the mysteries, problems, and perplexities of teaching and learning. Leaders are expected to take an active role in shaping people’s beliefs and values by creating a broader reference for their learning community. In order to do so, they must ensure that: . . . every member of the community is a learner; the learning community has a clear purpose, vision, and goals; the learning community values a collaborative culture and nurtures strong, meaningful relationships; leadership is shared among participants; structural conditions support members as a learning community... (pp.38-39)

In this way, adaptive leaders move beyond maintenance and control and instead seek to build capacity and leadership among learning community members. Moreover, the leader instils an attitude and culture of professional accountability where teachers feel personally committed to investing in the professional learning community (S. Ball, 2003).

Developing this thought, it is argued that those with positional power (e.g. the school principal) can create the conditions for a sustained focus on vision and values, and facilitate supportive structures for the development of a school’s learning goals (Senge, et al., 2000). In addition, it is also argued that success will depend on the choice of priorities made by the leader (Leithwood, Louis, Anderson, & Wahlstrom, 2004). These conditions may be difficult to isolate, with Robinson (2006) reporting a paucity of empirical evidence about the link between the impact of leadership on the professional community, and on student results. Despite this lack of evidence, DuFour and DuFour (2003) recommend being “tight” (p. 13) on establishing a clear priority on a focused purpose of the ‘big ideas’ of a professional learning community, and “loose” (p. 13) on providing teachers with sufficient autonomy to achieve these big ideas. In addition to this recommendation, it is also suggested that principal leaders need to make the best of

human and social resources; and manage structural resources whilst interacting with and drawing on external agents (Stoll, Bolam, McMahon, Wallace, et al., 2006).

Further to the leadership role of the principal, the literature also offers the possibility of teacher leadership in the context of the professional learning community. While the leadership of the school principal is critical to the development of the professional learning community (Hord & Sommers, 2008), leadership that is “stretched over the school” (Hargreaves & Fink, 2006, p. 109) is recognised as one of the elements of the professional learning community (Ailwood & Follers, 2002). Despite this appreciation of teacher leadership we have only just come to a clearer understanding of the phenomenon of teacher leadership. Initially, it seemed that teacher leadership was associated with teachers who assume formal ‘positional’ leadership roles, such as head of department or senior teacher (Smylie, 1997). However, in more recent times, educational leadership has been framed in terms of a shared and collective enterprise that can connect with the many rather than the few (Harris & Muijs, 2003). Thus teacher leadership was extended beyond formal ‘positional’ leadership roles to include the leadership potential of the classroom teacher (Muijs & Harris, 2007).

This understanding of teacher leadership is evident in the Australian research study, *Teachers as Leaders Research Project* (Crowther, Kaagan, et al., 2002) that resulted in the research team conceptualising school leadership as “parallel leadership” (p. 44). Focusing on the dynamics of school revitalisation and reform in support of student learning, this model of parallel leadership engages “processes of professional learning, culture building and, school wide pedagogy to enhance a school’s overall capacity to produce positive student outcomes” (p. 43). Here the principal as leader focuses on strategic development, while teacher leaders are concerned with pedagogical development. Each leadership role in its own way, is said to contribute to leading learning. In short, “When the school’s professional community engages in school wide pedagogical development and, at the same time, works towards a distinctive identity, it maximizes its capacity to enhance outcomes, particularly student achievement” (p. 43).

So far this review of the literature has framed the development of the professional learning community through an ‘organic’ process that evolves as a consequence of a collaborative partnership between the principal leader and teacher leaders. Here, professional agency lies with the various members of the school community who are free

to develop a shared vision and discern appropriate action. This process requires “long and continuous redesign conversations” within the school community and beyond to the wider community (Wilson & Davis in Miller, 2005, p. 262). These conversations aid the development of a shared vision around student learning, support engagement in collaborative activity to enact this shared vision and take collective responsibility for student learning. Such a conversation allows the teachers’ voice to be heard and for teachers to take ownership of curriculum change (Kirk & MacDonald, 2001). In this way, teachers “become partners in curriculum reform, derived from intimate knowledge of local contexts of implementation, in particular from their knowledge of their students, available resources, and the obdurate practicalities of their work” (p. 564).

But what of the professional learning community in the context of mandated curriculum reform where the vision and action is determined elsewhere and there is high stake accountability? In response to this question, Kruse and Seashore Louis (2007) suggest that there is “an important place for *top-down initiatives* to create professional learning communities which challenge deep seated beliefs that such communities emerge organically in schools with effective principal and teacher leadership” (p. 116). Closer to home, Proudford (2003), commenting on the implementation of curriculum reform in Queensland state schools calls for “professional learning communities to generate organisational learning and organisational capacity” (p. 2). According to Proudford’s case study research, she also identifies a “sense of urgency in establishing professional learning communities” (p. 10) as a support for mandated curriculum reform.

Given these research findings, it is interesting to explore the role played by the professional community in the context of curriculum reform in mathematics. Millet and Bibby (2004) provide a model for analysing the local context of curriculum reform in mathematics and, in doing so, clearly identify the role played by the professional community within this reform context. This model is of particular interest to this study as these authors use this theory when analysing the British teachers’ response to implementing the British Numeracy Strategy. Figure 3.2 depicts their interpretation of the theory.

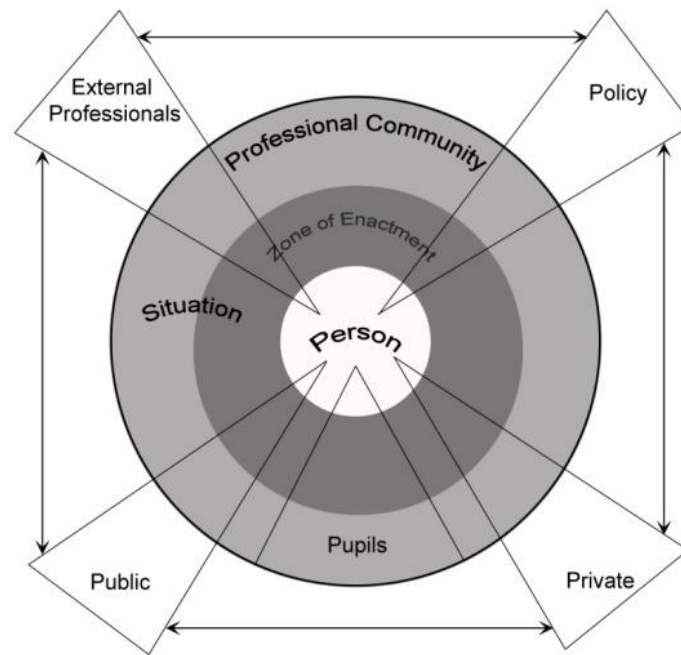


Figure 3.2 Theoretical model for analysing the context of mandated curriculum reform.

Source: Figure 3-2 from Millett and Bibby(2004, p. 3)

Of interest to this study that focuses on the teacher's response to curriculum reform Millett and Bibby identify a series of external factors that directly impact upon the professional community of the school, and challenge the teacher's practice, beliefs and assumptions. These external factors include "external professionals" and "policy" as well as the "public" and "private" domains (pp.8-11). *External professionals* encompass all those professionals from outside the school who can support teacher change through professional development, and *policy* refers to directives from governments and other authority bodies. External professionals and policy directives are often backed by a *private* domain that includes commercial sources of support that are not a part of the government support system; and the *public* refers to those who are outside the school but are none the less interested in education such as parents and the media. These external factors intervene in the life of the school by initiating curriculum change, supporting the implementation process and sustaining the change into the future.

Within this model, Millett and Bibby (2004) also focus on developing an understanding of a teacher's personal response to curriculum reform. In doing so they posit that teacher decision-making in this regard is influenced by "their experiences within the school,

current and past, of children and colleagues; their personal professional experiences; their knowledge of subject matter and pedagogy; and the sources of their professional strength (convictions/beliefs and warrants of these)” (p. 5). Moreover, they argue that the teacher’s response is influenced by both their “motivation” and “capacity” (p. 5) to accept change. Motivation is described as a “function of personal goals – the wants, needs and aspirations of the individual” (p. 5) however capacity refers to agency beliefs – “self-efficacy, self-confidence and academic self-esteem” (p. 5), as well as beliefs about the context in which the teacher works. In this way Millett and Bibby note the cognitive and affective aspects of the teacher’s decision-making with respect to curriculum reform.

This model also situates the teacher within the professional community of the school - the “situation” (p. 3). For Millett and Bibby (2004) this situation “plays a major role in distinguishing between success and failure in initiating, implementing and sustaining [curriculum] change” (p. 3). Developing this thought, they “define the *situation* as including all the everyday influences of professional colleagues and pupils that impinge upon the teacher as she carries out her role, be it as class teacher, mathematics co-ordinator or subject leader, or in a role of more general leadership or management in the school” (p. 6). These influences include “pressure and support from colleagues and headteachers, resourcing of professional development, emotional support and friendship, coherence and consistency of views” (p. 6). Lastly, the situation is also shaped by pupils” in classrooms, as “the arena of the classroom is where attempts at reform are dependent upon – the intimate details of decision-making about sorts of experiences to provide for pupils, and responses to the effect these experiences have” (p. 7). Thus pupils play an important role in influencing the teacher’s response to mandated curriculum reform.

Discussing their model in this way, Millett and Bibby (2004) then draw attention to the *zone of enactment* (p. 4) for each teacher within the overall situation. This is an “an area of potential for professional development, the space in which the individual makes sense of reform or change initiatives in essentially a social process” (p. 1). In their view, the process of implementing curriculum change begins with one or more external factors (e.g. external professionals, policy, public and private). In the first instance, the personal and professional characteristics of the teacher will influence this decision whether to accept or reject this demand. However Millett and Bibby also argue that the zone of

enactment is a “social construct” (p. 4) and, as such, will be influenced by interactions within the situation. If these interactions include “rich deliberations” that were “grounded in practice and supported by resources, curriculum change [is] more likely to be operationalised” (p. 4).

Developing this thought, Millett, Brown, and Askew (2004a) later identify four conditions necessary for the development of the professional community and the realisation of the teachers’ zones of enactment: time, talk, expertise, and motivation. They considered *time* for teachers to engage in discussion and reflection essential for the development of a professional learning community. When time is allocated, teachers work in an iterative framework of trial, reflection, discussion, modification, and retrieval. Time has also been identified by other researchers (Clarke, 1994; Heid, et al., 2006) as essential for teacher reflection in ongoing professional development. Millett et al. (2004a) reported that when teachers were provided opportunities to observe each other’s lessons, they were encouraged to *talk* with each other about these observations as a focus for reflection and discussion. *Expertise* came from within the school, from other teachers, as well as external sources such as university researchers. Expertise was shared when the teachers were supported to reflect on theory and practice. *Motivation* appeared in several guises. Some teachers were motivated by internal feelings of interest in mathematics, by a desire to improve their mathematics teaching, or from fear of mathematics teaching. External motivation such as encouragement from colleagues, policy (curriculum reform), and external experts were also factors.

3.8 RESEARCH QUESTION AND CONCLUSION

This chapter has established a firm basis of knowledge and research upon which to proceed with this study. The research problem was framed in terms of the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) at Hillside Primary School, and was therefore situated within the debate that swirls around the issues of mandated curriculum reform. Within this debate, issues of educational change, teacher professionalism and professional development surfaced, with relevant emergent theories in each of these areas coalescing around the concept of the professional learning community. Within the literature presented, there is strong support for situating curriculum reform within the context of a professional learning community described in terms of collaborative relationships, shared vision and values and the active promotion of

learning. Moreover, of interest to this study, this body of literature also alerts us to the impediments to the development of the professional learning community, including inappropriate structures, inadequate social capital and sustainability as well as inhibitors to successful professional learning. Finally, this review explores curriculum reform in mathematics and highlights Millett and Bibby's (2004) model for discussing change. This model clearly identifies the professional learning community as "the situation" (p. 3) in which the teacher is most likely to positively respond to curriculum reform. In addition, this model, by drawing attention to the "zone of enactment" (p. 4) as the space where each teacher makes sense of curriculum reform as they interact with their professional learning community, reminds us of the importance of teacher meaning-making in the context of curriculum reform. Finally, this model alerts us to the impact of internal and external factors that act as a source of support for curriculum reform and, in doing so, provides a positive approach to dealing with impediments to the development of the professional learning community, noted elsewhere (e.g., S. Ball, 2003; Blackmore, 2004; Blase & Blase, 2005; McLaughlin & Talbert, 2007; Smeed, et al., 2009) .

With this review of the literature in mind, the researcher identified the following research question:

What are the sources of support for teachers' meaning-making in the context of the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) at Hillside Primary School?

Firstly, this research question acknowledges Millett and Bibby's (2004) model for analysing the context of curriculum reform, identifying both internal and external factors that act as sources of support for curriculum reform in the context of the school environment. Secondly, this research question focuses attention on 'teacher meaning-making' in the context of curriculum reform. In doing so, one accepts the 'meaning hypothesis' advanced by Fullan and Stiegelbauer (1991) in their seminal work, *The new meaning of educational change*. Here they argue that "if reforms are to be successful, individuals and groups must find meaning concerning what should change as well as *how* to go about it" (p. xi). Later this concern for meaning-making is reflected in Spillane, Reiser and Reimer's (2002) "process of human sense-making" (p. 419) with respect to teacher efficacy, as well as Millett and Bibby's (2004) understanding of the

“zone of enactment” as “the space in which the individual makes sense of reform or change initiatives” (p.1).

Guided by this research question, this study was situated within a research paradigm of constructivism (Phillips, 2000a) and the theoretical framework of “symbolic interactionism” (Charon, 2007) and, in line with these methodological choices, this study engaged a “mixed methods” (Creswell & Plano Clark, 2007) approach to the design of the study. An account of the selection of this research paradigm and the resulting design of the study follows in Chapter Four.

Chapter Four: Research Paradigm and Design

4.1 INTRODUCTION

As outlined in Chapter Three, following a review of the literature, the researcher settled on one major research question. Consequently, this study asks:

What are the sources of support for teachers' meaning-making in the context of the implementation of the Mathematics Year 1-10 Syllabus (QSA, 2004) at Hillside Primary School?

The articulation of this research question was a significant milestone in this study as it was to guide the various moments of data collection, analysis and interpretation within this study. In making the methodological choices within this study, the researcher was guided by Crotty (1998) and O'Donoghue (2007), who both argue that choice in research paradigm should be made in light of the research question/s.

Given the nature and focus of this research question, this study was situated within a research paradigm of pragmatic constructivism (Burbules, 2000), and in line with this methodological choice, this study engaged a mixed methods (Creswell & Plano Clark, 2007) approach to the various moments of data collection, analysis and interpretation. This chapter provides an account of, and a rationale for, these methodological choices. In particular, this chapter discusses the ontological, epistemological and methodological implications of situating this study within the research paradigm of pragmatic constructivism (Section 4.2). This discussion of the research paradigm is followed by an account of the overall design of this study, including an overview of the qualitative and quantitative research methods employed during the study (Section 4.3). This is followed by a description of the participants in the study (Section 4.4), and detail with respect to the process of data analysis and interpretation employed (Section 4.5). Finally, this chapter concludes with a discussion of the issue of rigour in constructivist research (Section 4.6), and a discussion of various ethical considerations addressed in the design of this study (Section 4.7).

4.2 THE RESEARCH PARADIGM

As noted above, given the nature and focus of this study's research question, pragmatic constructivism was chosen as the research paradigm to drive this investigation. In making this methodological choice, the researcher was aware of the range of alternative inquiry paradigms. For example, in addition to constructivism, alternative inquiry paradigms such as positivism, post-positivism, and critical theory are all used in educational research (Guba & Lincoln, 2005). Within each of these research paradigms there are distinct ontological, epistemological and methodological differences and these differences relate to the basic "belief system or world view that guides the investigator" (Guba & Lincoln, 1994, p. 105). Consequently, the ontological, epistemological and methodological implications of situating this study within the research paradigm of pragmatic constructivism are discussed in this chapter.

4.2.1 *Ontology*

Each research paradigm assumes a distinct ontology which results from the researcher making certain assumptions about the "basic beliefs (or metaphysics)" of the nature of reality which is described as "what they can learn" (Guba & Lincoln, 1994, p. 107). The positivist research paradigm argues for "naïve realism, assuming an objective reality upon which inquiry can converge" (p. 109). It is this assumption that enables the investigator to determine "'how things really are' and 'how things really work'" (p. 109). Extending this thought, the postpositivist research paradigm tempers the positivist position of absolute truth of knowledge (Phillips & Burbules, 2000) by advancing a "critical realism" where a "'real' reality [exists], but only imperfectly and probabilistically apprehendable" (Guba & Lincoln, 2005, p. 193). Critical theory uses an alternative understanding of what can be known. The basic beliefs of the nature of reality from the critical theorist's view is of "historical realism – virtual reality shaped by social, political, cultural, economic, ethnic and gender values crystallized over time" (Guba & Lincoln, 1994, p. 109).

The constructivists' position, informing this research study, extends the critical theorist's view of the nature of reality, and it stands in direct contrast to the metaphysics of the positivist and postpositivist research paradigms. The constructivists have an alternative set of assumptions dependent on relativism that "assumes multiple, apprehendable, and somewhat conflicting social realities that are the products of human intellects, but that

may change as their constructors become more informed and sophisticated” (Guba & Lincoln, 1994, pp. 111-112). It is within this understanding that constructivists recognise that reality resides in relativism, thereby allowing for judgements to vary between individuals and their environments (Guba & Lincoln, 1994). Here, it is accepted that individuals actively seek to understand the world in which they live and work (Creswell, 2003).

4.2.2 Epistemology

Epistemological beliefs focus on the knower or would-be knower and what is known (Guba & Lincoln, 1994; Sarantakos, 2005). However, examination of the literature on the epistemological beliefs of constructivism identifies many varieties of constructivism (Ernest, 1996). Appreciating that there are many varieties of constructivism¹⁴, Matthews (2000) argues that overall there are three main schools of constructivism; philosophical, sociological, and educational. The first school, philosophical constructivism supports the social construction of all human knowledge and beliefs with its immediate origins in Thomas Kuhn’s work; however, the roots of this form of constructivism date back to ancient Greece and Aristotle (Boudourides, 2003). The second school, sociological constructivism, is aligned with the Edinburgh “Strong Program” and research on the sociology of scientific knowledge, where the growth of science and its associated theories are viewed in relation to “changing social conditions and interests” (Matthews, 2000, p. 169). The third school, educational constructivism, has its “origins in Jean Piaget’s work” (p. 169).

Today there are two fundamental positions evident within the literature on educational constructivism. The two positions are ‘individual’ and ‘social constructivism’, each offering a different angle on the origins of human knowledge (Phillips, 2000a). The first position is focused on the individual and the individual’s reality, and therefore how the individual constructs knowledge. Piaget’s theory of individual constructivism has been interpreted by von Glasersfeld (1996) as “radical constructivism”¹⁵ (p. 307), while

¹⁴ Matthews (2000) identifies up to 17 different forms of constructivism within educational constructivism alone.

¹⁵ The radical constructivism described by von Glasserfeld (1996) is not to be confused with the radical constructivism discussed by Phillips (2000b) and others, when discussing the sociology of scientific knowledge and therefore sociological constructivism. Phillips makes the point that “it was no accident that he [von Glasersfeld] labels his own position as *radical constructivism*” (Phillips, 2000a, p. 10, italics authors' own).

keeping this theory firmly within the individual construction of knowledge position. The argument of the radical constructivists is that no two individuals will construct the exact same understanding, as they will each be influenced by their own prior experiences and the associated prior constructed knowledge. In this way, constructed knowledge is of the individual's making. The second position recognises the social construction of the social world through the course of human history. This body of knowledge is a "human construct" that has been influenced by "politics, ideologies, values, the exertion of power and the preservation of status, religious beliefs and economic self-interest", and influences the way we respond in differing environments (Phillips, 2000a, p. 6). This appreciation of constructivism is generally known as social constructivism and is associated with the work of George Herbert Mead and John Dewey (Phillips, 2000b, p. 87)

Clarifying this thought, Burbules (2000) acknowledges the existence of these two quite different positions on educational constructivism as well as many positions in between. Burbules goes on to point out that "constructivism refers to many ideas, joined by the merest thread of family resemblance and often expressing quite contradictory views" (p. 308). However, these contradictory views can be attributed to the "relative weight they give to certain factors that most agree must be given some weight" (p. 309). He goes on to suggest that it is time for a pragmatic approach to constructivism that will allow for "moving beyond the impasse" (p. 327). To this end, Burbules recommends a pragmatic understanding of constructivism that accepts that:

1. All understandings of the world partake of a social environment, even when they are formulated by individuals alone;
2. Language provides the conditions for both understanding and misunderstanding;
3. Our efforts at understanding the world always occur at a distinct time and place, and under a set of circumstances that motivate and influence our choice of questions, methods, and reference groups for cross-checking our understandings;
4. The underlying issue that divides the anti- and pro-constructivists is their attitudes toward difference and disagreement; and,

5. Constructivism operates within a problem-based framework, in which one potential problem is always the status of one's construction of themselves.
(Burbules, 2000, pp. 322-325)

Explaining pragmatism further, Charon (2007) posits that:

first, pragmatists believe that humans do not respond to their environment; instead, they almost always interpret their environment... Second, pragmatists argue that humans believe something according to its usefulness in situations they encounter. Knowledge is learned, remembered, and believed in relation to our ability to successfully apply it... Third, pragmatists believe that we are selective in what we notice in every situation... Objects that we notice are defined by us according to their usefulness... Fourth, pragmatists focus on human action when they study the human being. It is not personality, past events, a trait or quality that is central, but what the actors are doing in their situation. (Charon, 2007, pp. 31-32)

Thus epistemological, pragmatic constructivism sees knowledge constructed through interaction within a social situation with relativism the outcome. This fundamental epistemological position makes it suitable for this study, as it acknowledges that interpretation can be created through the interaction between the participants and the researcher (Guba & Lincoln, 2005).

4.2.3 Methodology

This paradigm of pragmatic constructivism points to several research methodologies including case study, educational ethnography and symbolic interactionism. Pragmatic constructivists argue that knowledge is constructed through different forms, and should be interpreted in terms of multiple interacting positions that are mutually interdependent of, yet nevertheless have practical consequences for, the conduct of social interaction. Therefore it is not possible to separate the individual from the community because action “has to be interpreted and understood within the context of social practices” (Usher, 1996, p. 18).

These methodological considerations are particularly evident in the theoretical framework of symbolic interactionism. The ideas of symbolic interactionism stem from the Chicago School of the 1920s and 1930s with George Herbert Mead (1934) a major contributor to these ideas. However it was Blumer who first used the term “symbolic interactionism in 1937” (Woods, 1992, p. 338). Blumer (1969) clearly documented his thoughts on symbolic interactionism where he wrote:

the term “symbolic interaction” refers ... to the peculiar and distinctive character of interaction as it takes place between human beings. The peculiarity consists in the fact that human beings interpret or “define” each other’s actions, instead of merely reacting to each other’s actions. Their “response” is not made directly to the actions of one another but instead is based on the meaning, which they attach to such actions. Thus, human interaction is mediated by the use of symbols, by interpretation, or by ascertaining the meaning of one another’s actions. This mediation is equivalent to inserting a process of interpretations between the stimulus and response in the case of human behaviour. (p. 180)

In this early work, Blumer (1969) identified three guiding premises of symbolic interactionism, and these premises have continued to be accepted and extended since that time. These premises are reiterated with an additional premise by McCarthy and Schwandt (2000) as:

(1) The human worlds are symbolic, material and objective, and hence the primary aim is to understand how humans beings go about the task of assembling meaning through interaction with others; (2) that process characterizes lives, situations, and societies – these things are always evolving, adjusting, emerging, becoming; hence there is great interest in “strategies for acquiring a sense of self, developing a biography, adjusting to others, organizing a sense of time, negotiating order, constructing civilizations; (3) that neither the individual nor society is primary in understanding meaning; rather the starting point is the joint act of people doing things together; (4) that interaction means engagement with the empirical world, and only in the grounded, empirical world open to observations can self, encounter, social object, and meaning be investigated. (p. 60)

Charon (2007) sums up these premises by stating that to understand symbolic interactionism it is important “*to understand human action, we must focus on social interaction, human thinking, definition of the situation, the present, and the active nature of the human being*” (p. 30, italics author's own). Further, the “‘worlds’ that exist for human beings and for their groups are composed of ‘objects’ and these objects are the product of symbolic interaction” (Blumer, 1998, p. 10).

Thus symbolic interactionism as perspective is useful when interpreting a social situation such s the situation at Hillside Primary School (Charon, 2007). From a symbolic interactionist’s view, social situations are meaningful for individuals in the way other people act towards the social situation. Consequently, meaning is constructed through this social interaction (Blumer, 1998). This point is extended by Charon (2007), where

he argues that all social situations are symbols and therefore have meaning used to communicate and represent or refer to something. Furthermore, within this argument, language is a special type of symbol. It is the combination and use of symbols, language and perspective that is fundamental to human society (Charon, 2007; O'Donoghue, 2007).

For the researcher to construct meaning of this empirical social interactive world, symbolic interactionism as methodology is concerned with getting close to group life in order to understand what is going on in it (Blumer, 1998). Consequently using this methodology

...is a tough job requiring a high order of careful and honest probing, creative yet disciplined imagination, resourcefulness and flexibility in study, pondering over what one is finding, and a constant readiness to test and recast one's views and images of the area ... That it is demanding in a genuinely rigorous sense can be seen in the analysis of its two fundamental parts. I term these parts respectively as “exploration” and “inspection” (Blumer, 1998, p. 40)

The exploration stage as identified by Blumer (1998), has two distinct functions. Firstly, this stage provides the researcher with the opportunity to become familiar with the empirical social world under study. Charon (2007) interprets this as an opportunity to understand “What’s going on around here?” (p. 194). Secondly, this familiarisation process allows the researcher to refine the inquiry process that then leads to the inspection stage of the inquiry. This second stage of inspection involves the isolation of significant elements within the empirical world or situation, describing the situation in relation to these elements, and then using this understanding to inspect other forms of interaction. Strengthening Blumer’s (1998) original proposal for this inquiry process, Charon (2007) details five principles of investigation which should be followed. They are:

1. The central principle of symbolic interactionism is that we can understand what is going on only if we understand what the actors themselves believe about their world. (p. 193)
2. Symbolic interactionists believe that it is important to gather data through observing people in real situations. (p. 193)

3. Symbolic interactionists are critical of traditional social science, its use of scientific methodology for the study of human beings, and its definition of “important causal variables.” (p. 194)
4. The symbolic interactionist regards a careful description of human interaction to be a central goal of social science. (p. 195)
5. The symbolic interactionist in studying human beings believes it is important to move away from mechanical models of causation (characteristic of natural science) to processual models. (p.195)

In line with constructivist thinking, Blumer (1998) has been guided by the belief that symbolic interactionism does not follow traditional scientific methods. He writes that, “no theorizing, however ingenious, and no observance of scientific protocol, however meticulous, are substitutes for developing a familiarity with what is actually going on in the sphere of life under study” (p. 39). This methodological perspective involves interpretation of society and social situations where contemporary theorists have reinforced the perspective and method espoused by Blumer (1969) as valid (see for example Charon, 2007; Stryker, 2002). In particular Charon (2004) wrote:

...symbolic interactionist perspective is important to students of human action, interested in understanding the nature of human life, society, truth, and freedom... This perspective contributes to a liberal arts education: it deals intelligently and systematically with some of the important questions concerning human life (p. 216).

However, this position has exposed symbolic interactionist to some criticism. These criticisms have included an astructural bias, which has been viewed as evading macro-organisational and political issues. In addition, criticisms detailing the place (importance) of emotions and their impact on the social interaction process have also been documented by Stryker (2002). However, he goes on to defend symbolic interactionism by highlighting that “no other group has contributed more to the study of emotions” than that of the symbolic interactionists (p. 63). Further criticism involving different interpretations of Mead’s work, and in particular Blumer’s writings have resulted in corrective textual analysis (Denzin, 1992). While not damning these criticisms, Stryker (2002), neither dismisses them nor asserts that they are unimportant. In contrast, Charon (2004) confronts the issue of criticism, and declares that “expecting symbolic

interactionism to explain everything is erroneous but, in my opinion, it is correct to say that symbolic interactionism is an exciting and useful perspective for understanding human life” (p.190).

Constructivism is the research paradigm that has driven the theoretical directions of this study. Within this paradigm, the epistemological focus has been pragmatic constructivism and situated with this is symbolic interactionism. It is by taking a symbolic interactionist perspective that a depth of understanding of the empirical social world can be achieved without expectation that this ‘understanding’ is fixed but rather is a constructed interpretation. Table 4.1 provides an outline of the theoretical choices made to guide the conduct of this study.

Table 4.1 Overview of the methodological choices within this study

Research Paradigm	Ontology	Epistemology	Methodology
Guiding Questions	What is the form and nature of reality?	What is the relationship of the knower to the known?	What can be known about it?
Chosen Perspective	Constructivism	Pragmatic Constructivism	Symbolic Interactionism
Beliefs	Relativism	Interpretation of a particular situation	Role of symbols in the interaction
Relation to study	Relativism	Social and individual construction of knowledge	Professional Learning Community

It is argued here that this research has been “paradigm driven” from the outset (Wolcott, 1992, p. 169). The problem identified in Chapter Two, and the literature discussed in Chapter Three, along with the identification of the research question, guided the choice of research paradigm needed to focus the investigation. The orchestrating perspective and data collection methods are now outlined in the remainder of this chapter.

4.3 RESEARCH DESIGN

This study relied on a mixed methods approach to the various moments of data collection, analysis and interpretation. In short, this approach provides a way of utilising both qualitative and quantitative data (Creswell, 2003) and as Creswell & Plano Clark (2007) attest:

as a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination, provides a better understanding of research problems than either approach alone. (p. 59)

The combination of qualitative and quantitative methods allows the quantitative data to be linked directly to the qualitative data to see if the two types of data showed similar results (Creswell & Plano Clark, 2007). Here, numeric values of the quantitative data supplement descriptive data as interpreted by the researcher. Through triangulation weaknesses of qualitative studies, such as researcher bias, were limited by quantitative 'rigour'. Thus research results are presented in a convincing way with both numeric values and descriptive portraits (Lodico, Spaulding, & Voegtler, 2006).

Acknowledging the presence of both qualitative and quantitative data within the mixed methods approach, Creswell (2003) warns that at the outset of a study the researcher will need to make decisions regarding "implementation", "priority", "integration" and the "theoretical perspective" (pp. 211-213). Firstly, the researcher will need to make implementation decisions: whether to collect and analyse the qualitative data "sequentially" or "concurrently" (p. 211). Secondly, the researcher will need to decide whether "greater priority or weight should be to the quantitative or qualitative approach" (p. 212) and thirdly, decide on the integration or "mixing" (p. 212) of the two data approaches. Finally, it is important to consider how "a larger theoretical perspective will guide the entire design" (p. 213).

Following Creswell's (2003) lead, the researcher looked to symbolic interactionism for assistance with the design of the study. As discussed above, the theoretical framework of symbolic interactionism (e.g. Charon, 2007) recommends a two stage investigative process, including an "exploration stage" as well as "inspection stage" (p. 147). In the exploration stage, the researcher seeks to gain an early impression of "What is going on around here?" (p. 147), and in the inspection stage the focus is on the investigation of

specific issues identified during the exploration stage. Consequently, the overall design of the investigative process included both exploration and inspection stages.

In addition, this study took a sequential approach so that qualitative and quantitative data collection and analysis occurred in phases rather than concurrently. Moreover, priority was given to the qualitative approach within both the exploration and inspection stages. There was, however, the integration or mixing of two types of data collection in the exploratory stage. During the exploration stage, interviews with the Principal and HOC (qualitative approach) were conducted to develop a broad understanding of the research situation in the form of qualitative data. This is consistent with the perspective that researchers must acknowledge the importance of understanding the micropolitics of the research site (Smeed, et al., 2009). These qualitative data were then combined with the literature to construct and use a theoretically-based and construct-specific questionnaire (quantitative approach). These methods of data collection were selected in preference to participant observation as interviews followed by a questionnaire represent a more efficient way of gathering data from all teachers. The inspection stage of the study then involved further qualitative data collection through focus group interviews, and individual interviews with the teachers in the professional learning community. These interviews provided an avenue by which to further interrogate the qualitative and quantitative data collected during the first stage of this study. An overview of sequential design is presented as Figure 4.1.

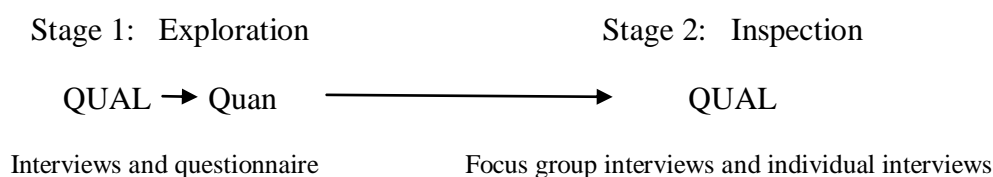


Figure 4.1 Mixed method design

In this figure, the \longrightarrow indicates a sequential form of data collection and analysis. “Quan” and “Qual” stand for quantitative and qualitative respectively and the use of the same number of letters suggests equality between these two forms of data. Capitalisation indicates the priority or weight given to both approaches. Specific data

collection procedures with respect to this investigative process are identified in Table 4.2 below.

Table 4.2 Steps in each of the two stages of this study

Research stage	Step in each stage	Research method	Description and purpose of the method
Exploration: First stage of the study	Step 1	Individual interviews	The Principal and HOC were interviewed to broaden the understanding of the sources of support that operate within the <i>situation</i> of this research site.
	Step 2	Construction, validation and use of the questionnaire	Interview data from Step 1 were then combined with the literature and existing questionnaires to develop and then use a theoretically-based and construct-specific questionnaire given to teachers.
Inspection: Second stage of study	Step 1	Focus group Interviews	Focus groups interviews with each year level of teachers were conducted. Interview data were transcribed, coded and themes identified.
	Step 2	Admin staff individual interviews	Final clarification of researcher's interpretation

In line with the theoretical perspective of symbolic interactionism, this study was conducted in two stages, exploration and inspection. Each stage involved two steps of data collection and analysis. The first stage was conducted at the commencement of the second school term of 2007. The initial data collection involved interviewing two members of the administration team, the Principal and HOC. During term 3 the researcher constructed and trialled the questionnaire. Three weeks before the completion of term 3 the questionnaires were completed by the teachers. The second stage of the study was conducted during term 4 of the school year.

The remainder of this chapter provides a detailed explanation of each of the data collection procedures used in this study. The methods are presented in order of use as delineated in Table 4.2

4.3.1 Interviews

Within this study, interviews were planned at the beginning and the end of the data collection. The purpose of the interview in qualitative research is to gain an understanding of a perspective that may not otherwise be available to the researcher. For this reason interviews form the foundation of data collection in most qualitative research. Patton (2002) makes the purpose for interviewing clear when writing:

we interview people to find out from them those things we cannot directly observe...We cannot observe feelings, thoughts, and intentions. We cannot observe behaviours that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings that attach to what goes on in the world. We ask people questions about those things. The purpose of interviewing, then, is to allow us to enter into the other person's perspective. (pp. 340-341)

The symbolic interactionist approach to conducting qualitative research involves accessing another person's perspective. Here "perspectives are points of view...conceptual frameworks" (Charon, 2007, p. 10) that guide the individual's perceptions of reality. Such perspectives are "created in the individual's social life. Each changes as the individual's groups and roles change" (p. 10). Moreover, it is recognised that no social object can be understood from only one perspective as "many perspectives can be used to see the same object, and each might tell something important about the object" (p. 10). Accepting this symbolic interactionist perspective it was deemed important to understand the ways in which the teachers and administrators at Hillside Primary School, the participants in this study, saw the implementation of the reform mathematics syllabus.

In addition to understanding the participants' perspective, it is argued in research literature that "most qualitative research operates from the perspective that knowledge is situated and contextual, and therefore the job of the interview is to ensure that the relevant contexts are brought into focus so that situated knowledge can be produced" (Mason, 2005, p. 62). Consequently, the purpose of qualitative interviewing:

...is to capture how those being interviewed view their world, to learn their terminology and judgements, and to capture the complexities of their individual perceptions and experiences. (Patton, 2002, p. 348)

Interviews were used at three points in the study. The first interviews occurred at Step 1 of the exploration stage of the study when the Principal and HOC were interviewed individually to ascertain their perspective on "What's going on around here?" (Charon, 2007, p. 194). These interviews permitted the researcher to explore the sources of support for curriculum change at Hillside Primary School. The questions asked were semi-structured to promote a "conversation with a purpose" (Mason, 2005, p. 67) style of interview. This allowed the researcher to elicit understandings and meanings

regarding the concepts around the sources of support described by these two participants. The Principal and HOC were interviewed on the same day, with each interview being approximately one hour in duration. The interviews were audio recorded and transcribed as recommended in the literature (Patton, 2002; Sarantakos, 2005). This recording provided an accurate record of what was said, and allowed the interview to continue without the hindrance of note taking (Hook, 1990; Silverman, 2000). Following each interview, supporting notes were made to insure that all data were recorded while vividly recollected (Patton, 2002). The interviews were also transcribed.

The second point of interview, the focus group interviews involved each year level of teachers during the inspection stage of the study. The interview questions were developed from the teachers responses to the questionnaire (discussed in Section 4.3.2 below) and were semi-structured in nature. These interviews permitted the participants to hear each others' contribution and thereby make adjustments to their own contributions (Patton, 2002). In this way, the social world under investigation came under the microscope through the interaction of perspectives, which promoted new constructions and reconstructions of socially held perspectives. Here the focus groups were purposely used to gain a deeper understanding of the sources of support (Patton, 2002). The topics discussed included sources of support for meaning-making while implementing the mathematics syllabus at each year level, as well as issues raised by the participants in their questionnaire responses. Immediately following each interview, supporting notes were made and the interviews transcribed.

The third point where the interview was used was at Step 2 of the inspection stage of the study, where each member of the administration team was re-interviewed. These interviews provided a final opportunity to clarify outstanding issues, ensuring that a thorough and accurate representation of all participants' perspectives was achieved. Points raised by the teachers during the focus group interviews were included during these final interviews with each member of the administration team. These interviews were approximately one hour in duration; however the length of time did vary depending on the participant's contribution. These interviews were immediately transcribed and supporting notes written.

4.3.2 Questionnaire

The exploration stage of this study employed a mixed methods approach, where data were collected initially through qualitative and then through quantitative means. The qualitative data in the form of interviews with the Principal and HOC, discussed above, provided a broad understanding of the research site. These data then informed the development of a questionnaire designed to further interrogate the research site. The development and validation of this theoretically-based, construct-specific questionnaire was a feature of the exploration stage of this study, and a copy of this questionnaire, the *School Professional Learning Community Questionnaire* (SPLCQ) is attached as Appendix 6.

The SPLCQ was developed using the intuitive-rational model for instrument development. This multi-step model for questionnaire development was first identified by Hase and Goldberg (1967) as a valid way to develop theoretical constructs and associated items. This model continues to be used for questionnaire development (Dorman, 2003; Lang, Wong, & Fraser, 2005; Walker, 2006). It relies on the researcher's intuitive understanding of the dimensions to be assessed, and therefore the validity of the developed constructs rests partly with the subjective opinions of the researcher constructing the questionnaire.

Initially, the items that make up each construct were based on items in existing questionnaires developed and used in prior research in the UK, USA and Australia (Bolam, et al., 2005; DuFour, DuFour, & Eaker, 2005; Huffman & Hipp, 2003; Laucer, Dean, Martin-Glen, & Asinsio, 2005; Louis, Marks, & Kruse, 1996; Mulford, Silins, & Leithwood, 2004), together with available literature. Later, these items were refined according to the information provided by the Principal and HOC during the interviews. Three teachers holding administrative positions in local schools were then asked to scrutinise the SPLCQ for appropriate use of context-based terms, readability of items and ease of interpretation. Minor changes were made as recommended to insure face validity.

In accord with this intuitive-rational approach to instrument development, four distinct sections within the SPLCQ emerged. The first section contains 26 items that form six constructs. It focuses on the sources of support that exist within the school culture, and the purpose of leadership as a source of support. The second section of the SPLCQ

focuses on sources of support external to the school that support syllabus implementation. The third section of the SPLCQ contains 20 items that formed four constructs addressing issues of teacher self-efficacy when implementing the new mathematics syllabus. The final section on the SPLCQ elicited responses on a range of teacher characteristics (e.g., gender, age band). A copy of the SPLCQ is provided as Appendix 6 and a full account of the development and validation of the SPLCQ is provided in Chapter Five.

4.4 PARTICIPANTS

Within this study, the process of participant selection was guided by the boundaries recognised as Hillside Primary School. This selection was purposive, as Hillside Primary School was recognised within the local school district as a leading school in teacher professional development as the school regularly hosts professional development sessions on new initiatives delivered by DETA. Due to this local recognition, it was suggested that Hillside Primary School might well be “information rich” (Patton, 2002, p. 230) with respect to supporting mandated curriculum reform. In addition, the researcher had previously been employed as the Support Teacher: Learning Difficulties and this also assisted access to this information rich site. It was thought that by situating this study within this research site, the researcher would be more likely to “discover, understand and gain insight and [Hillside Primary School was] therefore select[ed as] a sample from which most can be learned” (Chein as cited in Merriam, 1998, p. 61).

Within this research site, key personnel, including the members of administrative team (i.e., the Principal, Deputy Principal, Head of Curriculum (HOC) and Head of Special Education Unit (HSEU)) and the classroom teachers (Years 1-7), were invited to participate in the study. Details of their participation are detailed in the following two sections.

4.4.1 Administration team

The Principal of Hillside Primary School leads a team of four administrators and staff in a school that has 26 classes of students including those from a Special Education Unit (SEU). Consequently each member of the administration team has a specific role in supporting teachers and students. These roles have been outlined in Section 2.2. The Principal and Deputy Principal must ensure that when enrolling students, the teaching

staff is well positioned to meet student needs. The HOC and HSEU along with the Principal and Deputy Principal must ensure, on a day to day basis, that the teachers are supported in their role of meeting each student's educational needs. As the Principal and HOC are the main source of curriculum support it was decided to interview them during the exploration stage of the study from which the questionnaire was constructed. The inclusion of the four members in the administration team at step 2 of the second stage of the study proved critical as they each have a specific role in the support provided within the school for teachers.

4.4.2 Teacher participants

The study involved all 26 classroom teachers from Hillside Primary. Their ages, experience and qualifications range across a wide spectrum. The importance of gaining approval from all teachers was a significant factor in this study, as each teacher impacts on the professional community at Hillside Primary School. To have a voice silenced through lack of participation would have distorted the interpretation of the perspectives observed. To ensure maximum participation a presentation of the intentions of the study was delivered to a staff meeting. At this meeting all teachers were invited to participate. Following discussion of the time commitment required of teachers, they all agreed to participate in this study. However, one teacher chose not to complete the questionnaire as she did not want to put anything down on paper; however she was happy to be interviewed as a member of a focus group interview.

4.5 DATA ANALYSIS AND INTERPRETATION

Data analysis and interpretation in mixed methods research relates to the type of data approach chosen for the investigative process (Creswell, 2003). For example, descriptive and inferential numeric analysis occurs *within* the quantitative approach. Interpretation of data involves assigning significance or meaning by using numbers; the researcher then relates these numbers to the hypothesis or research question. Alternatively, descriptive and thematic analysis occurs *within* the qualitative approach, and interpretation of data involves the researcher relying on words (and other visual representations) to discuss their significance or meaning. Data analysis and interpretation *within* the different data types does not pose a problem, provided that the researcher is competent in both quantitative and qualitative approaches. However, mixed methods research brings the additional challenge of analysis and interpretation *between* the data approaches. What

follows is an account of how the researcher ‘managed’ data analysis and interpretation *within* and *between* different data approaches during this study.

4.5.1 Data analysis and interpretation within the quantitative approach

Typically, researchers take a number of key steps with respect to the analysis and interpretation of quantitative data, and embedded in each of these steps is a number of specific concepts and tools. For example, within the literature it is recommended that as a first step the quantitative researcher “prepare and organize the data...by assembling all data, transforming it into numeric scores, creating a data-base for computer or hand tabulation, and selecting a computer program to use in performing statistical tests on the data” (Creswell, 2003, p. 222). The second step involves “exploring and descriptively analysing the data” using a process that “consists of two general steps (1) exploring and describing the data, and (2) conducting statistical tests on the data” (pp. 225-226). As a third step, Creswell (2002) recommends “analysing the data to test hypotheses (research questions)” (p. 235) which involves choosing appropriate statistical tests. The fourth step involves interpretation or “represent[ing] and summarizing the data in tables, figures and a detailed discussion of the results” (p. 222). Finally, as a fifth step, Creswell (2002) recommends concluding the research “by summarizing key results, explaining the results, noting limitations, and advancing suggestions for future investigations” (p. 222).

Within this study, the analysis and interpretation of quantitative data occurred during the exploration stage of the study. At this time, data were prepared and organised utilising a sophisticated software program, Statistical Package for the Social Sciences (SPSS). This process then allowed for the exploration and description of the data in terms of construct validity. Once convergent and discriminant validity were confirmed, each scale was then examined for departure from normality. These checks on normality were deemed important, because departure from normality violates the underlying assumption of normality when conducting parametric tests of statistical inference. This is particularly important in this study as the sample size was small, involving the teachers from only one primary school. Further, these checks on normality were undertaken prior to conducting comparisons of various teacher characteristics (reported in Chapter Six, Section 6.3). Successful completion of these tests allows descriptive (reported in Chapter Six, Section 6.2) and inferential statistical analysis (reported in Chapter Six, Section 6.3) to be conducted. The results from these tests highlighted important aspects of the

research question that demanded further investigation in the exploration stage of this study. These quantitative results are summarised in Chapter Six, Section 6.4.

4.5.2 Data analysis and interpretation within the qualitative approach

The steps that qualitative researchers use to analyse and interpret data are similar to those used in quantitative research. For example, Creswell (2002) describes this process in terms of preparing and organizing the data for analysis, exploring the data by describing and developing themes from the data, interpreting the findings and validating the accuracy and credibility of the findings.

The initial preparation of the data for analysis requires organizing the vast amount of information, transferring it from the spoken or written words to text. This process will yield many pages of text that need to be managed. A general reading of this text provides a sense of the information found in this database. However, this first reading needs to be followed up by coding the text, as codes are used to build descriptions and to develop themes from the data. To this end, Auebach and Silverstein (2003) recommend a number of guidelines. These guidelines include writing down the research question, and keeping it in view during a filtering process leading to the selection of relevant text. By constantly referring to the research question, it is possible to select text that is relevant. In the same way it is also easier to exclude text with the knowledge that it is not relevant to the research purpose. This first stage of qualitative data analysis is represented in the first column of Table 4.3.

Once text relevant to the research question has been selected, the researcher is then able to begin a coding process. “Codes are labels used to describe a segment of selected text” (Creswell, 2002, p. 266). These codes are written in the margin of the text and may represent the participants’ “own words or standard educational terms” (p. 266). An example of coding within this study is presented in the second column in Table 4.3. The selected text has been coded such that I1P25T1 represents Interview 1, Page 25 of the transcript, spoken by Teacher 1.

Once the selected text is coded, it is possible to “reduce overlap and redundancy codes” (Creswell, 2002, p. 266). Finally, it is possible to collapse the codes into themes with themes similar to codes, but aggregated together to form a major idea.

These themes could then be linked to the themes developed from the other data sources. This is represented in the third column in Table 4.3

After selecting text, coding the data and developing themes, the final step in qualitative data analysis is reporting and representing the findings in the form of a narrative or theory development (Creswell, 2002). This is the final column in Table 4.3. This step represents the final act of interpretation and involves a subjective assessment by the researcher. Here it is assumed that the researcher can never be ‘neutral’ or ‘objective’, as this final narrative contains “personal reflections of the researcher about the meaning of the data, personal views compared or contrasted with the literature, the limitations of the study [and] suggestions for future research” (p. 278). Consequently, theory is the integration of concepts and relationships that explain the phenomenon under study (O'Donoghue, 2007). This discussion is in Chapter Nine.

Table 4.3 outlines an example of the progression from selecting relevant text to codes, identifying themes with the support of statistical data permitting the development of theory.

Table 4.3 Text to codes, theme identification and development of theory

Research Question: What are the sources of support for teachers’ meaning-making in the context of the implementation of the <i>Mathematics Year 1-10 Syllabus</i> (QSA, 2004) at Hillside Primary School?			
Selecting Relevant text	Coding	Theme	Theory
Principal: We have now established another set of release times for teachers with advanced organisers for moderation.	Structures: release time	There are limited opportunities for planning and collaboration in mathematics	Without a range of positive self-efficacy information the teacher as ‘person’ will hold on to deeply held personal beliefs, values and emotions when confronted by curriculum reform.
Questionnaire Item 18: Structures are in place within the school to help me with curriculum change, received 79.2% endorsement by teachers	Structures		
Questionnaire Item 16: The combination of year level meetings, year level planning day and half day moderation satisfy my needs for collegial collaboration, received 80% endorsement	Structures: release time		
Teacher: When we have these moderation days or we have planning days , we go through all the writing tasks and the science etc...we really don’t give maths much thought . (I1P25T1)	Structures: time		
Implementing mandated curriculum reform: Sources of support for teacher meaning-making		Janeen Lamb	80

4.5.3 Data analysis and interpretation between the quantitative and qualitative data approaches

As noted above data analysis and interpretation between quantitative and qualitative data approaches can be challenging in mixed methods research. To address this issue, Creswell (2003) recommends that researchers link the process of data analysis and interpretation with the overall research strategy. Developing this thought, he offers four different approaches to data analysis and interpretation between the data sources: “data transformation”, “instrumental development”, “explore outliers” and “examine multiple levels” (p. 221). Of these four types, Creswell posits that “explore outliers” and “instrumental development” are most appropriate to a sequential research strategy.

Instrumental development: In a sequential approach, the researcher obtains themes and specific statements from participants in an initial qualitative data collection. In the next phase, use these statements as specific items and themes for scales to create a survey instrument grounded in the views of the participants. A third and final phase might be to validate the instrument with a large sample representative of a population. (Creswell, 2003, p. 221)

Explore outliers: In a sequential model, an analysis of quantitative data in the first phase can yield extreme outlier cases. Follow-up qualitative interviews with the outlier cases can provide insight about why they diverged from the qualitative sample. (p. 221)

As noted above (Section 4.3), this study was designed around the theoretical framework of symbolic interactionists and followed the recommendation of a two-stage investigative process, including an “exploration stage” as well as “inspection stage” (Charon, 2007, p. 147). This research strategy represents a sequential approach, and consequently lends itself to instrument development and the exploration of outliers as described by Creswell (2002). During the exploration stage of this study, the researcher used analysis of initial qualitative interview data to develop a questionnaire. This questionnaire, in turn, was used to collect additional quantitative data that highlighted extreme issues or outliers that were further investigated during the inspection stage.

Beyond these analytical processes, this study also followed a model of data interpretation of qualitative data advanced by Neuman (2007). In short, this model advocates a “first, second and third-order interpretation of data” (p. 160). The first-order interpretation is from the point of view of the people being studied. The second-order interpretation comes from the point of view of the researcher, and involves eliciting the underlying coherence or sense of meaning in the data. The third-order interpretation involves the researcher assigning general theoretical significance to the data.

Within this study, the “first order interpretation” (Neuman, p. 90) occurred in the first stage of the study, and involved understanding the personal philosophies of the Principal and HOC. During this first stage of the study, the researcher identified common elements in the Principal’s and the HOC’s interviews. These identified elements were linked to the literature and existing questionnaires, and from here the researcher was able to begin construction of a general questionnaire. This first order interpretation of data is displayed in Chapters Five and Six. Neuman’s (2007) second and third order interpretation was conducted in the second stage of the study. This second order of interpretation allowed the researcher to develop a reasoned understanding of the data collected during this second stage by placing it within a context that generated themes (O'Donoghue, 2007; Woods, 2006). These themes were developed from analysis of the teachers’ interview responses recorded during focus group discussions. This second order interpretation of data is displayed in Chapter Seven. The “third order interpretation”, (p.90) is the final step in the second stage of this study. This is when themes were linked to theory and theoretical significance assigned. This third order interpretation of data is displayed in Chapter Eight as theoretical propositions. An example of this process is provided in the fourth column of Table 4.3

This process of data collection, analysis and interpretation is represented in Figure 4.2. This figure separates the data collection process from the data analysis process, although the continuous flow inherent within the figure represents the growing collaborative interpretation and understanding of the research site. At the same time, Figure 4.2 draws attention to the specific data collected in each of the two stages in the study, exploration and inspection. In addition, first, second and third order interpretation of the data is represented, indicating the process of data analysis that the researcher utilised during each stage of data collection.

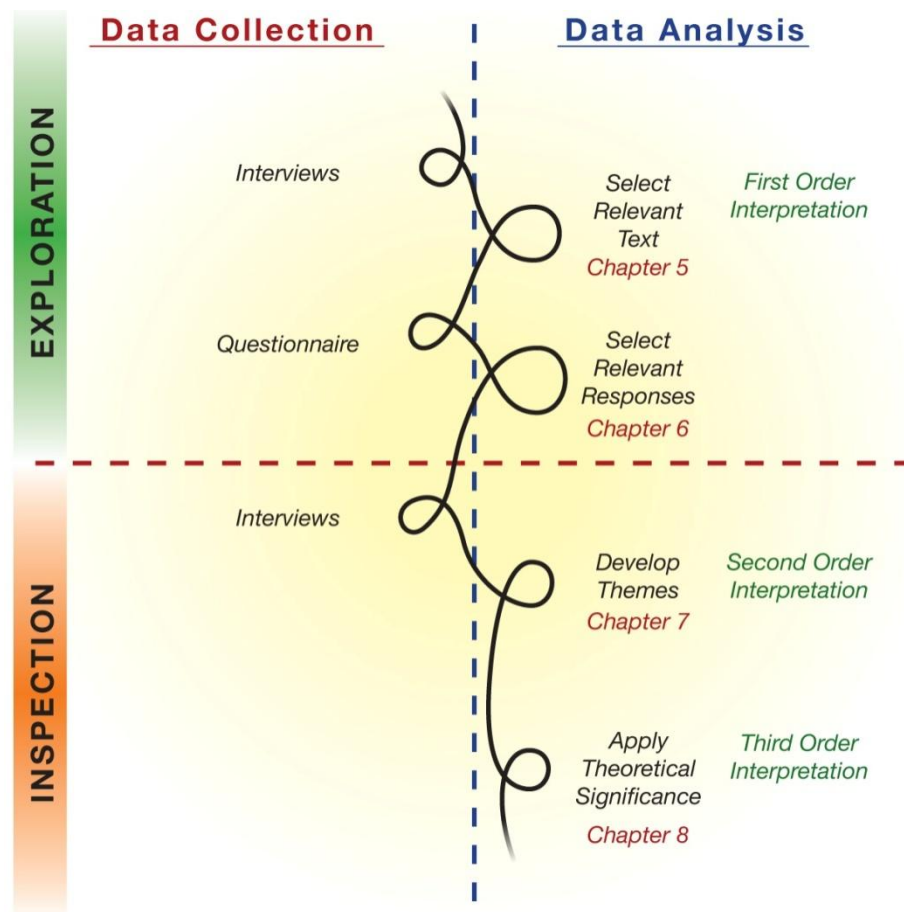


Figure 4.2 Interactive Model of Data Analysis and Interpretation

4.6 RIGOUR

The concepts of validity and reliability are fundamental to scientific research (Guba & Lincoln, 2005). However, in constructivist research the concern rests more around the accuracy of the interpretation of the qualitative findings from the combined perspective of the researcher and the participants and how this interpretation rests with the research question and the data collection methods. The terms used in the literature to discuss this concept include rigour, verification, legitimation, trustworthiness and authenticity to name just a few (Creswell, 2003; Guba & Lincoln, 2005). Even though the terms may be different, a range of primary strategies to assess the accuracy of the findings in qualitative research have been consistently discussed in the literature (Leedy & Ormrod, 2005; Merriam, 1998; Stake, 2005; Yin, 2003). It is recommended that those strategies appropriate to the specific study be incorporated into the planning and conduct of a qualitative study (Creswell, 2003).

This study used the strategies of triangulation, member checking and presence of negative or discrepant information to ensure that the concept of rigour was addressed, thereby safeguarding the quality of the study. Triangulation involved the collection of different data types where each type played a role in addressing the research question (Patton, 2002, p. 307). Consistent with this strategy, this study used a range of data collection methods employing both qualitative and quantitative data, which resulted in an accurate representation of the developing themes and subsequent assigning of theoretical significance. Member checking involves taking the findings back to the participants for them to determine the accuracy and therefore the trustworthiness of the findings (Creswell, 2003; Glesne & Peshkin, 1992). This strategy was specifically used throughout the study, as participants were asked to verify the researcher's interpretation of interview data as well as the results of the questionnaire. Finally, the researcher was alert to the presence of negative or discrepant information. By insuring that an open and accurate interpretation of findings had been captured, the researcher was well positioned to then write a descriptive account of the findings so that the reader could make decisions about transferability to their own or other contexts on the basis of 'fit' (Stake, 2000). Consequently, its validity will rely on "reader-user generalisability" (Merriam, 1998, p. 211) through "case to case transfer" (Firestone, 1993, p. 16).

4.7 ETHICAL CONSIDERATIONS

This research was conducted ethically and in accordance with the guidelines of the Australian Catholic University Research Project Ethics Committee. In particular, the participants were informed of the project in April of 2006, where a unanimous consensus for participation in the project was gained by a showing of hands at a staff meeting. As the researcher had previously been employed at the school the teachers were advised that they could simply elect not to participate if they felt any discomfort before or during the study. In 2007 the participants were more fully and openly informed of the purpose of the study at a staff meeting (Creswell, 2003). Again the teachers were advised that they could elect not to participate and in particular were advised that there was no expectation of participation due to their existing relationship with the researcher. In addition, informed consent in writing was subsequently gained from each participant. Appendix 2 is the information letter and consent forms for the administration team, and Appendix 3 is the information letter and consent forms for the teacher participants. Ethics approval documentation from the Australian Catholic University Research Project Ethics

Committee and DETA is Appendices 1. In accordance with the ethics approvals given, the anonymity of the individual participants and the school has been preserved.

4.8 CONCLUSION

This chapter has reported on the theoretical paradigm and research design that has driven this study. Constructivism provided the ontological direction, and within this paradigm the epistemological focus has been pragmatic constructivism and situated within this is symbolic interactionism. This chapter justifies and outlines a two-staged approach consistent with this symbolic interactionist perspective. This perspective promotes an understanding of the teachers' empirical social world by examining how they make meaning of mandated curriculum change. The two stages in this study, exploration and inspection, used a mixed method design.

Conduct of the exploration stage required the construction of a theoretically-based and construct-specific questionnaire following interviews with the Principal and HOC. The interviews and subsequent construction, validation and use of this questionnaire were completed during the exploration stage of the study. The second stage, inspection, involved interviewing the teachers and administration team through semi-structured interviews to further interrogate the data collected during the exploration stage. The data collected and analysed during this study used an iterative and interactive process represented in Figure 4.2. Issues of rigour, Section 4.6 and ethical considerations, Section 4.7 were then addressed.

This justification and outline of the research method provides an understanding from which the study was conducted. The following chapter, Chapter 5, describes the interviews with the Principal and HOC, and the subsequent construction and validation of the questionnaire, representing the exploration stage of the study.

Chapter Five: Exploration Stage - Development and Validation of the School Professional Learning Community Questionnaire

5.1 INTRODUCTION

As discussed in Chapter Four, this study was situated within the research paradigm of pragmatic constructivism and the theoretical framework of symbolic interactionism. In line with these methodological choices, this study involved two stages of data collection, exploration and inspection (Charon, 2007). During the first stage of this study, the exploration stage, the researcher recognised the need to construct and validate a questionnaire. This chapter provides an account of the development and validation of this questionnaire, the *School Professional Learning Community Questionnaire* (SPLCQ). The subsequent use of the SPLCQ facilitated the exploration of the research site where the researcher sought to explore “What’s going on around here?” (Charon, 2007, p. 147). The results from the use of the SPLCQ are reported in Chapter Six.

This chapter outlines and justifies the development and validation of the SPLCQ during the exploration stage. In particular, Section 5.2 provides an account of the development of this questionnaire through a process that brought together relevant literature, examples from questionnaires employed in prior research on the professional learning community, and interview data gathered from the interviews with the Principal and HOC (See Appendix 4 for interview questions). These data sources were used to develop 12 constructs and then 56 items to assess these constructs. Section 5.3 discusses the construct validity of the SPLCQ. Section 5.3.1 reports results for convergent validity, and section 5.3.2 details the subsequent refinement of the SPLCQ based on these results. Section 5.3.3 reports on internal consistency reliability, Section 5.3.4 reports results for discriminant validity, and Section 5.3.5 examines each final SPLCQ scale for departure from normality of the data. The analyses in Section 5.3.5 were considered important for two reasons. First, departure from normality of scale scores violates the underlying assumption of normality when conducting parametric tests of statistical inference (e.g., *t*-test, analysis of variance). Second, because the sample size in this study was small

(N=25 teachers), non-normality of data can render the results of such parametric tests unsound. These checks on normality were needed because a range of comparisons involving the SPLCQ and various teacher characteristics are reported in Chapter Six, Section 6.3. Although these tests were essential to establish normality of the sample, it is important to point out that this sample was not representative of a normal population. Instead, this sample was specifically chosen because it was believed to be ‘information rich’ and therefore purposive. This selection immediately throws into doubt any inferential statistical analysis conducted. However these analyses did not provide an end result in themselves, rather they highlighted the strength among variables indicating the need for effect size to be computed. From these results interesting insights were gained that led to the development of questions to be further investigated during the inspection stage of the study reported in Chapter 7. The final section in this chapter, Section 5.4, concludes this chapter.

5.2 DEVELOPMENT OF THE SPLCQ

The SPLCQ utilised the intuitive-rational model for instrument development. This multi-step model for questionnaire development was identified by Hase and Goldberg (1967) as a valid way to develop theoretical constructs and associated items. This model continues to be used for questionnaire development (Dorman, 2003; Lang, et al., 2005; Walker, 2006). It relies on the researcher’s intuitive understanding of the dimensions to be assessed, and therefore the validity of the developed constructs rests partly with the subjective opinions of the researcher constructing the questionnaire. Initially, the items that make up each construct were based on themes emerging from the literature and on items in existing questionnaires. Later, these items were refined according to the information provided by the Principal and HOC during the interviews. This process of developing the SPLCQ is described below.

Initially, in the development of the SPLCQ, the researcher was guided by a review of the literature, existing questionnaires from prior research on the professional learning community, and the interviews conducted with the Principal and HOC to be explored in this chapter. As discussed in Chapter three, the review of the literature within this study alerted the researcher to the various sources of support for teachers as they attempt to make sense of mandated curriculum reform. Consequently, the researcher identified the following research question:

What are the sources of support for teachers' meaning-making in the context of the implementation of the Mathematics Year 1-10 Syllabus (QSA, 2004) at Hillside Primary School?

This research question firstly acknowledges Millett and Bibby's (2004) model for analysing the context of mandated curriculum reform. Reflecting on the implementation of mandated curriculum reform in mathematics, these authors situate mandated curriculum reform within the cultural environment of the professional learning community, before also recognising the influence of external factors such as external professionals and also public, private and policy influences. Thus Millett and Bibby identify both internal and external sources of support for curriculum reform in the context of the school. Secondly, this research question focuses attention on 'teachers' meaning-making' in the context of mandated curriculum reform. In doing so, one accepts the 'meaning hypothesis' advanced by Fullan and Stiegelbauer (1991) in their seminal work, *The new meaning of educational change*. Here they argue that "if reforms are to be successful, individuals and groups must find meaning regarding *what* should change as well as *how* to go about it" (p. xi). Later this concern for meaning-making is reflected in Spillane, Reiser, and Reimer's (2002) "process of human sense-making" (p. 419) with respect to teacher efficacy as well as in Millett and Bibby's (2004) understanding of the "zone of enactment" as "the space in which the individual makes sense of reform or change initiatives" (p.1). This research question also positions this study within the discourse on leadership of and within the professional learning community (S. Ball, 1999; Blackmore, 2004; Hargreaves, 2007; Smeed, et al., 2009). Here the vision and goal of distributed leadership is distanced by the actuality of managerialist leadership that is being forced by education departments' contractual accountability expectations (Smeed, et al., 2009). Finally, this research question situates this study within the specific context of implementing the new mathematics syllabus at Hillside Primary School. In this way, we are reminded that this study followed a pragmatic concern for implementing a mandated curriculum reform in this school.

Beyond this review of the literature, six questionnaires from the UK, USA and Australia were analysed prior to the questionnaire being developed. The first questionnaire, the Effective Professional Learning Community questionnaire (EPLC) (Bolam, et al., 2005), was designed to "generate credible, accessible and practically useful findings for those within and outside schools, interested in creating, developing, supporting and sustaining

effective professional learning communities” (p. 28). It has four factors, three of which were relevant to this study: 1) professional and pupil learning ethos; 2) within school policy, management and support for professional learning; 3) enquiry orientation (internal and external), with the fourth factor being participation of non-teaching staff in the professional learning community. These four factors were assessed by 53 items and each had a Cronbach coefficient alpha above .70. The sample of 393 principals or curriculum co-ordinators from nursery, primary, secondary or special schools in the UK participated in the study.

The second professional learning community questionnaire developed by Silins and Mulford (2005) was designed to assess leadership and organisational learning. Exploratory and confirmatory factor analyses revealed a four factor nested model for organisational learning (subscales: Trusted and collaborative climate; Shared and monitored mission; Taking initiatives/risks and ongoing, relevant professional development) and a six factor nested model for principal transformational leadership (subscales: Vision and goals; Culture; Structure; Intellectual stimulation; Individual support and Performance expectations). Each of the 50 items used a five point Likert response format with anchors of strongly disagree and strongly agree. Scales had between three and seven items, with Cronbach alpha coefficients ranging from .74 to .92 based on teacher samples from two Australian schools.

The third questionnaire, developed as part of the School Restructuring Study of the Centre on Organisation and Restructuring of Schools (Louis, et al., 1996), assessed “instructional practices, professional activities, and personal and professional background, as well as perceptions of the school culture and the effects of school restructuring” (p. 767). Of the four factors, three adopted a nested model. The four factors are: Teacher responsibility for student learning, Professional community, Structural conditions for professional community and Human and social resources. Cronbach coefficients alphas for subscales ranged from .61 to .89 based on teacher samples from 24 schools in the United States.

The fourth questionnaire used was the Professional Learning Community Assessment, (PLCA) also from the USA (Huffman & Hipp, 2003). This 45 item questionnaire was designed to assess staff and other stakeholders’ perceptions of five dimensions of the professional learning community. The first dimension, Shared and Supported

Leadership, measured the extent to which school administrators participated democratically with teachers by sharing power, authority and decision making. The second dimension, Shared Values and Vision measured the extent to which staff share visions for school improvement that have an undeviating focus on student learning; while shared values support norms of behaviour that guide decisions about teaching and learning. The third dimension, Collective Learning and Application assessed the extent to which staff at all levels of the school shared information and worked collaboratively. The fourth dimension, Shared Personal Practice, measured the extent to which peers visit with, and observe one another. The final dimension, Supportive Conditions - Relationships and Structures, assessed the extent to which collegial relationships include respect, trust and norms of critical inquiry and improvement, while structures included proximity of staff to one another, and the time and space for staff to meet (p. 6). The PLCA used a four point, forced choice Likert scale ranging from 1 - Strongly Disagree to 4 - Strongly Agree. Cronbach coefficient alphas for each of the five dimensions assessed ranged from .83 to .93 based on data from 274 respondents (p. 74).

In addition to these four questionnaires, two checklist style instruments developed by DuFour, DuFour and Eaker (2005) and Laucer, Dean, Martin-Glen and Asimsio (2005) were consulted. A Needs Assessment for PLC Support and Training developed by DuFour et al. (2005) assesses the support and training provided in the PLC. Each of the 15 items on this instrument requires a yes or no response. The second instrument, the McREL Professional Learning Community Checklist developed by Laucer et al (2005), is a self-report instrument for teachers and teacher leaders. The checklist has four sections (viz. Shared sense of purpose and focus on student learning; Collaborative activity and deprivatised practice; Self support and cooperation; and Shared vision making), with 27 items in total. Items are scored according to whether a particular characteristic is present. If all items under a section in the checklist are ticked, then respondents perceive that they have a PLC. The unticked items indicate gaps in the PLC that can be addressed.

Following the review of existing questionnaires, it was found that no one single questionnaire addressed the focus of this study, namely, gaining a more informed and sophisticated understanding of mandated curriculum reform at Hillside Primary School. Consequently, the researcher decided to develop a theoretically-based and construct-specific questionnaire consistent with the research design used by Silins and Mulford

(2005). In order to meet the specific context of the Queensland state primary school, these constructs and associated items needed to meet two specific criteria. Firstly, the language used in the questionnaire should be consistent with the Queensland education system, and, secondly, the items themselves should reflect existing school structures, policies and practices evident in Queensland state primary schools.

As a result of this intuitive-rational approach to instrument development, four distinct sections within the SPLCQ emerged. The first section of 26 items focussed on the sources of support that exist within the school's micropolitical culture and the purpose of leadership as a source of support. The second section, consisting of 10 items on the SPLCQ, focused on sources of support external to the school that support syllabus implementation. This section contained items that formed two constructs. The third section of the SPLCQ contained 20 items that formed four constructs addressing issues of teacher self-efficacy when implementing the new mathematics syllabus. The final section on the SPLCQ elicited responses on a range of teacher characteristics (e.g., gender, age band). A copy of the SPLCQ is provided in Appendix 6.

The items on the SPLCQ employed a forced-choice four-point Likert scale. Typically, a Likert scale has a five-point response format with anchors ranging from strongly disagree to strongly agree. It is acknowledged that a four point scale does have limitations and therefore may yield less reliable results for the vast majority of psychometric instruments (Preston & Colman, 2000). However, it was decided that the neutral response category of unsure did not respect the teachers' knowledge of the school context; they would have an opinion on the items on the SPLCQ (Clark & Watson, 1995; Comrey, 1988). Consequently, a four point Likert response format was used, with options of strongly disagree, disagree, agree and strongly agree. This is consistent with the forced-choice four-point Likert scale used with the Professional Learning Community Assessment (PLCA) from the USA (Huffman & Hipp, 2003).

5.2.1 SPLCQ: Section 1

The first section of the SPLCQ relates to sources of support pertaining to the school's micropolitical culture. This section on the questionnaire contains 26 items that form six constructs. These theoretical constructs and associated items are listed in Table 5.1 below. The first three constructs are *Whole School Structured Planning*, *Year Level Structured Planning*, and *Structured Support from the HOC*. Each construct, in turn,

contains items that seek to understand the micropolitical culture of support in the school through examination of the structures that have been established. The next three constructs are *Curriculum Collaboration*, *Material Resourcing*, and *Teacher Accountability*. These three constructs seek to understand the purpose of leadership support, both given and received, at the whole school level as well as the year level.

Table 5.1 Constructs and related items of the initial form of the SPLCQ

Construct	Construct Name	Items
1	Whole School Structured Planning	1, 17, 18, 21, 24
2	Year Level Structured Planning	3, 7, 15, 16, 23
3	Structured Support from the HOC	11, 12, 13
4	Curriculum Collaboration	2, 4, 5, 6, 22, 25, 26
5	Material Resourcing	19, 20
6	Teacher Accountability	8, 9, 10, 14
7	Use of External Support Materials	27, 28 29, 34
8	External Professional Development	30, 31, 32, 33, 35, 36
9	Teacher Content Knowledge Confidence	37, 38, 39, 40, 49, 50
10	Personal Teaching Efficacy	41, 42, 43, 44, 45, 46, 47
11	Teacher Pedagogy Confidence	48, 52, 53
12	Mathematics Teaching Outcome Expectancy Efficacy	51,54, 55, 56

Construct 1: Whole School Structured Planning. Within the SPLCQ, this construct examined the extent to which teachers participate in whole school planning. This construct of ‘whole school structured planning’ was identified in the literature review as an important component for educational change (e.g., Hord & Sommers, 2008). Moreover, whole school planning also featured in three of the four professional learning community questionnaires previously identified in Section 5.2. For example, Silins and Mulford (2005) highlight the role of the principal in facilitating communication and distributing leadership. In addition, Huffman and Hipp (2003) focus on the importance of the process of decision making about school issues, while Louis et al (1996) consider the role of structures in the exchange of ideas across the whole school.

These ideas associated with the construct of ‘whole school planning’ were also highlighted during the initial interview with the Principal. In this interview, the Principal argued that new structures within the school were necessary to support whole school

planning. For this Principal, staff meetings and the quarterly curriculum forum provided an opportunity for whole school planning around curriculum issues, and this was further supported by the year level coordinators meeting. He went on to explain that staff meetings are also ‘focussed’ meetings where “every other Monday we have a staff meeting which has a clearly set professional agenda...put together as an admin team with input from our year level coordinators”.

These examples raised questions regarding the level of leadership in the context of whole school planning. Do classroom teachers feel empowered to influence others during sessions of whole school planning? Or, is leadership restricted to those with formal positions (i.e., members of the administration team and year level coordinators)? The following comment by the HOC would suggest that there are different levels of leadership in the context of whole school planning: “they [the teachers] are supported. They were all given the vision, they were led through what would happen”. Limiting classroom teachers’ input into the decision-making roles stands in contrast to the optimal position presented in the literature. It is argued in the literature that supportive structures that focus on whole school planning should include whole school participation in the development of a school vision and goal setting (Earl, et al., 2001; Leithwood, et al., 2002).

Following this review of the literature and initial interviews with the Principal and HOC, the following items were developed under *Construct 1, Whole School Structured Planning*:

- Item 1 Our staff meetings are an avenue through which to raise whole school curriculum issues.
- Item 17 The varying levels of leadership within the school support the implementation of the mathematics syllabus.
- Item 18 Structures are in place within the school to help me with curriculum change.
- Item 21 I contributed to the school vision.
- Item 24 An action plan has been developed for the implementation of the syllabus.

Construct 2: Year Level Structured Planning. This construct examined the extent to which year level structures support teachers with their planning. Support for planning at the year level was identified in the literature in terms of a support infrastructure closely aligned to successful curriculum reform (Harris & Lambert, 2003). With structures in

place, teachers are well positioned to manage and coordinate their specific year level activities (Leithwood, et al., 2007). In this way these structures contribute to improved teacher knowledge and practice (McLaughlin & Talbert, 2006). In addition, appropriate structures which allow teachers to collaborate effectively on curriculum reform at the year level may lead to the practice becoming institutionalised and therefore sustainable. However, these changes are only effective across the school if each year level is working towards achieving the same outcomes (Hord & Sommers, 2008).

The four questionnaires identified in the literature review also contained items on structures that support teams working collaboratively. DuFour, DuFour, and Eaker (2005) focus on teams within the school working interdependently to achieve common goals. This same construct is taken up by Huffman and Hipp (2003) and Silins and Mulford (2005), where they focus on the role of decision-making across grades and subject areas. They also include items on evaluating these practices.

These issues were taken up with the Principal during the interviews. He discussed year level support structures as a way to build capacity within the school. In particular, he commented on the appointment of year level coordinators who organised fortnightly year level meetings that benefit from the attendance of a member of the administration team:

I have built structures in the school, having year level coordinators who are very much empowered, informed and released to be given information and have had things explained to them, not just about maths but about all curriculum areas...Every other week is the year level specific curriculum meetings...The year level coordinators need to email various members of the admin team their agenda. We also then have specific input into those agendas to insure that we are talking curriculum issues through, such as mathematics or English or whatever, so that we have a conduit or forum as well to come down to year level specific activities... [Further] The year level meetings are shared between the Head of Curriculum, the Head of Special Education Services, the Deputy and me, as the Principal... So what we have here is another layer of leadership structure.

During the course of the discussion the Principal explained that year level curriculum meetings had been in place for some years. He also explained that a year level coordinators meeting held once a term to discuss curriculum issues specific to the school, had also been organised for some years. He did, however, go on to outline that two new structures had been implemented more recently. This includes a year level planning day

to plan integrated units of work in a school matrix across each of the Key Learning Areas (KLAs), and two half-days of moderation across each year level. The Principal elaborated that moderation across the year level is an important process demanded as part of the Mathematics *Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the supporting background paper, *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d). As a consequence, a teacher release time of half a day, per year level per semester had been recently introduced. The Principal stated:

We have now established another set of release times for teachers with advanced organisers for moderation. We set the Advanced Organisers over two weeks ago, and teachers from two year levels are, at this very moment, sitting down with the HOC, one group in the morning and one group in the afternoon...This is not just for the purpose of having results clarified, but for professional development to align what we believe is a due requirement for the children and that then links back electronically to our year level programs ...We have them all annotated and they can see them on the web as samples. So that is part of the planning processes across the whole school, and obviously those planning processes will be even more developed with the mathematics as well.

The purpose of these structures raised questions about year level planning. How effective do the teachers believe these structures are for actually supporting planning at the year level? Do these structures dovetail with whole school planning structures to support the school vision?

Apropos to the discussions with the Principal on structures developed to support teachers at the year level, the HOC also pointed out that other supports were offered at the year level.

They [the teachers] were given the documentation, they were led through what would happen, they were given the incentive, they were given the time off: all the things are in place.

The following items were developed for *Construct 2, Year Level Structured Planning* following this review:

- Item 3 Year level meetings benefit from the presence of a member of the administration.
- Item 7 The Year Level Planning Day held each semester is valuable for the implementation of change.
- Item 15 My professional community is restricted to my year level.
- Item 16 The combination of year level meetings, year level planning day and half day moderation satisfy my needs for collegial collaboration.
- Item 23 Incentives to encourage implementation of the syllabus are in place.

Construct 3: Structured Support from the HOC. This construct examined the extent to which the HOC directly provides teachers with programs and programming support to implement curriculum change. Since 2006 the Queensland state primary education system has funded the Head of Curriculum (HOC) position in state schools to provide ongoing curriculum change support (see discussion in Section 2.3). However, the Principal of Hillside Primary School proactively instigated this position within the school the year before. This initiative is in line with research that indicates that the person in a formal curriculum leadership position, such as HOC, is well placed to provide ongoing support for curriculum reform (Huffman & Hipp, 2003).

In advance of the state government's directive, the HOC position was established at Hillside Primary in 2005. The Principal was asked how successful he believed this new position to be. He responded very enthusiastically about the progress that has been made since the HOC was appointed. "I wanted the HOC to be working with us [the administration team] to develop the integrated units of work with clear intent and linked to assessment and reporting. We have achieved that." He went on to explain, "The HOC is very, very industrious. She does a lot of the writing. Because the role of the HOC is evolving and we have very high expectations."

The HOC was also very positive about her role and was able to identify activities that illustrated her support for curriculum reform. "I organise and facilitate the [planning] day for each year level and as a result we have coordination of units of work for each term in that semester, for each of the KLAs". In addition, the HOC identified that she leads the moderation half day by organising and facilitating this process for each year level. According to the HOC, this moderation half day is designed to be the final step in the alignment of planning, teaching, assessing and reporting. This alignment is an accountability requirement of QSA. Finally, the HOC saw her support in terms of the

provision of programs of work for teachers. She particularly felt that teachers had appreciated the provision of the school mathematics program, given that this program provided comprehensive support for the new mathematics syllabus.

The level of support discussed by the HOC raised questions about how the teachers perceived this support. However, given these claims with respect to the support provided by the HOC, the items written for Construct 3, Structured Support of the HOC were as follows:

- Item 11 The HOC provides me with units of work.
- Item 12 The HOC supports my teaching by providing me with the school mathematics program.
- Item 13 The HOC aligns planning, assessment and reporting.

Construct 4: Curriculum Collaboration. This construct examined the extent to which there are collaborative conversations about the curriculum at Hillside Primary. Within the literature, it is argued that teacher collaboration is a key component of curriculum reform (e.g., Crowther, Kaagen, et al., 2002; Hord & Sommers, 2008; Sergiovanni, 2000). In particular, researchers express concern about the wholesale adoption of programs, or innovations where programs are provided without expectation of teacher input (e.g., Fullan, 2005b; Lieberman, 2005; Miles, 2005).

In line with these arguments, the existing questionnaires on professional learning communities concentrate on the collaborative relationships at the whole school level (Huffman & Hipp, 2003; Louis, et al., 1996), and also focus on collaboration at the year level or department level (DuFour, et al., 2005; Laucer, et al., 2005). Given these arguments in the literature, it is interesting that in his initial interview, the Principal expressed the belief that ongoing opportunities for collaboration and discussion of curriculum issues were present at Hillside Primary. He argued that both whole school meetings (i.e., staff meetings and curriculum forums) provide opportunities for collaboration across the school. In addition, there were opportunities for teacher collaboration within year levels. The Principal explained that he wants teachers to be confident in their ability to demonstrate professional practice by working as a team. He also believed that year level structures (e.g. planning days and moderation processes) prompted teachers to be more supportive of one another and their teaching.

Well, the Year Level Planning, the Moderation, and these are not trumped up comments - yesterday I had two teachers after the Year 7 Moderation come to me, ...both of them came to me and said, this was fantastic, it really has given me an opportunity to understand more about the writing process...Now that's one of the strategic reasons why we've had the Year Level meetings, the Year Level Moderation, the Units of Work because if they're all doing the same thing they can talk the same language.

The HOC was also passionate about the degree of collaboration at the school level and year level as a consequence of the new school structures. "Well, the teachers work mainly in their year level teams, but when big change happens, [and] if anyone needs extra help, we're all available. I'm confident in the upper years and we have people in the early years to call on".

Such comments suggest that collaboration is a characteristic of Hillside Primary. However, during the initial interviews with the Principal and the HOC, it became apparent that collaborative processes were not consistently applied within the school. For example, it was noted that there was little evidence of collaboration in the implementation of the Mathematics program. The HOC explained that after her appointment as HOC, a colleague from another school suggested that she trial her school mathematics program that her colleague considered was 'really good'. This program was a detailed list of content to be covered during each of the four school terms. The HOC was enthusiastic about this as she explained:

Both the Principal and I had a look through the program, we thought it was comprehensive enough and worth trialling so that every teacher um, had the copy and they've all got the program in place...The Principal wanted it benchmarked so that when you [the teachers] had a look, the benchmarked tests are in place, just so that the standards are there.

Given the claims of collaboration at Hillside Primary and some evidence to the contrary, the items written for Construct 4, *Curriculum Collaboration* were as follows:

- Item 2 Year level meetings focus on planning units of work.
- Item 4 I support the teachers in my year level.
- Item 5 I am supported by the teachers in my year level.
- Item 6 My year level teachers work as a team.
- Item 22 I have opportunities for collegial discussion.
- Item 25 There is a spirit of collegiality within the school culture.

Item 26 I had input into the school mathematics plan.

Construct 5: Material Resourcing. This construct examined the extent to which teachers believe they are resourced to teach the new mathematics syllabus. It is well recognised in the literature that the provision of appropriate resources is necessary for teachers to meet the expectation of new curriculum (Clements & McMillen, 2002; Cobb, Yackel, & Wood, 1992; Hord & Sommers, 2008). Consistent with this view, items on the provision of resources are included on the existing questionnaires. In particular, these items take the perspective that high quality instruction is only possible when appropriate technology and instructional materials are provided (Huffman & Hipp, 2003; Laucer, et al., 2005).

Provision of material resources for the teaching of the new mathematics syllabus was discussed with the Principal at his initial interview. Recognising the need for resource support for curriculum change, the Principal was keen to gain funding for the purchase of new resources:

Once the units of work were in place, we said that they would be in place for a couple of years and then we'd review them. Therefore the resources we want fit into two groups. Those that we've already got we just have to replace due to natural attrition and those that we have to boost because we've increased the unit or we've diversified the unit.

Not long after this initial interview with the Principal he was able to report that approval had been given for the allocation of \$1000 per year level for the purchasing of mathematics materials.

Seeking more data with respect to resource support, the items written for Construct 5, *Material Resourcing* were:

Item 19 Resources are available to implement the syllabus.

Item 20 I have the appropriate resources to support the implementation of the reform syllabus.

Construct 6: Teacher Accountability. This construct examined the extent to which “contractual accountability” demands are directing curriculum reform (Smeed, et al., 2009, p. 34). This issue was important to this study because accountability is discussed in the research literature, with one concern being that accountability requirements are being centrally imposed as a way to insure that external policies are met, forcing a managerial form of leadership to evolve (Fitzgerald & Gunter, 2006). Consistent with

the concerns found in the literature, accountability was also represented in each of the existing questionnaires which were consulted. In the main, the focus of these questionnaires was on the stress that accountability issues caused teachers and middle managers. For example, the notion of teacher professionalism comes under the spotlight through the delegation of accountability requirements for activities critical for achieving external goals (DuFour, et al., 2005; Silins & Mulford, 2005)

Discussing how curriculum reform was introduced, the Principal explained that, in the past, teachers could put their own interpretation on curriculum documents. “We’d never had the accountability”. Consequently as Principal, he did not ask “What does Mary understand as a program? What does John understand?” However, he now appreciates that new accountability requirements mean that personal interpretation of curriculum documents is no longer appropriate, and that he needs to ask questions about curriculum issues. “We’re getting information about teaching and assessment that means I have to ask questions...well, as a result of moderation, do you think we’ve got an issue here, can you help us work... upon this?”

Agreeing that new accountability requirements are forcing change in schools, the HOC expressed the belief that:

He [the Principal] is particularly data driven. Because he has to be, as all these guys are now, they are so accountable to the Department and where the school is going and that’s then their major focus - on the outcome of the children and how everything is going to affect the pedagogy, the assessment, the reporting, all that sort of thing.

Consequently, her interpretation of the impetus behind the initiation of the moderation half day planned for each year level is coloured by issues of contractual accountability.

Where she explained that:

The terrible thing with all of this is the amount of change that is expected in every KLA and its teachers’ time. You see that making the process sustainable is the hardest thing that we can do and as leaders - and the Principal is very aware of it too- that is the whole moderation process now is what’s coming down in QSA and we’re skilling them before they’re hit with this next year...So, this whole process is making it easy for them by dealing with as much beforehand and getting them skilled up...It’d be terrible if we’d done nothing. So this is the whole leadership thing. It’s getting the process in place before you’ve got to bite the bullet with it next year.

These comments, with respect to accountability, raised questions about the purpose of the structures within the school. Consequently, the items written for Construct 6, *Accountability* were as follows:

- Item 8 Half day moderation helps me to meet my accountability requirements.
- Item 9 Accountability issues force my learning of new syllabi.
- Item 10 In this school, grades and test scores are talked about a lot by the Principal.
- Item 14 I am confident I am meeting my planning, assessment and reporting responsibilities.

5.2.2 *SPLCQ: Section 2*

This section of the SPLCQ focussed on sources of support external to the school that support the implementation of the mathematics syllabus. It comprised 10 items forming two constructs: Construct 7, *Use of External Support Materials* and Construct 8, *External Professional Development*. These constructs and the items that assess these constructs are listed in Table 5.1. Both constructs involved the assessment of input into the school environment from external sources.

Construct 7: Use of External Support Materials. This construct examines the extent to which teachers are supported by the use of materials produced externally to the school. Fullan's (2001) perspective, typical of that found in the research literature, is that, "all successful schools and districts are proactively plugged into an external network of resources, professional development and other forms of assistance" (p. 195). In line with this perspective, existing questionnaires assess the level of access teachers have to these resources (Huffman & Hipp, 2003).

When discussing teacher access to external resources, the HOC explained that the teaching staff had agreed at the end of 2005 to use a reform textbook program written to support the new mathematics syllabus in 2006. It was believed that this program was a way to professionally develop teachers in the new investigative pedagogy of mathematics - in the reform syllabus, as well as introduce the children to this pedagogy. When the use of the textbook was discussed with the Principal, he explained that Hillside Primary had always been above the state average on the state-wide literacy and numeracy tests conducted by the Queensland Studies Authority (QSA) each year for Years 3, 5 and 7 of the primary school. However, in 2006, results for the year 3 students

at Hillside Primary School were below the state average. In explaining this decline in results in mathematics, the Principal felt that the teachers had not used the textbook program as recommended:

We looked at it, we did the error analysis, it was basically the way people were using [the textbook], not using it as it is intended - explicit teaching had given way to trying to complete all the activities and we kept saying, prudent professional selection, use the ones that support your explicit teaching. It's not [the textbook's] fault, but it's about us trying to keep a handle on: do the children understand what's required in the task. We found they made silly mistakes with place value. We've run pivot tables on it, and we found that there were certain areas - because we were trying to do everything that was in [the textbook] - they neglected other areas and it was these other areas that showed up on the 3, 5, 7 tests. Now clearly mathematically, and you're the mathematician, if each of those children had not made two to three errors, or two to three fewer errors, it wouldn't have been a problem.

In support of this explanation, the HOC explained that the decision made to use the reform textbook prior to her appointment as Head of Curriculum and the decline in results for the Year 3 cohort in 2006:

I believed [we needed] to let things settle and work out what we're doing. So to my mind, they needed the program in place before [the textbook], rather than use [the textbook] as their program and then try to bring it into the program. I think they did it the wrong way around...But we've still got the [the textbook] material.

The HOC was asked about the role of the textbook in the school now that she had trialled and introduced another school's program. She responded:

[The textbook] is now to be used as a support. So we now have a program, this is what needs to be taught, Oh is [the textbook] connected with this - yes it can help me out here- but not using [the textbook] as the program, do you know what I mean?

This thought was extended when the HOC credited the textbook with 'compensating' for the teachers' lack of understanding of the new content and pedagogy required by the new mathematics syllabus:

I think they think they've got it - along with the way [the textbook] has changed their outlook a little bit - on how things are introduced, I think that they feel that they're introducing the new syllabus. I don't know how much they are actually introducing the intent of the new syllabus, but I think all of these sort of things are going to come with time and as we evolve it. I really

do, even making up the investigations and starting over, but I don't think you can throw everything at them in every KLA at once.

It seems that both the Principal and the HOC value external resource support even though some teachers may use these resources inappropriately. This interpretation raises questions about the teacher's perspective on the support provided by external resources. Thus, the four items in Construct Seven 7, *Use of External Support Materials* were:

- Item 27 Using [the textbook] has helped me to understand the intent of the mathematics syllabus.
- Item 28 I use [the textbook] materials regularly.
- Item 29 Using [the textbook] has helped me to implement the school mathematics plan.
- Item 34 I refer to the Mathematics Year 1-10 Syllabus.

Construct 8: External Professional Development. This construct examines the extent to which teachers access professional development (PD) from outside experts. Professional development is well recognised as an essential aspect for curriculum reform (Hord & Sommers, 2008). Not surprisingly, the existing questionnaires draw on the importance of professional development for curriculum reform. It is noted that PD can be supporting one another in the school environment, and/or accessing external expertise. Items written on the use of an external expert typically focus on the enhancement of teaching and learning through external PD (Huffman & Hipp, 2003; Laucer, et al., 2005).

In his initial interview, the Principal also highlighted the importance of PD. He acknowledged that with devolution, processes have changed, and that the need to take direct charge of PD rests with him rather than the system authority:

I can sit here and say, where are Education Queensland's advisors for English and mathematics – I can give myself an ulcer and tear my hair out worrying. But what we've done with outside consultants is say, right, we know what we are going to do in this school, we have our curriculum journey mapped out, if we're looking sensibly at mathematics at the moment; we have to acknowledge that's what we're doing. We've got to keep the locus of control here, but the flip of that is there's an accountability issue. We're looking at mathematics, what do we need? ... I have PD money, the amount of that PD money is determined by us and our School Council, based upon our identifications of immediate needs and projections for planning.

In the process of planning for PD, the Principal outlined the various opportunities for external PD offered to teachers. Firstly, teachers can attend PD that they identify as

relevant. In a daily newsletter, emailed to staff each morning, any new PD opportunities are listed under the permanent heading *Learning Skills and Workforce* (e.g. the District Programs on the new mathematics syllabus offered by the Queensland Studies Authority). Secondly, the ‘outside expert’ comes to the school: “We can get someone in here just for our staff.” Thirdly, teachers can attend PD with colleagues from neighbouring schools. Here the Principal often takes the initiative by holding district workshops in the hall at Hillside Primary School.

However, despite these claims by the Principal, when the HOC was asked to comment specifically on the amount of external PD provided in implementing the new Mathematics syllabus she said,

At the moment no, no, it’s not the same amount [as it is for the English syllabus] at this stage; it’s sort of dried up. As I said earlier, we are going to get together – the best PD is teachers talking to teachers. We are going to get together, and we are going to start organising investigations, that’s got to happen.

Given these comments, the six items in Construct 8, *External Professional Development* were:

- | | |
|---------|--|
| Item 30 | I have accessed external professional development in my own time to assist me implement the mathematics syllabus. |
| Item 31 | I have accessed external professional development on the implementation of the mathematics syllabus as a member of the school community. |
| Item 32 | School Cluster projects have assisted me to implement the mathematics syllabus. |
| Item 33 | District Programs have assisted me with my professional development needs in implementing the Mathematics syllabus. |
| Item 35 | I can access workshops hosted by my school. |
| Item 36 | My Principal promotes our school as a facilitator for other schools to implement new programs. |

5.2.3 *SPLCQ: Section 3*

This third section on the questionnaire has 20 items that assess four constructs, constructs 9-12. As limited information of teacher efficacy was obtained during the interviews with the Principal and HOC, it was decided to support these limited data with the literature in order to develop these theoretical constructs. In addition, 14 items were taken from three existing questionnaires (see below). The items and constructs in the third section in the SPLCQ are listed in Table 5.1. Each of these four constructs seeks to

assess teacher efficacy in the implementation of the mathematics syllabus by drawing on two separate theoretical perspectives on teacher efficacy. The first two constructs, *Teacher Content Knowledge Confidence* and *Personal Teaching Efficacy* fall within the theoretical perspective that considers the extent to which teachers believe they can influence the environment in which they teach. The second two constructs, *Teacher Pedagogy Confidence*, and *Mathematics Teaching Outcome Expectancy Efficacy*, fall within the theoretical perspective that considers the extent to which they believe they can perform at a given level, and how they cope with demanding situations (Bandura, 1997). While the items used are taken from existing questionnaires which originally used a five point Likert response format, the researcher continued the same format used in the first two sections of the SPLCQ by presenting each item on a four point Likert scale.

Construct 9: Teacher Content Knowledge Confidence. This construct examined the extent to which teachers believe they understand mathematics content, and how they can apply this content knowledge to the teaching of the reform mathematics syllabus. Within the literature, it is well recognised that teachers of mathematics, and in particular primary mathematics teachers, have poor content knowledge (e.g., D. L. Ball, et al., 2001; Ma, 1999; White, et al., 2005). When this literature is combined with the literature of managerialism that has developed within an entrepreneurial climate, questions on appropriate professional development on new content and pedagogy in the syllabus became evident. Of particular concern is that contractual accountability demands have the teachers focusing on test scores (Blackmore, 2004), thus preventing teachers from investing their time in professional development (S. Ball, 1999). Moreover, when this literature is combined with the comments made by the HOC, as presented above, “...at the moment no, no, it’s [mathematics PD] not the same amount [as it is for the English syllabus] at this stage; it’s sort of dried up”, concerns for teacher content knowledge confidence were raised.

These concerns for teacher content knowledge efficacy raised questions of confidence in implementing the new mathematics syllabus. Consequently, the six items that formed Construct 9, *Teacher Content Knowledge Confidence* were:

- Item 37 I understand what an investigation in mathematics is.
- Item 38 Teachers in my school are supported in developing their professional skills.
- Item 39 We have sufficient skills within the school to implement the syllabus.

- Item 40 I am implementing the new Mathematics Syllabus as intended.
- Item 49 My mathematics content knowledge helps my students make significant progress.
- Item 50 I have a good knowledge of investigation-based pedagogy in mathematics.

Construct 10: Personal Teaching Efficacy. This construct examined the extent to which teachers believed they are contributing to the academic progress of their students. In particular, positive perceptions indicate that teachers believe that they are confident in their ability to teach difficult or unmotivated students. Each of the seven items in this construct were taken from the *Personal Teaching Efficacy* scale from the *Patterns of Adaptive Learning Scales* (Midgley, et al., 2000). PALS documentation reports internal consistency reliability, with Cronbach's coefficient alpha of .69 for these seven items. These items in Construct 10, *Personal Teaching Efficacy*, were:

- Item 41 If I try really hard, I can get through to even the most difficult student when I teach mathematics.
- Item 42 Factors beyond my control have a greater influence on my students' achievement in mathematics than I do. (reverse scored)
- Item 43 I am good at helping all the students in my classes make significant improvement in mathematics.
- Item 44 Some students are not going to make a lot of progress in mathematics this year, no matter what I do.
- Item 45 I am certain that my mathematics teaching is making a difference in the lives of my students.
- Item 46 There is little I can do to ensure that all my students make significant progress in their mathematics this year. (reverse scored)
- Item 47 I can deal with almost any learning problem in mathematics.

Construct 11: Teacher Pedagogy Confidence. This construct examined the extent to which teachers felt confident about their teaching of mathematics. This construct considers the teachers' ability to produce certain outcomes. The three items in this construct came from the *Teaching Confidence Scale* (Woolfolk Hoy, 2000) and were:

- Item 48 I am confident in my ability to teach mathematics.
- Item 52 I am confident in my ability to teach mathematics as a co-inquirer with students.
- Item 53 I am confident in my ability to use a variety of assessment techniques in mathematics.

Construct 12: Mathematics Teaching Outcome Expectancy Efficacy. This construct examined the extent to which teachers believed they orchestrate student outcomes. The four items in this construct were taken from the *Science Teaching Efficacy Belief Instrument* (Riggs & Enochs, 1990) and modified so that the word “science” was replaced with the word “mathematics”. These items in this construct were:

- Item 51 I understand mathematics concepts well enough to be effective in teaching primary mathematics.
- Item 54 Even when I try very hard, I don't teach maths as well as I do other subjects. (reverse scored)
- Item 55 If students are underachieving in mathematics, it is most likely due to ineffective mathematics teaching. (reverse scored)
- Item 56 When a student has difficulty understanding a mathematics concept, I am usually at a loss as to how to help the student understand it better. (reverse scored)

5.2.4 SPLCQ: Section 4

Information on teacher characteristics was collected in the final section of the questionnaire. These items included: gender, age, years at present school, year levels taught, level of mathematics studied, academic qualifications and official leadership positions held. This opportunity was taken to acquire considerable information about each teacher that could not otherwise have been accessed as easily. This information assisted the researcher to construct a clearer picture of the micropolitical culture of this professional learning community (Gay & Airasian, 2000).

It is noteworthy that this initial form of the SPLCQ was further scrutinised to enhance its face validity. This was achieved by forwarding the questionnaire to three teachers in local schools who hold administrative positions. These teachers were asked to scrutinise the SPLCQ for appropriate use of context-based terms, readability of items and ease of interpretation. Minor changes to wording resulted from this advice. The final wording of all items on the SPLCQ as presented to the teachers at Hillside Primary School has just been detailed in the above description of constructs and items. The result of this questionnaire development process is the initial form of the SPLCQ (see Appendix 6).

5.3 STATISTICAL PROPERTIES OF THE SPLCQ

The initial form of the SPLCQ was developed and refined as described in Section 5.2 above. Its development was guided by the literature, existing questionnaires on professional learning communities and interviews with the Principal and HOC. As a result, 12 theoretical constructs were formed with items written or selected from existing questionnaires for each of these constructs. The following subsections report the construct validity of the 12 constructs in the SPLCQ. Construct validity utilises statistical methods to assess whether the items in each of the 12 theoretical constructs developed for the SPLCQ are in fact correlated, and can therefore be recognised as legitimate scales representing both theoretical and empirical construct validity. Without this validity the SPLCQ would not stand up to scrutiny and could not be used to support the research findings. These results are now reported.

5.3.1 *Convergent Validity*

Following the completion and collection of 25 of the 26 SPLCQs that were distributed, teachers' responses to the items were entered into the statistical analysis program, SPSS. Cronbach's coefficient alpha was chosen to assess internal consistency reliability for the items making up each of the 12 constructs. The usefulness of this statistic lies in its ability to give a numerical indication of the degree of correlation among the items in the same construct. As the correlation increases, the internal consistency reliability increases. Higher internal consistency reliability, and therefore convergent validity, is indicated by high coefficient alphas. Therefore, the closer the coefficient alpha is to 1, the more highly correlated are the items in the construct and the better the internal consistency reliability of the set of items. One reason why internal consistency reliability needs to be taken seriously when developing scales, concerns the subsequent use of these scales in comparisons of groupings. It is well established that relationships between variables are attenuated if unreliable scales are employed in analyses (see DeVellis, 2003; Henson, 2001). It follows that statistical significance in inferential tests (e.g. *t* tests, analysis of variance) can be difficult to establish if scales do not have sound internal consistency reliability and this was important as these tests guided the calculation of effect size between variables.

Table 5.2 shows each theoretical construct, the items in each construct and that construct's Cronbach's coefficient alpha. Cronbach's coefficient alpha for constructs 2,

3, 8, 9, 11 and 12 were considered by the researcher to be too low for adequate internal consistency reliability. However, it seems somewhat arbitrary as to what is a low alpha and therefore unacceptable, and what is a high alpha, and therefore considered as indicating acceptable internal consistency reliability (Gay & Airasian, 2000). The researcher decided that anything below a Cronbach coefficient alpha of .60 was not satisfactory for internal consistency reliability. As a consequence of these results, the researcher returned to the theoretical constructs and the items on the SPLCQ and considered how to refine the SPLCQ through reassigning items to the theoretical constructs.

Table 5.2 Items and Cronbach Coefficient Alpha for 12 Constructs of the Initial Form of the SPLCQ

Construct	Construct Name	Items	Cronbach α
1	Whole School Structured Planning	1, 17, 18, 21, 24	.72
2	Year Level Structured Planning	3, 7, 15, 16, 23	.36
3	Support From the HOC	11, 12, 13	.35
4	Curriculum Collaboration	2, 4, 5, 6, 22, 25, 26	.78
5	Material Resourcing	19, 20	.91
6	Teacher Accountability	8, 9, 10, 14	.64
7	Use of external Support Materials	27, 28, 29, 34	.70
8	External Professional Development	30, 31, 32, 33, 35, 36	.48
9	Teacher Content Knowledge Confidence	37, 38, 39, 40, 49, 50	.36
10	Personal Teaching Efficacy	41, 42, 43, 44, 45, 46, 47	.60
11	Teacher Pedagogy Confidence	48, 52, 53	.40
12	Mathematics Teaching Outcome Expectancy Efficacy	51, 54, 55, 56	.32

5.3.2 Refinement of the SPLCQ

To refine the SPLCQ, and in order to establish satisfactory internal consistency reliability for each scale, the researcher appreciated that factor analysis with such a small sample was problematic, so therefore constructed a 56 item by 56 item correlation matrix that included each item on the SPLCQ. This matrix allowed the researcher to identify correlations between items, and for these items to be then considered as possible inclusions in one of the theoretically developed constructs. Only those items that aligned with the theoretical construct and also enhanced the internal consistency reliability of the

construct, were retained for further statistical analysis. The new constructs and items were then subjected to further reliability analysis to identify those items that contributed least to the reliability of the construct. These items were removed from the construct. The refinement of the SPLCQ saw Construct 3 disappear and Construct 7 refocussed. In addition, the four constructs 9-12 were reduced to two. They were refocused as *Content Knowledge Efficacy* and *Teaching Efficacy*. A range of other movement of items also occurred. On completion of this process the number of constructs had been reduced from 12 to 10, while 9 of the 56 original items had been left unassigned to a construct.

The final 10 constructs, construct description providing a common sense definition of the constructs and the number of items in each construct are shown in Table 5.3. A sample item and item numbers from the SPLCQ are also provided.

Table 5.3 Descriptive Information for the Final Form of the School Professional Community Questionnaire (SPLCQ)

Construct Name	Construct Description	Items per Construct	Sample Item and Item Numbers
Whole School Structured Planning (WSSP)	The extent to which the whole school participates in structured planning.	5	Structures are in place within the school to help me with curriculum change. 17, 18, 21, 24, 26
Whole School Collaboration (WSC)	The extent to which the whole school community collaborates.	6	There is a spirit of collegiality within the school culture. 11, 12, 22, 25, 38, 39
Year Level Structured Planning (YLSP)	The extent to which year level teachers participate in structured planning.	5	The Year Level Planning Day held each semester is valuable for the implementation of change. 7, 14, 15, 16, 23
Year Level Collaboration (YLC)	The extent to which the year level teacher community collaborates.	4	I am supported by the teachers in my year level. 2, 4, 5, 6
Teacher Accountability (TA)	The extent to which accountability is part of the teacher's life.	3	Half day moderation helps me to meet my accountability requirements. 8, 9, 10
Material Resourcing (MR)	The extent to which teachers believe they are resourced to teach mathematics.	2	Resources are available to implement the syllabus. 19, 20
Professional Resourcing (PR)	The extent to which teachers believe they have access to professional resources from within the school.	5	I can access workshops hosted by my school. 27, 28, 29, 35, 36
External Professional Development (EPD)	The extent to which teacher access professional development from outside experts.	4	I have accessed external professional development in my own time to assist me implement the mathematics syllabus. 30, 31, 32, 33
Content Knowledge Efficacy (CKE)	The extent to which teachers believe that they understand mathematics content and can apply this content knowledge to the teaching of the new mathematics syllabus.	5	I have a good knowledge of investigation based pedagogy. 34, 37, 40, 48, 53
Teaching Efficacy (TE)	The extent to which teachers believe that they are contributing to the academic progress of their students, and can effectively teach all students	8	I am certain that my mathematics teaching is making a difference in the lives of my students. 41, 43, 45, 47, 49, 51, 54, 55

5.3.3 Internal Consistency Reliability of the Final Form of the SPLCQ

As shown in Table 5.4 the internal consistency reliability for each of the constructs was at least sound and it was considered reasonable to consider these constructs to be scales. The lowest Cronbach coefficient alpha was .68 for Teacher Accountability. This alpha was well above the researcher's self-designated minimum of .60 for a scale to claim sound internal consistency reliability. As can be seen in Table 5.4, seven scales had a Cronbach coefficient alpha above .70 with a further scale, Year Level Collaboration,

with a Cronbach coefficient alpha of .85 while Material Resourcing had the highest Cronbach coefficient alpha of .91. Item-scale correlations were performed and confirm that all items had been assigned to the appropriate scale, and that each item made an appreciable contribution to that scale's internal consistency reliability.

Table 5.4 Descriptive Statistics for the 10 scales of the Final Form of the SPLCQ

Scale Name	Cronbach Coefficient α	Scale Mean	Standard Deviation	Minimum Statistic	Maximum Statistic	Mean Correlation	Skewness Statistic	Kurtosis Statistic
WSSP	.72	2.70	0.37	2.00	3.40	.43	0.55	-0.18
WSC	.76	3.23	0.38	2.67	4.00	.41	0.58	-0.22
YLSP	.73	3.08	0.44	2.20	4.00	.40	0.43	-0.02
YLC	.85	3.62	0.40	2.75	4.00	.27	-1.20*	0.12
TA	.68	3.38	0.42	2.33	4.00	.13	-0.25	0.10
MR	.91	2.48	0.65	1.00	4.00	.26	0.08	-0.01
PR	.78	2.65	0.53	1.60	3.60	.08	-0.24	0.02
EPD	.71	2.00	0.35	1.00	2.50	.03	-1.36*	2.74*
CKE	.76	2.84	0.35	2.17	3.33	.39	-0.70	-0.37
TE ¹⁶	.74	2.90	0.31	2.25	3.50	.33	-0.54	0.17

* $p < .01$

5.3.4 Discriminant Validity of the Final Form of the SPLCQ

Although the 10 constructs are now being called scales, the discriminant validity must also to be tested before construct validity could be claimed. Discriminant validity gives a numeric index of the degree to which the different scales assess mutually exclusive dimensions of the school professional learning culture. This empirical mutual exclusivity reinforces the notion that the constructs were theoretically distinct. In this case, the closer the mean correlation is to zero, the more distinct are the scales. For internal reliability consistency, the intention is to have items very closely related and therefore form a scale. With discriminant validity, the intention is to have each scale very different from each other scale.

Table 5.4 reports the discriminant validity data for the 10 scales using the mean correlation of the scale with the remaining nine scales as an index. These data indicate

¹⁶ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

the scales do overlap, but not to the extent that would violate the psychometric structure of the SPLCQ. The results in Table 5.4 show that the mean correlation for each scale is low, with the three highest values being .43 for Whole School Structured Planning, .41 for Whole School Collaboration and .40 for Year Level Structured Planning. Although these three scales have similar mean correlations, they are sufficiently low to indicate distinct scales in their own right, even though some overlap of the scales does exist. Additionally, these scales are distinct, meaning that theoretically, Whole School Structured Planning is different from Year Level Structured Planning, and that these are different again from Whole School Collaboration. This also reinforces the decision to retain all three scales in the SPLCQ. The remaining seven scales have lower mean correlations, the lowest being .03 for External Professional Development. These mean correlations for each scale with the remaining nine scales, have returned a sufficiently low index permitting discriminate validity to be claimed.

5.3.5 Departure of Scales from Normality: Skewness, Kurtosis and the Kolmogorov-Smirnov Test for Normality

Parametric inferential testing has as its fundamental premise that the measure must be normally distributed in the population. It is therefore important to use indices of skewness and kurtosis to test each scale for normality. The Kolmogorov-Smirnov tests can also be employed to test for normality of each scale to ascertain normality of the data set. A second premise for parametric inferential testing is that the sample is drawn randomly from the population. The sample in this study did not represent a random sample because it was specifically chosen. As stated earlier, this selection immediately throws into doubt any inferential statistical analysis conducted. However these analyses were used to guide the collection of qualitative data on the social situation of Hillside Primary School as a way to further investigate this social setting during the inspection stage of the study. Even though this sample does not represent the population it is still important to ascertain that the sample is behaving in a normal way by conducting skewness and kurtosis analysis.

Table 5.4 shows skewness and kurtosis statistics for the final 10 SPLCQ scales. Skewness provides an indication of the symmetry in the data distribution. As shown in Table 5.4, there were six scales with negative skewness scores indicating the shape of the distribution was skewed to the right or positively skewed. Two of these scales, Year Level Collaboration and External Professional Development, have statistically

significant skewness ($p < .01$), suggesting significant departure from normality. As all other skewness statistics were close to zero, they can be considered to sufficiently close to a normal distribution for probability estimates to be useful.

While skewness provides an indication of the symmetry of the data distribution, kurtosis statistics refers to whether the data are peaked or flat relative to the normal distribution. In terms of the statistics reported in Table 5.4, a normal distribution will have a kurtosis value of zero. Table 5.4 shows that the kurtosis values for the 10 scales range from -0.37 for Content Knowledge Efficacy where the shape of the curve is flatter than normal, to 2.74 for External Professional Development where the shape of the curve has a higher peak than normal. The kurtosis value varied significantly from zero for External Professional Development ($p < .01$) with a very peaked curve. This suggests that the EPD scale departed significantly from normality.

As noted earlier in this main section, normality of data is an assumption of parametric inferential tests of statistical significance, like the t test and analysis of variance. Due to the results for skewness and kurtosis, it was decided to formally test the data for normality using a series of Kolmogorov-Smirnov tests with a Type 1 error rate of .05. Results are presented in Table 5.5

Table 5.5 Kolmogorov-Smirnov test results for 10 SPLCQ scales

<i>Scale Name</i>	<i>Z Score</i>
WSSP: Whole School Structured Planning	K-S Z = 1.05 ($p = .22$)
WSC: Whole School Collaboration	K-S Z = 0.75. ($p = .62$)
YLSP: Year Level Structured Planning	K-S Z = 1.11 ($p = .17$)
YLC: Year Level Collaboration	K-S Z = 1.93 ($p = .001$)
TA: Teacher Accountability	K-S Z = 0.81 ($p = .54$)
MR: Material Resourcing	K-S Z = 1.44 ($p = .03$)
PR: Professional Resourcing	K-S Z = 0.57 ($p = .90$)

EPD: External Professional Development	K-S Z = 1.36 ($p = .05$)
CKE: Content Knowledge Efficacy	K-S Z = 1.39 ($p = .04$)
TE: Teaching Efficacy	K-S Z = 0.97 ($p = .30$)

These Kolmogorov-Smirnov tests with a Type 1 error rate of .05 revealed four scales for which there were statistically significant departures from normality: YLC, MR, EPD and CKE¹⁷. Each of these four scales had a p-value rate less than .05. These results were important in deciding which statistical tests to perform when comparing SPLCQ scores according to different teacher characteristics. As a result parametric tests were performed on Whole School Structured Planning, Whole School Collaboration, Year Level Structured Planning, Teacher Accountability, Professional Resourcing and Teaching Efficacy while non-parametric tests were performed on Year Level Collaboration, Material Resourcing, External Professional Development and Content Knowledge Efficacy. These comparisons are reported in Chapter Six.

5.4 CONCLUSION

This chapter has reported on the introductory component of the exploratory stage of the research design. Informed by literature, existing questionnaires and preliminary interviewing, a rationale for 12 preliminary constructs for a questionnaire, the School Professional Learning Community Questionnaire (SPLCQ), was established. In addition, part of the literature review, Section 5.2, examined previous research studies involving professional learning communities. The SPLCQ was designed to assess the sources of support evident in the school professional learning community for the implementation of the new mathematics syllabus. As discussed in Section 5.2, the development of the SPLCQ followed the intuitive-rational model for instrument development in which these 12 theoretical constructs were defined, and then 56 items were written to assess these constructs (Hase & Goldberg, 1967). Three teachers holding administrative positions in local schools were asked to scrutinise the SPLCQ for appropriate use of context-based terms, readability of items and ease of interpretation. Minor changes were made as recommended to ensure face validity.

¹⁷ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

The SPLCQ was then distributed to the 26 teachers at Hillside Primary. A total of 25 completed questionnaires were returned, allowing convergent and discriminant validity to be assessed. Cronbach's coefficient alpha was considered too low for 6 of the 12 constructs as the criterion value set for this study was 6.0. Consequently a refinement process was undertaken to improve scale reliability. As reported in Section 5.3, this refinement process resulted in the number of constructs being reduced from 12 to 10 with 9 of the 56 items being left unassigned to a construct. These changes, incorporating both theoretical and statistical judgements resulted in Cronbach's coefficient alphas for the 10 constructs ranging from .68 to .91 indicating very sound internal reliability consistency. From this point, the constructs were called scales. These 10 scales then underwent discriminant validity testing. In each case the mean correlation of the scale with the remaining nine scales was sufficiently low to indicate that 10 generally distinct scales had been developed.

Further descriptive statistics, skewness, kurtosis and Kolmogorov-Smirnov testing for normality were conducted. These tests were important as the fundamental assumption of parametric inferential testing of statistical significance is that the measure must be normally distributed in the population. Statistically significant skewness was found for two scales, YLC and EPD¹⁸. In addition, the kurtosis value varied significantly for EPD with a very peaked curve indicating significant departure from normality. As a result of these tests, normally of the data was formally tested using a series of Kolmogorov-Smirnov tests. These tests revealed that scores on four scales, YLC, MR, EPD, and CKE, had statistically significant departures from normality. These four scales had to undergo non-parametric testing, as these tests do not rely on the premise that data are normally distributed. The remaining six scales underwent parametric testing for statistical significance as these scales conform to normal distribution. These parametric and non-parametric tests are reported in Chapter Six, along with comparisons of SPLCQ mean scale scores according to seven teacher characteristics from which inferences about the data can be draw.

¹⁸ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

Based on the development and validation of the SPLCQ reported in this chapter, it is possible to develop a theoretically-based and construct-specific instrument to assess sources of support for the implementation of the new mathematics syllabus. In particular, it has been possible to use literature and interview data to identify key constructs of a school professional learning community. This chapter has also described the successful development of a context-specific instrument which assesses these particular constructs. The final form of this instrument, the SPLCQ, has sound psychometric properties.

Given the evidence that the SPLCQ is a valid measure of a professional learning community, the analyses of descriptive and inferential statistics analyses for individual items and scales is justified. These analyses are reported in the next chapter.

Chapter Six: Exploration Stage - Results of the Use of the School Professional Learning Community Questionnaire

6.1 INTRODUCTION

This chapter is the second of two that report on the exploration stage of this study. The exploration stage as identified by Blumer (1998) has two distinct functions. Firstly, this stage provides the researcher with the opportunity to become familiar with the empirical social world under study. Charon (2007) interprets this as an opportunity to understand “What’s going on around here?” (p. 194). Secondly, this familiarisation process allows the researcher to refine the inquiry process that, in turn, guides the inspection stage of the inquiry. This second stage of inspection involves the isolation of significant elements within the empirical world or situation, describing the situation in relation to these elements and then using this understanding to inspect other forms of interaction. In other words, the exploration stage enabled the researcher to identify issues or areas of interest that deserve further investigation during the inspection stage, the second stage of the study.

So far, the data collection and analysis reported in Chapter Five allowed the researcher to begin the process of exploration by becoming familiar with the empirical social world of Hillside Primary School. This initial understanding, combined with relevant literature and six questionnaires from the UK, USA and Australia, supported the development of the School Professional Learning Community Questionnaire (SPLCQ). This questionnaire, in turn, enabled a further exploration of the empirical social world of Hillside Primary School. The data, collected using this survey instrument, are displayed in this sixth chapter.

Descriptive statistics for individual items from the 10 scales are reported in Section 6.2. Descriptive statistics discuss the spread of data for each item in the SPLCQ. This statistic provides an understanding of the frequency distribution of the teachers’ responses to each item. Section 6.3 reports inferential statistics for comparisons of SPLCQ scores

according to eight teacher characteristics. These inferential statistics aim to make inferences from the data in order to draw conclusions that go beyond the sample. Results reported in Sections 6.2 (descriptive statistics) and 6.3 (inferential statistics) shed light on key issues or areas of interest for further research. In preparation for the inspection stage of this study, these issues or areas of interest, along with a series of unresolved issues are discussed in Section 6.4, while Section 6.5 concludes this chapter.

6.2 ANALYSIS OF INDIVIDUAL ITEMS OF THE SPLCQ: DESCRIPTIVE STATISTICS

The purpose of this section is to analyse individual items of the SPLCQ. As noted in Chapter Five, the final form of the SPLCQ consists of 48 items assigned to 10 underlying scales. There are also nine items that were not assigned to any scales. Section 6.2.1 considers items from the four scales that relate to planning and collaboration: Whole School Structured Planning (WSSP), Whole School Collaboration (WSC), Year Level Structured Planning (YLSP) and Year Level Collaboration (YLC). Section 6.2.2 reports findings for items from another three scales: Content Knowledge Efficacy (CKE), Teaching Efficacy (TE) and Teacher Accountability (TA). Section 6.2.3 reports data pertaining to items from three scales, Material Resourcing (MR), Professional Resourcing (PR) and External Professional Development (EPD). Sections 6.2.1 – 6.2.3 provide a tabulation of the frequency distributions for each item, while also highlighting items that have particularly high or low levels of endorsement. In this way, the exploratory stage provides baseline findings on the research question of this study. Collectively, Sections 6.2.1 to 6.2.3 shed light on possible areas to be further investigated. These areas are discussed in Section 6.2.4.

6.2.1 Analysis of Items from Whole School Structured Planning (WSSP), Whole School Collaboration (WSC), Year Level Structured Planning (YLSP) and Year Level Collaboration (YLC) Scales

Table 6.1 shows frequencies for questionnaire items assigned to the WSSP, WSC, YLSP and YLC scales. There are several observations from these data that are pertinent to the research question of this study.

Table 6.1 Response Percentages for Questionnaire Items in the WSSP, WSC, YLSP, and YLC Scales (N=25)

Scales and Items	Response %			
	SD	D	A	SA
Scale 1- Whole School Structured Planning				
Item 17: The varying levels of leadership within the school, support the implementation of the mathematics syllabus.	0.0	28.0	68.0	4.0
Item 18: Structures are in place within the school to help me with curriculum change.	0.0	20.8	75.0	4.2
Item 21: I contributed to the school vision.	0.0	32.0	60.0	8.0
Item 24: An action plan has been developed for the implementation of the syllabus.	0.0	21.7	65.2	13.0
Item 26: I had input into the adoption of the school mathematics plan.	4.0	68.0	28.0	0.0
Scale 2 – Whole School Collaboration				
Item 11: The HOC provides me with units of work.	4.0	36.0	40.0	20.0
Item 12: The HOC supports my teaching by providing me with the school mathematics program	0.0	0.0	72.0	28.0
Item 22: I have opportunities for collegial discussion.	0.0	8.0	68.0	24.0
Item 25: There is a spirit of collegiality within the school culture.	0.0	0.0	56.0	44.0
Item 38: Teachers in my school are supported in developing their professional skills.	0.0	8.0	84.0	8.0
Item 39: We have sufficient skills within the school to implement the syllabus.	0.0	8.0	72.0	20.0
Scale 3 - Year Level Structured Planning				
Item 7: The Year Level Planning Day held each semester is valuable for the implementation of change.	0.0	4.0	28.0	68.0
Item 14: I am confident I am meeting my planning, assessment and reporting responsibilities.	0.0	8.0	68.0	24.0
Item 15: My professional community is restricted to my year level.	20.0	64.0	12.0	4.0
Item 16: The combination of year level meetings, year level planning day and half day moderation satisfy my needs for collegial collaboration.	0.0	20.0	64.0	16.0
Item 23: Incentives to encourage implementation of the syllabus are in place.	0.0	43.5	43.5	13.0
Scale 4– Year Level Collaboration				
Item 2: Year level meetings focus on planning units of work.	0.0	12.0	60.0	28.0
Item 4: I support the teachers in my year level.	0.0	0.0	24.0	76.0
Item 5: I am supported by the teachers in my year level.	0.0	0.0	20.0	80.0
Item 6: My year level teachers work as a team.	0.0	0.0	24.0	76.0

Teachers' responses to items in the first scale, Whole School Structured Planning, demonstrate a consistent level of endorsement at approximately 70%. Here the majority of teachers endorsed Item 17: *The varying levels of leadership support the*

implementation of the mathematics syllabus, and Item 18: *Structures are in place within the school to help with curriculum change*. Likewise there was majority endorsement of Item 21: *I contribute to the school vision*, and Item 24: *An action plan has been developed for the implementation of the syllabus*. Together these data suggest that whole school planning is a feature of Hillside Primary School, and that teachers contribute to the development of the school vision and action plans. However, before drawing this conclusion, it should be noted that 32% of teachers did not perceive that they had input into the school vision (Item 21). Moreover, there was also a majority disendorsement of Item 26: *I had input into the adoption of the school mathematics plan*. Given these findings, whole school planning in mathematics became an area of interest for further research.

Most teachers agreed with items in the second scale, Whole School Collaboration. For example, 92% of teachers endorsed Item 38: *Teachers in my school are supported in developing their professional skills*. There is strong endorsement for Item 22: *I have opportunities for collegial discussion*, and Item 25: *There is a spirit of collegiality within the school culture*. However, within this scale, there were inconsistent results with respect to the role of the HOC. While there was 100% endorsement of Item 12: *The HOC supports my teaching by providing me with the school mathematics program*, only 60% of responses endorsed Item 11: *The HOC provides me with units of work*. This finding with respect to the role of the HOC justified further investigation.

The third scale, Year Level Structured Planning, shows that three of the five items are positively perceived by the teachers while two items are not. Here the teachers endorsed Item 7: *The Year Level Planning Day held each semester is valuable for the implementation of change*, Item 14: *I am confident I am meeting my planning, assessment and reporting responsibilities*, and Item 16: *The combination of year level meetings, year level planning day and half day moderation satisfy my needs for collegial collaboration*. At the same time, these teachers responded negatively to Item 15: *My professional community is restricted to my year level*, and Item 23: *Incentives to encourage implementation of the syllabus are in place*, with 84% and 43.5% disendorsement respectively. While these inconsistent results justified further investigation, it is also interesting to see that the teachers have endorsed the items on Scale 3, Year Level Structured Planning, more strongly than the items on Scale 1, Whole

School Structured Planning. This discrepancy between whole school and year level warranted further investigation.

In the fourth scale, Year Level Collaboration, it is clear that teachers agreed that year level collaboration was occurring at Hillside Primary School. In fact, for three of the four YLC items, all teachers reported either agreement or strong agreement with the items. For example, Item 5: *I am supported by my teachers in my year level*, received an 80% strongly agree endorsement. The responses to Items 4 and 6 of 76% of teachers strongly agreed with both items, clearly show that teachers identified professionally as part of a year level team. The data also found Item 7: *The Year Level Day held each semester is valuable for the implementation of change* gained 96% positive endorsement. The only different statistic in this scale is that 12% of teachers disendorsed Item 2: *Year level meetings focus on planning units of work*. This endorsement of year level collaboration, but disendorsement of year level meetings, suggests the need for further investigation into how teachers collaborate at the year level. Perhaps these teachers saw forms of year level collaboration, other than year level meetings, as being more productive.

6.2.2 Analysis of Items from Content Knowledge Efficacy (CKE), Teaching Efficacy (TE) and Teacher Accountability (TA) Scales and Unassigned Items

Frequencies for scales 5, 6 and 7 on the SPLCQ, CKE, TE and TA are shown in Table 6.2. As reported in Section 6.2.1 several observations can be made from these data that inform the design of the inspection stage of the study.

Scale 5, Content Knowledge Efficacy, has a consistent level of endorsement of between 70-80% for all items except Item 50: *I have a good knowledge of investigation based pedagogy in mathematics*. Here 56% of teachers disendorsed this item. These inconsistent frequencies demand further investigation, especially evident between Item 50 and others in the scale, for example Item 37: *I understand what an investigation in mathematics is*, that has almost unanimous endorsement with 88%. Further, 92% of teachers endorsed Item 48: *I am confident in my ability to teach mathematics*. These results suggest that teachers know what an investigation is, but do not know how to use it in teaching. This interpretation however was not conclusive and further investigation was warranted.

Table 6.2 *Response Proportions for Questionnaire Items in the CKE and TE scales (N=25)*

Scales and items	Response %			
	SD	D	A	SA
Scale 5- Content Knowledge Efficacy				
Item 34: I refer to the Year 1-10 Mathematics Syllabus.	0.0	20.0	72.0	8.0
Item 37: I understand what an investigation in mathematics is.	0.0	12.0	60.0	28.0
Item 40: I am implementing the new Mathematics Syllabus as intended.	0.0	28.0	72.0	0.0
Item 48: I am confident in my ability to teach mathematics.	0.0	8.0	80.0	12.0
Item 50: I have a good knowledge of investigation based pedagogy in mathematics	0.0	56.0	44.0	0.0
Item 53: I am confident in my ability to use a variety of assessment techniques in mathematics.	0.0	24.0	72.0	4.0
Scale 6 - Teaching Efficacy				
Item 41: If I try really hard, I can get through to even the most difficult student when I teach mathematics.	0.0	28.0	64.0	8.0
Item 43: I am good at helping all the students in my classes make significant improvement in mathematics.	0.0	16.0	80.0	4.0
Item 45: I am certain that my mathematics teaching is making a difference in the lives of my students.	0.0	16.0	84.0	0.0
Item 47: I can deal with almost any learning problem in mathematics.	0.0	44.0	56.0	0.0
Item 49: My mathematics content knowledge helps my students make significant progress.	0.0	12.0	72.0	16.0
Item 51: I understand mathematics concepts well enough to be effective in teaching primary mathematics.	0.0	0.0	96.0	4.0
Item 54: Even when I try very hard, I don't teach maths as well as I do other subjects.	24.0	52.0	20.0	4.0
Item 55: If students are underachieving in mathematics, it is most likely due to ineffective mathematics teaching	12.0	80.0	8.0	0.0
Scale 7– Teacher Accountability				
Item 8: Half day moderation helps me to meet my accountability requirements.	0.0	0.0	64.0	36.0
Item 9: Accountability issues force my learning of new syllabi.	4.0	8.0	72.0	16.0
Item 10: In this school grades and test scores are talked about a lot by the principal.	0.0	0.0	25.0	75.0

Items on Scale 6, Teaching Efficacy, also produced conflicting results. For example, Item 43: *I am good at helping all the students in my classes make significant improvement in mathematics* had 84% of teachers endorsing this item. Further, Item 51: *I understand mathematics concepts well enough to be effective in teaching primary mathematics*, has 100% agreement by teachers. The negatively worded item, Item 55, *If students are underachieving in mathematics, it is most likely due to ineffective mathematics teaching*, was disendorsed by 92% of teachers. Yet 44% of teachers

disendorsed Item 47: *I can deal with almost any learning problem in mathematics*. These conflicting results warranted further follow up with teachers during the inspection stage of the study.

In Scale 7, Teacher Accountability, there is almost total agreement that accountability is part of the teacher's life. For two of the three TA items, all teachers reported either agreement or strong agreement. In particular, positive responses to Item 9: *Accountability issues force my learning of new syllabi*, suggested a link between accountability expectations and mandated curriculum reform in mathematics. Moreover positive responses to Item 10: *In this school grades and test scores are talked about a lot by the principal* and Item 8: *Half day moderation helps me to meet my accountability requirements*, suggest that there was administrative support for meeting the accountability requirements. However, anecdotal evidence (Chapter One, Section 1.2) suggested that these teachers did not see accountability as a priority as is suggested by the positive responses to items in Scale 7.

6.2.3 Analysis of Items from Material Resourcing (MR), Professional Resourcing (PR), External Professional Development (EPD) Scales and Unassigned Items

Frequencies for the next three scales of the SPLCQ, MR, PR and EPD are shown in Table 6.3. As reported above, several observations can be made from these data that inform this exploration stage of the study.

The results for the two items that make up Scale 8 Material Resourcing, divided the teachers, with 48% endorsing and 52% disendorsing Item 19: *Resources are available to implement the syllabus*. Similar results were obtained for Item 20. Consequently, it was decided that these inconclusive responses should be further investigated.

Scale 9, Professional Resourcing, has three items that are endorsements and two that are disendorsed. For example, 79.2 % of teachers perceived that can access workshops hosted by the school. Alternatively, Item 27: *Using [the textbook] has helped me to understand the intent of the mathematics syllabus*, had 44% of teachers disagreeing and 12% strongly disagreeing with this item. Here, the textbook material originally purchased by the school as a source of professional development for the teachers, does not appear to be providing the teachers with this support. Furthermore, 68% of teachers disagreed with Item 29: *Using [the textbook] has helped me implement the school maths*

plan. Since the results for this scale, PR, contradicted the HOC's view provided during the initial interviews on the use of the textbook, professional resourcing was identified as an area for further investigation (See Section 5.2.2).

Table 6.3 Response Proportions for Questionnaire Items in the MR, PR and EPD Scales and Unassigned Items (N=25)

Scales and Items	Response %			
	SD	D	A	SA
Scale 8 – Material Resourcing				
Item 19: Resources are available to implement the syllabus.	4.0	48.0	40.0	8.0
Item 20: I have the appropriate resources to support the implementation of the new syllabus.	4.0	52.0	40.0	4.0
Scale 9 – Professional Resourcing				
Item 27: Using [the textbook] has helped me to understand the intent of the mathematics syllabus.	12.0	44.0	28.0	16.0
Item 28: I use [the textbook] materials regularly.	8.0	20.0	48.0	24.0
Item 29: Using [the textbook] has helped me to implement the school mathematics plan.	0.0	68.0	20.0	12.0
Item 35: I can access workshops hosted by my school.	0.0	20.8	75.0	4.2
Item 36: My principal promotes our school as a facilitator for other schools to implement new programs.	0.0	22.7	68.2	9.1
Scale 10 – External Professional Development				
Item 30: I have accessed external professional development in my own time to assist me implement the mathematics syllabus.	12.0	64.0	24.0	0.0
Item 31: I have accessed external professional development on the implementation of the mathematics syllabus as a member of the school community.	8.3	83.4	8.3	0.0
Item 32: School cluster projects have assisted me to implement the mathematics syllabus.	4.3	91.4	4.3	0.0
Unassigned items				
Item 1: Our staff meetings are an avenue through which to raise whole school curriculum issues.	0.0	20.8	79.2	0.0
Item 3: Year level meetings benefit from the presence of a member of the administration.	0.0	24.0	56.0	20.0
Item 13: The HOC aligns planning, assessment and reporting.	0.0	0.0	68.0	32.0
Item 42: Factors beyond my control have a greater influence on my students' achievement in mathematics than I do.	0.0	44.0	56.0	0.0
Item 44: Some students are not going to make a lot of progress in mathematics this year, no matter what I do.	0.0	40.0	48.0	12.0
Item 46: There is little I can do to ensure that all my students make significant progress in their mathematics this year.	4.0	96.0	0.0	0.0
Item 52: I am confident in my ability to teach mathematics as a co-inquirer with students.	0.0	28.0	60.0	12.0
Item 56: When a student has difficulty understanding a mathematics concept, I am usually at a loss as to how to help the student understand it better.	4.0	88.0	8.0	0.0

The teachers tended to disagree or strongly disagree with each item on Scale 10, External Professional Development. For example, Item 32: *School cluster projects have assisted me to implement the mathematics syllabus* and Item 31: *I have accessed external professional development on the implementation of the mathematics syllabus as a member of this school*, resulted in 91.4% and 83.4% disendorsement respectively. Indeed all four items on scale 10, EPD, were disendorsed by the teachers. Each of these items specifically states professional development in ‘mathematics’. Clearly, teachers believe that professional development in mathematics has been inadequate. This understanding was of interest given the directives issued by Department of Education and Training regarding professional development in mathematics (discussed in Section 2.3).

Finally, the unassigned items also produced interesting results. For example, Item 46: *There is little I can do to ensure that all my students make significant progress in their mathematics this year*, has 100% disendorsement of this statement. Yet, 56% of teachers endorsed Item 42: *Factors beyond my control have a greater influence on my students’ achievement in mathematics than I do*. The mixed message in these results warranted further investigation during the inspection stage of this study.

6.2.4 Unresolved issues following frequency analysis

This frequency analysis identified several unresolved issues about internal sources of support for the implementation of the new mathematics syllabus.

Planning

This frequency analysis revealed a number of inconsistencies with respect to planning. In the first instance, this analysis suggests that structured planning is a feature of Hillside Primary School. For example, in Item 7: *The Year Level Planning Day held each semester is valuable for the implementation of change*, gained 94% positive endorsement. However, analysis also found that 32% of these teachers did not believe that they had provided input to the school vision, and the majority of teachers did not believe that they had input into the school mathematics plan. It seems that teachers perceive that they have more input into year level planning rather than whole school planning. Supporting this interpretation it is interesting to see that the teachers have endorsed the items on Scale 3, Year Level Structured Planning more strongly than the

items on Scale 1, Whole School Structured Planning. The discrepancy between whole school and year level planning warrants further investigation.

Collaboration

This frequency analysis also suggested a strong collaborative culture at Hillside Primary School. Most teachers agreed with items in the second scale, Whole School Collaboration, and in the fourth scale, Year Level Collaboration. However, there were inconsistent results with respect to the role of the HOC. While there was 100% endorsement of Item 12: *The HOC supports my teaching by providing me with the school mathematics program*, only 60% of the responses endorsed Item 11: *The HOC provides me with units of work*. Moreover, despite the overall strong endorsement of items that suggest year level collaboration, there is a 12% disendorsement of year level meetings.

Teacher efficacy

This frequency analysis also found a number of inconsistencies with respect to teacher efficacy. While Scale 5, Content Knowledge Efficacy, was generally high, this analysis identified efficacy concerns with regard to the implementation of the new mathematics syllabus that, unlike earlier syllabi, required a good knowledge of investigation-based pedagogy in mathematics. Likewise, while Teaching Efficacy (Scale 6) was generally high, 44% of these teachers did acknowledge that they could not deal with learning problems in mathematics.

Teacher accountability

The frequency analysis of data from Scale 7, Teacher Accountability, highlighted the impact of accountability expectations on the role of the teacher, and raises questions with respect to the link between teacher accountability and the implementation of the new mathematics syllabus at Hillside Primary School. This frequency analysis found a strong endorsement of Scale 7 items around teacher accountability, suggesting a positive link between accountability and implementation. However, anecdotal evidence (discussed in Section 1.2) suggested that these teachers did not see accountability as a priority, as the positive responses to items in Scale 7 would indicate. Given the contemporary ‘push’ for curriculum reform and teacher accountability (as discussed in Chapter Two), this issue of teacher accountability warranted further investigation.

Material resourcing and professional resourcing

These findings identify a number of unresolved issues with respect to material resourcing and professional resourcing. Here the teachers were divided on items relating to Scale 8, Material Resourcing, and Scale 9, Professional Resourcing. Thus there were inconclusive results with respect to whether teachers believed that resources were available to implement the syllabus (Item 19), and that teachers could access workshops hosted by the school (Item 35).

External Professional development

Finally, this analysis suggested that external professional development represented an inadequate source of support for the implementation of the new mathematics syllabus. These teachers disendorsed all items on Scale 10, indicating that they had not accessed various professional development opportunities in mathematics, and found professional development in mathematics of little support. This response was interesting given the departmental directives regarding professional development in mathematics (discussed in Section 2.3).

In order to gain a deeper appreciation of these unresolved issues, the following section examines teacher perceptions through the lens of seven teacher characteristics.

6.3 COMPARISONS OF SPLCQ SCORES ACCORDING TO TEACHER CHARACTERISTICS: INFERENCE STATISTICS

This section reports comparisons of SPLCQ scores according to seven teacher characteristics: teacher gender, teacher age, years at present school, year level taught in last five years, level of mathematics studied at school, academic qualifications and official leadership roles (Sections 6.3.1 to 6.3.7 respectively). It was believed that these characteristics may influence teacher perceptions of the sources of support available within the professional learning community of Hillside Primary School. As standard parametric tests assume that the sample was drawn from a random population and the sample in this study was purposive, statistical analysis for significance was used as a guide. For each comparison identified effect sizes were computed to measure the strength of the relationship between two variables. Cohen's d (1988) – the difference in group means per pooled group standard deviation was employed as a convenient index to measure effect size. Here it is argued that values of 0.20 is a small effect size, 0.50 medium and 0.80 large. Graphs which illustrate mean scale scores for each comparison

have also been provided as these graphs further illustrate different teacher perceptions depending on teacher characteristic.

6.3.1 SPLCQ Scores According to Teacher Gender

Figure 6.1 shows the mean scale scores according to gender. A noteworthy feature of this figure is the sizeable gap between male and female scores on YLSP and EPD. Male scores for both scales were greater than females, with effect sizes of .73 for YLSP and .88 for EPD. These effect sizes were interpreted as moderate and large respectively. However, as a grouping variable, teacher gender had no substantive influence on the SPLCQ scores. This finding sheds no further light on the issues raised in Section 6.2

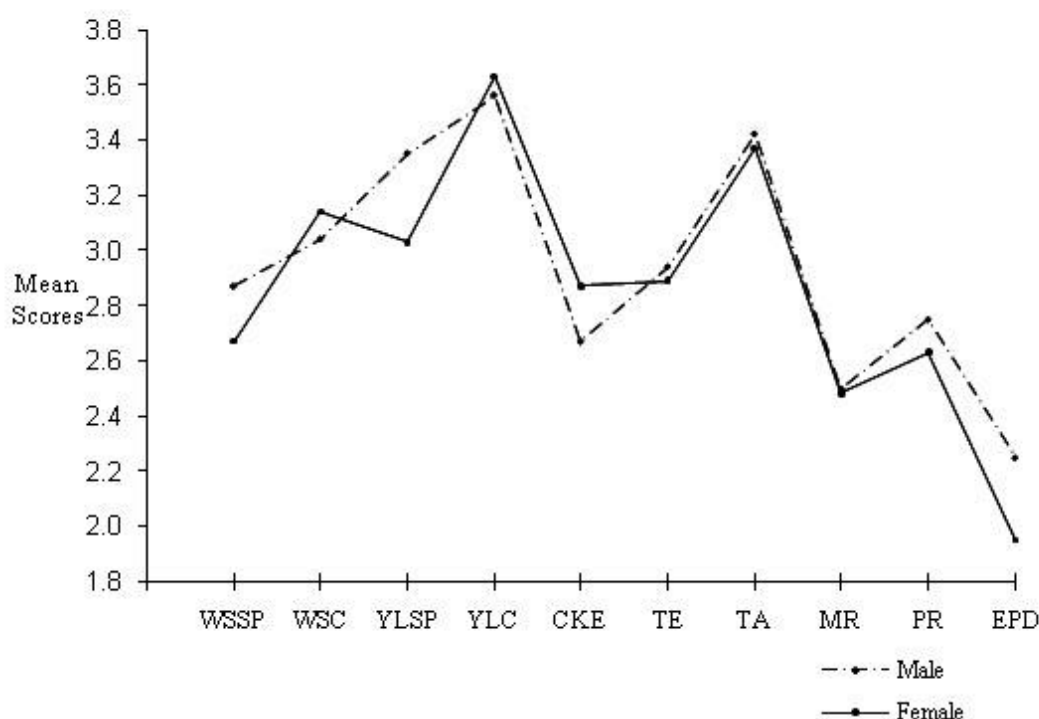


Figure 6.1 Mean scores for 10 SPLCQ scales according to gender

6.3.2 SPLCQ Scores According to Teacher Age

To compare SPLCQ scale scores according to teacher age, teachers were assigned to three groups. The first group consisted of teachers who were less than 30 years of age (8 teachers). The second group were teachers between 31 and 50 years of age (10 teachers). The third group were teachers who were over 50 years of age (7 teachers). For each of

the six scales where parametric tests could be performed (viz. WWSP, WSC, YLSP, TA, PR and TE¹⁹), one way ANOVAs were performed with the teacher age as the grouping variable. Of these tests, one was statistically significant: TE, $F(2, 23) = 6.29$ ($p < .01$). When an F-value is significant, it is important to identify where the significant differences exist. This is achieved by conducting the Tukey's Honestly Significant Difference (HSD) test. Tukey's HSD post hoc procedure revealed statistical differences in TE for the comparison of teachers who were below 30 years of age with teachers aged between 31-50 years ($p < .01$), and also with teachers over 50 years of age ($p < .05$). The younger age group of teachers who were less than 30 years of age perceived significantly higher TE than did those teachers who were 31-50 year old and those over 50 years of age (effect sizes = 1.32 and 1.16 respectively). Both of these effect sizes are very large. This difference is very evident in Figure 6.2. This statistically significant difference between the different age groups highlights the inconsistency found with the items in this scale in Section 6.2.2. It can now be argued that it was the younger teachers who believed they could deal with almost any learning problems.

To compare SPLCQ scores according to teacher age for the remaining four scales (viz. YLC, MR, EPD and CKE²⁰), Kruskal-Wallis tests were conducted with this same grouping arrangement. None of these tests was statistically significant. This finding suggests that teacher age did not impact significantly on these scales, and therefore do not shed any further light on the issues identified in Section 6.2.

Figure 6.2 shows mean scale scores for the three age groups: <30 years, 31-50 years and >50 years. A noteworthy feature of this figure is that the three groups follow a similar trend on eight of the ten scales where YLSP and TE are different. Even though there was no statistically significant difference across these scales according to teacher ages, Figure

¹⁹ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

²⁰ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

6.2 does reflect the very low perceptions of EPD found in the frequency analysis. Obvious in Figure 6.2 is the sizeable gap between teachers aged between 31-50 years and teachers over 50 years of age, and less than 30 years of age for EPD (effect sizes .94 and .44 respectively), indicating that the teachers' age may influence their perceptions of EPD. Also worthy of note is that the less-than-30 age group perceived higher levels of YLSP than did the 31-50 and the over 50 years age groups with effect sizes of .53 and .37 respectively (moderate and small). Although these statistics are not significant, they may still bear on the findings.

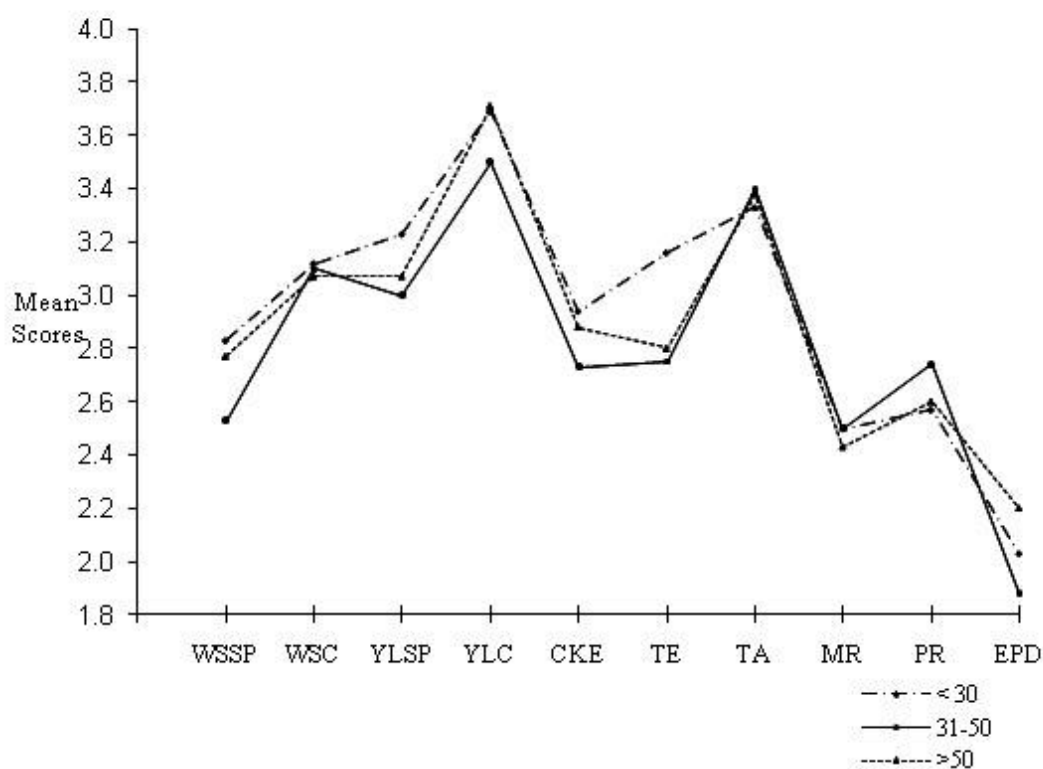


Figure 6.2 Mean scores for 10 SPLCQ scales according to teacher age

6.3.3 SPLCQ Scores According to Years of Teaching

To compare SPLCQ scores according to years of teaching, teachers were assigned to three groups. The first group consisted of teachers who had been teaching 1 to 6 years (7 teachers). The second groups were teachers who had been teaching between 7 and 20

years (9 teachers). The third group were teachers who had taught for more than 20 years (9 teachers). For each of the six scales where parametric tests could be performed (viz. WSSP, WSC, YLSP, TA, PR and TE²¹), one way ANOVAs were performed with the years of teaching as the grouping variable. Of these tests, two were statistically significant: WSC, $F_{(2, 23)} = 4.94$ ($p < .05$), and TE, $F_{(2, 23)} = 6.95$ ($p < .01$).

Tukey's HSD post hoc procedure was performed on these two scales. Tukey's HSD post hoc procedure revealed statistically significant differences in WSC for the comparison of teachers with 1 to 6 years of teaching with teachers with greater than 20 years experience, and also with teachers with 7 to 20 years of teaching compared to teachers with greater than 20 years experience ($p < .05$). For the TE²² scale, Tukey's HSD post hoc procedure revealed similar statistically significant differences for the comparison of teachers with 1 to 6 years of teaching, with teachers with greater than 20 years experience, and also for teachers with 7 to 20 years of teaching, with teachers with greater than 20 years experience ($p < .05$). Teachers who had taught for 1 to 6 years perceived significantly higher WSC and TE than did those teachers with greater than 20 years of teaching (effect sizes = 1.21 and 1.42 respectively). Similarly, teachers who had taught for 7 to 20 years perceived significantly higher WSC and TE than did those teachers with greater than 20 years of teaching (effect sizes = 1.08 and 1.10 respectively). All of these effect sizes are very large.

To compare SPLCQ scores according to years of teaching for the remaining four scales (viz. YLC, MR, EPD and CKE), Kruskal-Wallis tests were conducted with this same grouping arrangement. None of these tests was statistically significant. Figure 6.3 shows mean scores for the three groups in this comparison.

²¹ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

²² WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

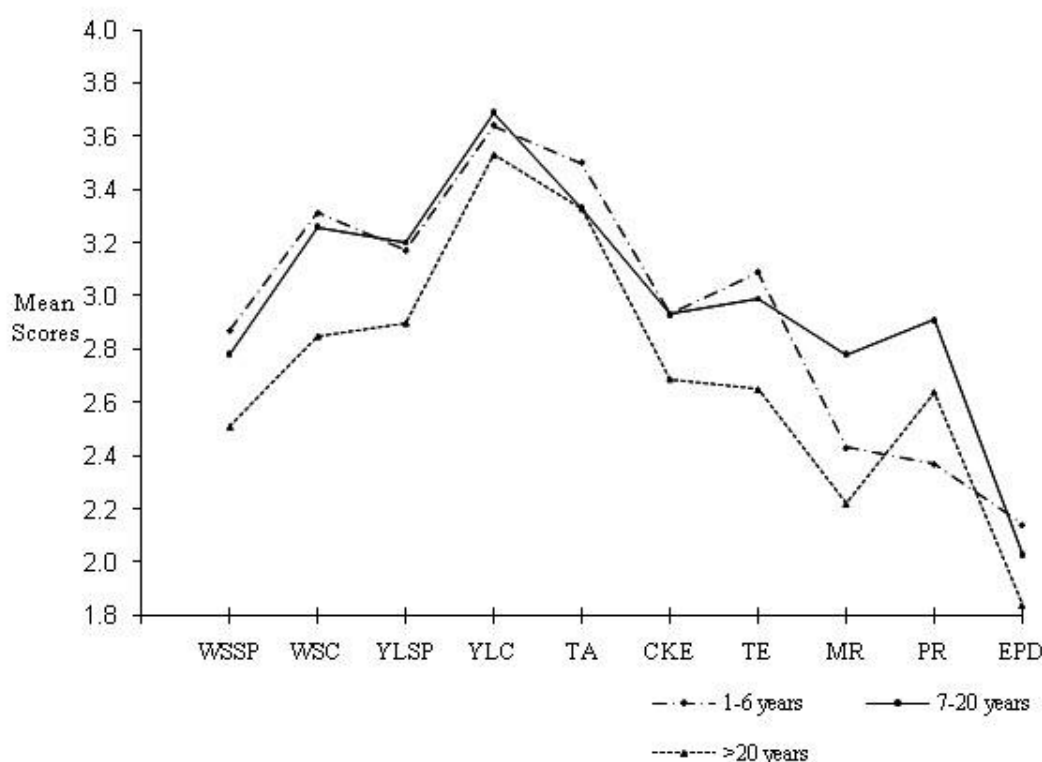


Figure 6.3 Mean scores for 10 SPLCQ scales according to years of teaching

As shown in Figure 6.3, sizeable gaps were evident between teachers with 1-6 years of teaching experience and teachers with over 20 years of teaching experience on the YLSP and MR scales (effect sizes .63 and .32 respectively). Teachers with 1-6 years of teaching experience were perceived as having higher levels of YLSP and MR²³ compared to teachers with over 20 years of teaching. Similar effect sizes for these same scales were found between teachers with 7-20 years of teaching experience and teachers with over 20 years of teaching (effect sizes of .70 and .86 respectively). Teachers with 7-20 years of experience perceived higher levels of PR compared to teachers with 1-6 and 7-20 years of experience (effect sizes of 1.02, and .51 respectively).

²³ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

6.3.4 SPLCQ Scores According to Years at Present School

To compare SPLCQ scale scores according to years at present school, teachers were assigned to three groups. The first group consisted of teachers who had been teaching at the school between 1 and 4 years (13 teachers). The second group were teachers who had taught at the school between 5-10 years (6 teachers). The third group were teachers who had taught at the school more than 10 years (6 teachers). For each of the six scales where parametric tests could be performed (viz. WSSP, WSC, YLSP, TA, PR and TE²⁴), one way ANOVAs were performed with the years at present school as the grouping variable. Of these tests, four were statistically significant: WSSP, $F_{(2, 23)} = 4.24$ ($p < .05$), WSC, $F_{(2, 23)} = 8.14$ ($p < .01$), YLSP, $F_{(2, 23)} = 5.82$ ($p < .01$), and TE, $F_{(2, 23)} = 6.04$ ($p < .01$).

Tukey's HSD post hoc procedure revealed statistically significant differences in WSSP, WSC, YLSP and TE for the comparison of teachers who had been teaching in the school between 1-4 years with teachers who had been teaching in the school for more than 10 years ($p < .05$). Additionally, for YLSP scale, Tukey's HSD post hoc procedure revealed statistically significant differences for the comparison of teachers who had been teaching in the school between 1-4 years with teachers who had been teaching in the school for between 5-10 years.

Teachers who had been teaching at the school between 1-4 years perceived significantly higher WSSP, WSC YLSP and TE than did those teachers who had taught in the school for more than 10 years (effect sizes = 1.30, 1.58, 1.36, and 1.42 respectively). Similarly, teachers who had been teaching at the school between 1-4 years perceived significantly higher YLSP than did those teachers who had been teaching at the school between 5-10 years (effect sizes = 1.02). All of these effect sizes are very large.

To compare SPLCQ scores according to years of teaching for the remaining four scales, Kruskal-Wallis tests (viz. YLC, MR, EPD and CKE) were conducted with this same grouping arrangement. Two of these four tests were statistically significant, MR (K-W $H = 7.98$, $df = 2$, $p < .05$) and CKE (K-W $H = 7.55$, $df = 2$, $p < .05$). To ascertain whether

²⁴ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

significant differences existed between pairs of groups, three pairwise Mann-Whitney tests were performed for these two scales. Results indicated significant differences for both MR and CKE²⁵ scores between teachers who had taught between 1-4 years in the school and those teachers who had taught more than 10 years in the school (M-W $U = 10.00$, $Z = -2.86$, $p < .01$ and M-W $U = 12.50$, $Z = -2.46$, $p < .05$ respectively).

Figure 6.4 shows mean scores for the three groups in this comparison. Of note is the distinct pattern of those with 1-4 years of teaching in this school who perceived higher levels of all scales compared to other teachers except for EPD. This clear trend would suggest that inconsistencies across the scales may also be a consequence of teachers new to the school holding higher perceptions. In addition to this trend, sizable gaps are evident on the YLC scale. For the comparison of teachers with 1-4 years at the school with 5-10 years and over 10 years at the school, the effect sizes for the YLC scale were .48 and 1.1 respectively. This suggests that teachers new to the school and with up to 10 years teaching at the school, perceive high level of year level collaboration in comparison to teachers teaching at the school for longer periods of time.

²⁵ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

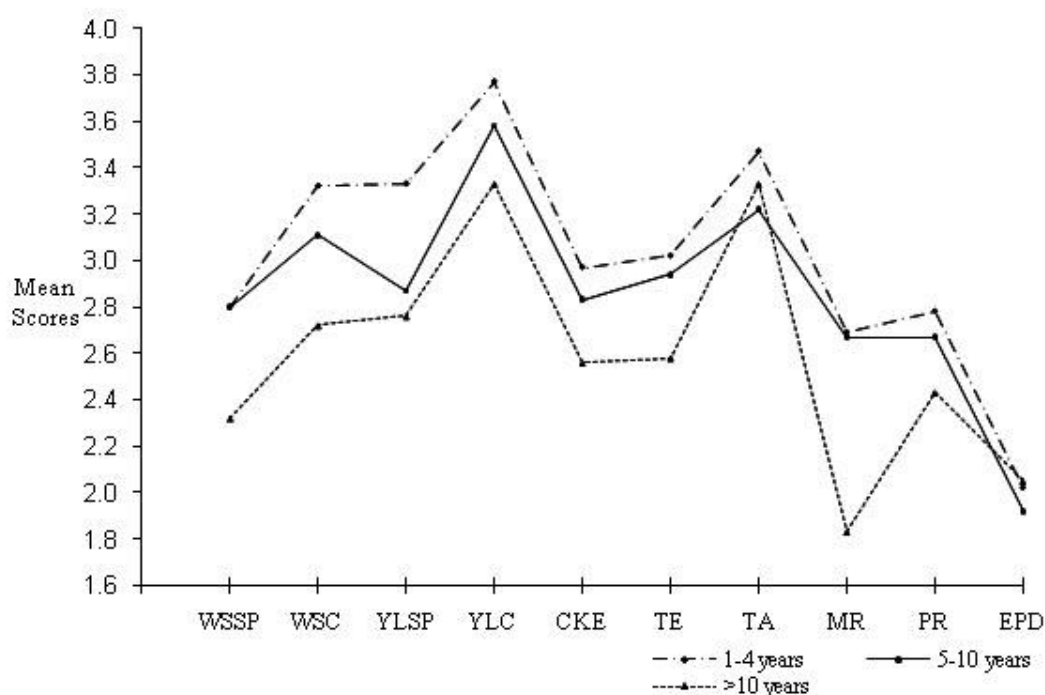


Figure 6.4 Mean scores for 10 SPLCQ scales according to years of teaching in the school

6.3.5 SPLCQ Scores According to Official Leadership Roles

To compare SPLCQ scale scores according to official leadership roles, teachers were assigned to two groups. The first group consisted of teachers who only held classroom teaching positions in the school (18 teachers). All remaining teachers were assigned to the second group on this variable (7 teachers). These teachers held co-ordination roles within the school as well as classroom teaching roles. For each of the six scales where parametric tests were possible (viz. WSSP, WSC, YLSP, TA, PR and TE²⁶), *t* tests were performed with the type of official leadership role as the grouping variable. Of these tests, none was statistically significant indicating that official leadership roles did not have any impact on the issues identified for these six scales in Section 6.2.

²⁶ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

Mann-Whitney tests for the remaining four scales (viz. YLC, MR, EPD and CKE²⁷) were conducted with this same grouping arrangement. None was significant. This again indicates that official leadership roles did not have any impact on the issues identified for these four scales in Section 6.2.

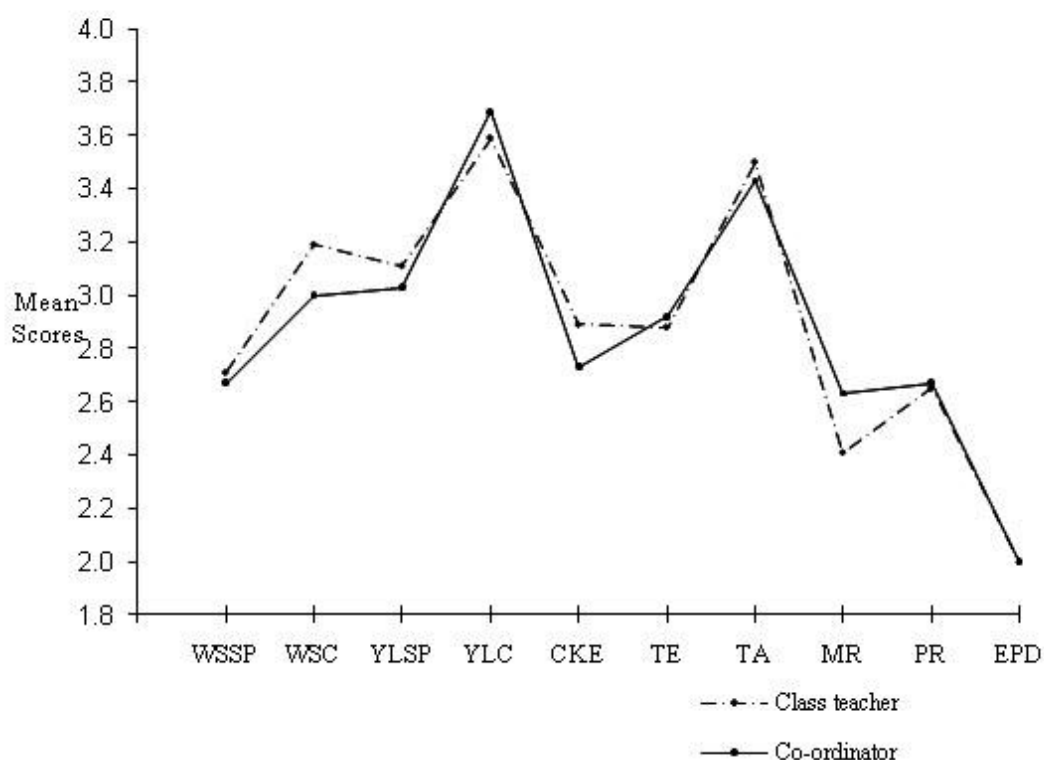


Figure 6.5 Mean scores for 10 SPLCQ scales according to leadership roles

Figure 6.5 shows mean scale scores gaps between WSC, CKE, MR. Small to medium effect sizes were calculated for three scales WSC (effect size = .50), CKE (effect size = .46) and MR (effect size = .33). Compared to coordinators, class teachers perceived higher levels of WSC and CKE but lower levels of MR. Although these gaps are interesting, as a grouping variable, leadership roles had no substantive influence on SPLCQ scores.

²⁷ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

6.3.6 SPLCQ Scores According to Year Levels Taught in the Last Five Years

To compare SPLCQ scale scores according to year levels taught in the last five years, teachers were assigned to three groups. The first group consisted of teachers who had been teaching in years 1-3 (12 teachers). The second group was teachers who had been teaching in years 4-5 (6 teachers). The third group was teachers who had been teaching in years 6-7 (7 teachers). For each of the six scales where parametric tests could be performed (viz. WSSP, WSC, YLSP, TA, PR and TE²⁸), one way ANOVAs were performed with the year levels taught as the grouping variable. None of these tests was statistically significant. These statistics for the teaching characteristic, years of teaching in the last five years, suggest that this characteristic does not impact on the inconsistencies identified as issues for further investigation in Section 6.2 for these six scales.

To compare SPLCQ scores according to year levels taught in last five years for the remaining four scales, Kruskal-Wallis tests (viz. YLC, MR, EPD and CKE) were conducted with this same grouping arrangement. None of these tests was statistically significant. Here again, this lens of years of teaching in the last five years, does not shed light on the unresolved issues identified in Section 6.2.

However, Figure 6.6 shows mean scale scores for the three groups in this comparison, and although there was no statistically significant difference for any scales, there were sizeable gaps for this grouping variable. For example, upper years teachers perceived higher levels of PR compared to early and middle school teachers (effect sizes = .96 and .75 respectively). Early years teachers perceived higher levels of MR compared to middle and upper school teachers (effect sizes = .77 and .37 respectively). This is a noteworthy feature of this figure as it provides some insight into the inconsistencies found during frequency analysis on items in these two scales, MR and PR. These data are detailed in Table 6.3.

²⁸ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

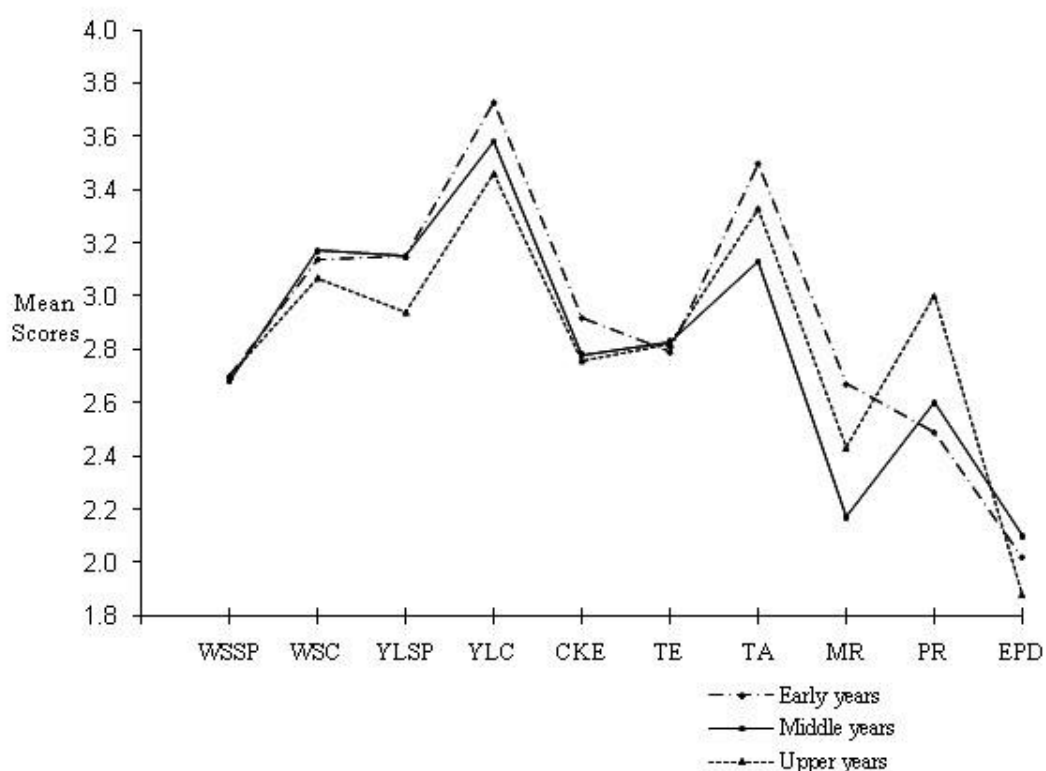


Figure 6.6 Mean scores for 10 SPLCQ scales according to year levels taught

6.3.7 SPLCQ Scores According to Level of Mathematics Studies at School

To compare SPLCQ scale scores according to level of mathematics studied when at school, teachers were assigned to two groups. The first group consisted of teachers who had studied Maths A, Social Maths or Maths in Society (20 teachers). All remaining teachers were assigned to the second group on this variable (5 teachers). These teachers had studied Maths 1, Maths 2, Maths B and/or Maths C. For each of the six scales where parametric tests were possible (viz. WSSP, WSC, YLSP, TA, PR and TE²⁹), *t* tests were performed with the level of mathematics studied at school as the grouping variable. None of these was statistically significant. This was an unexpected result, since it is commonly accepted in the literature that there is a correlation between teacher efficacy

²⁹ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

and higher levels of mathematics studied (see for example, Borko, 2004; Hill, Rowan, & Loewenberg-Ball, 2005; White, et al., 2005).

Mann-Whitney tests for the remaining four scales (viz. YLC, MR, EPD and CKE) were conducted with this same grouping arrangement. None of these tests was statistically significant.

Figure 6.7 shows mean scale scores for the two levels of maths studied at school in this comparison. Of note are the sizeable differences in mean scale scores for MR and EPD, with teachers who had studied higher levels of mathematics at school having perceived higher levels of MR and EPD compared to the other group (effect sizes = .57 and .66 respectively). These findings suggest that teachers who have studied Maths in Society, Social Maths or Maths A, perceive a greater need for material resources when teaching mathematics than do the teachers who have studied Maths 1, 2, B and or C. In addition, these same teachers perceive the need for more professional development than teachers who have studied Maths 1, 2, B and or C.

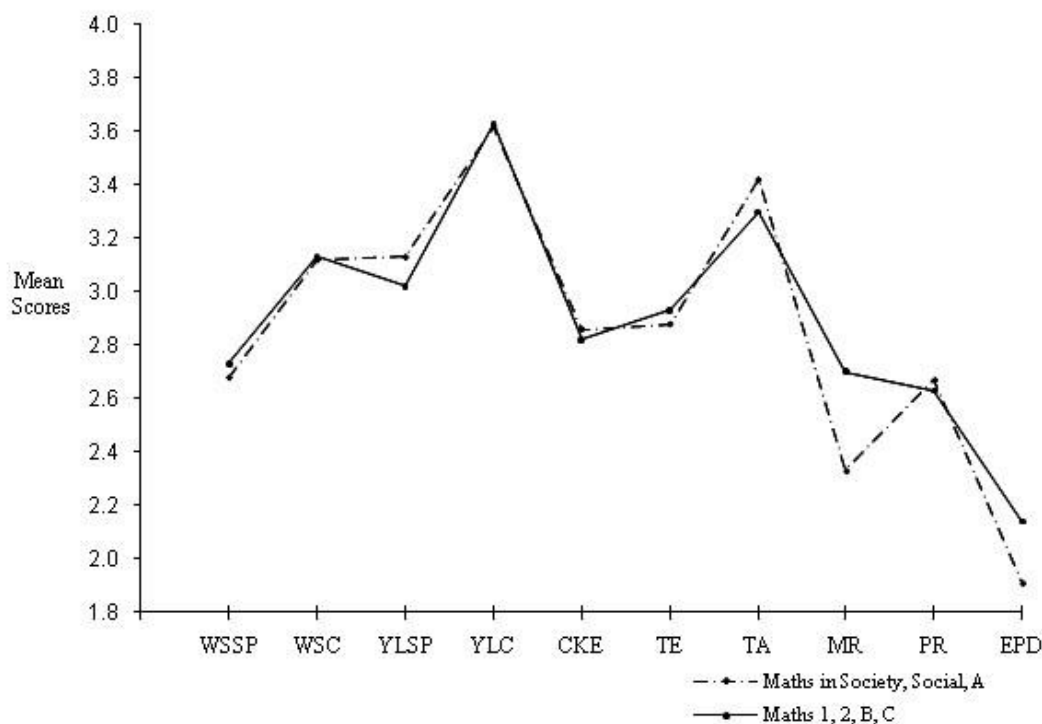


Figure 6.7 Mean scores for 10 SPLCQ scales according to level of mathematics studied at school

6.3.8 SPLCQ Scores According to Academic Qualifications

To compare SPLCQ scores according to academic qualifications, teachers were assigned to three groups. The first group consisted of teachers who had a Diploma of Education (8 teachers). The second group consisted of teachers who had a Bachelor of Education (13 teachers). The third group consisted of teachers who had a Bachelor of Education as well as other Bachelor qualifications (4 teachers). For each of the six scales where parametric tests could be performed (viz. WSSP, WSC, YLSP, TA, PR and TE³⁰), one way ANOVAs were performed with the academic qualifications as the grouping variable. None of these tests was statistically significant.

³⁰ WWSP: Whole School Structured Planning, WSC: Whole School Collaboration, YLSP: Year Level Structured Planning, YLC: Year Level Collaboration, TA: Teacher Accountability, MR: Material Resourcing, PR: professional Resourcing, EPD: External Professional Development, CKE: Content Knowledge Efficacy, TE: Teaching Efficacy

To compare SPLCQ scores according to academic qualifications for the remaining four scales, Kruskal-Wallis tests (viz. YLC, MR, EPD and CKE) were conducted with this same grouping arrangement. None of these tests was statistically significant.

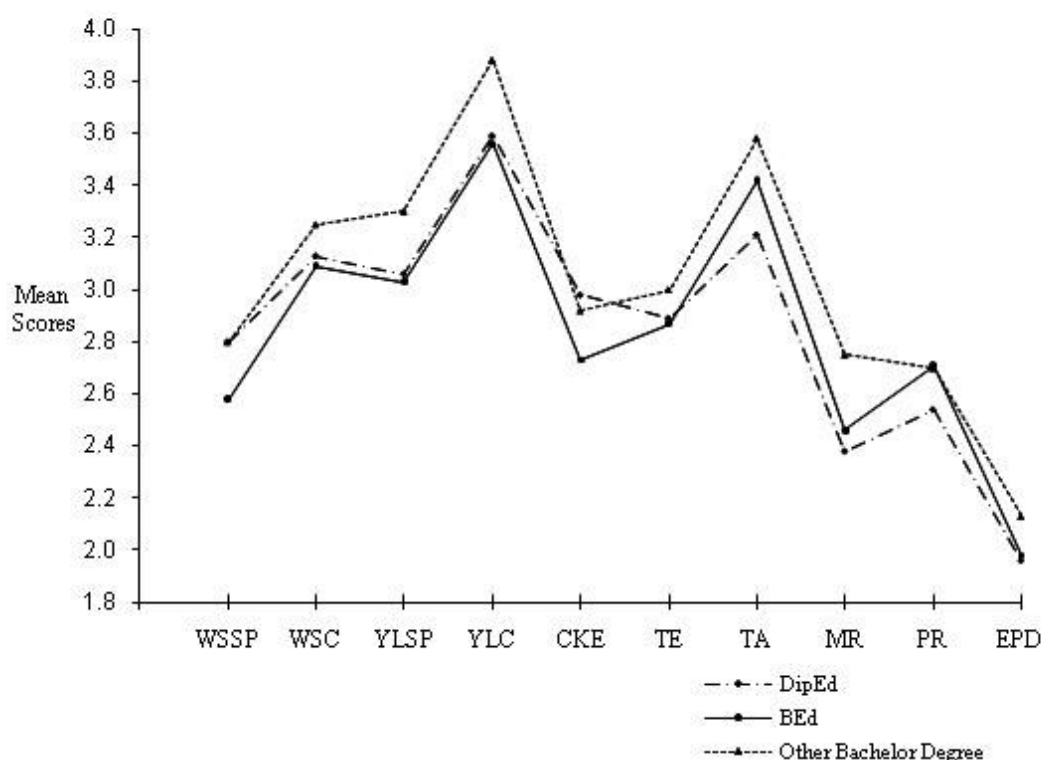


Figure 6.8 Mean scores for 10 SPLCQ scales according to academic qualifications

Although no statistically significant differences have been recorded, it is interesting to examine Figure 6.8 which shows mean scale scores for the three groups in this comparison. Of note, is a distinct pattern of teachers with other bachelor degrees having perceived higher levels for all scales compared to teachers with other qualifications apart from CKE.

6.4 UNRESOLVED ISSUES AT THE CONCLUSION OF THE EXPLORATION STAGE

In order to gain a deeper appreciation of these unresolved issues, the following section examines teacher perceptions through the lens of seven teacher characteristics. Here there was a comparison of SPLCQ scores according to seven teacher characteristics: teacher gender, teacher age, years of teaching at this school, official leadership roles,

year level taught in last five years, level of mathematics studied at school and academic qualifications (Sections 6.3.1 to 6.3.7 respectively). In summary, this exercise found that as a grouping variable, teacher gender and official leadership roles had no substantive influence on the SPLCQ scores. Consequently, these findings shed no further light on the unresolved issues raised in Section 6.2. However, the remaining variables did appear to have an effect on the SPLCQ scores, and could therefore shed light on the unresolved issues identified in Section 6.2.4.

Planning

It was identified in the frequency analysis in section 6.2.1 that in the main teachers hold high perceptions of planning at Hillside Primary School. In addition, it was noted that teachers perceive more highly year level structured planning. The data found that these teachers perceive that they do not have input into the school vision or the school mathematics plan, while appreciating that the year level planning day supported the implementation of curriculum reform. Inferential statistical analysis probed these issues further in Section 6.4, where it was noted that teachers with between 1-4 and then 5-10 years of teaching at Hillside Primary School perceived higher levels of planning in comparison to teachers teaching at the school for longer periods of time. These findings highlight a number of unresolved issues and raise the following questions:

Are there generally high levels of planning at Hillside Primary School and, if so, are these high levels of planning reflected in the implementation of the new mathematics syllabus?

Is year level planning emphasised over whole school planning, and is this emphasis reflected in the implementation of the new mathematics syllabus?

Does the teacher characteristic of years of teaching at Hillside Primary impact upon planning and, if so, what does this mean for the implementation of the new mathematics syllabus?

Collaboration

As discussed in Section 6.2.1, frequency analysis found that that most teachers perceive a highly collaborative culture at Hillside Primary School. However there are inconsistencies with respect to whole school collaboration. In particular teacher responses were divided on the supportive role of the HOC. Inferential statistical analysis

recorded statistically significant differences between teachers, where teachers with 1-4 and 5-10 years of teaching at Hillside Primary School were more positive in their perceptions of whole school collaboration compared to teachers with over 20 years teaching in this school. In contrast, statistically significant results were not recorded for year level collaboration. However, sizeable gaps are evident in Figure 6.4. Again, teachers with 1-4 and 5-10 years of teaching at the school hold more positive perceptions about whole school collaboration than teachers with over 20 years of teaching experience. In short, it seems that teachers with less teaching experience at Hillside Primary School are more positively disposed towards both whole school and year level collaboration. These findings highlight a number of unresolved issues and raise the following questions:

Are there generally high levels of collaboration at Hillside Primary School and, if so, are these high levels of collaboration reflected in the implementation of the new mathematics syllabus?

Is year level collaboration emphasised over whole school collaboration and is this emphasis reflected in the implementation of the new mathematics syllabus?

Does the teacher characteristic of years of teaching at Hillside Primary impact upon collaboration and, if so, what does this mean for the implementation of the new mathematics syllabus?

Teacher efficacy

Frequency analysis in Section 6.2.2 found that teachers' content knowledge and teaching efficacy are generally high. However, frequency analysis also found that these teachers did not have a good knowledge of investigation based pedagogy, nor did they feel confident to deal with learning problems in mathematics. This inconsistency was further analysed according to teacher characteristics. Consequently, inferential statistics identified that those teachers who were less than 30 years of age and had been teaching at Hillside Primary School for less than four years, perceived significantly higher teacher efficacy than older teachers with more than 10 years teaching at this school. Unexpectedly, inferential statistics also found that higher study in mathematics did not impact on teachers' efficacy as seen by the close mean scale scores in Figure 6.7. These findings highlight a number of unresolved issues and raise the following questions:

Are there generally high levels content knowledge efficacy and teaching efficacy at Hillside Primary School and, if so, are these high levels of teacher efficacy reflected in the implementation of the new mathematics syllabus?

Why do teachers who have a high teacher efficacy in general, not feel confident to teach using an investigative pedagogy or address learning problems?

Do the teacher characteristics of age and years of teaching at Hillside Primary School impact upon teacher efficacy, and if so what does this mean for the implementation of the new mathematics syllabus?

Is there a relationship between level of mathematics studied and teacher efficacy for the teachers at Hillside Primary School?

Teacher Accountability

As outlined in the frequency analysis, teacher accountability was very highly perceived by teachers. The frequency analysis highlighted the impact of accountability expectations on the role of the teacher, and raised questions with respect to the link between teacher accountability and the implementation of the new mathematics syllabus at Hillside Primary School. The inferential statistics shed no further light on this issue as no statistically significant difference was observed. However, anecdotal evidence (discussed in Section 1.2) suggested that these teachers did not see accountability as a priority as the data would have us believe. Consequently, the issue of teacher accountability warranted further investigation and, in particular, the following questions needed to be addressed.

Is teacher accountability a priority at Hillside Primary School?

What is the relationship between teacher accountability and the implementation of the new mathematics syllabus?

Material Resourcing and Professional Resourcing

Items in the scales material resourcing and professional resourcing were identified in the frequency analysis as giving inconsistent results. Here, teachers were divided on whether they had sufficient material resources to support the implementation of the new syllabus and whether professional resourcing, such as the provision of a reform textbook series,

supported the implementation of the mathematics syllabus. Inferential statistical analysis found statistically significant differences for material resourcing with the grouping variable years of teaching in this school. Here teachers with greater than 10 years teaching experience in the school perceived significantly less material resourcing than teachers teaching in the school for shorter periods of time. In addition to these data, sizeable gaps were evident for material resourcing and professional resourcing for the grouping variable year levels taught. Figure 6.5 reveals that early years teachers perceived higher levels of material resourcing compared to middle and upper school teachers. In contrast, the upper years teachers perceive higher levels of professional resourcing than middle and early years teachers. These findings provide some insight into the inconsistencies found during frequency analysis on items in these two scales. However further investigation was warranted:

Are material and professional resourcing, sources of support for the implementation of the new mathematics syllabus?

Does the teacher characteristic of years of teaching at the school or year levels taught influence teacher perceptions on the levels of material and professional resourcing?

External Professional Development

Frequency analysis of the items in the external professional development scale showed that all items were strongly disendorsed. This was an unexpected finding given the directive from the Department of Education and Training discussed in Section 2.3. Further analysis based on the teacher characteristic of age found no statistically significant differences. However, sizeable gaps were evident in Figure 6.2, where teachers over 50 years of age held higher perceptions of external professional development than teachers less than 30 years of age while teachers aged between 31-50 years hold the least positive perceptions. These findings raise a number of questions:

Is there external professional development to support the implementation of the new mathematics syllabus?

Does teacher age impact upon how much support is needed by the teachers in terms of external professional development?

6.5 CONCLUSION

This chapter has reported on the use of the SPLCQ. Descriptive statistics were reported in Section 6.2 and inferential statistics reported in Section 6.3. Key issues in the analysis of these data were identified in Section 6.4. This in turn led to the identification of unresolved issues and the development of a number of questions as a platform for the inspection stage of the research. These unresolved issues and questions are in relation to planning, collaboration, teacher efficacy, teacher accountability, material and professional resourcing and external professional development. The results of these questions and the inspection stage of this study are reported in Chapter Seven.

Chapter Seven: Inspection Stage - Display and Interpretation of Interview Data

7.1 INTRODUCTION

This study frames the research problem in terms of the implementation of mandated curriculum reform in mathematics and the purpose of this study was to gain a more sophisticated and informed understanding of how teachers at Hillside Primary School make sense of such reform and, as a consequence, respond to it. In order to achieve this purpose a two stage investigative process was undertaken. The results from the first stage, the exploration stage, are displayed in Chapters Five and Six. A number of unresolved issues and associated questions that relate to planning, collaboration, teacher efficacy, teacher accountability, material and professional resourcing and external professional development were summarised at the conclusion of Chapter Six. These questions and data from the School Professional Learning Community Questionnaire informed the collection, display and interpretation of data from the second stage of this study, the inspection stage displayed in this chapter.

In addition to these six issues and related questions, it became apparent during the interviews conducted throughout the second stage of the study, that the role of the Principal was an additional issue that required further inspection. This issue is also discussed in this chapter. Consequently, this chapter is structured around the presentation of these interview data in terms of the issues (see Appendix 5 for interview questions). Section 7.2 relates to whole school and year level planning and collaboration; Section 7.3 teacher efficacy; Section 7.4 teacher accountability; Section 7.5 material and professional resourcing; Section 7.6 external professional development; and Section 7.7 the role of the Principal. The chapter concludes with Section 7.8.

7.2 WHOLE SCHOOL AND YEAR LEVEL PLANNING AND COLLABORATION IN MATHEMATICS

Historically, teacher participation in planning and collaboration activities had been a feature of Hillside Primary School. As discussed in Chapter 2, Hillside Primary School's first triennial school review in 2004 presents a favourable view of the school, with staff involvement in school activities and support for collaborative partnerships

receiving special commendation. The review notes that staff involvement in school activities can best be seen by participation in a range of committees addressing a variety of educational issues. However, the exploration stage of this study identified a basic discrepancy between the generally high levels of planning and collaboration at Hillside Primary School, and what appeared to be a paucity of planning and collaboration with respect to the implementation of mathematics reform. In addition, there seemed to be an emphasis on year level planning and collaboration over whole school planning and collaboration that was also reflected in the implementation of the reform mathematics syllabus. Statistical analysis of the questionnaire data found that there were discrepancies based on the teacher characteristic of years of teaching at Hillside Primary School that influenced attitudes to planning and collaboration at the school. With these issues in mind, the inspection stage of this study sought answers to the following questions:

Are there generally high levels of planning and collaboration at Hillside Primary School and, if so, are these high levels of planning and collaboration reflected in the implementation of the reform mathematics syllabus?

Are year level planning and collaboration emphasised over whole school planning and collaboration, and is this emphasis reflected in the implementation of the reform mathematics syllabus?

Does the teacher characteristic of years of teaching at Hillside Primary impact upon planning and collaboration at the school and, if so, what does this mean for the implementation of the reform mathematics syllabus?

In line with these questions, data collection, analysis and interpretation during the inspection stage of the study clarified issues around whole school planning and collaboration, as well as year level planning and collaboration.

7.2.1 Whole School Planning and Collaboration

In the first instance, this inspection stage of this study found a gap between the principal's vision and the reality of whole school planning and collaboration at Hillside Primary School. As noted previously in Section 5.2.1, the Principal believed that whole school structures such as the co-ordinators' meetings, staff meetings and quarterly curriculum forums, provided an appropriate avenue for whole school planning and collaboration. Consequently, he saw staff meetings as focussed meetings where "every

other Monday we have a staff meeting which has a clearly set professional agenda, and that professional agenda is what we put together as an admin team with input from our year level coordinators”. In other words, these meetings were designed to facilitate communication, enabling the exchange of ideas and whole school planning in support of the implementation of the reform mathematics syllabus. However, interviews with classroom teachers as well as the HOC and the Head of Special Education Services (HSES) found a gap between this vision and the reality of whole school planning and collaboration, and this gap, in turn, impacted upon the implementation of the new mathematics syllabus.

The gap between the principal’s intention and reality of planning and collaboration, was identified during focus group interviews with the year level coordinators. In response to questions about whole school planning, these year level coordinators unanimously agreed that these meetings did not involve planning and collaboration but rather they focussed on administrative issues. As one coordinator explained:

I think, really, the position of Year Level Coordinator, you don’t really have any [authority], you’re just a coordinator...It’s more organisational things. We connect together and we share resources, like, we’re not using these resources this week you can have them if you like... I’m the ‘in between person’. You know, admin gives me a message which I pass down to the others. (I2P4T1) [See Section 4.5.2 for explanation of coding]

This interpretation was supported by the HOC when she presented the argument that a clear delineation exists between herself as the HOC and her planning role, and that of the year level coordinators:

They [year level co-ordinators] don’t have a role in the implementation of the syllabus as apart from the teachers, I don’t feel. When it comes time for them to create their end of term assessment, they get together as a team to do that and the organisation of that is with the year level co-ordinators. Their role is more to organise the assessment, than it is implementing the [school] program [for the various KLAs including mathematics].

This perspective on the restricted planning and collaboration role of the year level co-ordinator’s meeting was later echoed by the HSES:

They might be given information from the admin team and they then share that with their team, but, it’s more the person who’s just the co-ordinator of meetings [at the year level] or who resources bits of paper [for the administration].

In a similar vein, the teachers presented the perspective that whole school staff meetings are not structures for planning and collaboration. Rather, they are designed to inform teachers of initiatives within the school, as well as support dissemination of departmental information. The teachers explained that this dissemination was possible at the staff meeting because it was compulsory for them to attend this meeting. Although the curriculum forum had voluntary attendance it too focussed on curriculum initiatives and directives from DET. Here the teachers were very clear that these meetings were not designed to facilitate collaboration that would lead to whole school planning. Typical of the teachers' responses was:

You especially find out new information because, I think that the meetings are an opportunity for a lot of examination of [Education] Department documentation, and I think that sort of seems to be the main purpose of these meetings. (I3P7T3)

Thus, there was general agreement that meetings focussed on keeping teachers informed about initiatives within the school, as well as relaying information about initiatives and directives from DET. Many teachers believed that the curriculum forum and other meetings were not important, because the discussions at these meetings had no direct impact on their teaching. As one teacher explained, "These meetings are not important to me. I don't go. We don't go." [Looking around the group for confirmation. Other teachers nodding in agreement] (I1P5T1)

However, it should be noted that this negative attitude to meetings was not consistently held. These negative comments reflected the opinions of teachers with more than ten years teaching experience at Hillside Primary School. In contrast, teachers new to teaching at Hillside Primary School (i.e. 1-4 years) believe that attendance at the curriculum forum is important. For these newer teachers, the curriculum forum was important because it was promoted by the principal and they wanted to understand how the school operated in relation to the latest initiative from DET, particularly if it carried contractual accountability requirements. As one young teacher, new to the school explained:

I go out of interest and because I think it is important that I understand all this stuff. I find it very interesting. (I6P12T1)

Another teacher new to the school was positive about how the Principal promoted DET directives and how this was evident within the school:

They make sure that all these new directives are actually happening in this school, whereas when I was at another school they were nowhere near as organised as this. I think now, I think I actually understand what's going on. (I6P13T3)

In short, these teachers new to Hillside Primary School held a more positive view with respect to the importance of whole school meetings such as curriculum forums. However, it should be noted that this positive attitude did not reflect a belief that whole school meetings provided a structure for whole school planning and collaboration in support of the implementation of the new mathematics syllabus. Rather, they agreed with their longer term colleagues that whole school meetings were about relaying information about initiatives within the school, and initiatives and directives from DET. For example, one teacher new to the school explained:

Like, for example, we talked recently about looking to a ten year plan. It was about science and technology [Science, Technology, Engineering and Mathematics, STEM]. The Principal had the new booklet at the meeting and he talked about what was in it. It was so that we knew it was happening. Not that we had to do anything about it at this stage. (I6P13T3)

Thus interview data collected during the inspection stage of the study highlighted a gap between the principal's vision of whole school planning and collaboration, and the reality experienced by the members of staff. At best, the various whole school staff meetings provided information about initiatives and directives from DET, rather than providing opportunities for whole school planning and collaboration, including mathematics. As one teacher noted:

These meetings are about what's happening in the school and looking at the glossy magazines put out by the [Education] Department and sort of understanding what the latest push is. They've got nothing to do with planning in any KLA, let alone maths. (I7P6T2)

Whilst teachers new to teaching at Hillside Primary School saw the value in receiving information about DET initiatives and directives, the more experienced teachers perceived this information to be irrelevant and of little consequence to classroom teaching.

7.2.2 Year Level Planning and Collaboration

Interviews during the inspection stage also focussed on planning and collaboration that was occurring at the year level. The frequency results on the SPLCQ (reported in Table 6.1) indicated an almost total endorsement by teachers of year level planning and collaboration, and discussions with the teachers confirmed these findings by identifying a strong commitment to both formal and informal forms of year level planning and collaboration.

Discussing the place of year level planning and collaboration in the school, teachers initially described informal forms of year level planning and collaboration, and argued that informal forms of planning and collaboration contributed to student learning outcomes. As one teacher saw it:

I think as individuals, we're more interested in the students doing their personal best and I think if we can achieve that, then what more?... We work as a team and we help one another. We work within the bounds of the curriculum and all of our documents as much as we can, given the time constraints. But we, seriously, the four of us are really into these students producing their best. (I3P9T1)

In addition, some teachers saw opportunities for planning and collaboration to be more specifically about the provision of collegial support:

We normally sort of just keep track of what everyone's doing. Then we see if anyone needs assistance with their teaching, and what problems they've had with any students. (I7P12T3)

However, it should be noted that the level of informal collaboration at the year level seems to be dependent upon geographical proximity. For example, some year levels at Hillside Primary School are located side by side while other year levels have their classrooms separated by as much as a five to seven minute walk from one building, across a field to another building. Those teachers who are close together enjoyed the benefits of proximity for informal collaboration as the following comments testify:

Oh, you know, it might be just 30 seconds, hook in and say, "I can't understand this". (I4P15T3)

Because we're all together we find that we have almost informal ones [meetings] at 3.00 o'clock. We might have a five minute one about something. It's great. It gets it out of the way. (I6P14T2)

Proximity also supported professional collaboration as evidenced by these teachers' comments:

Because we're next door we see 'Oh that's interesting' why are you doing it that way or what are you doing? It's a great learning. (I7P19T3)

and

[Teacher's name] was writing on the board only last week and I saw her and thought oh, it's so much trouble drawing these proper shapes on the board that way and I said, "Hang on a minute, let me help you" and I went, watch this. You do this and you do that, learn a new trick". [Looking at the teacher] You were pleased weren't you? I said "all of this makes you look good in front of the class". (I3P15T2)

Moreover, teachers separated by distance believed it made a difference to their capacity to conduct informal collaboration:

I think it does, it does a bit. Sometimes we yell at each other through the windows and that sort of thing. I suppose we're relatively close, but it's not like being these two rooms beside one another. Not that I have ever been right next door. Last year I was upstairs again and along in the next block down, so it hasn't been easy. (I1P17T2)

However, not all the teachers were enthusiastic with respect to informal year level planning and collaboration. Whilst teachers new to the school were overwhelmingly supportive of year level planning and collaboration, this was not the case with teachers who had been at the school for more than 10 years. As one long term teacher remarked:

I was a much better teacher when I worked on my own, much better. Absolutely. Now I'm very limited. I loved it. I am a very traditional style of teacher and I like the traditional routines. It's probably because I haven't been taught the process of how to work in groups, so that's probably why I prefer to work alone. (I4P227T4)

The implication here is that teachers with more experience may have been trained to demonstrate independent professionalism, while teachers with fewer years of teaching are more inclined to have been trained to collaborate with colleagues. In contrast, the teachers new to the school presented a totally different perspective, as the following comments suggest:

I just couldn't do this without help. I'm just new here, and I'm still getting used to the programs here. As much as [teacher name] prefers to work alone, I must say I didn't know that, she's a wonderful support to me. (I4P22T2)

Beyond these informal forms of year level planning and collaboration, teachers also identified formal opportunities for year level planning and collaboration including fortnightly year level meetings, year level planning days and the moderation days. Discussing these formal meetings, teachers noted their value as a source of support for curriculum reform, with these meetings encouraging professional conversations that, in turn, contributed to improved classroom practice and enhanced student learning. As one teacher saw it:

We discuss things like, you know, things that come along in the general course of a day or a week where people need some clarification. What are you telling the kids what a trapezium or a trapezoid is? Are you calling them the same thing? Sometimes little things like that, or, how do you describe a multiple? Or how do you want the kids to say something like what we might call three point four? Do you want them to say three point four or do you want them to say three and four tenths? How do you want them to describe that? Those sorts of things are discussed. How do you want them to set out a particular problem? What steps do you want to see them identifying. You know, those sorts of things we just have to discuss. (I3P12T1)

Explaining this point further, the teachers noted that the HOC was primarily responsible for providing support for curriculum reform. Consequently, the HOC organised the planning days in which teachers, in year levels, were given teacher release to work with the HOC to develop units of work for the various KLAs. Once the units have been written, the HOC collated these units across year levels and developed the school matrix that outlined the content to be covered, the units developed and resources needed for each year level. In this way, planning days made sure that changes to curriculum documents from either the Queensland Studies Authority (QSA) or DET were reflected in the units that had been planned, as well as the resources needed, to support the teaching of these units. Typical of the comments by teachers was:

This [curriculum development] has been a big ongoing task. We work on them, [unit plans] then a change comes in [from QSA or DET] and then we madly work on them again. The Principal likes everything to be current. It's a lot of work. (I3P22T3)

To clarify the extent of year level planning and collaboration the teachers were then asked about the focus of the planning and collaboration in mathematics. At this point,

there was unanimous agreement amongst teachers that planning days and moderation days were not utilised for mathematics planning. As one teacher explained:

When we have these moderation days or we have planning days, we go through all the writing tasks and the science etc.; it's really supposed to be the units we've already been planning with the HOC, we really don't give maths much thought. (I1P25T1)

Later the HOC agreed that there had been no year level planning in mathematics and, justifying this omission, she argued that it was impossible to work on every KLA at any one time. Faced with widespread curriculum reform across each KLA, her role was to ensure that the documentation was correct.

The syllabus has come down [from the QSA]; it's my job to make sure that from those syllabuses school programs are written. And then from the school program it's put into the units of work.

Thus choices had to be made, and with the Principal's approval, the HOC met her administrative responsibilities by supplying a school program in mathematics to every teacher, with individual teachers being responsible for the development of their own units of work (as discussed in Section 5.2.2). As she explained:

We [referring to herself and the principal] don't like units so much in mathematics. People work from the program in terms of what needs to be covered on a weekly basis...I think each teacher works to the program, this is my understanding of it; each teacher works to the program which is fairly detailed and it's in terms.

Elaborating on this point, the HOC noted that the school program in mathematics was a detailed list of content to be taught each term for each of the seven year levels at Hillside Primary School. Appreciating that collaborative planning involved more than the provision of a list of content to be taught, the HOC shared her plans for next year:

What I want to do next year, Maths-wise, and we can do it all in one with the Essential Learnings, is look at what we are doing and see whether it lends itself to an investigation at that level, and get it written.

In summary, the interview data collected during the inspection stage of the study highlighted a gap between the principal's vision of whole school planning and collaboration, and the reality experienced by the members of staff. At best, the various whole school staff meetings provided information about initiatives and directives from

DET, rather than providing opportunities for whole school planning and collaboration, especially in mathematics. In addition, data collected during the inspection stage of the study also confirmed that year level planning and collaboration was a feature of Hillside Primary School. The principal and the HOC, as well as the teachers, described both informal and formal forms of year level planning and collaboration, and noted their value in terms of encouraging professional conversations, developing units of work, as well as developing the school matrix detailing the planned units of work across the primary school. However, year level planning and collaboration were not supporting the implementation of the new mathematics syllabus, as mathematics was not on the agenda at formal year level planning meetings. In contrast to extensive collaborative planning in other KLAs, the teachers were supplied with a school program for mathematics that outlined the content for each year level and there were no scheduled planning days to develop units of work. Moreover, mathematics was not part of the school matrix. This indicates that there may be a gap between the Principal's intention and the reality, in terms of planning and collaboration in mathematics.

7.3 TEACHER EFFICACY

The exploration stage of this study identified that the teachers have generally high levels of teaching efficacy and content knowledge efficacy. However, discrepancies were evident as these generally high efficacy levels were not necessarily reflected in mathematics, as teachers consistently identified unease with respect to teaching investigative pedagogy and addressing learning problems in mathematics. In particular, inferential statistical analysis identified that those teachers who were less than 30 years of age and who had been teaching at Hillside Primary School for less than four years, perceived themselves to have higher teacher efficacy than older, more experienced teachers with more than 10 years teaching at this school. Unexpectedly, inferential statistical analysis did not find any significant difference between teachers with the grouping variable, mathematics studied. With these issues in mind this study sought answers to the following questions.

Are there generally high levels of content knowledge efficacy and teaching efficacy at Hillside Primary School, and if so, are these high levels of teacher efficacy reflected in the implementation of the new mathematics syllabus?

Why do teachers who have a high teacher efficacy in general, not feel confident to teach investigative pedagogy or address learning problems?

Do the teacher characteristics of age and years of teaching at Hillside Primary impact upon teacher efficacy, and if so what does this mean for the implementation of the new mathematics syllabus?

Is there a relationship between level of mathematics studied and teacher efficacy for the teachers at Hillside Primary School?

In line with these questions, data collection, analysis and interpretation during the inspection stage of the study clarified issues around efficacy in teaching, content knowledge efficacy and teacher efficacy.

7.3.1 Efficacy in teaching

Discussions with the teachers, during the inspection stage interviews, confirmed high levels of teacher efficacy. At each of the year level interviews, the teachers were asked if they believed they were good teachers. The consistent reply across each year level discussion group was similar to the following statement:

Yes, I think I am. I don't think I could keep coming every day if I didn't think I was doing a good job. (I4P24T3)

In addition, it initially seemed that teachers were also confident with respect to mathematics with the following being typical of the teachers' responses:

Specifically maths, yes we have to be. We bounce ideas off one another and we all have something positive to contribute. (I5P18T2)

However, further questioning of teachers' perceptions of their content knowledge efficacy on the new content in the mathematics syllabus, as well as their teaching efficacy in response to requirements for an investigative pedagogy in the new syllabus, created a general unease.

7.3.2 Content Knowledge Efficacy

In the first instance, as discussed in Section 6.4, the data reveal that young teachers, and those teachers teaching at the school from 1-4 years, were generally more confident with respect to content knowledge than older teachers. Moreover, the comments of younger

teachers suggest higher levels of professionalism with a greater commitment to professional development, as they spoke of seeking answers to questions for which they did not know the answer. Typical of their responses were, “If I don’t know something I ask someone or look it up” (I6P19T3), and “It’s so easy with the internet. Just type it in and there’s your answer” (I7P24T1). However, upper years teachers with more than 10 years teaching experience at the school, asked how confident they were when teaching mathematics, explained that they were usually confident with respect to their teaching “but maths is not my best subject” (I1P27T2). These teachers were then specifically asked about teaching the new content, for example, the patterns and algebra strand in the syllabus. This question gained a depth of insight not expected, with one teacher’s reluctant response:

I have just been keeping my head above water this year getting used to the new content, so I’m probably not a good one to answer that question, or not very well anyway. (I4P28T1)

This teacher went on to explain how she was exhausted by all the change and the requirements that go hand in hand with it. She went on to say, “I’m just trying to keep a low profile” (I4P28T1). This perspective was supported by another teacher who had been teaching at the school for more than 10 years, and who openly admitted that she relies on her students for support. “No, they have to help me all the time because I’ve got no confidence. I didn’t really study maths when I did senior. That’s my problem with algebra” (I1P27T2). This statement contrasts with the statistical data as well as the words of an early years teacher who had been teaching at the school for more than 10 years, and believes that patterns and algebra has always been part of the early years curriculum: “We’ve always taught that. We know what works and we just do it” (I5P18T1).

In this way, the data revealed that there were different levels of content knowledge efficacy with respect to mathematics. The responses of younger teachers and those teaching at the school from between 1-4 years, suggest higher levels of content knowledge efficacy compared to older, more experienced teachers teaching at the school for more than 10 years. However, the interview data conflicts with the questionnaire data by suggesting that teaching in the early years can make a difference to teacher efficacy.

7.3.3 *Teaching Efficacy in Mathematics*

Seeking to further understand the issue of teacher efficacy at Hillside Primary School, the researcher focussed the teachers' attention specifically on their teaching efficacy and their attitudes to the requirement of investigative pedagogy, within the new mathematics syllabus. The discussion that followed revealed a general unease with respect to investigative pedagogy that was more pronounced with the experienced teacher teaching at the school for more than 10 years. This unease is exemplified by this comment made by one such experienced teacher:

I don't think we ever really got our head around investigations ...an activity that we do in the room might accidentally be an investigation but because I'm a bit wishy-washy about what investigations are...it could accidentally happen to be there and it could be called an investigation. (I1P27T2)

This comment suggests that the teachers demonstrate a low level of persistence in the face of obstacles. Another experienced teacher, also teaching at the school for more than 10 years, encountered similar difficulties. Her decision to limit investigative pedagogy was justified by lack of time and resources, indicating that demanding situations did not result in a determined effort by teachers.

Investigations did sort of get put in the 'too hard box' because there's so many other things to cover, and that's going to take all this extra time and resources, and I don't probably know enough about it to really make it as effective as I could... therefore I was concentrating on what I already know. (I6P22T4)

In addition, it seems that low levels of content knowledge efficacy encouraged teachers to avoid using investigative pedagogy. As an experience teacher explains:

If I give them [students] an open ended investigation I could really end up in trouble, but if I teach them something, I make sure I have that bit right at least. (I7P23T4)

Interestingly, across the groups, younger teachers new to the school tended to agree with the unease voiced by the more outspoken, experienced teachers.

Given this general unease it is not surprising that teachers tended to ignore the requirement of the new mathematics syllabus for an investigative pedagogy. Justification for continuing to teach in the way that they had taught mathematics in the

past was evident during each year level group discussion. For example, this experienced teacher with more than 10 years teaching at the school claimed that:

It's the follow up. We teach with the hands on, we go to the textbook to follow up and you know, there's not enough follow up there. So you have your photocopied sheets and we do things in our maths groups, so that's why I was thinking "what is the new Maths?" (I5P20T2)

By the end of the discussion on this topic, teachers at each year level were openly discussing how they had reverted to the pedagogy they knew which did not require the input of investigative pedagogy. This was justified in terms of having the freedom to follow the new school mathematics program. For example:

I will be honest. I think the girls down there also struggled. They tried to follow the Syllabus and [the textbook] until we said, 'Just do – you know what you've got to cover – go to that program – that shortened program that the HOC got for us, and again that's where she supports us well, and just follow that. (I5P23T1)

Explaining further, an upper years teacher justified reverting to more traditional pedagogy in terms of trying to balance old and new:

I think you still keep failing, even though you try and take on board a lot of the new stuff. You still fall back on your strengths and what you know how to teach well, and you do try to incorporate the new things or the styles of teaching or content as well, but, you know it's hard to shake 12 years of teaching a particular way - maths in a particular way - you can't just all of a sudden change. I think you take things on in little pieces and if you look back, and if you look at yourself in four years time, you'll probably notice quite a big difference in what you were teaching and how you're teaching it. (I3P23T2)

Such comments were supported by discussions with the HOC, as she believes that the teachers need to have professional freedom in their own classrooms and should not be told when or how to teach particular mathematics content. She points out that the school program only says what indicates to be taught:

So in a term, introduce this [list of content], but how fast or how slowly it's done, or what's introduced when, I think is a personal thing. I think they need to be in charge of their little room and hope that by assessment time, it has been covered.

Given this comment from the HOC, it is interesting to note that these teachers firmly believed that they had made an effort to embrace the investigative pedagogy of the reform syllabus. However, they see the requirement for investigative pedagogy had been weakened with the introduction of the school mathematics program, as it did not specify a pedagogical approach giving them the freedom to revert to prior pedagogical practices. Consequently, the implementation of the reform mathematics syllabus was compromised by the introduction of a school program in mathematics that only listed content without specifying an investigative pedagogy. It seems that the teachers have welcomed the delivery of the school program in mathematics, interpreting it to mean that they did not need to continue with investigative pedagogy; rather that they could revert to their prior teaching approach. In short, the school program in mathematics allowed these teachers to control what is presented in the class, privileging them to introduce new content when ready.

In this way, the interview data analysed during the inspection stage of the study highlights a discrepancy between general teacher efficacy and teacher efficacy in mathematics. Most teachers believe they are ‘good teachers’, although when specifically asked about investigative pedagogy and their content knowledge efficacy for the new content in the syllabus, the gaps in efficacy were illuminated. Discussion with the teachers on this topic created a sense of unease, where the older more experienced teachers were most open about their reduced efficacy in the teaching of mathematics in terms of the new syllabus. However, their feeling of inadequacy about this has been alleviated by the belief that the priority at Hillside Primary School had reverted to a more traditional style of mathematics teaching with the introduction of the school mathematics program. Not surprisingly, this perspective has impacted on the implementation of the new mathematics syllabus.

7.4 TEACHER ACCOUNTABILITY

As discussed in Chapter One, prior to undertaking this study, the researcher was working as a Support Teacher: Learning Difficulties at Hillside Primary School. Anecdotal evidence at the time suggested that teachers did not believe that accountability was an important issue for them. Perhaps this was to be expected, as Hillside Primary School had consistently maintained its high ranking against ‘like schools’ as well as performing above state average. Consequently, the teachers did not have to set teaching goals and

did not feel pressured to be accountable for student results as traditionally the students had performed well. However, when the researcher returned to the school to collect data for this study, there was a sense that the whole school was ‘traumatised’ by the Year 3 results for the Year 3, 5, 7 state testing in 2006, and there was a new ‘press’ for teacher accountability.

Interviews with the Principal during the exploration stage interview (see Section 5.2.1), also highlighted how accountability issues had changed at Hillside Primary School. In the past, teachers were able to put their own interpretation on curriculum documents saying “We never had the accountability”. However, with the publication of the poor test results in 2006, it was now necessary to have a consistent approach to teaching across the year levels and throughout the school. Elaborating on this he said, “We’re getting information about teaching and assessment that means I have to ask questions.” The evidence for increased accountability was also important for the HOC. She said, “He [the Principal] is particularly data driven. Because he has to be...”

Given these comments from the Principal and HOC, it was hardly surprising that the exploration stage of this study identified that accountability was now an important part of the teachers’ life. Indeed, the teachers’ responses to items on the SPLCQ relating to accountability received almost 100% positive endorsement. Moreover, the use of inferential statistics did not find any statistically significant difference between any of the grouping variables, indicating that all teachers perceived accountability in the same way. With this issue of teacher accountability in mind, the inspection stage of this study sought answers to the following questions:

Is teacher accountability a priority at Hillside Primary School?

What is the relationship between teacher accountability and the implementation of the reform mathematics syllabus?

In line with these questions, data collection, analysis and interpretation during the inspection stage of the study, clarified issues that swirl around the subject of teacher accountability. In particular, the data collected and analysed during the inspection stage highlighted two aspects of teacher accountability: namely, accountability in terms of student learning, and accountability in terms of the school’s test results in mathematics. The overriding issue seems to be that the teachers at each year level are caught between

alternative visions for teacher accountability. On one hand, it is an accountability that focuses on what the teachers see is best for their students, and on the other hand, an accountability that focuses on what they see is best for the school in terms of achieving at an appropriate level on the Year 3, 5, 7 state tests.

Interview responses during the inspection stage suggest that the teachers at Hillside Primary School, were primarily motivated by a desire to improve student learning. Consequently, they expressed concern about the pressure of accountability in terms of their 2006 results from the Year 3, 5, 7 state tests, and how these results reflect on their students. The following teacher's comments reflect the general consensus of opinion:

We just feel that we are too data driven. I personally feel, and I think I can speak for my year level as well, there is so much emphasis on data and responding to data. Data doesn't take into account 'bad hair days'. Data doesn't take into account death in the family, illness or whether a child has a cold, is sick, it just doesn't show that. At no point on any data does it say, "Well, Jo Bloggs was sick with a cold". (I2P24T1)

Moreover, they questioned the value of the testing regime in terms of making valid assessments of teaching and learning in the school. As one teacher argued:

I mean, our Principal is pretty proactive, but less and less time is available for Principals and leaders to walk into the classroom and get a feel. To become part of the class - get involved in the lesson. That's just not happening any more. And even though I don't necessarily want to see a return to the bad old inspectorial days, one thing inspectors did was, they provided that link of understanding the context. They walked in. They knew the school. They could feel what was going on. Today all that happens is someone prints out a sheet of paper with a graph of your school's results and says "Oh, there you are, that's what's happening at that school." (I3P28T3)

At this point, attention turned to the negative impact of state testing and teacher accountability associated with the implementation of the reform mathematics syllabus, and teachers described their frustration with trying to introduce investigative pedagogy as instructed by the new mathematics syllabus, and at the same time meeting context expectations of state testing. As one teacher explained:

We were trying to implement the new syllabus and use investigations... But then you get this other agenda [the state tests] like a tsunami coming over the top, saying, you know, boom, boom, boom, this is down, and now you've got to have prescriptive lessons to teach these particular facts and get them ready for the big test. Now, there'll be even more pressure next year, because we

are going to be doing this in May, we are going to have three days [of national testing] as opposed to two days. We are going to be up against the whole of Australia and the only thing that worries me is that it becomes a case of state versus state, school versus school. I can just see that coming in and washing away a lot of the stuff that people are trying to do over time. So, I suppose we have to balance the two, and what I'm finding difficult is balancing those two. Not through my lack of knowledge, but just through lack of time, lack of resources, trying to get all the other things done that you are supposed to get done. This other agenda, this other accountability agenda with the mathematics, has become more important because in the end, no-one is going to sort of praise you or say "Gee, you did this wonderful investigation" and you know what? They are going to look at and unfortunately this is how the Department is focused these days. They are going to look at a sheet of paper that says, at this school their results for Year 3, 5, 7 state tests are this. (I4P33T2)

Continuing this discussion, the teachers then drew the researcher's attention to their frustration as they seek to reconcile "two agendas"; the agenda of curriculum reform as outlined in the new mathematics syllabus, and the accompanying reform text book series, and the agenda of state tests and the school program in mathematics.

There seems to be two agendas being played out on the schools. I think the philosophy behind [the reform textbook series] is right along the lines of the philosophy of the new maths syllabus and the teaching of it and the understanding of the concepts. But I think there are some more concrete concepts, you know, getting back to the algorithms for the operations that were still tested on those important state tests.....and you know, we've come to be fairly run by data these days, and its not being addressed in the [textbook] program like that, and we've just gone back into what we need to do for the state tests. That's our school program. I think at the moment, there's just two programs and its difficult working them cohesively. ... but then again it could all change again next year. (I1P35T2)

There was a basic conflict between the mathematics syllabus with its requirement for open-ended investigations, and the more recent document on *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d) that details prescribed content. One teacher described this conflict:

The concern I have is that there seems to be a clear division between what is being sought out of this whole accountability agenda from QSA [*Essential Learnings*], where they are saying now we want kids to basically know this, and this and basically you've got to get in there and do a prescriptive lesson on a particular topic and ram that home and then be accountable for that. Whereas if you are looking at investigations, which is what the syllabus asks us to do, it's over time, there you're more jumping into the unknown a little bit with kids in wanting to get stuff from them, they're in a way setting the

agenda, they're in a way finding things out. It is two different sides of the coin. (I3P29T1)

Thus, in an era of state testing and teacher accountability, these teachers were too afraid “to jump into the unknown” and embrace the new syllabus and its requirement of investigative pedagogy. Consequently, these teachers believed that they had moved away from attempting large investigations recommended in the mathematics syllabus and supported by the reform textbook, and focussed instead on providing “prescriptive lessons”. There was a definite sense that the large investigations recommended by the new syllabus would be ‘wasting their time’ in terms of preparation for the Year 3, 5, 7 state tests and consequently, teachers were quickly reverting to prior pedagogical practices with limited opportunities for student investigations. Moreover, they believed that state tests had ‘won the day’, and the new mathematics syllabus was on its way out. As one teacher’s comments indicate:

It’s crazy, the syllabus was only to be mandated in 2007 and here we are in 2007 and it’s already on its way out. These things have a shelf life of about a year I think, as do most things in the Department...It’s just not worth doing anything (I4P28T3)

This frustration with change is also reflected in a lengthy comment from the HOC where she expresses concern for teacher agency and “the amount of change”.

I am a little bit peeved with the Department at the moment because of the amount of change. The *Essential Learning* worried me a lot – more than they worry the Principal. He’s a lot more, “We’ll cope with everything. We have processes in place.” It still means more work for teachers. We’ve spent a long time getting these units right [in KLAs other than mathematics]. They’re great, they’ve been refined, the teachers are happy with them. But when I had a look at the *Essential Learning* – they’ve introduced another agenda. A lot of it’s not the same, they’re not the same as the syllabus which means a lot of it has to be changed. It’s right back again to creating units next year and we’ve spent the last three years creating units. It annoys me. It’s more than frustrating. I know it’s been hard work for teachers – I know that some of them are going to say, “What is this?” And I don’t blame them. I am fully with them. I don’t trust them [the QSA] enough not to change it again in 2009. They’re bringing all the syllabuses down in 2009. They’ve re-done them. I don’t trust them enough, that if the Federal agenda changes again or something else happens, that they’ll change it again. They are promising not to but I don’t believe them. Not with what’s happened.

When these views were presented to the Principal he denied that there was a problem with change, or that there was conflict between the two agendas of the mathematics

syllabus and the *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d) document. He said:

No, we're not caught in this at all. This is what the system gives us. The teachers here are very, very good. We go to a lot of trouble here pulling units together. We have already made a start on *Essential Learnings* to pull them through to the gatekeeper. We hear them saying 'Oh, there is too much to do.' Every person who comes into this school says, wow, you've got all your programs done. They're in place and I only wish I could export 25% of our teachers, and then bring them back just so that they can see what is on the other side of the fence. I have no drama with what we are doing. If we left it to the laissez-faire system we would have anarchy.

This comment confirms the teachers' understanding that there had been a move away from meeting the requirements of the mathematics syllabus and the priority given to writing programs and units for particular KLAs, with attention now given to changing these programs and units to comply with the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c). As the Principal described the situation:

The program must be followed. It is getting tighter and tighter. The Essential Learnings makes that quite clear. There's nowhere to deviate. This is what you have got to do boys and girls so just do it. How you do it, is up to you. We can sit and whinge and carry on but the reality is you've got to do it.

In this way, the Principal points to the movement from the mathematics syllabus to the primacy of *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d), but he also seems intolerant of discussion on the teachers' concerns.

However, in contrast to the Principal's optimistic views, the HSES presents an alternative more pessimistic view that alerts us to the possible impact of the testing regime on teacher agency in the school:

I think more and more, there is a sense of "Oh we're feeling powerless." There's less and less inservice, less and less support, and basically, you are told to do something new. You've got to marry it with your school program, you've got to marry it with *Essential Learnings* and QSA and systemic testing and the textbook you are using that may or may not match. So they're really sort of feeling in that respect that they don't have a lot of control. This would be my perception.

In this way, the inspection stage of this study confirmed that teacher accountability was a priority at Hillside Primary School, and one that left the teachers across all year levels feeling vulnerable. In response to this concern for state test results, the HOC, following instructions from the Principal, sourced a new school mathematics program based on the *Developing Essential Learnings for Queensland* (QSA, 2007d), and there was an expectation that teachers would follow the content prescribed in this program. Consequently, the teachers at Hillside Primary School put aside thoughts of engaging in open-ended investigations as required by the mathematics syllabus, and focussed their attention on prioritising prescriptive lessons based on the school mathematics program. At this point, the teachers recognised that there were two conflicting reform agendas at play. On one hand, there was a desire for curriculum reform in mathematics expressed in the new mathematics syllabus and supported by the reform textbook and, on the other hand, concerns around the testing regime and the school program in mathematics based on the *Queensland Curriculum Assessment and Reporting Framework: Developing the Essential Learnings for Queensland* (QSA, 2007d) document. Consequently, teachers have replaced the investigative pedagogy of the mathematics syllabus with prescribed lessons based on the school program in mathematics. At the same time as the HOC voiced her frustration with respect to the constant change, the HSES suggested that there was an issue with teacher agency and, teachers expressed concern that student learning needs are not being met. Interestingly, the Principal would not accept that there were problems here and reminded the researcher of the importance of teaching to school programs in order to bring about improved test results in mathematics.

7.5 MATERIAL AND PROFESSIONAL RESOURCING

The exploration stage of this study identified that the teachers were divided on the provision of material and professional resources at Hillside Primary School. Inferential statistical analysis found statistically significant differences for material resourcing where teachers with greater than 10 years teaching experience in the school perceived significantly less material resourcing than teachers teaching in the school for shorter periods of time. Although not statistically significant, sizeable gaps were evident for material resourcing and professional resourcing for the grouping variable, year levels taught. In particular, Figure 6.5 reveals that early years teachers perceived the highest levels of material resourcing, and the lowest the middle years teachers. While it is the upper years teachers who perceive the highest levels of professional resourcing, and the

early years the lowest. Given these initial findings, the researcher, during the inspection stage of this study, sought answers to the following questions:

Are material and professional resourcing, sources of support for the implementation of the reform mathematics syllabus?

Does the teacher characteristic of years at this school and year levels taught, influence teacher perceptions on the levels of material and professional resourcing?

In line with these questions, data collection, analysis and interpretation during the inspection stage of the study clarified issues around material resources and professional resourcing.

7.5.1 Material Resources

As discussed in Section 5.2.1, the Principal, during his initial interview, spoke about the provision of material resources for the teaching of the reform mathematics syllabus. He recognised the need for appropriate type and quantity of material resources to support curriculum change, and claimed that he was keen to gain funding for the purchase of new resources. Not long after this interview, he was able to report that approval had been given for the allocation of \$1000 per year level for the purchasing of mathematics materials. However, there could be a problem here as the Principal also saw the purchase of mathematics materials linked to resource needs identified in units of work.

Once the units of work were in place, we said that they would be in place for a couple of years and then we'd review them. Therefore the resources we want fit into two groups. Those that we've already got we just have to replace due to natural attrition, and those that we have to boost up, because we've increased the unit or we've diversified the unit.

As outlined above in the interview data associated with planning and collaboration, units of work have not been developed for mathematics. As discussed in Section 7.2, the HOC had previously organised the planning days in which teachers, in year levels, were given teacher release to work with the HOC to develop units of work for the various KLAs. Once the units have been written, the HOC collated these units across year levels and developed the school matrix that outlined the content to be covered, the units developed and, most significantly the resources needed for each year level. However, mathematics had been deliberately omitted from this strategic planning process.

This omission raises questions with respect to how material resources were selected when the \$1000 per year level was spent on mathematics resources. Discussions with the teachers on this issue, indicated that each year level could select whatever they wanted from a range of catalogues rather than consult the school matrix. One teacher describes the process in the following way:

Well it was very simple. The HOC got a lot of different brochures for us and at one of our year level meetings we looked on the internet and looked at our brochures and we went on a shopping spree. One thousand dollars goes very quickly when you're buying maths resources...The only restriction was we had was that we had to put in our orders to be checked so that we weren't all [each year level] buying the same thing. (I6P21T4)

In this way the teachers from each year level were totally responsible for the purchase of the resources that they wanted. Although the purchase of these materials was not related to planned units of work with the HOC, the teachers have direct input by ordering what they perceived they needed.

In particular, the early years teachers were generally excited about the expected arrival of newly ordered mathematics material resources. As one early years teacher commented:

Yeah we have lots of stuff. It's mainly old, but we are about to get our order of new materials in so we're excited about that. (I5P22T2)

However, in contrast to the early years teachers, the middle years teachers, and of those, teachers who have been in the school for more than 10 years, believed they did not have access to sufficient current material resources to teach using the required investigative pedagogy of the new mathematics syllabus. A typical comment was:

Well we do have resources...[But]To conduct investigations we need a full range which we just don't have. I've brought a heap of things in from home. We all have...The shipment of resources we have ordered will be here soon. That'll be good. (I1P33T1)

This inability to access sufficient material resources is hardly surprising given that the HOC and the teachers had not planned units of work in mathematics and this KLA was not included in the school matrix. Consequently, material resources were purchased haphazardly and without reference to units of work and the school matrix.

7.5.2 Professional Resources

In his initial interview (Section 5.2.2), the Principal described the provision of professional resources in terms of the reform textbook series and the school program in mathematics. However, the teachers were critical of both these initiatives as sources of support for the implementation of the new mathematics syllabus.

During the discussion with the teachers, it became apparent that once the reform textbook was introduced into the school, there was no further professional support provided to the teachers. As this teacher explains:

It was just kind of, you know, as we introduced [the textbook] and all the rest of it – investigations were kind of encouraged, but there wasn't any guide as far as kind of training and how to do it (I1P33T2)

Moreover, teachers perceived disadvantage because they did not get the full program.

I think that because we didn't purchase everything, we didn't get the full [textbook] series; I think if we got the whole lot it would work together as a great program, but I think they [the Principal and HOC] thought that because we were using the student workbook we don't need it all. (I4P23T2)

Again, the teachers were critical of the reform textbook series, this time because it was 'so prescriptive', preventing them from incorporating some of their existing practices. In contrast, they were very positive about the recent introduction of the school program in mathematics, because it provided them with the freedom to incorporate their 'tried and tested' practices. This teacher explains:

I found last year that teaching [from the textbook] was very challenging because every single lesson was a brand new lesson. Five days a week you were doing brand new stuff, and I found that was hard. Now I've gone back. There seems to be a lot of practice – once they get the understanding, they listen to me and practice a lot. It's much better. (I7P2T1)

However, the teachers remembered that the textbook was put aside in 2007 in response to very pragmatic concerns for the unexpected results in mathematics for Year 3 on the Year 3, 5, 7 state tests in 2006. As a direct consequence of these results, the reform textbook was replaced with the school program in mathematics at the commencement of 2007. However, the decision was made to keep the student workbook from the textbook series, which caused frustration for the teachers.

So we were told, you have to submit (sic) to the new program... this is our program, follow it. It's not as prescriptive as [the textbook] but I think I'm getting a bit lost as well trying to say, well here's a school program, are we still expected to get through this workbook that the kids have purchased? (I7P28T2)

Teacher frustration was evident with the ongoing change to their professional resources and students' workbooks, as this comment from an upper years teacher suggests:

The last couple of years has been fairly hard to get our head around it all because we implemented [the textbook] over the last couple of years...but then this year a new school program has come off because we thought [the textbook] wasn't addressing some of the things, particularly in the Year 3, 5 and 7 testing at the moment ... Yeah, and they sort of said, well, you know, the core content must be included as well because we don't think it's included in the [textbook] but we still use [the textbook] and now we're going to [a different textbook] next year. We're giving everything a try. (I1P33T2)

A middle years teacher takes a pragmatic view about what is happening, suggesting that experience is what is required:

This is one of the things that I think comes out of all of this, is there's no textbook that will serve all your needs. And there's no program that will serve all your needs. So what you really need to do is find, over a period of time – you find a particular resource from somewhere. Like [the textbook] might have this wonderful unit or wonderful page even. You know, it could even be as simple as a page of activities that really focuses in on what you want to get across to the kids. So you take that, and you take that, and you take that. I think the problem is that everybody looks at these programs as a panacea and it's not; and so, what does concern me a little bit is throughout the school when you start having a different program in every year level, I think that concerns me in terms of the continuity and filling in the gaps. But I feel confident enough as a teacher myself and all the years I have been teaching and my knowledge of mathematics over time, to be able to, I suppose, marry a lot of different types of programs and resources. This means I can conform to any department requirement. (I3P23T3)

The inspection stage of the study suggests that there were insufficient material and professional resources to support the implementation of the new mathematics syllabus. With respect to material resources there had been a special \$1000 grant to boost material resourcing in mathematics. However, it seems that funds were spent haphazardly with reference to catalogues, rather than units of work and the school matrix. Consequently, teachers blamed their failure to implement the reform mathematics syllabus on insufficient resources to support the requirements of investigative pedagogy. When it

came to professional resourcing, we find that the introduction of the new reform textbook did not support the implementation of the new syllabus in mathematics. However, in 2007, in response to the poor state test results, this reform text book was quickly replaced by a school program in mathematics even though the school mathematics program did not address the investigative pedagogy. However, this decision had implications for the implementation of the reform mathematics syllabus as teachers now believed that investigative pedagogy was no longer a priority.

7.6 EXTERNAL PROFESSIONAL DEVELOPMENT

During the exploration stage interview with the Principal, he outlined three ways that the teachers at Hillside Primary School can access professional development. They are, 1) teachers can personally access external professional development, 2) an outside expert comes to the school or 3), the school hosts a district workshop (see Section 5.2.2 for a full discussion). In complete contrast to this discussion with the Principal, the teachers overwhelmingly disendorsed all items on the SPLCQ relating to external professional development (see Section 6.3). Consequently, the researcher sought answers to the following questions during the inspection stage of this study:

Is there external professional development to support the implementation of the new mathematics syllabus?

Does teacher age impact upon how much support is needed by the teachers in terms of professional development?

When these questions were taken to the teachers during the focus group interviews, they were unanimous in their agreement, making comments similar to, “I haven’t seen maths PD for a long time now” (I7P28T2). Despite the Principal’s claim that numerous external professional development opportunities were made available to teachers, it seems that these opportunities were not in mathematics (see section 5.2.2). Consequently when the HOC was asked to comment specifically on the amount of external professional development provided on the implementation of the reform mathematics syllabus, she admitted that:

At the moment no, no, it’s not the same amount [as it is for the English syllabus] at this stage; it’s sort of dried up. As I said earlier, we are going to get together – the best PD is teachers talking to teachers. We are going to get

together and we are going to start organising investigations, that's got to happen.

However the paucity of external professional development in mathematics had been noted and teachers, during year level interviews, commented on the professional development they had attended in KLAs other than mathematics. The early years teachers, in particular, reflected on the positive results from other professional development, and their frustration that this is not available to them for mathematics.

I know with writing for instance, I'd been to a Key Teacher session and I came back to the teachers in my year level. I told them about planning, how you plan writing, and so we've got much better results since we've done that. The same thing should be happening in maths. (I5P24T1)

Moreover, the teachers in general expressed frustration at having to implement the new investigative pedagogy of the syllabus with little guidance:

I think one of the problems right across the board, is there hasn't been any attention given to developing skills for teachers to do investigations and develop investigative thinking. (I4P32T1)

Thus teachers perceived that the lack of professional development on the new content and pedagogy of the syllabus, prevented them from fully implementing the new mathematics syllabus.

In this way, the inspection stage of the study highlights the paucity of external professional development in mathematics. It seems that there were professional development opportunities in support of all the KLAs except mathematics. Consequently, the teachers at Hillside Primary School have not received appropriate professional development to support the implementation of the new syllabus in mathematics, and their needs with respect to new content and investigative pedagogy have not been met. Not surprisingly, this failure to provide external professional development in mathematics has impacted on the implementation of the mathematics syllabus.

7.7 THE ROLE OF THE PRINCIPAL

During the exploration stage of this study, a number of unresolved issues were identified for further inspection (see Section 6.4). These unresolved issues formed the basis of data

collection during the inspection stage of this study. However, during the inspection stage data collection, another issue surfaced. The Principal of Hillside Primary School played a critically important role in supporting curriculum reform at his school. He had developed formal structures by which curriculum reform was conducted, as new policies and initiatives were released from the Department of Education and Training (DET). In addition, he promoted professional development in a range of forms and provided material and professional resources for his teachers. With these issues in mind, this study sought answers to the following questions from the inspection stage data.

Is the Principal instrumental in curriculum reform at Hillside Primary School?

How has the Principal supported the implementation of the reform mathematics syllabus?

As a result of these questions, data collection, analysis and interpretation during the inspection stage of the study clarified issues around the role of the Principal in curriculum reform at Hillside Primary School.

It was during the inspection stage interview with the Principal that he said that he had put in place a range of formal structures to support curriculum reform. In particular, he listed staff meetings, curriculum forums, year level planning and moderation days, year level coordinators' meetings and year level meetings. He discussed how these meetings provided opportunities for dialogue that permitted the exchange of ideas and whole school planning of curriculum reform, and in particular, reform in mathematics. However during the inspection stage interviews with the teachers, they provided an alternative perspective on the purpose for these meetings. From the teachers' perspective, the staff meetings and curriculum forums were for the dissemination of DET directives ensuring that they were kept well informed of all relevant DET initiatives. One teacher describes her perspective on the purpose of these meetings: "I think that the meetings are an opportunity for a lot of examination of [Education] Department documentation, and I think that sort of seems to be the main purpose of these meetings." (I3P7T3)

The teachers do agree with the Principal that year level planning and moderation days directly support the implementation of curriculum reform. However, mathematics is not one of the KLAs being targeted during these meetings. One teacher explains:

When we have these moderation days or we have planning days, we go through all the writing tasks and the science etc. It's really supposed to be the units we've already been planning with the HOC, we really don't give maths much thought. (I1P25T1)

The Principal accepted this observation, drawing attention to the difficulties associated with a new syllabus for each KLA since 2001, and the new demands associated with the implementation of the *Queensland Curriculum Assessment and Reporting Framework: Developing the Essential Learnings for Queensland* (QSA, 2007d) across the KLAs. The HOC also confirmed this dilemma by explaining that it was impossible to work on every KLA at any one time. Faced with widespread curriculum reform across each KLA, the HOC explained that her role was to ensure that the documentation was correct. Consequently, under the Principal's direction, the HOC met her administrative responsibilities by supplying a school program in mathematics to every teacher.

As the teachers did not have direct support from the HOC to plan units in mathematics to support the implementation of the reform syllabus, discussions about the role of the year level coordinators developed. Each year level coordinator confirmed that the role they held did not have any 'power', but rather the position had evolved into a conduit between the administration and the year level teachers. This was confirmed by the HOC. As discussed in Section 7.2.1 above, the HOC did not believe that year level coordinators had a role in planning. Rather, they were to implement the program she had given them and organise the assessment.

The last formal structure in place within the school to support curriculum reform is year level meetings. These meetings were seen by all teachers to be the meeting where mathematics planning could be conducted. However, this planning was short term, and focussed more on gaining consistency of approach and use of terms, rather than long term planning. For example, one teacher said:

We discuss things like, you know, things that come along in the general course of a day or a week where people need some clarification. What are you telling the kids what a trapezium or a trapezoid is? Are you calling them the same thing? (I3P12T1)

It would seem that the Principal has specific functions for each of the formal structures. The staff meetings and curriculum forums kept the teachers informed of DET directives and initiatives, while the planning and moderation days were used for the KLAs that

were selected by the Principal as the priority. He needed to prioritise, because all KLAs could not be considered at once. Finally, the year level meetings provided an opportunity for the teachers to address their immediate and pressing short term concerns.

In addition to these formal structures within the school designed to support curriculum reform, the Principal also evidenced several forms of professional development he makes available to the teachers. He also listed material and professional resources he provides to support them. As discussed above, no professional development in any of these forms was available in mathematics. The teachers were divided as to the availability of material resources. The early years teachers felt they had sufficient resources, while the middle years teachers believed they had insufficient resources. During the course of the data collection phase the Principal intervened, and announced a mathematics budget for each year level of \$1000. One middle years teacher describes her perspective on material resources.

Well we do have resources...[But]To conduct investigations we need a full range which we just don't have. I've brought a heap of things in from home. We all have...The shipment of resources we have ordered will be here soon. That'll be good. (I1P33T1)

In terms of professional resourcing the Principal did take action. He provided the teachers with the reform textbook in 2006. However, the unexpected results for Year 3 on the state tests conducted in that year resulted in what the teachers called a “knee jerk response” from the Principal. At this time the reform textbook was withdrawn and replaced by the school mathematics program. This new school mathematics program aligned itself to the requirements of the newly introduced *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c).

7.8 CONCLUSION

This chapter has reported on the inspection stage of this study. In line with the questions identified in the conclusion of Chapter Six, the data collection, analysis and interpretation during this stage of the study focussed on the issues of teacher efficacy, planning and collaboration, material and professional resourcing, professional development, conflicting policy agendas, as well as the approach being adopted by the Principal. In summary, the inspection stage of the study identified the following findings:

There are limited opportunities for planning and collaboration in mathematics

The inspection stage of the study highlighted a gap between the principal's vision of planning and collaboration, and the reality experienced by the members of staff. At best, the various whole school staff meetings provided information about initiatives and directives from DET, rather than providing opportunities for whole school planning and collaboration, including mathematics. In addition, data collected during the inspection stage of the study also confirmed that whilst year level planning and collaboration was a feature of Hillside Primary School, the implementation of the new mathematics syllabus did not include opportunities for year level planning and collaboration. It seems the principal, supported by the HOC, prioritises the KLAS to be considered during the planning and moderation days. In hindsight, it seems that the decision to take mathematics off the planning agenda had impacted upon the implementation of the new mathematics syllabus.

There are low levels of efficacy in mathematics

Overall, the teachers in this study believe that they are 'good teachers'. However, when specifically asked about investigative pedagogy and their content knowledge efficacy for the new content in the syllabus, the gaps in efficacy were illuminated. Discussion with the teachers on this topic created a sense of unease, where the older more experienced teachers were most open about their reduced efficacy in the teaching of mathematics in terms of the new syllabus. However, their feeling of inadequacy about this has been alleviated by the belief that they now have reverted and that the priority at Hillside Primary School has reverted to a more traditional style of mathematics teaching with the introduction of the school mathematics program. Not surprisingly, this perspective has impacted on the implementation of the new mathematics syllabus.

Accountability issues are impacting upon reform in mathematics

As discussed in Chapter One, prior to undertaking this study the researcher was working as a Support Teacher: Learning Difficulties at Hillside Primary School. Anecdotal evidence at the time suggested that teachers did not believe that accountability was an important issue for them. Consequently, the teachers did not have to set teaching goals, and did not feel pressured to be accountable for student results, as traditionally the students had performed well. However, when the researcher returned to the school to

collect data for this study, there was a sense that the whole school was ‘traumatised’ by the Year 3 results for the Year 3, 5, 7 state testing in 2006, and there was a new ‘press’ for teacher accountability.

As teacher accountability had become a priority at Hillside Primary School, teachers across all year levels felt vulnerable. In an era of state testing and teacher accountability, these teachers were too afraid “to jump into the unknown” and embrace the reform mathematics syllabus with its requirements for new content and investigative pedagogy.

There are insufficient resource provisions

Initially, there were certainly moves to resource mathematics teaching at Hillside Primary School. In particular, there was great excitement as the Principal announced a special \$1000 grant to boost material resourcing in mathematics. However, given the paucity of planning with respect to mathematics, these funds were haphazardly spent without reference to units of work and the school matrix. In addition, there were also plans to provide sufficient professional resources through the introduction of the new reform textbook. However, in 2007, in response to the poor state test results this reform textbook was quickly replaced by a school program in mathematics even though the school mathematics program did not address the investigative pedagogy required in the new mathematics syllabus. Teachers now believed that investigative pedagogy was no longer a priority, and they blamed insufficient resources for their failure to implement the new mathematics syllabus.

There is a paucity of professional development in mathematics.

This study also found a paucity of professional development in mathematics. It seems that there were professional development opportunities in support of all the KLAs except mathematics. Consequently, the teachers at Hillside Primary School have not received appropriate professional development to support the implementation of the new syllabus in mathematics, and their needs with respect to new content and investigative pedagogy have not been met. Not surprisingly, this failure to provide external professional development in mathematics has impacted on the implementation of the mathematics syllabus.

The reform mathematics syllabus represents one amongst many curriculum reforms.

As discussed in Chapter Two, Hillside Primary School has demonstrated a strong commitment to school-based curriculum development. For example, Hillside Primary School has been very proactive in the development of the early years of learning, developing their Early Years Learning Philosophy to support the curriculum in these years. In addition, this school acknowledges the importance of the middle years of schooling by developing policy and support structures around the Middle Phase of Learning. These initiatives support the other facets of this school's environment including the Special Education Unit (SEU), the team of Advisory Visiting Teachers (AVT) based at the school, as well as an Information Communication Technology Program (ICT) that supports 22 trainees. All of these school-based curriculum innovations operated alongside the mandated curriculum reform that is required of all schools within the Queensland education system. For example, reform syllabi were released in 2002 for Study of Society and the Environment and for The Arts, as well as a reform syllabus for Technology in 2003. During this time there was a series of ongoing changes to English and Science syllabi as well as other policy initiatives, such as the expectation that each school introduce a daily Health and Physical Education session. When the reform syllabus in mathematics was published in 2004 for implementation by 2007, this represented one amongst many other reforms. Consequently, it is hardly surprising that this study found that teachers were frustrated with the amount of curriculum change.

There are conflicting policy agendas in mathematics

This study has found conflicting policy agendas in mathematics at Hillside Primary School. As discussed in Chapter One, the QSA released the *Mathematics Year 1-10 Syllabus* (QSA, 2004) with the intention of fully implementing this syllabus by 2007. This reform mathematics syllabus represents a significant shift in the teaching of mathematics from the previous syllabus (Department of Education, 1987). With the new syllabus there was a move towards outcomes based education, an investigative pedagogy for teaching mathematics and a variety of new content. By 2006, the reform syllabus had begun to impact upon the teaching of mathematics at Hillside Primary School, and teachers at Hillside Primary School were voicing their concerns about the implementation of the new syllabus. In response to poor state test results in 2006, a school program in mathematics based on the *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d)

and the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) was presented to the teachers at Hillside Primary School. However, these teachers soon identified two conflicting policy agendas at play, and noted the primacy of the school program in mathematics over the reform mathematics syllabus. While the Principal would not accept that there was a problem with this development, the HOC voiced her frustration with respect to the constant change. The HSES suggested that there could be an issue with teacher agency, and the teachers expressed their concern for student learning. Meanwhile, the teachers' thoughts of engaging investigative pedagogy according to the reform syllabus were put aside in favour of prescriptive lessons based on the school mathematics program.

The Principal is inconsistent in his approach to curriculum reform

Clearly, the Principal has in the past supported whole school planning and curriculum reform at Hillside Primary School. He has developed structures that are designed to cope with the avalanche of curriculum reform that descends on the school from DET. For him, the KLAs that have the most pressing requirements for change are addressed first, and other short term alternative measures are put in place for those KLAs that are not the priority. Mathematics reform was not considered to be a priority, and consequently time and resources were not committed to whole-school planning and collaboration in this KLA. As a short term measure, the school mathematics program was distributed to the teachers as a way of addressing the need to implement the *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d) and the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c). Moreover, as the *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d) and the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) were perceived to be a return to traditional mathematics pedagogy, it was generally accepted that the teachers did not need immediate assistance with the implementation of the school mathematics program.

As a way to shed light on the theoretical perspective of these findings the following chapter, Chapter Eight, will develop and discuss these issues and associated findings in accordance with the research literature.

Chapter Eight: Inspection Stage - Theoretical Significance of Findings

8.1 INTRODUCTION

As discussed in Chapter Four, data collection in this study progressed through two research stages of “exploration” and “inspection” (Blumer, 1998, p. 40). At the same time, data analysis and interpretation involved an iterative process comprised of a “first, second and third-order interpretation” (Neuman, 2007, p. 160) of these data. Following a first and second-order analysis and interpretation of data, this study identified eight findings (Chapter Seven). These findings include:

6. There are limited opportunities for planning and collaboration in mathematics
7. There are low levels of teacher efficacy in mathematics
8. Accountability issues are impacting upon reform in mathematics
9. There are insufficient resource provisions
10. There is a paucity of professional development in mathematics
11. The reform mathematics syllabus represents one amongst many curriculum reforms
12. There are conflicting policy agendas in mathematics
13. The Principal is inconsistent in his approach to curriculum reform

The third-order interpretation of the findings follows, as the study addresses the theoretical significance of each finding. Theoretical propositions are developed following discussion of each of these findings with reference to the literature. In particular the discussion in this chapter is supported by Figure 2.1, the Social Ecology Model adapted from Bronfenbrenner (1979) and well as Millet and Bibby’s (2004) model, Figure 3.2. Consequently, Section 8.2 in this chapter focuses on the teacher as person, and considers the study’s findings with respect to the influence of self-efficacy on performance. Section 8.3 discusses the study’s findings with respect to the professional community at Hillside Primary School, with special reference to the provision of sources of support for curriculum reform in mathematics. Sections 8.4 and 8.5 discuss the study’s findings in terms of its institutional context as well as the wider

context of globalisation and curriculum reform. Section 8.6 discusses the role of the Principal within this context. Finally, Section 8.7 concludes this chapter.

8.2 THE TEACHER AS PERSON

Overall, this study found that the teachers at Hillside Primary School believed that they are ‘good teachers’. However, this study also found a discrepancy between the teachers’ general teacher efficacy and their teacher efficacy in mathematics. When specifically asked about investigative pedagogy and their content knowledge efficacy for the new content in the syllabus, the gaps in efficacy were illuminated. Discussion with the teachers on this topic created a sense of unease in them. The older more experienced teachers were more open about their reduced efficacy in the teaching of mathematics in terms of the reform syllabus. When asked to discuss the new content in the syllabus one teacher replied:

I have just been keeping my head above water this year, getting used to the new content so I’m probably not a good one to answer that question; or not very well anyway. (I4P28T1)

Such comments were not surprising given that the literature identifies the challenge that many primary teachers face when teaching mathematics (e.g., Handal & Herrington, 2003). For example, researchers have found that primary mathematics teachers are not specialist mathematics teachers (Carroll, 1998, July) and consequently, lack the depth and breadth of content knowledge necessary to take on the responsibility of changing the way mathematics is taught. Research also informs us that attitudinal change to mathematics teaching may be difficult, as attitudes are often formed from their own school experiences (D. L. Ball, 1988, 1996; D. L. Ball, et al., 2001).

However, this study has found that the challenge of mathematics teaching goes beyond a lack of qualification and a poor school experience to the deeper issue of teacher efficacy. Teacher efficacy is generally defined in terms of “the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (Tschannen-Moran, et al., 1998, p. 233). Over time, teachers will develop a relatively stable set of core beliefs about their competence levels (Ross, 1998). However, being presented with a new task will cause a re-evaluation of efficacy (Schatz, 2006; Tschannen-Moran, et al., 1998). With every new task, teachers can go through a cycle that begins with a state of “unconscious

incompetence” where a teacher is unaware of the limitations of their knowledge, to a state of “conscious incompetence” where a teacher becomes aware of their limitations with respect to a specific aspect of their teaching. A teacher can move from a state of “conscious incompetence” to a state of “conscious competence” following positive efficacy feedback, before entering a state of “unconscious competence” where they have no need to dwell on their competency level (Schratz, 2006). In short, “the proficiency of performance creates a new mastery” (Tschannen-Moran, et al., 1998, p. 228). However, this process will require greater teacher effort and persistence.

Greater efficacy leads to greater effort and persistence, which leads to better performance, which in turn leads to greater efficacy. The reverse is also true. Lower efficacy leads to less effort and giving up easily, which leads to poor teaching outcomes, which then produce decreased efficacy. Thus, a teaching performance that was accomplished with a level of effort and persistence influenced by the performer's sense of efficacy, when completed, becomes the past and a source of future efficacy beliefs. Over time this process stabilizes into a relatively enduring set of efficacy beliefs. (p. 228)

This understanding of the relationship of teacher efficacy to teacher performance and curriculum reform is further explained by Millett and Bibby (2004) in their model for analysing curriculum reform in mathematics. According to Millett and Bibby (2004), the teacher’s “zone of enactment” (p. 3), or their motivation and capacity for curriculum reform in mathematics, is realised as external demands for curriculum reform interact with the teacher’s personal and professional identity. There are both “cognitive and affective issues relating to the teacher’s experience of mathematics...and her feelings about herself in mathematics” (p. 6) . In other words, there may be cognitive issues with respect to content, pedagogy and assessment, as well as their “personal agency beliefs” and “beliefs about self-efficacy ... and academic self esteem” (p. 5). In order to fully appreciate the teacher’s response to curriculum reform, “we need to know how the teacher sees herself as a professional, her views about general pedagogical issues and how these have developed over time (her career and experience)” (p. 6). Thus teacher efficacy is said to significantly influence a teacher’s motivation and capacity to engage in curriculum reform.

In this way, this study confirms the theoretical accounts of the relationship between teacher efficacy and curriculum reform, as well as highlighting the importance of ensuring access to sources of self-efficacy information for teachers struggling with

curriculum reform. Consequently, this study promotes these theoretical understandings via Theoretical Proposition One.

Theoretical Proposition One:

Curriculum reform with its expectations of new content and pedagogy causes the teacher to re-evaluate teaching efficacy. Here there may be cognitive issues in terms of new content, pedagogy and assessment, as well as affective issues related to deeply-held personal beliefs, values and emotions.

This theoretical proposition situates the teacher as ‘person’ at the centre of curriculum reform. As reform is initiated, a range of self-efficacy information, incorporating cognitive and affective issues relating to academic and professional experience as well as personal beliefs, values and emotions, will impact on the level of engagement within a specific educational reform. This self-efficacy information will directly impact on the teacher’s motivation and capacity for curriculum reform.

8.3 THE PROFESSIONAL LEARNING COMMUNITY

Related to the above discussion, this study confirms claims in the literature that the professional learning community represents an ideal situation for curriculum reform. Whilst there is no precise definition for the professional learning community provided in the literature (Hord & Sommers, 2008), “there is general consensus that you will know one [a professional learning community] exists when you see a group of teachers sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth promoting way” (Stoll & Seashore Louis, 2007, p. 1).

Given this definition of the professional learning community, it was interesting to note that historically Hillside Primary School has a strong reputation for teacher participation in planning and collaboration activities in support of curriculum innovation. As discussed in Chapter 2, Hillside Primary School’s first triennial school review in 2004 presents a favourable view of the school, with staff involvement in school activities and support for collaborative partnerships receiving special commendation. The review notes of staff involvement in school activities can best be seen by participation in a range of committees addressing various educational issues. As one teacher described the situation:

I know with writing for instance, I'd been to a Key Teacher session and I came back to the teachers in my year level. I told them about planning, how you plan writing, and so we've got much better results since we've done that. The same thing should be happening in maths. (I5P24T1)

However, despite this teacher's interest, the "same thing" did not happen in mathematics. Formal opportunities for planning and collaboration were nonexistent, as whole school staff meetings provided information about initiatives and directives from DET rather than providing opportunities for whole school planning and collaboration in mathematics. In addition, there were insufficient resources to support the implementation of the reform mathematics syllabus. Initially, there were certainly moves to resource mathematics teaching at Hillside Primary School (i.e. a special \$1000 grant per year level to boost material resourcing in mathematics). However, due to the lack of planning with respect to mathematics, these funds were haphazardly spent without reference to units of work and the school matrix. Finally, it was also found that there was a paucity of professional development in mathematics, with no scheduled opportunities for professional learning with respect to the new content and investigative pedagogy. It seems that there were professional development opportunities in support of all the KLAs except mathematics.

This situation is interesting, given that the literature clearly recommends problem-solving and collaborative partnerships that are socially based and action-oriented as a way forward in educational reform (Crowther, Kaagan, et al., 2002). In this way, teachers "become partners in curriculum reform, derived from intimate knowledge of local contexts of implementation, in particular from their knowledge of their students, available resources, and the obdurate practicalities of their work" (Kirk & MacDonald, 2001, p. 564). In a similar vein, the provision of insufficient resources and the paucity of professional development is of concern, given claims in the literature that resources and professional development work together to support curriculum change in the context of the professional learning community (Clements & McMillen, 2002; Hord & Sommers, 2008). Appropriate resourcing and professional development enables teachers to translate theory into practice by focussing on content knowledge, developing instructional materials and 'testing' teaching strategies (Lee, 2005; Lingard, et al., 2001). Thus, without opportunities for teachers to gain self-efficacy information, teacher efficacy levels fell as teachers struggled in isolation to teach the reform syllabus as they did not have "the intellectual quality and developmental appropriateness of interactions

with a more knowing other” (Blanton, Berenson, & Norwood, 2001, p. 5). In short, when it came to mathematics reform, the teachers at Hillside Primary School were not supported by a professional learning community.

Millet and Bibby (2004) recommend the professional learning community as the ideal situation for curriculum reform because it is within this environment that issues of teacher efficacy may be addressed. Surrounding the teacher is the “situation” (p.3), a specific school culture that impacts on the teacher’s capacity to change. Ideally, this situation makes available various sources of self-efficacy information that together serve to develop teacher efficacy and, in turn, positively influence the teacher’s “zone of enactment” (p. 3) within the overall situation. This zone of enactment is “an area of potential for professional development, the space in which the individual makes sense of reform or change initiatives in essentially a social process” (p. 1). In their view, the process of implementing curriculum change begins with one or more external factors (e.g. external professionals, public and private, and policy). In the first instance, teacher efficacy will influence their decision whether to accept or reject the curriculum change. However, these authors also argue that since the zone of enactment is a “social construct” (p. 4) it can be influenced by social interactions within the situation. This is particularly true if these social interactions include “rich deliberations” that were “grounded in practice and supported by resources, so that curriculum change [is] more likely to be operationalised” (p. 4).

For Millett et al (2004a) this type of social interaction is possible within the professional learning community characterised by the four conditions of `time, talk, expertise, and motivation (pp. 251-252). When time is allocated, teachers work in an iterative framework of trial, reflection, discussion, modification, and retrial. Moreover, when teachers are given opportunities to observe each other’s lessons, they are encouraged to *talk* with each other about these observations as a focus for reflection and discussion. *Expertise* is shared when the teachers are supported to reflect around theory and practice. At the same time, *motivation* follows “pressure and support from colleagues and headteachers, resourcing of professional development, emotional support and friendship, coherence and consistency of views” (p. 6). Thus it is argued that when these four conditions are present within a professional learning community, “curriculum change [is] more likely to be operationalised” (Millett & Bibby, 2004, p. 4).

In a similar vein, others argue that teacher efficacy is not a ‘fixed’ commodity, and is influenced by the availability of “sources of self-efficacy information” (Tschannen-Moran, et al., 1998, p. 228). Just as the challenge of curriculum reform may lower teacher efficacy, so too the availability of sources of self-efficacy information can raise teacher efficacy. These sources of self-efficacy information include making available “mastery experiences”, “physiological and emotional clues”, “vicarious experiences”, “verbal persuasion” and “cognitive processes” (pp. 229-230). In brief, mastery experience is the most powerful source of support for efficacy, as success breeds both self-efficacy and confidence for the future. In addition, “feelings of relaxation and positive emotions signal self-assurance and the anticipation of future success” (p. 229). Vicarious experiences and verbal persuasion as outcomes of professional development, classroom observation and collegial dialogue, contribute to self-efficacy information and provide specific performance feedback. This “cognitive processing determines how the sources of information will be weighed, how they will influence the analysis of the teaching task and the assessment of personal teaching competence” (p. 230). In short, a teacher’s engagement with a new task, such as teaching a new curriculum in mathematics, will depend on his/her assessment of teaching efficacy, and the availability of various sources of self-efficacy information.

However, at Hillside Primary School, this study has found that there were limited opportunities for social interaction in response to the demands of the reform mathematics syllabus. In other words, teachers were unable to access sources of self-efficacy information with respect to the new tasks of investigative pedagogy and the acquisition of new content knowledge. As it happened, the teachers at Hillside Primary School soon put aside any thought of the investigative pedagogy of the new mathematics syllabus. They were aware that mathematics was not a priority reform area in their school. Moreover, they were of the opinion that their efforts to implement the reform mathematics syllabus (QSA, 2004), and their misguided reliance on investigative pedagogy in their classrooms, was responsible for their poor state test results in 2006. Left to their own devices, teachers put aside the new investigative pedagogy and reverted to their traditional style of teaching. In short “lower efficacy leads to less effort and giving up easily” (Tschannen-Moran, et al., 1998, p. 228). As one teacher explained:

I found last year that teaching [from the textbook] was very challenging because every single lesson was a brand new lesson. Five days a week you

were doing brand new stuff and I found that was hard. Now I've gone back. There seems to be a lot of practice – once they get the understanding, they listen to me and practice a lot. It's much better. (I7P2T1)

In summary, the findings of this study confirm claims in the literature (eg. Millet & Bibby, 2004) regarding the important role of the professional learning community in supporting curriculum reform. This literature reminds us that beyond the concern for the teacher as 'person', curriculum reform is sustained if the 'situation' of the school reflects a professional learning community which offers supportive conditions of time, talk, expertise and motivation. Thus the professional learning community makes available sources of self-efficacy information that, in turn, influences levels of teacher efficacy with respect to the curriculum reform, and encourages engagement in the implementation process (Tschannen-Moran et al., 1998). Consequently this study offers a second theoretical proposition:

Theoretical Proposition Two:

The professional learning community offers an appropriate situation for curriculum reform. This situation is characterised by conditions of time, talk, expertise and motivation, and is an appropriate environment for curriculum reform due to the availability of sources of self-efficacy information for teachers. Without a range of positive self-efficacy information from within self and the professional learning community, the teacher as 'person' will hold on to deeply held personal beliefs, values and emotions when confronted by curriculum reform, disengaging from the implementation process.

8.4 THE INSTITUTIONAL CONTEXT

This study found that the reform mathematics syllabus published in 2004 represented one amongst many curriculum reforms mandated within Queensland Education. Historically, Hillside Primary School has demonstrated a commitment to school-based curriculum development. However, in the new century, school-based curriculum was put aside in favour of meeting new demands for mandated curriculum reform across all KLAs. At Hillside Primary School the reform mathematics syllabus represented just one amongst a number of mandated curriculum reforms requiring attention. The principal described the situation, "We used to have one syllabus document change every couple of years. Since 2001 we have had every KLA change." To complicate matters, the reform

mathematics syllabus with its new content and emphasis on investigative pedagogy represented a significant shift in the teaching of mathematics from the previous syllabus (Department of Education, 1987). By 2006, the reform syllabus had begun to impact upon the teaching of mathematics at Hillside Primary School and, due to low levels of teacher efficacy, teachers were beginning to voice their concerns. However, commitment to the implementation process was short lived, as 2007 saw the publication of the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c). In response the Principal at Hillside Primary School, with the support of the HOC, presented teachers with a new school mathematics program based on the *Essential Learnings* framework. It led teachers to offer prescriptive lessons and all thoughts of the reform mathematics syllabus were put aside. To appreciate what is happening here, it is useful to explore the influence of the institutional context on the school.

Millett and Bibby's (2004) model for discussing change locates the teacher and the school within a wider institutional context that includes "external professionals" (p.3), external "policy" (p. 3) developed by governments and various authorities, the "private (p. 3) or commercial sector and, the general "public" or those, such as parents and the media, who are outside the school but are none-the-less interested in education. The influence of external policy makers is illustrated in this study, as the 'problem' with mathematics teaching at Hillside Primary School began when the QSA released the *Mathematics Year 1-10 Syllabus* (QSA, 2004) which was to be fully implemented by 2007. This new policy document was a matter of concern because it represented a significant shift in the teaching of mathematics from the previous syllabus (Department of Education, 1987). As discussed above, this intervention directly impacted upon teacher efficacy levels.

There was some external support for the implementation of reform syllabi, including the one in mathematics. Firstly, DET introduced the new role of the Head of Curriculum in primary schools, which Hillside Primary School implemented. However, the practical support offered by this position is questionable, given the scope of the position and its accountability requirements. Secondly, there was a new emphasis on professional development within Queensland public education (DEA, n.d.). The implementation of the reform mathematics syllabus was identified by DET as a priority area for professional development. This education authority employed five Education Officers (Mathematics) to support mathematics teachers by organising professional development

seminars and workshops across the state of Queensland. Given the state's geographical spread of the population and the number of teachers involved, this external support for the implementation of the reform mathematics syllabus proved to be inadequate. Consequently, at Hillside Primary School, it was left up to the Principal and the HOC to provide additional professional development in mathematics. As discussed above this was not made available.

The morale destroying influence of external policy-makers was further felt as the QSA published a second set of documents, the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the supporting background paper, *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d). By specifying essential content, student achievement standards, assessment procedures and reporting requirements in all KLAs including mathematics, these documents were seen by the teachers to go against the 'spirit' of the reform mathematics syllabus (QSA, 2004). However, the reform mathematics syllabus continued to sit beside the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and from 2007, teachers in Queensland were expected to meet the requirements of both the reform mathematics syllabus (QSA, 2004) and the *Mathematics Essential Learning* (QSA, 2007a, 2007b, 2007c).

Unfortunately, the reform mathematics syllabus (QSA, 2004) and the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) offered conflicting policy agendas. Evidence of conflicting policies from longitudinal research (e.g., Lingard, et al., 2001) had previously found that alignment of curriculum, pedagogy and assessment is hindered by inconsistencies within the Queensland Education Department. However, beyond Queensland it also seems that conflicting policies are commonplace as research (e.g., Hess, 1999; McLaughlin & Talbert, 2003) has found that lack of consultation between departments within Education Departments or School Districts has resulted in a lack of coherence of policy initiatives.

Interestingly, the literature argues that the constant generation of new initiatives and policies is a direct result of global pressure to perform internationally, with the intention being to influence local practices to ensure higher student performance (McLaughlin & Talbert, 2003). It seems that the difficulty in coordinating initiatives or policies ultimately leads to reduced performance, thus having the opposite effect to that intended

(Knapp, et al., 2003). With this interpretation in mind, this study offers a third theoretical proposition:

Theoretical Proposition Three:

The institutional context beyond the school influences curriculum reform by mandating curriculum reform and providing external support in the form of professional development and consultancy support. However, conflicting reform agendas will work against curriculum reform.

This theoretical proposition brings us back to literature on curriculum reform in the wider socio-cultural context of curriculum reform and globalisation. Scholars have sought to explain international influences on education policy and practice in terms of the growing impact of globalisation (Burbules & Torres, 2000; Priestley, 2002). In short, a new reform mathematics syllabus is said to be the result of new global impulses (Atweh, Clarkson, & Nebres, 2003).

8.5 CURRICULUM REFORM AND GLOBALISATION

Globalisation represents a “world-wide economic, scientific, cultural and political interdependence” that “is becoming ever more securely established” (Delors, 1996, p. 39). Moreover globalisation has lead to the emergence of the “knowledge economy” in which “production and services are based on knowledge-intensive activities ... The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources” (Powell & Snellman, 2004, p. 199). Moreover, it has become fashionable to specify the capabilities of the ideal worker in these knowledge-intensive industries of the future (e.g., P. Brown & Lauder, 2004). Thus the Australian Council of Deans of Education (2004) directly focuses on the role of education in developing the skills and knowledge of the future workforce, and calls for educational reform in support of the knowledge economy.

Given this context, it is hardly surprising that there has been an avalanche of curriculum reform (Millett & Bibby, 2004). The migration of policies around the world has lead to the term “global curriculum” (Atweh & Clarkson, 2002, p. 3) and a concern for student performance and national standards (Marks & Creswell, 2005). Consequently, the reform *Mathematics Year 1-10 Syllabus* (QSA, 2004) reflects trends in international

research and theoretical development, and is in line with research by Beishuizen (1993), Watson et al (1995), and Fox (2000). More recently, the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) specify essential content, student achievement standards, assessment procedures and reporting requirements, as international student testing results raise concerns regarding student performance in achieving first class national standards.

Whilst policy-makers claim the high moral ground [i.e., student learning for the 21st century (Queensland Studies Authority., 2007d)] with each new curriculum reform, researchers identify the ‘dark’ side of globalisation and curriculum reform in terms of twin phenomena of presentism and performativity. Presentism is generally described in terms of individualism, conservatism and isolation and whilst theorists (e.g., Lortie, 1975) initially associated presentism with teachers in their own classroom, more recently this category has been extended to include the operation of the whole school community as the entity (Shirley & Hargreaves, 2006, October, pp. 163-164). In addition, there are claims that presentism has only grown in intensity, with “addictive presentism” (Hargreaves & Shirley, 2009, p. 9) reflecting the apparent obsession by the school community for dealing with the immediate or present issues that provide short term gains at the expense of long term planning, resulting in a narrow view of the purpose of education being promoted (Hargreaves, 2009). In other words, the avalanche of policies in combination with the immediacy of policy implementation is overwhelming teachers, resulting in conservative practice. Moreover, this avalanche of policy reform, which in many cases offers conflicting policy agendas, has meant that presentism is coming more sharply into the researchers’ focus

At Hillside Primary school, we see evidence of addictive presentism as a result of an avalanche of policy changes, including curriculum reform in mathematics. As the Principal explained, “We used to have one syllabus document change every couple of years. Since 2001, we have had every KLA change.” Consequently, short term gains have replaced long term planning as evidenced by the way in which the \$1000 grant to each year level was spent on mathematics resources. Discussions with the teachers on this issue indicated that each year level could select whatever they wanted from the internet and a range of catalogues, rather than engaging in systematic resourcing based on whole school plans for mathematics.

Obviously there is a sense of ‘lurching’ from one reform to another, and as one teacher saw it:

The last couple of years has been fairly hard to get our head around it all because we implemented [the textbook] over the last couple of years...but then this year a new school program has come off because we thought [the textbook] wasn't addressing some of the things, particularly in the Year 3, 5 and 7 testing at the moment ... Yeah, and they sort of said, well, you know, the core content must be included as well, because we don't think it's included in the [textbook], but we still use [the textbook] and now we're going to [a different textbook] next year. We're giving everything a try. (I1P33T2)

It is simple to see that in this situation of addictive presentism, it would be easy for individualism, conservatism and isolation to prevail. As one teacher noted, “It's crazy, the syllabus was only to be mandated in 2007 and here we are in 2007 and it's already on its way out. These things have a shelf life of about a year, I think, as do most things in the Department...It's just not worth doing anything (I4P28T3)”.

As well as this addictive form of presentism, there is also evidence of performativity at Hillside Primary School. In short, performativity “is a new mode of state regulation which makes it possible to govern in an ‘advanced liberal’ way. It requires individual practitioners to organise themselves in response to targets, indicators and evaluations; to set aside personal beliefs and commitments and live an existence of calculations” (S. Ball, 2003, p. 215). Critical of the way performativity is played out on schools, S. Ball (2003) continues his scathing attack, writing that “performativity produces opacity rather than transparency, as individuals and organizations take ever greater care in the construction and maintenance of fabrications” (p. 215). He goes on to argue that performativity does not merely get in the way of teaching and learning, it is actually changing what is taught and how it is learned. In line with these arguments, the flawed purpose of performativity is highlighted suggesting that performativity prevents risk taking and stifles creativity, the essential elements for success in the capitalist economy, and like addictive presentism delivers conservative practices (Gleeson & Husband, 2001).

At Hillside Primary School, the teachers are in agreement that accountability was now a way of life. Prior to this study, as discussed in Chapter One, there was anecdotal evidence that teachers did not believe that accountability was an important issue for

them. Consequently, the teachers did not have to set teaching goals and did not feel pressured to be accountable for student results, as traditionally the students had performed well on state tests. However, when the researcher returned to the school to collect data for this study, there was a sense that the whole school was ‘traumatised’ by the Year 3 results for the Year 3, 5, 7 state testing in 2006 and, there was a new ‘press’ for teacher accountability. As elsewhere, Hillside Primary School has been subject to “high stakes accountability systems that press for immediate test score gains in literacy and mathematics” (McLaughlin & Talbert, 2007, p. 153). Moreover, “paperwork, classroom management tasks, and multiple course preparations [were] draw[ing] teachers’ time and energy away from getting to know the students personally and working with colleagues on instruction” (p. 152). Together these consequences of performativity act as major structural impediments to the development of the professional learning community: “an inclusive group of people, motivated by a shared learning vision, who support and work with each other, finding ways, inside and outside their immediate community, to enquire on their practice and together learn new and better approaches that will enhance all pupils’ learning” (Stoll, Bolam, McMahon, Thomas, et al., 2006, p. 1).

As the professional learning community is said to offer an ‘ideal’ situation for curriculum reform (see Millett & Bibby, 2004), the phenomenon of performativity does not bode well for the implementation of the reform mathematics syllabus. As one teacher explained:

We were trying to implement the new syllabus and use investigations... But then you get this other agenda [the Year 3 state tests results] like a tsunami coming over the top saying, you know, boom, boom, boom, this is down, and now you’ve got to have prescriptive lessons to teach these particular facts and get them ready for the big test... This other agenda, this other accountability agenda with the mathematics has become more important because in the end, no-one is going to sort of praise you or say “Gee, you did this wonderful investigation” and you know what they are going to look at and unfortunately this is how the Department is focused these days. They are going to look at a sheet of paper that says, at this school their results for Year 3, 5, 7 state tests are this. (I4P33T2)

In summary, this study found that the reform mathematics syllabus published in 2004 represented one amongst many curriculum reforms. Moreover, a second set of curriculum documents, the *Mathematics Essential Learnings* (QSA, 2007a, 2007b,

2007c) and the *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d) were published. This study has found that both these documents influenced mathematics teaching at Hillside Primary School, confirming Millet and Bibby's (2004) claim regarding the influence of "external policy" (p. 3). The analysis of the external context of mathematics teaching at Hillside Primary School focused attention on the growing influence of globalisation on reform in education. It seems that there is an avalanche of curriculum reform (Millet & Bibby, 2004) moving towards a "global curriculum" (Atweh & Clarkson, 2002, p. 3), and a growing concern for student performance and national standards (Marks & Creswell, 2005). At the same time, there is a great deal of difficulty coordinating initiatives and policies (Knapp, et al., 2003), and conflicting policy agendas are commonplace, evidenced by the reform mathematics syllabus (QSA, 2004) and the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c). Whilst policy-makers make an effort to situate change around the requirements of the 21st century, theorists have begun to identify the 'downside' of globalisation and curriculum reform in terms of presentism and performativity. This study found evidence of both phenomena at Hillside Primary School. This situation resulted in "structural impediments" (Milbrey Wallin McLaughlin & Talbert, 2007, p. 153) to the development of the professional learning community, and the subsequent implementation of the reform mathematics syllabus. With this interpretation in mind, this study offers a fourth theoretical proposition:

Theoretical Proposition Four

Curriculum reform is influenced by the discourse of globalisation and a concern for the knowledge economy. Consequently, policy makers beyond the school look to the global curriculum, and are concerned about student performance and national standards. In this socio-cultural context the phenomena of presentism and performativity act as structural impediments to the development of the professional learning community, and work against the implementation of curriculum reform.

8.6 THE ROLE OF THE PRINCIPAL

This study has found that the Principal has in the past supported whole school planning and curriculum reform at Hillside Primary School: there is evidence of a commitment to

curriculum change within the context of the professional learning community. Historically, Hillside Primary School was proactive with respect to the development of the early and middle years of learning, as well as the establishment of a Special Education Unit (SEU) and the introduction of an Information Communication Technology Program (ICT). There is also evidence of the Principal's commitment to educational change within the context of the professional learning community. The triennial school review in 2004 identified a range of committees centred on curriculum issues and teachers "sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth promoting way" (Stoll & Seashore Louis, 2007, p. 1).

In addition, this study found that the Principal has developed structures that are designed to cope with the avalanche of curriculum reform that continues to descend on the school from DET. In particular, the Principal had welcomed the opportunity to appoint a Head of Curriculum (HOC). In keeping with the duties of this new role, a former classroom teacher was assigned responsibility for the quarterly curriculum forum, the fortnightly year level coordinators meeting, and the planning day and moderation half day that were each held once per semester. These activities were organised with cooperation from the seven year level coordinators who are senior teachers. In addition to these curriculum leadership responsibilities, the HOC, along with other members of the administration team, support the fortnightly staff meetings and year level meetings by their input to the agenda and contributions to discussions.

Finally, the Principal has dealt with the avalanche of curriculum reform by prioritising the Key Learning Areas (KLAs) for curriculum development. It was his intention that the KLAs that have the most pressing requirements for change are addressed first, and that other short term alternative measures are put in place for those KLAs of lesser priority. In this plan, mathematics reform was not considered to be an immediate priority, and consequently time and resources were not committed to curriculum development in this KLA. Consequently, this study found limited opportunities for planning and collaboration to support the implementation of the reform mathematics syllabus. In addition, there were insufficient resources and a paucity of professional development to support this KLA. Later, as a short term measure to support the implementation of the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) supported by the *Queensland Curriculum Assessment and Reporting Framework*:

Developing Essential Learnings for Queensland (QSA, 2007d), a school mathematics program was presented to the teachers. In contrast to curriculum development processes in other KLAs, this school mathematics program was developed by the HOC without teacher input.

It is interesting to reflect on the Principal's approach to curriculum reform in mathematics, as the literature continues to highlight the role of the principal in curriculum reform. Typical of this claim, Fullan (2002) posits that school leaders' capabilities with respect to "changing the context, helping create new settings conducive to learning and sharing that learning" (p. 414) are essential to the success or otherwise of curriculum change. For Millet and Bibby (2004), "quality leadership" will create the professional learning community and, in doing so, contribute to a "collective capacity and infrastructure for reform" (p. 7). On a practical note, the principal is said to be responsible for the provision of the necessary "time, talk, expertise and motivation" (Millet, et al., 2004a, pp. 251-252) required for curriculum reform.

In taking up these leadership responsibilities, the Principal in this study expressed an interest in reform across all KLAs, and a commitment to the professional learning community. As he explained:

I have built structures in the school, having year level coordinators who are very much empowered, informed and released to be given information and have had things explained to them, not just about maths but about all curriculum areas...Every other week is the year level specific curriculum meetings...The year level coordinators need to email to various members of the admin team what their agenda will be. We also then have specific input into those agendas to insure that we are taking curriculum issues through, such as mathematics or English or whatever, so that we have a conduit or forum as well to come down to year level specific activities... [Further] The year level meetings are shared between the Head of Curriculum, the Head of Special Education Services, the Deputy and me, as the Principal... So what we have here is another layer of leadership structure.

In addition to these well established structures, the Principal went on to outline more recently implemented structures, year level planning and moderation days:

We have now established another set of release times for teachers with advanced organisers for moderation. We set the advanced organisers over two weeks ago and teachers from two year levels are, at this very moment, sitting down with the HOC, one group in the morning and one group in the afternoon...This is not just for the purpose of having results clarified but for

professional development to align what we believe is a due requirement for the children, and that then links back electronically to our year level programs ... We have them all annotated and they can see them on the web as samples. So that is part of the planning processes across the whole school and obviously those planning processes will be even more developed with the mathematics as well.

However, this study has found a gap between the Principal's vision for curriculum reform at Hillside Primary School and reality with respect to the implementation of the reform mathematics syllabus. In this case, the Principal made the decision not to prioritise the KLA of mathematics, and opportunities for establishing a professional learning community embracing the challenge of curriculum reform in mathematics were lost.

As discussed above, there is evidence of "presentism" (Hargreaves & Shirley, 2009) and "performativity" (J. Miller, 2000) as the Principal accepts short term gains rather than engaging in long term planning, and he narrowed the focus from student learning to raising state test results. This Principal was very aware of the expectations regarding curriculum reform: "We used to have one syllabus document change every couple of years. Since 2001, we have had every KLA change." This avalanche of policy change 'pushed' so strongly on 'the situation' at Hillside Primary School, it encouraged the Principal to 'push out' by adopting a survival approach to the allocation of scarce resources to support curriculum reform in mathematics that elsewhere has been likened to "educational triage" (Booher-Jennings, 2005, p. 231)³¹. The outcome of this Principal's triage efforts was that mathematics reform was not seen to be in urgent need of attention, and was therefore 'bandaged' and put back into the 'waiting room'. This first 'bandage' came in the form of a reform textbook series that was provided to each of the teachers. However, unlike other curriculum reforms, no further support structures were provided for mathematics. There was no professional development, provision of resources or opportunities for planning and collaboration. Consequently, major impediments to the development of the professional learning community remained, and there was little in the way of support for teachers to address issues of teacher efficacy

³¹ The medical concept of triage is typically associated with a process for prioritising injured people into groups according to their need for or likely benefit from immediate medical treatment. Triage is used in hospital emergency rooms, on battlefields, and at disaster sites when limited medical resources must be allocated (Iserson & Moskop, 2007)

with respect to the expectations of the reform mathematics syllabus. This triage approach, from the outset, restricted the teachers' "zone of enactment" (Millett & Bibby, 2004, p. 3) with respect to the proposed mathematics reforms centred on investigative pedagogy.

By 2007, the Principal, in response to poor state test results, applied a second 'bandage' by presenting the teachers with a new school mathematics program based on the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the supporting background paper, *Queensland Curriculum Assessment and Reporting Framework: Developing Essential Learnings for Queensland* (QSA, 2007d). Justifying this approach, he explained:

The reality is, we have a new syllabus, we've got to put it together, we've put it together, we don't have the luxury of calling all these people around saying, what do we teach in term 1 or term 3, somebody's got to do it. I tend to get on and do things with the HOC so that they are done.

Later the Principal applied a third bandage in the form of the \$1000 grant to each year level to boost resources in mathematics. However, due to the lack of planning with respect to mathematics, these funds were spent haphazardly as teachers selected whatever they wanted from the internet and a range of catalogues. As there had been no opportunities for collaboration and planning in mathematics, teachers were unable to situate their spending within a shared vision for mathematics at Hillside Primary School.

Thus this 'triage' approach to prioritizing curriculum reform did not allow for "long and continuous redesign conversations" (Wilson & Davis as cited in L. Miller, 2005, p. 262), a key component of successful curriculum reform. Not surprisingly a few teachers interpreted these actions harshly, with one teacher describing this response by the Principal as "knee jerk" and that "quick fix seems to be his modus operandi". However, the majority of teachers were happy with the level of support in mathematics. Furthermore, there was an illusion that the reform mathematics syllabus had been implemented, and a belief that the school program had actually facilitated this implementation process. As the HOC saw it, "They've [the teachers have] got it – along with the way [the textbook] has changed their outlook a little bit on how things are introduced; I think that they feel that they're introducing the new syllabus."

However, the literature recommends caution when dealing with claims of curriculum reform in the context of globalization, presentism and performativity. Prior research has found that “performativity produces opacity rather than transparency” (S. Ball, 2003, p. 215). Moreover, curriculum reform, student testing regimes and teacher accountability, encourage a discourse of managerialism that threatens professional agency and diminishes collaborative cultures in schools. Managerialism has resulted in a “new moral environment” and a “culture of self interest” (S. Ball, 1999, p. 4). This culture encourages ‘power over’ approaches to school leadership in order to meet new expectations of accountability (Smeed, et al., 2009). Although there may be short term gains with respect to test results, in the long term the literature warns that ‘power over’ approaches to school leadership threaten the teacher’s professionalism and identity. As Day (2002) writes:

As a consequence of (imposed) changes in the control of curriculum and assessment and increased measures of public accountability, teachers in most countries now work within cultures in which their careers are ever more dependent upon external definitions of quality, progress and achievement for their success. Although many experienced teachers have maintained their identities, finding room to maneuver within a general reduction in their traditional classroom autonomy, the pressure on these and younger colleagues is to comply with competency based agendas. In such cultures, attention to teachers’ identities—arguably central to sustaining motivation, efficacy, commitment, job satisfaction and effectiveness—has been limited. (p. 677)

Furthermore, there are concerns for student learning in this culture. A “preoccupation with data-driven improvement distracts teachers from deeper engagement with teaching and learning”, and an “overwhelmingly short-term orientation, driven by political agendas, leads to cynical strategies to improve results that secure only temporary success” (Hargreaves, 2009, p. 23). Instead of managerialist leadership, the literature advocates for “sustainable educational leadership and improvement [that] develops deep learning for all that spreads and lasts, in ways that do no harm to and indeed create positive benefits for others around us, now and in the future (p. 22). Elsewhere others (e.g., Fullan, 2005a) relate this sustainable educational leadership with the moral purpose of education and argue that when moral purpose is at the forefront, meaning and purpose for change is established, leading to an enhanced capacity for change.

At Hillside Primary School, it could be argued that the Principal exercised ‘power over’ the teachers by restricting opportunities for collaboration and planning in mathematics,

and demanding that teachers follow the school mathematics program. However, to be fair, the teachers on the other hand, were complicit in the establishment of this power relationship. Challenged by the requirements of the reform mathematics syllabus and experiencing low levels of teacher efficacy, they accepted the new school mathematics program without hesitation. After all, this school mathematics program was ‘sold’ to the teachers as supporting the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) and the supporting background paper, *Queensland Curriculum Assessment and Reporting Framework: Developing the Essential Learnings* (QSA, 2007d), and there was a perception among the teachers that these documents offered a more traditional approach to teaching mathematics, a position of comfort for these teachers. This supports Tschannen-Moran et al’s (1998) claims that “lower [teacher] efficacy leads to less effort and giving up easily” (p. 228) when it comes to curriculum reform.

However, if we accept the concerns in the literature regarding managerialism in education, as well as the criticism of ‘power over’ approaches to leadership and the de-professionalisation of teachers, we can begin to see that the Principal and teachers at Hillside Primary School were accepting short term gains instead of long-term educational reform in support of ‘deep’ student learning. As Hargreaves (2009) reminds us:

The inspiring future ...lies in less bureaucracy and more democracy; in collaboration more than competition; in innovation and inspiration, more than data-driven intervention; in the fear factor giving way to the peer factor as a driver of school reform...Our better future lies in a hopeful vision of a more just world that we can create together, rather than a swift and superficial one that will distract us, or a greedy and fearful one that will control and eventually destroy us. This is our fragile world. This can be its future. Now is our moment of choice. (p. 32)

In summary, this study identified a gap between the Principal’s vision of curriculum reform at Hillside Primary School and the reality of curriculum reform in mathematics. Whilst the Principal expressed support for curriculum reform across all KLAs and the professional learning community, in reality there was a deliberate decision not to support curriculum reform in mathematics as it did not have immediate priority. The literature explains this decision in terms of globalisation, presentism and performativity. Challenged by an avalanche of curriculum reform, the Principal adopted a ‘power over’ approach to leadership and relied on a form of “educational triage” (Booher-Jennings,

2005, p. 231) in prioritising curriculum reform within the school. When it came to mathematics reform the teachers, with few exceptions, accepted the Principal's decisions. Challenged by low levels of teacher efficacy, these teachers welcomed what they perceived to be a return to a traditional pedagogy. In addition, the new school program and the \$1000 resource grant to each year level gave the illusion of curriculum reform in mathematics. However, these are short term gains and there could be long term issues with respect to teacher professionalism and identity and the moral purpose of education, namely student learning. With this understanding in mind, the findings of this study suggest a fifth and final theoretical proposition:

Theoretical Proposition Five

Recognising an avalanche of curriculum reform, the principal in survival mode may prioritise curriculum reforms. By using a model of educational triage (Booher-Jennings, 2005, p. 231) coupled with a managerial approach to leadership, the principal can create an illusion of curriculum reform, and this illusion will be accepted by teachers if there are low levels of teacher efficacy. Here there may be short terms gains. However, in the long term, this approach works against teacher professionalism and identity as well as against deep student learning.

8.7 CONCLUSION

This chapter discusses the findings of this study in the light of the literature. As outlined in Chapter Seven this study identified eight findings:

1. There are limited opportunities for planning and collaboration in mathematics
2. There are low levels of teacher efficacy in mathematics
3. Accountability issues are impacting upon reform in mathematics
4. There are insufficient resource provisions
5. There is a paucity of professional development in mathematics
6. The reform mathematics syllabus represents one amongst many curriculum reforms
7. There are conflicting policy agendas in mathematics
8. The Principal is inconsistent in his approach to curriculum reform

These findings were then discussed in terms of literature in the areas of the teacher as person, the professional learning community, curriculum reform and globalisation and

the role of the principal. As a result of this analysis, this chapter advances five theoretical propositions. These theoretical propositions are:

Theoretical Proposition One: Curriculum reform, with its expectations of new context and pedagogy, causes the teacher to re-evaluate teaching efficacy. There may be cognitive issues in terms of new content, pedagogy and assessment as well as affective issues related to deeply-held personal beliefs, values and emotions.

Theoretical Proposition Two: The professional learning community offers an appropriate situation for curriculum reform. This situation is characterised by conditions of time, talk, expertise and motivation, and it is an appropriate environment for curriculum reform due to the availability of sources of self-efficacy information for teachers. Without a range of positive self-efficacy information from within self and the professional learning community, the teacher as ‘person’ will hold on to deeply held personal beliefs, values and emotions when confronted by curriculum reform, disengaging from the implementation process.

Theoretical Proposition Three: The institutional context beyond the school influences curriculum reform, by mandating curriculum reform and providing external support in the form of professional development and consultancy support. However, conflicting reform agendas will work against curriculum reform.

Theoretical Proposition Four: Curriculum reform is influenced by the discourse of globalisation and a concern for the knowledge economy. Consequently, policy makers beyond the school look to the development of a global curriculum and are concerned about student performance and national standards. In this socio-cultural context, the phenomena of presentism and performativity act as structural impediments to the development of the professional learning community, and work against the implementation of curriculum reform.

Theoretical Proposition Five: Recognising an avalanche of curriculum reform, the principal in survival mode may prioritise curriculum reforms. By using a model of educational triage coupled with a managerial approach to leadership, the principal can create an illusion of curriculum reform, and this illusion will be accepted by teachers if there are low levels of teacher efficacy. Here there may be short terms gains. However,

in the long term, this approach works against teacher professionalism as well as against deep student learning.

Offering a number of recommendations for the future, the final chapter advances a model for analysing the context of mandated curriculum reform with a view to supporting teacher meaning making in this context.

Chapter Nine: Review and Synthesis

9.1 RESEARCH PROBLEM AND PURPOSE

The impetus for this study was a pragmatic concern for the implementation of the *Year 1-10 Mathematics Syllabus* (QSA, 2004) at Hillside Primary School. This concern stems from my teaching responsibilities as Support Teacher Learning Difficulties. In this role I had many discussions with teachers on the specific content knowledge necessary for understanding particular mathematics concepts, and how these concepts may be taught to avoid confusion or misconceptions for the students in their class. As a result of this contact, it became clear that many teachers in the school have a general unease with the teaching of mathematics. This unease was heightened as draft versions of the reform *Mathematics Year 1 – 10 Syllabus* (QSA, 2004) became available. This reform mathematics syllabus mandated a broad range of changes including a move towards outcomes based education, an investigative pedagogy for teaching mathematics as well as a variety of new content.

With the publication of this reform mathematics syllabus, the teachers at the school voiced their concerns as they struggled with the new content and pedagogy. Prior research (e.g., M. Brown, et al., 2003; Buzeika, 1996, July; Fullan & Stegelbauer, 1991) had already identified the importance of teacher meaning-making in the context of curriculum reform. Moreover, other research (e.g., Delors, 1996) had alerted the researcher to the challenge of implementing mandated curriculum reform in an era of globalisation. With this research in mind, the researcher identified the research problem as the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) at Hillside Primary School, and the purpose of this study was to gain a more informed and sophisticated understanding of how teachers make sense of curriculum change and as a consequence, respond to it.

9.2 THE RESEARCH QUESTION

The research question emerged following a comprehensive review of the literature centred on the challenge of implementing mandated curriculum reform. This review explored issues of educational change, teacher professionalism and professional development and noted that emergent theories in each of these areas coalesced around

the concept of the professional learning community. Thus this review of the literature highlights the role of the professional learning community in supporting mandated curriculum reform. Ironically, there is very little research literature on the day-to-day operation of a professional learning community in general, and more specifically in relation to mandated curriculum reform in mathematics. However, a study of the *British Numeracy Strategy* (Millett, Brown, & Askew, 2004b) focuses on teachers' response to mandated curriculum reform in mathematics, and identifies the sources of support for teacher meaning-making in this context. With this research in mind, the research question for this study was identified as:

What are the sources of support for teachers' meaning-making in the context of the implementation of the Mathematics Year 1-10 Syllabus (QSA, 2004) at Hillside Primary School?

9.3 RESEARCH PARADIGM AND DESIGN

The research question guided the various moments of data collection, analysis and interpretation within this study. Given the nature and focus of this study's research question, "constructivism" was chosen as the research paradigm (Guba & Lincoln, 2005; Sarantakos, 2005). As with other research paradigms, constructivism offers its own ontology, epistemology and methodology. From an ontological perspective, constructivism recognises that 'reality' is relative to an individual's experiences and the environment in which they live. Moreover, constructivist epistemology focuses on the knower, or would-be knower, and what is known as a consequence of knowledge being constructed through interaction within the environment. Finally, constructivism relies on a hermeneutic/dialectical methodology aimed at the understanding and reconstruction of previously held problematic constructions.

Thus described, constructivism points to a particular category of research methodology namely, symbolic interactionism. Symbolic interactionism as methodology is concerned with getting close to this group life in order to understand what is going on in it (Blumer, 1998). This requires the adoption of two distinct stages within the study, "exploration" and "inspection" (Blumer, 1998, p. 40). The exploration stage allows the researcher to understand "What's going on around here?" (Charon, 2007, p. 194) as well as refine the inquiry process. As the exploration stage usually raises a number of issues, this stage is

followed by an inspection stage designed to collect more in-depth data around each issue.

Subsequently, this study relied on a “mixed methods approach” (Creswell, 2003; Creswell & Plano Clark, 2007) for the various moments of data collection, analysis and interpretation. The researcher accepted the argument that combination of both quantitative and qualitative methods provides a better understanding of research problems than either approach alone (Plano Clark, 2007, p. 59). Moreover, a mixed methods approach allowed the researcher to meet the requirements of both the exploration and inspection stages of the study. The exploration stage of the study began with initial interviews with the Principal and HOC. From this interview data, an instrument was developed, administered to all classroom teachers, validated and analysed. This analysis raised a number of issues that led into the inspection stage of the study. Focus group interviews were conducted with each year level group of teachers. This was followed by further clarification of the issues with individual interviews of the four members of the administrative team.

This two stage data collection process was supported by a three-step iterative process of data interpretation involving a “first-, second- and third-order interpretation of data” (Neuman, 2007, p. 160). The first-order interpretation is from the point of view of the people being studied: the Principal, the HOC and the teachers at Hillside Primary School. The second-order interpretation comes from the point of view of the researcher, and involves eliciting the underlying coherence or sense of meaning in the data. The third-order interpretation involves the researcher assigning general theoretical significance to the data.

9.4 ANSWERING THE RESEARCH QUESTION

This study has generated considerable data in response to the research question:

What are the sources of support for teachers’ meaning-making in the context of the implementation of the Mathematics Year 1-10 Syllabus (QSA, 2004) at Hillside Primary School?

Following a first and second-order interpretation of the data (see Chapters Five, Six and Seven) the following findings were identified:

1. There are low levels of teacher efficacy in mathematics
2. There are limited opportunities for planning and collaboration in mathematics
3. There are insufficient resource provisions
4. There is a paucity of professional development in mathematics
5. The reform mathematics syllabus represents one amongst many curriculum reforms
6. Accountability issues are impacting upon reform in mathematics
7. There are conflicting policy agendas in mathematics
8. The Principal is inconsistent in his approach to curriculum reform

A third-order interpretation of the data identified the theoretical significance of these findings and a number of theoretical propositions were advanced (see Chapter Eight).

When discussing internal sources of support, Millett and Bibby (2004) draw attention to the teacher's "personal agency beliefs" and "beliefs about self-efficacy ... and academic self esteem" (p. 5). Teacher efficacy is generally defined in terms of "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, et al., 1998, p. 233). This study found that the teachers at Hillside Primary School questioned their capabilities with respect to the implementation of the reform mathematics syllabus, and they expressed the belief that they did not have the necessary content, pedagogy or assessment knowledge. This finding confirms the importance of understanding teacher efficacy beliefs discussed in the literature leading to the first theoretical proposition (Millett & Bibby, 2004; Schratz, 2006; Tschannen-Moran, et al., 1998, p. 233).

Theoretical Proposition One:

Curriculum reform, with its expectations of new content and pedagogy, causes the teacher to re-evaluate teaching efficacy. Here there may be cognitive issues in terms of new content, pedagogy and assessment as well as affective issues related to deeply-held personal beliefs, values and emotions.

In line with this issue of teacher efficacy, Millett and Bibby (2004) also identify the professional learning community as a source of support for curriculum reform. In particular, these authors identify the presence of "time", "talk", "expertise" and

“motivation” (Millett, et al., 2004a, pp. 251-252) the professional learning community as being critical to the provision of sources of self-efficacy information. When these sources of support are provided, they feed self-efficacy and confidence in future professional undertakings for the whole professional learning community (Durrant & Holden, 2006; Tschannen-Moran, et al., 1998).

Evidence is presented throughout this study that Hillside Primary School has a very strong professional learning community when planning and discussing mandated curriculum reform in KLAs other than mathematics. For KLAs other than mathematics, time was provided so that talk and ongoing discussion on content, pedagogy, planning and assessment were possible. Professional and material resources were provided as well as external professional development, which allowed expertise to be shared among the professional learning community. This resulted in motivation and ongoing updating of the school plan and matrix for these KLAs. Unfortunately these same experiences were not available to the teachers for mathematics. In this case, there was no time for whole-school planning and collaboration in mathematics. In addition, the teachers did not feel they had sufficient or appropriate material, professional resources or professional development. Without these sources of support and the associated positive self efficacy information, the teachers at Hillside Primary School made sense of the reform process by reverting to traditional teaching practices. This finding led to the second theoretical proposition:

Theoretical Proposition Two:

The professional learning community offers an appropriate situation for curriculum reform. This situation is characterised by conditions of time, talk, expertise and motivation and it is an appropriate environment for curriculum reform due to the availability of sources of self-efficacy information for teachers. Without a range of positive self-efficacy information from within self and the professional learning community, the teacher as ‘person’ will hold on to deeply held personal beliefs, values and emotions when confronted by curriculum reform, disengaging from the implementation process.

This study also highlights the influence of the institutional context on curriculum reform and the sources of support within this context that are external to the school. The reform

mathematics syllabus published in 2004 represented one of many curriculum reforms mandated by DET and by 2006, the reform mathematics syllabus had impacted upon the teaching of mathematics at Hillside Primary School. Millett and Bibby's (2004) model for discussing change locates the teacher and the school within a wider institutional context that includes "external professionals" (p. 3), external "policy" (p. 3) developed by governments and various authorities, the "private" (p. 3) or commercial sector, and the general "public" or those, such as parents and the media, who are outside the school but are none the less interested in education.

The influence of external policy makers is particularly evident in this study as the 'problem' with mathematics teaching at Hillside Primary School began when the QSA released the *Mathematics Year 1-10 Syllabus* (QSA, 2004). The influence of external policy-makers was further felt as the QSA published a second set of documents, *Mathematics Essential Learnings* (QSA, 2007a). Unfortunately, the reform mathematics syllabus (QSA, 2004) and the *Mathematics Essential Learnings* (QSA, 2007a, 2007b, 2007c) offered conflicting policy agendas and further exacerbated the 'problem' with respect to reform in mathematics. To address this problem, there was some external professional support for the implementation of the reform mathematics syllabus. The implementation of the reform mathematics syllabus was identified by DET³² as a priority area for professional development, and this education authority employed five Education Officers (Mathematics) to support teachers of mathematics by organising professional development seminars and workshops across the state of Queensland. Given the state's geographical spread and the number of teachers involved, this external institutional support for the implementation of the reform mathematics syllabus proved to be inadequate. Sensing that investigative pedagogy in mathematics was no longer a priority within DET, the teachers at Hillside Primary School were again encouraged to revert to traditional pedagogical practices. This finding is represented in the third theoretical proposition:

³² In 2006 and 2007 when these priorities were identified, the Department of Education and Training (DET) was called the Department of Education and the Arts (DEA) until September 2006 and then, following the state election at that time, it was renamed the Department of Education Training and the Arts (DETA). The name changed again following the state election in 2009 to Department of Education and Training (DET).

Theoretical Proposition Three:

The institutional context beyond the school influences curriculum reform by mandating curriculum reform and providing external support in the form of professional development and consultancy support. However, conflicting reform agendas and limited institutional support will work against curriculum reform.

This study also reminds us that the challenge of implementing reform in mathematics should be situated within the broad socio-cultural context of “globalization” (Delors, 1996, p. 39) and the ‘knowledge economy’ (Powell & Snellman, 2004, p. 199). Consequently, there has been an “avalanche of curriculum reform” (Millett & Bibby, 2004), and we have seen the emergence of a “global curriculum” (Atweh & Clarkson, 2002, p. 3) and a corresponding concern for student performance and national standards (Marks & Creswell, 2005). At the same time, worried by these developments, researchers (e.g., S. Ball, 2003; Blackmore, 2004; Hargreaves & Shirley, 2009) identified the ‘dark’ side of globalisation and curriculum reform in terms of the twin phenomena, “presentism” (Hargreaves & Shirley, 2009) and “performativity” (Blackmore, 2004). In short, presentism is described in terms of individualism, conservatism and isolation in classrooms and more recently, isolation as a school community, where prioritising of short term gains is made at the expense of long term planning. Related to presentism, there is also evidence of performativity as school communities, and individual practitioners organise themselves in response to targets, indicators and evaluations, resulting in “opacity rather than transparency as individuals and organizations take ever greater care in the construction and maintenance of fabrications” (S. Ball, 2003, p. 215).

At Hillside Primary School there is evidence of presentism and performativity in response to the avalanche of curriculum reform, and a nervousness about student performance on state testing. Evidence of conservatism in the classroom as well as an obsession with short term gains rather than long term plans, manifested themselves following poor state test results with teacher accountability now being a way of life. Together, presentism and performativity act as major structural impediments to the development of the professional learning community as “an inclusive group of people, motivated by a shared learning vision, who support and work with each other, finding ways, inside and outside their immediate community, to enquire on their practice and

together learn new and better approaches that will enhance all pupils' learning" (Stoll, Bolam, McMahon, Thomas, et al., 2006, p. 1). This finding lead to the fourth theoretical proposition:

Theoretical Proposition Four:

Curriculum reform is influenced by the discourse of globalisation and a concern for the knowledge economy. Consequently, policy makers beyond the school look to the global curriculum and are concerned about student performance and national standards. In this socio-cultural context the phenomena of presentism and performativity act as structural impediments to the development of the professional learning community and work against the implementation of curriculum reform.

This study also highlights the role of the principal in the context of curriculum reform. For Millett and Bibby (2004), "quality leadership" will create the professional learning community and in doing so, contribute to a "collective capacity and infrastructure for reform" (p. 7). Moreover, on a practical note, the principal is said to be responsible for the provision of the necessary "time, talk, expertise and motivation" (Millett, et al., 2004a, pp. 251-252) required for curriculum reform within the professional learning community. However, the literature also notes that in an era of globalisation, presentism and performativity, the principal, in an effort to survive the demands placed on him, is more likely to adopt a managerialist, or 'power over' approach to leadership that threatens professional agency and diminishes collaborative cultures in schools (S. Ball, 1999; Smeed, et al., 2009). Moreover, when it comes to prioritising curriculum reform, the principal may adopt a form of "educational triage" (Booher-Jennings, 2005, p. 231) that allocates scarce resources to certain curriculum reforms at the expense of others. This means that some curriculum reforms miss out on the "long and continuous redesign conversations" (Wilson & Davis as cited in L. Miller, 2005, p. 262), a key component of successful curriculum reform in the professional learning community.

In line with this literature, this study has found that the Principal has, in the past, supported whole school planning and curriculum reform at Hillside Primary School. There is evidence of a commitment to curriculum change within the context of the professional learning community. However, the Principal also dealt with the avalanche

of curriculum reform by adopting a triage approach where he prioritised the Key Learning Areas (KLAs) for curriculum reform. It was his intention that the KLAs that have the most pressing requirements for change are addressed first, and other short term alternative measures are put in place for those KLAs that are not of the highest priority. In this plan, mathematics reform was not considered to be a priority, and consequently time and resources were not committed to curriculum development in this KLA. Consequently, this study found limited opportunities for planning and collaboration in support of the implementation of the reform mathematics syllabus. In addition, there were insufficient resources and a paucity of professional development to support this KLA.

In this case, by making the decision not to prioritise the KLA of mathematics, the Principal lost the opportunity to establish a professional learning community around the challenge of curriculum reform in mathematics. Instead, he provided the teachers with a series of ‘short term fixes’ (i.e. the school mathematics program) that created the illusion of reform in mathematics. It could be argued that the Principal exercised ‘power over’ the teachers by restricting opportunities for collaboration and planning in mathematics, and demanding that teachers follow the school mathematics program. However, to be fair, the teachers were also complicit in the establishment of this power relationship. Challenged by the requirements of the reform mathematics syllabus, and experiencing low levels of teacher efficacy, they accepted the new school mathematics program without hesitancy. This supports Tschannen-Moran et al’s (1998) claims where they explain “lower [teacher] efficacy leads to less effort and giving up easily” (p. 228) when it comes to curriculum reform. This understanding of the situation at Hillside Primary School suggests a fifth and final theoretical proposition:

Theoretical Proposition Five:

Recognising an avalanche of curriculum reform, the principal in survival mode may opt to prioritise curriculum reforms. By using a model of educational triage coupled with a managerial approach to leadership, the principal can create an illusion of curriculum reform and this illusion will be accepted by teachers if there are low levels of teacher efficacy. Here there may be short terms gains. However,

in the long term, this approach works against teacher professionalism as well as against deep student learning.

When read together, these theoretical propositions answer the research question by highlighting both internal and external sources of support for the teacher in the context of mandated curriculum reform. Here sources of support found within the school are identified in terms of opportunities for time, talk, expertise and motivation conceptualised as the professional learning community. Moreover, sources of support external to the school include policy as well as professional development and consultancy support. Yet again, this study alerts us to the link between globalisation and curriculum reform, and warns against the possibility of the twin phenomena of presentism and performativity. Consequently, this study highlights the role of the principal in prioritising curriculum reform and in determining the level of support for various curriculum areas. In the context of globalisation and facing an avalanche of curriculum reform, the principal may adopt a form of “educational reform triage” (Booher-Jennings, 2005, p. 231) to prioritising mandated curriculum reform and, consequently, some curriculum areas will miss out on internal and external sources of support for curriculum reform. This answer to the research question prompted the researcher to develop a model for supporting mandated curriculum reform.

9.5 A MODEL FOR SUPPORTING MANDATED CURRICULUM REFORM

This study offers a new model (Figure 9.1) that situates the teacher within the context of mandated curriculum reform. Millet and Bibby’s (2004, p. 3) model for analysing the context of mandated curriculum reform offered an appropriate starting point for model development in this study. Their model is of particular interest to this study as these authors use this model when analysing the British teachers’ response to implementing the *British Numeracy Strategy*. This model is explained in section 3.7 of this study.

In brief, Millet and Bibby’s model situates the teacher within a series of interrelated contexts, namely the school as professional learning community and the institutional context beyond the school. Here Millet and Bibby posit that the teacher’s response to curriculum reform is influenced by both their “motivation” and “capacity” (p. 5) to accept change. Motivation is described as a “function of personal goals – the wants, needs and aspirations of the individual” (p. 5) however capacity refers to agency beliefs

– “self-efficacy, self-confidence and academic self-esteem” (p. 5) - as well as beliefs about the context in which the teacher works.

To further explain the teacher’s response to curriculum reform they situate the teacher within the context of the school as a professional learning community, as well as the wider institutional context beyond the school. They argue that these contexts provide both internal and external sources of support for curriculum reform. The “professional learning community” (p. 6) is deemed to be the key internal source of support for curriculum reform and, developing this thought, Millett et al(2004a) later identify four conditions necessary for the development of the professional learning community, namely, “time, talk, expertise, and motivation” (pp. 251-252). At the same time, external sources of support are offered within the institutional context beyond the school. These external sources of support include “external professionals” and “policy” as well as the “public” and “private” domains (Millett & Bibby, 2004, pp. 8-11). These internal and external sources of support together create the ideal “situation” (p. 6) for curriculum reform, as there is “pressure and support from colleagues and headteachers, resourcing of professional development, emotional support and friendship, coherence and consistency of views” (p. 6).

The new model (Figure 9.1) developed during this study, follows Millett and Bibby’s lead by situating the teacher within the context of a professional learning community, as well as the institutional context beyond the school. However, the findings of the study resulted in several refinements to Millett and Bibby’s model.

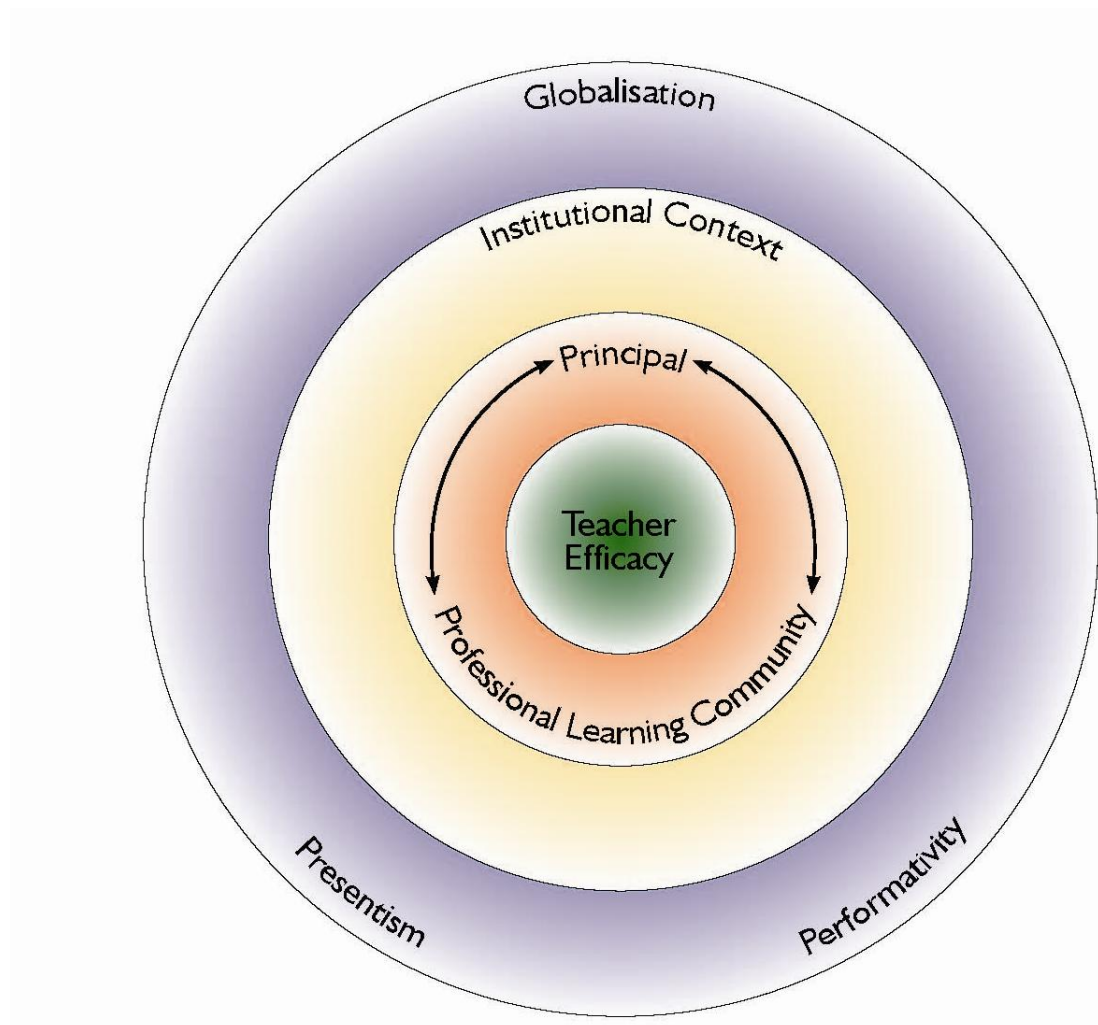


Figure 9.1 Model for analyzing the context of mandated curriculum reform

- Firstly, this study found that teacher efficacy plays a crucial role in determining teacher motivation and capacity for curriculum reform. Consequently, teacher efficacy is at the centre of the new model.
- Secondly, this study also found that the professional learning community offers internal sources of support in the form of time, talk, expertise and motivation. At the same time, there are external sources of support provided within the institutional context, including external policy and external professionals. These internal and external sources of support are inherently structured within the new model.

- Thirdly, the findings from this study alert us to the link between globalisation and curriculum reform, and warn against the possibility of both presentism and performativity. An avalanche of curriculum reform is overwhelming teachers and principals alike, resulting in managerial approaches to leadership, conservative practice in the classroom, and an obsession with short term, rather than long term planning. These developments in turn diminish the professional learning community and the possibility for curriculum reform. Consequently, this new model situates the teacher and the implementation of mandated curriculum reform within the context of globalisation, presentism and performativity.
- Finally, this study highlights the role of the principal with respect to the implementation of mandated curriculum reform. In particular, this study found that the principal contributes to the creation of the professional learning community by prioritising curriculum reforms. Thus the availability of time, talk, expertise and motivation in support of a particular curriculum reform will depend on its level of priority. Moreover, it is through the principal that teachers will learn about mandated curriculum reform, and it is the principal who invites external professionals to work in the school. Within this new model, the principal is situated at the interface of the ‘tug-of-war’ between the school as professional learning community and the institutional context beyond the school, and the role of the principal is identified in terms of priority decision-making.

In summary, this model for analysing the context mandated curriculum reform recognises the role the teacher plays in implementation and provides detail with respect to both internal and external sources of support for teacher meaning making in this context. At the same time, this model reminds us that teacher efficacy will influence the teacher’s response to mandated curriculum reform. In addition, this model alerts us to the possibility of presentism and performativity in the context of globalisation and curriculum reform. Consequently, the principal’s role in prioritising curriculum reform takes on a new importance and the recommendations that follow speak to this role.

9.6 RECOMMENDATIONS ARISING FROM THIS STUDY

The recommendations that follow point to the way forward for principals who wish to support mandated curriculum reform whilst avoiding the press for managerial approaches in the context of globalisation, presentism and performativity.

Recommendation One

In consultation with teachers, the principal should prioritise curriculum reform in the context of a professional learning community, keeping in mind teacher efficacy levels as well as the timelines of external policy-makers.

This recommendation recognises that given the amount of curriculum reform, it is prudent for the principal with the school community to take a sustainable approach to prioritising curriculum reform. Globalisation, as well as the twin phenomenon of presentism and performativity, has meant that school communities are being overwhelmed by an avalanche of curriculum reform leading to a growing obsession with conservatism, and short term goals generated by the pressures of national/state test results. The principal may stand against this trend by taking a strategic approach to priority decision-making that takes into account the wellbeing of the student and the teacher, as well as institutional expectations. Here priority decision making is framed as a process of discernment that encourages the principal to scrutinize a situation and look for opportunities for deep student learning and the enhancement of teacher efficacy within institutional limits. Finally, this recommendation recognises that this process of discernment will be enhanced with teacher input; it is assumed that teachers, with their intimate knowledge of student learning needs, will contribute to wise decision-making. Moreover, there is a commitment to the development of “activist teaching professionalism” (Sachs, 2003, pp. 138-147), and providing conditions for the development of a professional learning community in support of curriculum reform.

Recommendation Two

The principal should build a professional learning community around high priority curriculum reforms by ensuring internal sources of support including time, talk, expertise and motivation.

This recommendation advances the professional learning community as an entity that supports high priority curriculum reform through the collective analysis of student learning outcomes, and the application of teacher professional learning from reflective dialogue and inquiry (DuFour, et al., 2006; Hord, 2004). Here there is a sense that the principal must be intentional in the provision of internal sources of support for the professional learning community. Practical supports of time, talk, expertise and motivation should not be left to chance. Without these practical supports there will be fewer opportunities for teachers to receive self-efficacy information, and in turn, teacher motivation and capacity will decline, threatening the successful implementation of the curriculum reform (Millet & Bibby, 2004). At the same time, this recommendation is designed to promote pedagogical leadership by the teacher as well as strategic leadership by the principal in a model of “parallel leadership” (Crowther, Kaagen, et al., 2002, p. 44). Focusing reform on support of student learning, this model of parallel leadership engages “processes of professional learning, culture building and, school wide pedagogy to enhance a school’s overall capacity to produce positive student outcomes” (p. 43).

Recommendation Three

The principal should become aware of and access external institutional sources of support for high priority mandated curriculum reforms. These external sources of support include new policies as well as professional development opportunities and consultancy support.

This recommendation acknowledges the place of the school within its wider institutional context as well as the wider socio-cultural context of globalisation. The constant generation of new educational policies motivated by global pressure to perform internationally, has meant that education authorities, such as the Department of Education and Training, find it difficult to coordinate new initiatives or policies (Knapp, et al., 2003). As a consequence, principals may find that the professional development and consultancy support offered within the institutional context is inappropriate. For this reason, the principal must once again be intentional in becoming aware of, and accessing external sources of support. Together with the internal sources of support, these external sources of support are crucial to successful implementation of mandated curriculum reform. Without these sources of support, there will not be “pressure and support from

colleagues and headteachers, resourcing of professional development, emotional support and friendship, coherence and consistency of views” (Millet & Bibby, 2004, p. 6).

9.7 THE LIMITATIONS OF THIS STUDY

Although this study was focused on the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004), it is limited in its scope because this focus was restricted to one school site, Hillside Primary School. Whilst this limitation is acknowledged, this single school context was a purposeful sample that provided this study with an opportunity to make available a rich description of the sources of support that exist in this school (Merriam, 1998). Such a description of this single school context provided an opportunity to examine in detail the sources of support for teachers’ meaning-making in the context of the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004). Consequently, the findings described in this study are specific to Hillside Primary School, and do not claim that this school is representative of education in Queensland. However, this study may be useful for teachers in other schools to consider. In this way this research seeks its important response from those who read it (Stake, 2005). However, its validity will rely on “reader-user generalisability” (Merriam, 1998, p. 211) through “case to case transfer” (Firestone, 1993, p. 16).

In addition to the limitation of one school context, this study also recognises the limitations of the constructivist research paradigm inherent in its ontology, epistemology and methodology as identified in Section 4. 2. Importantly this study did not set out to judge the way the sources of support for teacher meaning-making in the context of the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004) were developed, but rather, to richly describe them. In so doing, symbolic interactionism as methodology was chosen, as it is concerned with getting close to group life, allowing for the context to be richly described. It also required a two stage investigative process which lends itself to a mixed methods approach. This choice meant that the limitations of qualitative and quantitative data collection methods acknowledged in the literature and discussed in Section 4.3 were counterbalanced by a number of strategies. These included triangulation which involved the collection of different data types where each type played a role in addressing the research question (Patton, 2002, p. 307), and member checking, which involved taking the findings back to the participants for them to determine the accuracy and therefore the trustworthiness of the findings (Creswell, 2003;

Glesne & Peshkin, 1992). In addition, data were scrutinised for the presence of negative or discrepant information thereby safeguarding the quality of the study (Leedy & Ormrod, 2005; Merriam, 1998; Stake, 2005; Yin, 2003).

9.8 RECOMMENDATIONS FOR FURTHER RESEARCH

There are strong arguments in the literature in support of the professional learning community, as well as a growing knowledge base around this phenomenon. However, researchers continue to identify the gap between the vision and reality of the professional learning community. Moreover, researchers (e.g., Mulford, 2008) identify the lack of large scale studies investigating this phenomenon, both internationally and within Australia. Although this study sought to contribute to the growing body of knowledge about the gap between the vision and reality of the professional learning community, it is in fact a small scale study focused on one school, Hillside Primary School.

Recommendation 1:

Large scale research on the gap between the vision and reality of the professional learning community, incorporating a wide range of Australian school settings, is needed.

This recommendation is of particular importance at this time, as the Australian government has released draft national curricula for each of English, mathematics, science and history for simultaneous implementation later this year. This mandated curriculum reform will involve every primary teacher, in every school in Australia, in each of the four curriculum areas, and most secondary teachers in at least one and most likely two of the curriculum areas. Compounding this Australian government initiative is a recently instigated national testing regime that has its results reported on an open website called *My School*, where league tables of school results are detailed. It seems that the issues of globalisation, presentism and performativity are close at hand. Consequently a more informed and sophisticated understanding of this implementation process will aid long term implementation and sustainability of nationally mandated curriculum reform.

While understanding that the gap between the vision and reality of the professional learning community is important, the role played by the principal in the reform process is also important. This study noted that during discussions with the Principal and HOC that

both identified that other schools were amazed by what they have achieved in KLA's other than mathematics. It is reasonable to ask if this is because once a reform is prioritised, sources of support are provided that promote personal agency beliefs as well as beliefs about self efficacy, ultimately leading to the teachers taking over the reform process. If so, how can the Principal effectively promote the professional learning community to minimise the gap between the vision and reality of the implementation of mandated curriculum reform?

Recommendation 2:

Investigate further the way principals deal with mandated curriculum reform in more than one curriculum area at a time.

This research study found that conflicting policy agendas contributed to teachers putting aside thoughts of implementing reform. Teachers will not undertake change if they do not understand the change or how to go about it.

Recommendations 3:

A systemic investigation into the establishment of teacher professional learning communities as a way of supporting teachers' meaning-making in the context of implementing the wide range of initiatives required of Queensland's teachers is warranted. This is of particular importance now, as a new series of changes are to be mandated following the release of the Australian national curricula for English, mathematics, science and history.

In making these recommendations the researcher is aware of the enormous pressure that is being placed on students, teachers and schools to perform in the new climate of national testing, and to embrace mandated curriculum reform with the imminent release of the Australian curricula.

9.9 CONCLUSION

Although this study leaves many questions unanswered, it does shed light on the process of implementing mandated curriculum reform. In so doing, it suggests a way forward with respect to how principal leadership and teacher leadership can meet in a professional learning community, find meaning in mandated curriculum reform, and

ultimately make their vision a reality. However, this study is offered on the understanding that:

When I disclose what I have seen, my results [will] invite other researchers to look where I did and to see what I saw. My ideas are candidates for others to entertain, not necessarily as truth, let alone the truth, but as positions about the nature and meaning of a phenomenon that may fit their sensibility and shape their thinking about their own inquiries. (Peshkin, 1985, p. 280)

Appendix 1 Ethics Approval

Human Research Ethics Committee

Committee Approval Form

Principal Investigator/Supervisor: Dr Gayle Spry Brisbane Campus
Co-Investigators: Associate Professor Jeffrey Dorman Brisbane Campus
Student Researcher: Mrs Janeen Lamb Brisbane Campus

Ethics approval has been granted for the following project: Teacher Leadership in the Implementation of a new mathematics syllabus
for the period: 14 June 2007 to 30 June 2008
Human Research Ethics Committee (HREC) Register Number: Q200607 23

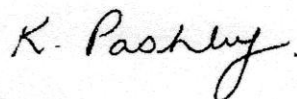
The following standard conditions as stipulated in the *National Statement on Ethical Conduct in Research Involving Humans* (1999) apply:

- (i) that Principal Investigators / Supervisors provide, on the form supplied by the Human Research Ethics Committee, annual reports on matters such as:
 - security of records
 - compliance with approved consent procedures and documentation
 - compliance with special conditions, and
- (ii) that researchers report to the HREC immediately any matter that might affect the ethical acceptability of the protocol, such as:
 - proposed changes to the protocol
 - unforeseen circumstances or events
 - adverse effects on participants

The HREC will conduct an audit each year of all projects deemed to be of more than minimum risk. There will also be random audits of a sample of projects considered to be of minimum risk on all campuses each year.

Within one month of the conclusion of the project, researchers are required to complete a *Final Report Form* and submit it to the local Research Services Officer.

If the project continues for more than one year, researchers are required to complete an *Annual Progress Report Form* and submit it to the local Research Services Officer within one month of the anniversary date of the ethics approval.



Signed:

Date: 14 June 2007

(Committee Approval.dot @ 31/10/06)

Page 1 of 2

(Research Services Officer, McAuley Campus)

(Committee Approval.dot @ 28.06.2002)

Page 2 of 2

Appendix 2 Information letter and consent form for members of the administration team

INFORMATION LETTER TO ADMINISTRATION PARTICIPANTS

TITLE OF PROJECT:

TEACHER LEADERSHIP IN THE IMPLEMENTATION OF A NEW MATHEMATICS SYLLABUS

NAME OF PRINCIPAL SUPERVISOR:

DR. GAYLE SPRY

NAME OF STUDENT RESEARCHER:

JANEEN LAMB

PROGRAMME IN WHICH ENROLLED:

PhD

Dear Participant,

You are invited to participate in a project which is being undertaken as part of a PhD project by Janeen Lamb. The purpose of the project is to gain a more informed understanding of the sources of support during the implementation of the Year 1-10 Mathematics Syllabus (QSA, 2004).

Your participation in the study will initially involve an interview for 30 minutes. Following this interview a general questionnaire will be constructed that will then be administered to all teaching staff as well as yourself. The questionnaire will take approximately 20 minutes to complete. This will be followed by a maximum of two focus group discussions in which you may be asked to participate. The focus group discussions will be held after school and will go for a maximum of one hour. A final interview will then be conducted with a small number of teachers who participated in the focus group discussions and again you may be asked to participate. This interview will go for approximately 30 minutes. All interviews and focus group discussions will be audio taped. Janeen Lamb will come to the school to conduct each of these data collection episodes.

Your participation in this study will hopefully lead to a more informed understanding of teachers leading learning in a professional community. Once results from this study have been analysed they will be presented at a staff meeting at a convenient time. These results will also be of interest to the research community and will be disseminated through journal articles and conference presentations. Confidentiality will be ensured during the conduct of the research and in any report or publication arising from the research.

The only risk associated with your participation in this project is the possible concern you may experience due to being audio recorded. If you choose not to be audio recorded notes can be taken by the interviewer. However, at any time during the project you are free to withdraw your consent and discontinue as a participant without giving any reason. The school counsellor will be available to you should you require this service.

Any questions regarding this project should be directed to the Principal Supervisor, Dr. Gayle Spry, on phone number, 3623 7310 in the School of Leadership, Australian Catholic University, McAuley Campus, 1100 Nudgee Road, Banyo.

This study has been approved by the Human Research Ethics Committee at Australian Catholic University. However in the event that you have any complaint or concern about the way you have been treated during the study, or if you have any query that the Supervisor and Student Researcher have not been able to satisfy, you may write to the Chair of the Human Research Ethics Committee. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

Chair, HREC
C/o Research Services
Australian Catholic University
Brisbane Campus
PO Box 456
Virginia QLD 4014
Tel: 07 3623 7429
Fax: 07 3623 7328

If you agree to participate in this project, please sign both copies of the Consent Form, retain one copy for your records and return the other copy to Janeen Lamb.

.....
Principal Supervisor
Dr. Gayle Spry
State Co-ordinator
of Educational Leadership
School of Educational Leadership
ACU

.....
Student Researcher
Mrs Janeen Lamb
School
ACU

CONSENT FORM

Copy for Participant to keep

TITLE OF PROJECT:

TEACHER LEADERSHIP IN THE IMPLEMENTATION OF A NEW MATHEMATICS SYLLABUS

NAME OF PRINCIPAL SUPERVISOR:

DR. GAYLE SPRY

NAME OF STUDENT RESEARCHER:

JANEEN LAMB

I (*the participant*) have read and understood the information provided in the Letter to Participants. Any questions I have asked have been answered to my satisfaction. I agree to participate in this study involving an initial interview that will take 30 minutes, to complete a questionnaire that will take 20 minutes, and the possible involvement in a maximum of two focus group discussions held after school that are expected to go for one hour. I understand that I may be selected to participate in a further interview that will take 30 minutes. All interviews and focus group discussions will be audio recorded. I realise that I can withdraw my consent at any time. I agree that research data collected from the study may be published or may be provided to other researchers in a form that does not identify me in any way.

NAME OF PARTICIPANT:

SIGNATURE: DATE:.....

SIGNATURE OF PRINCIPAL
INVESTIGATOR/SUPERVISOR:

..... DATE:.....

SIGNATURE OF STUDENT
RESEARCHER:

..... DATE:.....

CONSENT FORM

Copy for Researcher

TITLE OF PROJECT:

TEACHER LEADERSHIP IN THE IMPLEMENTATION OF A NEW MATHEMATICS SYLLABUS

NAME OF PRINCIPAL SUPERVISOR:

DR. GAYLE SPRY

NAME OF STUDENT RESEARCHER:

JANEEN LAMB

I (*the participant*) have read and understood the information provided in the Letter to Participants. Any questions I have asked have been answered to my satisfaction. I agree to participate in this study involving an initial interview that will take 30 minutes, to complete a questionnaire that will take 20 minutes, and the possible involvement in a maximum of two focus group discussions held after school that are expected to go for one hour. I understand that I may be selected to participate in a further interview that will take 30 minutes. All interviews and focus group discussions will be audio recorded. I realise that I can withdraw my consent at any time. I agree that research data collected from the study may be published or may be provided to other researchers in a form that does not identify me in any way.

NAME OF PARTICIPANT:

SIGNATURE: DATE:

SIGNATURE OF PRINCIPAL
INVESTIGATOR/SUPERVISOR:

..... DATE:

SIGNATURE OF STUDENT
RESEARCHER:

..... DATE:

Appendix 3 Information letter and consent form for teacher participants

INFORMATION LETTER TO PARTICIPANTS

TITLE OF PROJECT:

TEACHER LEADERSHIP IN THE IMPLEMENTATION OF A NEW MATHEMATICS SYLLABUS

NAME OF PRINCIPAL SUPERVISOR:

DR. GAYLE SPRY

NAME OF STUDENT RESEARCHER:

JANEEN LAMB

PROGRAMME IN WHICH ENROLLED:

PhD

Dear Participant,

You are invited to participate in a project which is being undertaken as part of a PhD project by Janeen Lamb. The purpose of the project is to gain a more informed understanding of the sources of support during the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004).

Your participation in the study will initially involve completing a questionnaire. The questionnaire will take approximately 20 minutes to complete. This will be followed by a maximum of two focus group discussions in which you may be asked to participate. The focus group discussions will be held after school and will go for a maximum of one hour. A final interview will then be conducted with a small number of teachers who participated in the focus group discussions and again you may be asked to participate. This interview will go for approximately 30 minutes. All interviews and focus group discussions will be audio taped. Janeen Lamb will come to the school to conduct each of these data collection episodes.

Your participation in this study will hopefully lead to a more informed understanding of teachers leading learning in a professional community. Once results from this study have been analysed they will be presented at a staff meeting at a convenient time. These results will also be of interest to the research community and will be disseminated through journal articles and conference presentations. Confidentiality will be ensured during the conduct of the research and in any report or publication arising from the research.

A possible risk associated with your participation in this project is the concern you may experience due to being audio recorded. If you choose not to be audio recorded notes can be taken by the interviewer. However, at any time during the project you are free to withdraw your consent and discontinue as a participant without giving any reason. The school counsellor will be available to you should you require this service.

Any questions regarding this project should be directed to the Principal Supervisor, Dr. Gayle Spry on phone number, 3623 7310 in the School of Educational Leadership, Australian Catholic University, McAuley Campus, 1100 Nudgee Road, Banyo.

This study has been approved by the Human Research Ethics Committee at Australian Catholic University. However in the event that you have any complaint or concern about the way you have been treated during the study, or if you have any query that the Supervisor and Student Researcher have not been able to satisfy, you may write to the Chair of the Human Research Ethics Committee. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

Chair, HREC
C/o Research Services
Australian Catholic University
Brisbane Campus
PO Box 456
Virginia QLD 4014
Tel: 07 3623 7429
Fax: 07 3623 7328

If you agree to participate in this project, please sign both copies of the Consent Form, retain one copy for your records and return the other copy to Janeen Lamb.

.....
Principal Supervisor
Dr. Gayle Spry
State Co-ordinator
Leadership
School of Educational Leadership
ACU

.....
Student Researcher
Mrs Janeen Lamb
School of Educational
ACU

CONSENT FORM

Copy for Participant to keep

TITLE OF PROJECT:

TEACHER LEADERSHIP IN THE IMPLEMENTATION OF A NEW MATHEMATICS SYLLABUS

NAME OF PRINCIPAL SUPERVISOR:

DR. GAYLE SPRY

NAME OF STUDENT RESEARCHER:

JANEEN LAMB

I (*the participant*) have read and understood the information provided in the Letter to Participants. Any questions I have asked have been answered to my satisfaction. I agree to participate in this study involving a questionnaire that will take 20 minutes to complete and the possible involvement in a maximum of two focus group discussions held after school that are expected to go for one hour. I understand that I may be selected to participate in a further interview that will take 30 minutes. All interviews and focus group discussions will be audio recorded. I realise that I can withdraw my consent at any time. I agree that research data collected from the study may be published or may be provided to other researchers in a form that does not identify me in any way.

NAME OF PARTICIPANT:
(block letters)

SIGNATURE: DATE:.....

SIGNATURE OF PRINCIPAL
INVESTIGATOR/SUPERVISOR:

..... DATE:.....

SIGNATURE OF STUDENT
RESEARCHER:

..... DATE:.....

CONSENT FORM

Copy for Researcher

TITLE OF PROJECT:

TEACHER LEADERSHIP IN THE IMPLEMENTATION OF A NEW MATHEMATICS SYLLABUS

NAME OF PRINCIPAL SUPERVISOR:

DR. GAYLE SPRY

NAME OF STUDENT RESEARCHER:

JANEEN LAMB

I (*the participant*) have read and understood the information provided in the Letter to Participants. Any questions I have asked have been answered to my satisfaction. I agree to participate in this study involving the completion of a questionnaire that will take 20 minutes to complete, and the possible involvement in a maximum of two focus group discussions held after school that are expected to go for one hour. I understand that I may be selected to participate in a further interview that will take 30 minutes. All interviews and focus group discussions will be audio recorded. I realising that I can withdraw my consent at any time. I agree that research data collected for the study may be published or may be provided to other researchers in a form that does not identify me in any way.

NAME OF PARTICIPANT:
(block letters)

SIGNATURE: DATE:.....

SIGNATURE OF PRINCIPAL
INVESTIGATOR/SUPERVISOR:

..... DATE:.....

SIGNATURE OF STUDENT
RESEARCHER:

..... DATE:.....

Appendix 4 Interview Questions

Exploration Stage

EXPLORATION STAGE INTERVIEWS
PRINCIPAL AND HEAD OF CURRICULUM

1. How is curriculum planning within the Professional Learning Community at Hillside Primary School structured?
2. How are professional and material resources organised?
3. What professional development is available to the teachers and how do they access it?
4. How is accountability impacting on these structures?

Appendix 5 Interview Questions

Inspection Stage

INTERVIEW QUESTIONS: INSPECTION STAGE

1. Do you think the Principal instrumental in curriculum reform at Hillside Primary School?
2. How has the Principal supported the implementation of the reform mathematics syllabus?
3. Do you believe there are generally high levels of planning and collaboration at Hillside Primary School and, if so, are these high levels of planning and collaboration reflected in the implementation of the reform mathematics syllabus?
4. Do you believe that year level planning and collaboration is emphasised over whole school planning and collaboration, and, if so, is this emphasis reflected in the implementation of the reform mathematics syllabus?
5. Do you believe that the years you have been teaching at Hillside Primary impact upon your planning and collaboration at the school and, if so, what does this mean for the implementation of the reform mathematics syllabus?
6. Is teacher accountability a priority at Hillside Primary School?
7. What do you believe is the relationship between teacher accountability and the implementation of the reform mathematics syllabus?
8. Are there generally high levels of content knowledge efficacy and teaching efficacy at Hillside Primary School, and if so, are these high levels of teacher efficacy reflected in the implementation of the new mathematics syllabus?
9. Does teacher age impact upon how much support is needed by the teachers in terms of professional development?
10. Do you think your age is impacting on the support you need in terms of professional development
11. Why do teachers who have a high teacher efficacy in general, not feel confident to teach investigative pedagogy or address learning problems?
12. Do you believe that the teacher characteristics of age and years of teaching at Hillside Primary impact on teacher efficacy, and, if so, what does this mean for the implementation of the new mathematics syllabus?
13. Is there a relationship between level of mathematics studied and teacher efficacy for the teachers at Hillside Primary School?
14. Do the material and professional resources provide you with a source of support for the implementation of the reform mathematics syllabus?
15. Is there external professional development to support the implementation of the new mathematics syllabus?

Appendix 6 The School Professional Learning Community Questionnaire

Survey of Sources of Support for the Implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004)

~ To gain a more sophisticated and informed understanding

Please complete the questions in the pages that follow and return the questionnaire in the envelope provided to:

Student Researcher
Janeen Lamb
School of Educational Leadership
Australian Catholic University
Banyo, Brisbane

There are four sections in this questionnaire. This first section of questions relates to sources of support that exist within the school culture. Please indicate your answer to questions 1-26 by circling the appropriate number.

Please circle your response		Strongly Disagree	Disagree	Agree	Strongly Agree
1	Our staff meetings are an avenue through which to raise whole school curriculum issues.	1	2	3	4
2	Year level meetings focus on planning units of work.	1	2	3	4
3	Year level meetings benefit from the presence of a member of the administration.	1	2	3	4
4	I support the teachers in my year level.	1	2	3	4
5	I am supported by the teachers in my year level.	1	2	3	4
6	My year level teachers work as a team.	1	2	3	4
7	The Year Level Planning Day held each semester is valuable for the implementation of change.	1	2	3	4
8	Half day moderation helps me to meet my accountability requirements.	1	2	3	4
9	Accountability issues force my learning of new syllabuses.	1	2	3	4
10	In this school, grades and test scores are talked about a lot by the Principal.	1	2	3	4
11	The HOC provides me with units of work.	1	2	3	4
12	The HOC supports my teaching by providing me with the school mathematics program	1	2	3	4
13	The HOC aligns planning, assessment and reporting.	1	2	3	4
14	I am confident I am meeting my planning, assessment and reporting responsibilities.	1	2	3	4
15	My professional community is restricted to my year level.	1	2	3	4
16	The combination of year level meetings, year level planning day and half day moderation satisfy my needs for collegial collaboration.	1	2	3	4
17	The varying levels of leadership within the school, support the implementation of the mathematics syllabus.	1	2	3	4

Please circle your response		Strongly Disagree	Disagree	Agree	Strongly Agree
18	Structures are in place within the school to help me with curriculum change.	1	2	3	4
19	Resources are available to implement the syllabus.	1	2	3	4
20	I have the appropriate resources to support the implementation of the new syllabus.	1	2	3	4
21	I contributed to the school vision.	1	2	3	4
22	I have opportunities for collegial discussion.	1	2	3	4
23	Incentives to encourage implementation of the syllabus are in place.	1	2	3	4
24	An action plan has been developed for the implementation of the syllabus.	1	2	3	4
25	There is a spirit of collegiality within the school culture.	1	2	3	4
26	I had input into the adoption of the school mathematics plan.	1	2	3	4

This second section of questions relates to external sources of support that are accessed by you or the school in order to support syllabus implementation. Please indicate your answers to questions 27- 36 by circling the appropriate number.

Please circle your response		Strongly Disagree	Disagree	Agree	Strongly Agree
27	Using [textbook] has helped me to understand the intent of the mathematics syllabus.	1	2	3	4
28	I use the [textbook] materials regularly.	1	2	3	4
29	Using [textbook] has helped me to implement the school mathematics plan.	1	2	3	4
30	I have accessed external professional development in my own time to assist me implement the mathematics syllabus.	1	2	3	4
31	I have accessed external professional development on the implementation of the mathematics syllabus as a member of the school community.	1	2	3	4
32	School Cluster projects have assisted me to	1	2	3	4

Please circle your response		Strongly Disagree	Disagree	Agree	Strongly Agree
	implement the mathematics syllabus.				
33	District Programs have assisted me with my professional development needs in implementing the Mathematics syllabus.	1	2	3	4
34	I refer to the mathematics Year 1-10 Syllabus.	1	2	3	4
35	I can access workshops hosted by my school.	1	2	3	4
36	My Principal promotes our school as a facilitator for other schools to implement new programs.	1	2	3	4

This third section of questions relates to how effective you believe your teaching of mathematics is for all students in your class when implementing the new mathematics syllabus. Please indicate your answers to questions 37- 56 by circling the appropriate number.

	Please circle your response	Strongly Disagree	Disagree	Agree	Strongly Agree
37	I understand what an investigation in mathematics is.	1	2	3	4
38	Teachers in my school are supported in developing their professional skills.	1	2	3	4
39	We have sufficient skills within the school to implement the syllabus.	1	2	3	4
40	I am implementing the new Mathematics Syllabus as intended.	1	2	3	4
41	If I try really hard, I can get through to even the most difficult student when I teach mathematics.	1	2	3	4
42	Factors beyond my control have a greater influence on my students' achievement in mathematics than I do.	1	2	3	4
43	I am good at helping all the students in my classes make significant improvement in mathematics.	1	2	3	4
44	Some students are not going to make a lot of progress in mathematics this year, no matter what I do.	1	2	3	4

	Please circle your response	Strongly Disagree	Disagree	Agree	Strongly Agree
45	I am certain that my mathematics teaching is making a difference in the lives of my students.	1	2	3	4
46	There is little I can do to ensure that all my students make significant progress in their mathematics this year.	1	2	3	4
47	I can deal with almost any learning problem in mathematics.	1	2	3	4
48	I am confident in my ability to teach mathematics.	1	2	3	4
49	My mathematics content knowledge helps my students make significant progress.	1	2	3	4
50	I have a good knowledge of investigation-based pedagogy in mathematics.	1	2	3	4
51	I understand mathematics concepts well enough to be effective in teaching primary mathematics.	1	2	3	4
52	I am confident in my ability to teach mathematics as a co-inquirer with students.	1	2	3	4
53	I am confident in my ability to use a variety of assessment techniques in mathematics.	1	2	3	4
54	Even when I try very hard, I don't teach maths as well as I do other subjects.	1	2	3	4
55	If students are underachieving in mathematics, it is most likely due to ineffective mathematics teaching.	1	2	3	4
56	When a student has difficulty understanding a mathematics concept, I am usually at a loss as to how to help the student understand it better.	1	2	3	4

Finally we would like to know just a little about you so we can see how different types of people feel about the issue of sources of support for the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004)

Name:

Gender:

Male ☐

Female ☐

Age Range

☐ 1 – 30

☐ 31 – 40

☐ 41 – 50

☐ >50

Years at present school ☐ < 1 year ☐ 1 – 2 years ☐ 3 – 4 years
 ☐ 5 – 6 years ☐ 7 – 10 years ☐ > 10 years

Please circle year levels taught in the last 5 years:

1 2 3 4 5 6 7 8 9 10 11 12

If you completed year 12 mathematics please tick subjects studied:

Maths 1 *Maths 2* *Social Maths* *Maths in Society* *Maths A* *Maths B* *Maths C*

Please list your academic qualifications:

Please list official leadership roles you hold within the school.

Please list teacher professional associations for which you hold membership.

If you would like to add anything in relation to the questions asked here please feel free to detail the issues in the space provided.

The best way to contact me to participate in focus group discussions is by:

Phone:

.....

Email:

.....

Other:

.....

Thank you for taking the time to complete and submit this survey. Your information and insight are very valuable to us in gaining a more sophisticated and informed understanding of the sources of support for the implementation of the *Mathematics Year 1-10 Syllabus* (QSA, 2004).

Should you have any further questions about this survey or any of its questions please contact Janeen Lamb on 3623 7318 or j.lmab@student.acu.edu.au

Please return your completed questionnaire in the envelope provided to:

Student Researcher
Janeen Lamb
School of Educational Leadership
Australian Catholic University
1100 Nudgee Road
Banyo, Brisbane

Queensland Studies Authority. (2004). *Mathematics Year 1-10 Syllabus*. Retrieved 13 June, 2006, from www.qsa.qld.edu.au/ksa/pd/workshops/1to10/math_opt_1.html

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