AN INVESTIGATION OF TEACHERS' CURRICULUM INTERPRETATION AND IMPLEMENTATION IN A QUEENSLAND SCHOOL

Emily Ross

BSc (UQ), BEd (UQ), MEdSt (UQ), GCCom (UQ), PGCertEdLead (ACU), MEd (ALC)

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Abstract

Intended, planned and enacted curricula go hand in hand. It is only through teachers' interpretation that the curriculum can be meaningfully implemented in classrooms. Teachers are provided with the curriculum (intended curriculum) and expected to enact it for students in their classroom (enacted curriculum). Teachers undergo a process of curriculum planning to interpret the curriculum and translate it into learning experiences that are appropriate for their students. The process of curriculum planning is not well-represented in literature. Literature positions teacher curriculum planning as a part of intended curriculum, that is, as the teacher intention for the classroom (Ellis, 2004; Sherin & Drake, 2009). As well, it positions curriculum planning as a component of the enactment of curriculum, that is, a necessary step in enacting the curriculum in the classroom (Solomon, 2009). Rarely is the planned curriculum defined and discussed as an element in its own right.

This study sought to explore the process of curriculum interpretation used by teachers. Studies of curriculum interpretation frequently compare the intended to the enacted curriculum, particularly to ascertain the degree of alignment. This study included the interim step of planning in order to ascertain the process, from intended to planned to enacted, as used by teachers. Further, this study sought to identify the influences that impact upon the process of curriculum interpretation. The study aimed to investigate how teachers interpret and implement the Australian Curriculum: Mathematics, in their classroom.

This qualitative exploratory case study analysed the process of curriculum interpretation of a Queensland primary school during the implementation of the Australian Curriculum: Mathematics. The case study focused on the processes undertaken by five teachers from the one school, as they implemented the curriculum. Data were collected from each teacher participant through pre-unit semi-structured interviews; teachers' recorded journal entries about planning for lessons and reflections on lesson enactment; and post-unit semi-structured interviews.

The teachers in the study employed similar strategies when interpreting the intended curriculum to the planned curriculum. However, each teacher followed a unique process to enact the curriculum. Further, the teachers engaged in a process of

reflection to support the refinement of the planned curriculum following enactment. The study found that while similar influences impacted this process, there were variations in terms of how it impacted on each teacher. Influences could be categorised according to the degree of impact they exerted on the planned curriculum. Major influences impacted the development of an alternate curriculum plan; these included content/pitch of the curriculum; time; and assessment. While minor influences caused the alteration of a teaching strategy or activity, these included mathematical language; digital technology; and textbooks and other resources.

The study provided recommendations for teachers, schools, and broader systemic education partners. The recommendations suggested strengthening support for teacher curriculum planning, including through the provision of time, analysing and targeting curriculum support materials, and the provision of professional learning. Additionally, the recommendations proposed analysis of influences on curriculum interpretation at a local level to allow for strategic support for curriculum implementation. The procedure for mapping the processes of curriculum interpretation developed in this study provides a method to identify issues at a school level and comprises an important contribution of the study.

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List of Abbreviations

ACACA   Australasian Curriculum, Assessment and Certification Authorities

ACARA   Australian Curriculum, Assessment and Reporting Authority

C2C   Curriculum into the Classroom

DEEWR   Department of Education, Employment and Work Relations

DET   Department of Education and Training, Queensland

EC   Enacted Curriculum

GTMJ   Guide to Making Judgment

IC   Intended Curriculum

iNCB   Interim National Curriculum Board

ISQ   Independent Schools Queensland

KLA   Key Learning Area

MCEECDYA   Ministerial Council for Education, Early Childhood Development and Youth Affairs

MCEETYA   Ministerial Council on Education, Employment, Training and Youth Affairs

NAPLAN   National Assessment Program – Literacy and Numeracy

PC   Planned Curriculum

QBSSSS   Queensland Board of Senior Secondary School Studies

QCAA   Queensland Curriculum and Assessment Authority (formerly the QSA)

QCEC   Queensland Catholic Education Commission

QSA   Queensland Studies Authority (now QCAA)

QSCC   Queensland Schools Curriculum Council

TIMMS   Third International Mathematics and Science Study (1999)

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

QUT Verified Signature

Signature:

Date: 15 May, 2017

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Chapter 1: Introduction

Australia is in the midst of a curriculum change, the largest curriculum change we have seen as a country (Crabbe, 2008). Many times, politicians in this country aspired to develop and implement a national curriculum (Australian Government, 2014; Crabbe, 2008), and until 2010 this was purely aspirational. Through bipartisan political support for a national curriculum, in 2010 the tide turned and the national curriculum became a reality for education jurisdictions across the country (Crabbe, 2008). This national curriculum is referred to as the *Australian Curriculum*.

Australia has eight states and territories – each with its own policies and practices in Education. Queensland was one of the first states to meet the challenge of the new curriculum (Australian Curriculum, Assessment and Reporting Authority, 2012; Ross, 2012). However, this was not without its complications. At the commencement of implementation, Queensland was a state that had been in constant curriculum change since 1999 with the introduction of outcomes-based education through the first of the Years 1 to 10 key learning area syllabi.

As an early adopter of the Australian Curriculum, Queensland educational authorities (comprised of the Queensland Studies Authority - now known as the Queensland Curriculum and Assessment Authority, the Department of Education and Training, Independent Schools Queensland, and the Queensland Catholic Education Commission) agreed to a phased implementation. The year 2011 became one of familiarisation for teachers, in building their knowledge of three areas of the Australian Curriculum - English, Mathematics and Science - prior to their implementation in 2012 across Preparatory Year to Year Ten. (In Queensland, the formal year of schooling prior to Year One is referred to as the Preparatory Year.)

During 2011, the Queensland educational authorities worked furiously to develop resources to support teachers and schools, in preparation for the curriculum's implementation. Teachers and schools were given directives about how they should implement the Australian Curriculum through the resources created by the Queensland educational authorities. Over the four years since implementation

commenced, these resources have directed educational decisions in Queensland and have led to significant changes to Queensland's approach to implementation.

Since 2010, the researcher of the present study has been managing projects to support the implementation of the Australian Curriculum in Queensland. As a Manager at the Queensland Curriculum and Assessment Authority (QCAA), her role has been to develop policies, resources and professional learning to support schools and teachers during this time of change. For this work to be effective, it is the belief of the researcher that she needs to understand better how teachers interpret curriculum, and the influences that impact upon the process of interpretation.

Section 1.1 of this chapter provides the contextual background to this study, including the exploration of relevant curriculum history for Australia and Queensland during this period of unprecedented change, and the researcher's professional involvement in curriculum development and implementation. Section 1.2 provides a rationale for the research, leading to a statement of the research aims and Research Questions in Section 1.3. An overview of the methodology for the study is provided in Section 1.4. The significance of the study is considered in Section 1.5, after which, Section 1.6 will provide an outline of the thesis.

1.1 BACKGROUND

Since 2006, Queensland schools have been required to implement three distinct curriculum initiatives in mathematics: The Years 1 to 10 Mathematics Key Learning Area Syllabus (The State of Queensland (Queensland Studies Authority), 2004), The Queensland Curriculum, Assessment and Reporting Framework Mathematics Essential Learnings and Standards (The State of Queensland (Queensland Studies Authority), 2006), and The Australian Curriculum: Mathematics (Australian Curriculum, Assessment and Reporting Authority, 2010). A summary of the three curriculum initiatives for mathematics appears in Appendix A. These three initiatives have been influenced by the national curriculum landscape in Australia. In particular, the attempts at a national curriculum have had a considerable impact on education countrywide, since the first attempt in 1980. This change has been felt by teachers who have had to accommodate and implement each of the changes. Teachers of Mathematics in Queensland were required to implement three different curricula between 2006 and 2012. For each of these curricula, teachers were required to

develop knowledge of the new curriculum requirements, prepare and enact lessons, acquire understanding of a novel method of discerning student achievement, and report, with authority, to parents about student progress in relation to the new curriculum. Each of these curriculum changes has been accompanied by support materials and professional development with different foci and structures.

The curriculum changes that have been briefly outlined, and their effect on teachers, have been observed by the researcher of the present study. In her professional roles, this researcher has assisted in the curriculum development processes of numerous curriculum reforms; this has included development of the research base and framework of the reform, the conception and creation of substantial draft curricula, and analysis of data in consultation processes. However, the researcher has noted that support generated for teachers has not been equitably considered across each of the curriculum initiatives.

Teachers represent the frontline for curriculum implementation. They receive the curriculum initiative and have to implement it in their classrooms, with their students. During the implementation of the Australian Curriculum, a teacher, external to this study, described teaching to the researcher as "the only profession where you are required to build the plane while you're flying it" (Anonymous Teacher, personal communication, August 13, 2010). This teacher is referring to the requirement that teachers learn the curriculum requirements, apply pedagogical content knowledge, and plan meaningful activities for students during the implementation of a curriculum that they are simultaneously teaching and learning about. In other professions, a grace period is provided when large structural changes or innovations are implemented. The professionals have time to adjust to the changes, plan to accommodate the change, and make modifications to their practice. Such a period is often not available to teachers. At times, the training or professional learning that would assist to develop teacher understanding of the changes is also delivered alongside the commencement of implementation of the reform. This study is not likely to instigate changes to the implementation strategies used by the education system. However, it is hoped that this study will initiate analysis of the structures and resources used to support curriculum change, so that a more strategic approach may be developed to support the process of curriculum interpretation used by teachers.

1.1.1 Researcher's curriculum development history

The researcher of the present study is a passionate advocate for quality curriculum in Queensland. The researcher has worked in both a variety of roles in education and a variety of students, from early years to adults. The researcher commenced her career as a science, mathematics and special education teacher in Queensland high schools. More recently, she has held numerous professional roles as a leader of curriculum development projects at a state and national level. In 2005, the researcher joined the Queensland Studies Authority to support the development of the *Years 1 to 10 Mathematics Key Learning Area Syllabus Support Materials* (Queensland Studies Authority, 2005a) and provide professional development for teachers to assist with implementation. The Queensland Studies Authority was a statutory authority of the Queensland State Government in Australia. The Authority was charged with responsibility for curriculum, assessment, and certification for the state. Following this work, the researcher developed numerous Queensland senior syllabi in mathematics, science and business learning areas.

In 2008, the researcher was invited to join the interim National Curriculum Board to support various projects in mathematics and numeracy. After managing the initial development of the Australian Curriculum: Mathematics, she supported the development of key framing documents for the Australian Curriculum.

In 2010, the researcher returned to the Queensland Studies Authority to manage the implementation of the Australian Curriculum in Queensland. Through numerous leadership roles at the Queensland Studies Authority (2010 to 2014) and the Queensland Curriculum and Assessment Authority (2014 to the present) the researcher has been responsible for supporting teachers and schools to implement the Australian Curriculum through managing projects to develop policy, resources and professional development. Whilst she is an employee of the Queensland Curriculum and Assessment Authority, the ideas shared in this dissertation are those of the researcher and not of the Queensland Curriculum and Assessment Authority.

In the present study, it has been difficult for the researcher to remain an observer of the interactions while maintaining that her reality was not altered through the data collected from participants and that this reality had not influenced the responses of the participants.

1.1.2 Role of the researcher

According to Weber (2004), interpretivists believe that the research that has been undertaken is reliable if the researcher can demonstrate *interpretive awareness* (Weber, 2004, p. ix). That is, that during the conduct of the research, the interpretive researcher is able to demonstrate that they have acknowledged the subjectivity that they bring to the study and the steps that they have taken to address the implications of their subjectivity.

A suggestion that Weber (2004) provided, is that the interpretivist researcher should attempt to withhold their preconceptions of the phenomena when seeking to observe it and remain open to alternative findings and explanations for what is observed. He suggests that a process for withholding preconceptions is to focus first on the description of the phenomena and then look at explaining it from the context in which it was observed, while constantly checking the reasonableness of alternative interpretations of the phenomena observed (Weber, 2004). The researcher of the present study has undertaken to withhold preconceptions while conducting the study.

As suggested by Peshkin (1998), the interpretivist researcher needs to consider throughout the study how their subjectivity could influence the research. It is important that the researcher of the present study makes a declaration of their professional position.

The professional roles of the researcher for the last eleven years have centred on the development of curriculum policy at a state and national level. These roles have involved the development of Mathematics curriculum for the Preparatory Year (in Queensland this is the formal year of schooling prior to Year One) through to Year 12, in addition to curriculum in other learning areas. The roles have also involved the implementation of the curriculum, including the development of resources to support teachers to unpack and deliver the curriculum, professional learning events and opportunities, and the provision of advice to senior officers across the nation in how best to support teachers during the implementation of curriculum. Performing these roles has meant that the researcher has considered numerous issues and influences that impact upon teachers' curriculum enactment across numerous curriculum reforms.

During the present study however, as much as possible, the researcher has attempted to maintain an open mind to the possibility of the breadth of findings that could be uncovered from the research undertaken. She has endeavoured at all times, that is, during data collection, analysis and the consideration of conclusions, to be open to the possibility of alternate views and explanations to the phenomena observed. It is because of the passion the researcher has for her professional role that she has been driven to seek to understand further how teachers work with the curriculum that she, and others that work with her, produce. The researcher desires to understand how curriculum is received and interpreted by teachers, and to further understand the potential influences that impact upon the decisions teachers make based on this curriculum every day.

1.2 RATIONALE

Queensland has a rich history of building teacher autonomy. In the past 26 years, the syllabi and curriculum documents that have been developed have promoted the importance of providing teachers with flexibility. Flexibility in curricula has been central to providing teachers the support to design meaningful activities for their students in their classrooms. The numerous reviews and ensuing reports of the Queensland education system have made mention of teacher planning and preparation to enact curriculum in their classrooms.

Ben-Peretz (1990) described each layer of curriculum development as an interpretation. Her work focused on two described levels of interpretation. The first level of interpretation is performed by the curriculum developer, who interprets the subject matter of the learning area or subject and transforms this into an intended curriculum. This work is published and provided to teachers, who perform the second level of interpretation. The second level of interpretation is the process through which the teacher operationalises the intended curriculum. Teachers convert the intended curriculum into a curriculum plan that is suited to the development of the students, and prepare the intended curriculum for enactment in their classrooms.

Ben-Peretz's (1990) levels of interpretation support a distinction that exists in curriculum development circles. Curriculum developers (that is, those charged with the role of curriculum development within a curriculum authority) describe their work as the 'big C' curriculum. They see the curriculum they produce as being in its

purist form, as it is directly as written by the curriculum developers. Curriculum developers maintain there is a distinction between the 'big C' curriculum and the planning documents or programs constructed by teachers. The programs planned by teachers represent the 'little c' curriculum. Central to this distinction is the belief that what teachers create is an interpretation of what the curriculum developer originally developed. Alignment of the teacher's interpretation ('little c' curriculum), to the curriculum developed by curriculum developers ('big C' curriculum), forms an important part of the Queensland senior secondary (post-compulsory Years 11 and 12) work program approval process. The process of work program approval is a quality assurance mechanism, which compares the interpretation of the curriculum as written by teachers in the form of a work program, with the intended curriculum as published in the syllabus. A work program contains the school's intention for sequencing the content topics of the curriculum in the specified time. It also contains a summary of the intended assessment items that will be used to make judgements on how well the students have learned and are able to apply the curriculum content. This process is integral to the school's curriculum accountability and the determination of final results for students graduating from high school.

Several studies have identified the various aspects, artefacts and outcomes of the process of curriculum interpretation. Porter, McMaken, Hwang, and Yang (2011) have provided terminology to describe the artefacts of curriculum interpretation. The intended curriculum refers to the curriculum policy provided by the curriculum authority. This definition of intended curriculum is akin to Ben-Peretz's (1990) first level of curriculum interpretation. The enacted curriculum defines the full classroom experience of planned and unplanned activities that operationalise the intended curriculum, akin to Ben-Peretz's (1990) second level of curriculum interpretation. Porter's (2011) work has served to ascertain the degree of alignment of the artefacts of curriculum. The development of the Surveys of Enacted Curriculum (Porter et al., 2011) graphically represents a three-dimensional view of the curriculum. The three dimensions represent the degree of variability of the topics covered, instructional time, and relative complexity of cognitive demand (Porter, 2002). These measures are represented in a topographical map, which reflects the curriculum. Figure 1.1 provides an example of a topographical map, created using the Surveys of Enacted Curriculum (Porter, 2002) process.
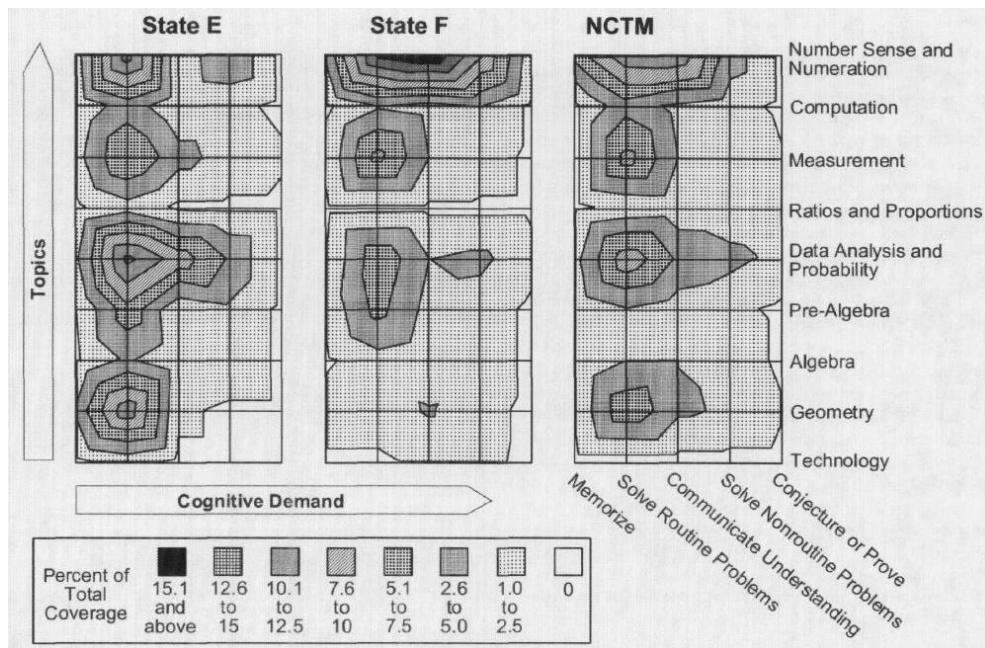
Figure 1.1. Representations of mathematics curriculum using the Surveys of Enacted Curriculum (Porter, 2002, p.8)

Figure 1.1 provides an example of topographical maps created using the Surveys of Enacted Curriculum. In this example, the curricula of two American states (State E and State F) are able to be compared with the American National Council of Teachers of Mathematics (NCTM) standards. The topographical maps allow comparison of the focus, complexity and depth of mathematics curriculum content in the interpretation of the original curriculum provided.

Remillard and Heck (2014) have published a visual model to describe the curriculum policy, design, and enactment system. The visual model appears in Figure 1.2.
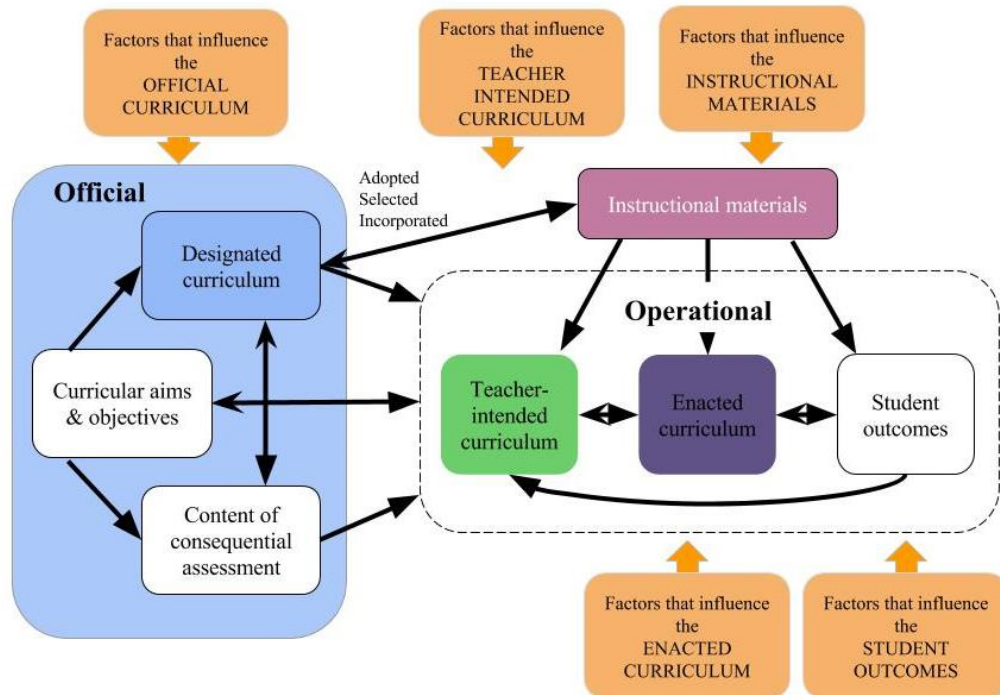
Figure 1.2. Visual model of the curriculum policy, design, and enactment system (Remillard & Heck, 2014, p. 709).

Their research tracks the artefacts of the interpretation process from the intended curriculum, which they term official curriculum, to enactment and finally assessment of students. In their article, they briefly describe the teacher-intended curriculum as a product of the first interpretation of the curriculum. Through planning, teachers develop their intention for the classroom. The enacted curriculum reflects the activities, planned and unplanned, that occurred during curriculum enactment. Finally, the assessed curriculum reflects the curriculum content that is the focus of assessment used to ascertain students' learned knowledge and skills. Through an analysis of curriculum literature from the United States of America, Remillard and Heck (2014) also described the typical factors that impact upon each of the artefacts of the curriculum policy, design, and enactment. The typical factors were attributed to each of the aspects of the visual model. The typical factors appear in the orange callout boxes at the top and bottom of Figure 1.2.

Few studies have analysed the process of curriculum interpretation, in particular, the process of curriculum planning undertaken by teachers to enliven the curriculum. Curriculum documents are developed as a map. They provide a definition of the discipline, the boundaries of subject matter, and the scope that is required to be covered in the course of learning. The curriculum provides the

topography, the hills and valleys representing the degree of difficulty, the importance of the content and the depth of treatment required to cover the content of the discipline. The curriculum encourages imagination of the multitude of possibilities of the journeys that can be taken to cover the territory. It is the teacher who reads the curriculum, and with the knowledge of the students in their care, makes careful decisions to plan the best journey for their students.

1.3 RESEARCH AIMS AND QUESTIONS

This study sought to explore how teachers interpret and enact curriculum. It intended to ascertain the process of curriculum planning used by teachers to operationalise the current Queensland curriculum (The Australian Curriculum: Mathematics developed by ACARA). The process of curriculum enactment, that is, from the planned curriculum to the enacted curriculum in the classroom, will also be studied. This study has also identified the influences that impact upon the processes, that is, the process of interpretation from intended to planned curriculum and from planned to enacted curriculum. Therefore, the aim for the present study is to investigate how teachers interpret and implement the Australian Curriculum: Mathematics, in their classroom.

The researcher believes that through an enhanced understanding of the process of curriculum interpretation used by teachers, and the associated influences that impact upon this process, she will be able to better support future curriculum initiatives in her professional role. This broad intention frames the two Research Questions for the present study:

1. What is the process of curriculum interpretation used by individual teachers?

2. What are the specific influences that impact upon teachers' curriculum interpretation?

1.4 OVERVIEW OF INTERPRETIVIST PARADIGM

The researcher adopted an interpretive design for the present study. The study sought to understand the meaning that teachers derive from the curriculum and the actions that they instigated in order to communicate these meanings to their students. This aligns with Cohen, Manion and Morrison's (2011) view of the interpretivist research perspective. An exploratory case study research design (Yin, 2009) has been used, as

it addressed the research aims of exploring and understanding the teacher processes of curriculum interpretation. Further, the research questions sought to understand the experiences of teachers in relation to curriculum interpretation.

The research was undertaken at a public school situated in a lower socio-economic area approximately 70km from the Central Business District of Brisbane, Queensland. The participants ($n = 8$) in the study included the school administrative team (Principal, Deputy Principal and Head of Curriculum). However, the focus of the study was the experience of five then (at that time) primary generalist classroom teachers, one each from Years Three, Four, Five, Six and Seven. These year levels equate to students of approximately 8 to 12 years of age.

Semi-structured interviews were conducted with the school administrative team to assist in developing the researcher's understanding of the school context. Data gathered from the teacher participants ($n = 5$) occurred in three stages that were centred on the enactment of a unit of mathematics instruction across a period of five weeks. The three stages of data gathering were: 1. pre-unit when semi-structured interviews were conducted, 2. during the teaching of the unit when teachers recorded entries in a journal about their planning for lessons and their reflections on lesson enactment, and, 3, post-unit when semi-structured interviews were conducted with the participants.

1.5   SIGNIFICANCE OF THE STUDY

This research explored the process of curriculum interpretation. While studies have investigated teacher curriculum enactment and the alignment of the enacted curriculum to the original intended curriculum, there is a gap in the literature relating to the examination of teacher planning.

1.5.1 Defining teacher curriculum planning

In seeking to define the artefacts of curriculum interpretation, such as teacher curriculum planning, little research has been uncovered that provides a concrete definition of the planned curriculum. Teacher curriculum planning is insinuated in literature, however, the process and artefacts of the process are rarely discussed.

Sherin & Drake (2009) described curriculum planning as the teachers' intentions to cover the prescribed curriculum, and thus part of the intended

curriculum. This view does not acknowledge the process of interpretation that is undertaken by the teacher in order to enact the curriculum policy as written, whereas researchers such as Solomon (2009), position curriculum planning as a component of enacting the curriculum in the classroom. This view does not acknowledge the preparation that occurs prior to enactment. The enacted curriculum is made up of planned and unplanned experiences that happen in the classroom.

Remillard and Heck (2014) described the notion of the teacher-intended curriculum as a stage in operationalising the curriculum. They suggested that it is often the hardest to observe, as it is in its most detailed form within the teacher's mind.

These descriptions make mention of the planning process that occurs, but they do not acknowledge the artefacts that may be developed as a consequence of this process. The intended curriculum provides the map of the content, and the enacted curriculum represents the journey that is taken, but rarely is the journey taken without first planning how to get there.

1.5.2 Influences on curriculum interpretation

Literature can be found that identifies influencing factors on curriculum enactment. However, when instances are cited, they are frequently cited as influences on the artefacts of enactment, for example, on classroom activities, and student work (Remillard & Heck, 2014; Porter, McMaken, Hwang, & Yang, 2011). They are rarely described for the processes of curriculum enactment, that is, during the action of enactment in the classroom. Furthermore, as there is little research on curriculum planning, there is equally little research dedicated to the influences on curriculum planning.

1.5.3 Alignment of interpretations of curriculum and preparation for enactment

Frequently the focus of literature on curriculum interpretation is to ascertain the degree of alignment that exists across the interpretations. Researchers such as Porter have developed complex processes to analyse the alignment across the artefacts of interpretation, and compare them to the original intended curriculum.

Porter et al.'s (2011) *Surveys of Enacted Curriculum* is a tool that has influenced the foundation to this study. This tool is used to ascertain the degree of alignment between curricula. In particular, this work compares the intended

curriculum, enacted curriculum and assessed curriculum. The tool uses quantitative methods to measure the degree of alignment. It was used during the development of the Australian Curriculum to provide national and international benchmarking to other curricula. In the mathematics learning area, the degree of alignment was very high; however this does not negate the need for support for teacher planning to enact new curricula. The Survey of Enacted Curriculum (Porter et al., 2011) measures the alignment of the curriculum content but does not take into account the underpinning philosophy nor the techniques, such as assessment tasks and methods of making judgements on student work, which are required to enact the new curriculum.

While Porter, et al.'s (2011) work describes a process for the comparison of the intended curriculum, enacted curriculum, and assessed curriculum, the researcher was unable to find a comparative study that involved the planned curriculum. Further, in relation to the context of this study, very little literature was found on curriculum implementation that involved a government-developed interpretation of the curriculum, such as the Curriculum into the Classroom materials provided for Queensland Department of Education schools.

1.5.4 Research contribution

This study has sought to identify the planned curriculum as an interim step between teachers unpacking the intended curriculum and enacting it in the classroom. It is hypothesised that curriculum interpretation by teachers will involve the processes of planning the curriculum (intended curriculum to planned curriculum) and enacting the curriculum (planned curriculum to enacted curriculum). The identification of this interim step in the process of curriculum interpretation is not frequently described in literature, thus making this study significant.

This study has drawn on the *Model of curriculum, design, and enactment system* published by Remillard and Heck (2014). Remillard and Heck's model described the artefacts of curriculum interpretation. Additionally, Remillard and Heck identified the influencing factors on the aspects of their model based upon analysis of commonly cited research from the United States of America. The present study has sought to determine the influences on the processes rather than the artefacts of curriculum interpretation. This has been executed through thematic analysis of the data collected from the teacher participants. In doing this, this study has provided a method for the identification of the influences on the processes of curriculum

interpretation. An ability to identify the influences is significant, because it will assist teachers, schools, and education authorities to strategically identify targets for supporting curriculum change.

Porter (1989) acknowledged that few studies have been undertaken of the enacted curriculum, as they are difficult and costly. The studies of enacted curriculum tend to use more qualitative methods and require more time-involved methods such as discussion with teachers and observations of the actual content of classroom curriculum. The reward for such research is a more comprehensive picture of the enacted curriculum from an observer's perspective, as most of the research literature asks teachers to recall their experiences in the classroom. Additionally, research which invests time into discussion with teachers about some of the justifications for misalignment between the planned and enacted curriculum may lead to an interesting picture of the outside pressures and external distracters from classroom practice. As Porter (1989) suggested, there is little reported research that applies a qualitative lens to the alignment of intended, planned and enacted curriculum. It is in this absence of research and literature that this research project has adopted a qualitative design for describing, analysing and explaining the process of curriculum interpretation using qualitative methods.

1.6   THESIS OUTLINE

Chapter 1 has provided an outline of the context in which this study will be placed. The chapter has provided a brief overview of the research background to the study and has discussed the issues which provided the impetus for this study. The background included insight into the curriculum history of the researcher. Details of the researcher's history of curriculum experience have given perspective to the rationale for the present study.

The rationale of the research presented in Chapter 1 has provided links to key research that has directly influenced the study. Studies addressing the artefacts of curriculum interpretation were cited, leading to articulation of the research aims and questions for the study, which was accompanied by an overview of the research design. The overview of the research design has included a description of the uses of exploratory case study. Additionally, the research context, participants, and instruments were introduced.

Chapter 1 also presented the significance of the study as qualitative research on the process of curriculum interpretation. This study has described an interim step in the process of curriculum interpretation, that is, the process of teacher planning. Further, the study has sought to identify the influences that impact the processes of teacher curriculum planning and enactment.

Chapter 2 provided the historical curriculum context for the present study. The chapter provided an overview of the historical and current education landscape in Queensland as background to the study. It presented a summary of the key policy positions that have shaped the path to the development of the first national curriculum for Australia. Subsequently, it demonstrated how the key national documents have influenced curriculum policy in the State of Queensland.

Chapter 3 provided a literature review of relevant research in the field of curriculum studies. The chapter provided a discussion of the divergence of curriculum definitions that permeate the research. Subsequently, the chapter provided an overview of literature relating to the process of curriculum interpretation and the influencing factors that impact upon this process. The chapter provided the definitions, as well as the theoretical and conceptual framework that underpin this research. It culminated in the presentation of the two research questions for this study.

Chapter 4 provided details of the research design and methods of the study. The interpretivist research approach is explicated as the theoretical frame for the study. The exploratory case study research design is explained, prior to the description of the research setting for the study. This included an overview of the school's administrative team and the five teacher participants in the study. The chapter provided clarification about the data collection methods used, which were semi-structured interviews and journals. The process of thematic analysis that was used as the method of data analysis for this study is discussed. Finally, the issues relating to research quality and ethical implications of the research are considered.

Chapter 5 presented the results of the study. The chapter commenced with a description of the context of the research setting, Joanlee State School (a false name) using data collected from the school administrative team. It also provided an overview of the method that is used for the presentation of data collected from the

five teacher participants. Each of the teachers has been considered individually in this chapter.

The discussion presented in Chapter 6 considers the findings of the study in relation to relevant literature. The process of curriculum interpretation is considered initially through the actions of interpretation, that is, the process of curriculum planning, enactment, and reflection. Subsequently, the influences impacting upon the process of curriculum interpretation are considered.

The final chapter of the thesis, Chapter 7, articulated the findings in regard to answering the research questions of the study. The limitations of the study are considered. The chapter provided the implications of the study for research and the profession, through the articulation of key recommendations targeting the education system, schools and teachers, which the research indicated may assist and enhance the process of curriculum interpretation and enactment.

Chapter 2: Curriculum reform in Australia and Queensland

2.1 INTRODUCTION

This study is positioned within the context of the implementation of the Australian Curriculum: Mathematics, in Queensland. The commencement of implementation came at a time when Queensland had seen constant curriculum change since the late 1990s. Additionally, the Australian Curriculum represented the first successful attempt at a national curriculum for Australia. These two occurrences epitomise the climate of constant curriculum change that teachers had been accommodating. This chapter will provide a discussion of the major curriculum initiatives that have shaped the education landscape at a National and State level.

This chapter provided a synopsis of key reform; Federal policy documents are provided to outline the process to develop Australia's first national curriculum (Section 2.2). A summary of significant policy and major curriculum development within Queensland's history is also provided with commentary of the influence of the national agenda (Section 2.3). Finally, Section 2.4 provided a summary for the curriculum context for this study.

2.2 AN OVERVIEW OF CURRICULUM REFORM

This chapter focused on the curriculum policies and initiatives that have shaped education nationally and for the State of Queensland, published during the period between 1980, when the first attempt at a national curriculum was published, and 2016, when the latest version of the Australian Curriculum was published. Further, the policies, initiatives, and curriculum cited have centred on the mathematics learning area. Mathematics curriculum is the area of learning that was being taught by the teachers as the focus of this study, and thus the sources listed have been specific to mathematics where the policies are specified for particular learning areas. The policies and initiatives listed provide context for this project, and these are further discussed in the sections that follow. The policies and initiative that will be discussed have been summarised in Table 2.1.

Table 2.1

Summary of National and State curriculum initiatives 1980-2016

Year	Australian policies and initiatives	Queensland policies and initiatives
1980	Core Curriculum for Australian Schools (Curriculum Development Centre, 1980)	Report of the Select Committee on Education in Queensland (Ahern Report) (Queensland Legislative Assembly, 1980).
1985		Education 2000. Issues and options for the future of Education in Queensland. A Discussion Paper The State of Queensland (Department of Education) (1985).
1987		P-10 Curriculum Framework (The State of Queensland (Department of Education), 1987a)
		Years 1 to 10 Mathematics Syllabus (The State of Queensland (Department of Education), 1987b)
		Years 1 to 10 Mathematics Teaching, Curriculum and Assessment Guidelines (The State of Queensland (Department of Education), 1987c)
1989	Hobart Declaration on Schooling (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 1989)	
1991	Mathematics National Statements and Profiles (Curriculum Corporation, 1991)	
1993		Years 1 to 10 mathematics sourcebooks: Activities for teaching mathematics (The State of Queensland (Department of Education and Training), 1993)
1994		Shaping the Future: review of the Queensland school curriculum (Wiltshire Report) (The State of Queensland (Department of Education and Training), 1994)
1995		Years 3, 5, 7 literacy and numeracy testing commences (The State of Queensland (Department of Education and Training), 2013a)
1999	Adelaide Declaration on National Goals for Schooling in the Twenty-First Century (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 1999)	
2004	Schools Assistance Act (2004)	Years 1 to 10 Mathematics Key Learning

Year	Australian policies and initiatives	Queensland policies and initiatives
		Area Syllabus (The State of Queensland (Queensland Studies Authority), 2004)
2005		Years 1 to 10 Mathematics Key Learning Area Syllabus Support Materials and professional learning (The State of Queensland (Queensland Studies Authority), 2005a)
		Queensland Curriculum, Assessment and Reporting Framework (The State of Queensland (Department of Education and the Arts). 2005)
2006	National Statements of Learning for Mathematics (Curriculum Corporation, 2006)	
2007		Mathematics Essential Learnings and Standards (The State of Queensland (Queensland Studies Authority), 2007)
2008	Melbourne Declaration on Educational Goals for Young Australians (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 2008)	
	National Assessment Program – Literacy and Numeracy commences (Australian Curriculum, Assessment and Reporting Authority, 2013)	
	National Mathematics Curriculum: Framing Paper (National Curriculum Board, 2009)	
2009	Shape of the Australian Curriculum: Mathematics (Australian Curriculum, Assessment and Reporting Authority, 2009a)	
2010	Australian Curriculum: Mathematics v1.0 (Australian Curriculum, Assessment and Reporting Authority, 2016)	
2011	Australian Curriculum: Mathematics v2.0 (Australian Curriculum, Assessment and Reporting Authority, 2016)	Australian Curriculum familiarisation (Trenwith, 2010)
		Australian Curriculum: Mathematics resources released (Jan 2011), The State of Queensland (Queensland Studies Authority) (2011)
		Curriculum into the Classroom (C2C) materials released for mathematics (Australian Curriculum v1.2) (Oct 2011) (Lippett, 2011)

Year	Australian policies and initiatives	Queensland policies and initiatives
2012	Australian Curriculum: Mathematics v3.0 (Australian Curriculum, Assessment and Reporting Authority, 2016)	Implementation of the Australian Curriculum: Mathematics (Trenwith, 2010)
	Australian Curriculum: Mathematics v4.0 (Australian Curriculum, Assessment and Reporting Authority, 2016)	
2013	Australian Curriculum v5.0 (no change to mathematics) (Australian Curriculum, Assessment and Reporting Authority, 2016)	
2014	Review of the Australian Curriculum (Australian Government, 2014)	
	Australian Curriculum v6.0 (no change to mathematics) (Australian Curriculum, Assessment and Reporting Authority, 2016)	
	Australian Curriculum v7.0(no change to mathematics) (Australian Curriculum, Assessment and Reporting Authority, 2016)	
2015	Australian Curriculum: Mathematics v8.0 (Australian Curriculum, Assessment and Reporting Authority, 2016)	

The major curriculum initiatives listed in Table 2.1 have set the background for the development of the *Australian Curriculum*. The table summarises the policies and initiatives that have been commissioned and published to advance the national education agenda. In particular, the *Core Curriculum for Australian Schools* (Curriculum Development Centre, 1980), *Mathematics National Statements and Profiles* (Curriculum Corporation, 1991), *National Statements of Learning for Mathematics* (Curriculum Corporation, 2006), and the *Australian Curriculum: Mathematics* (Australian Curriculum, Assessment and Reporting Authority, 2010a), represent four attempts at developing a national curriculum for Australia. The final attempt, the Australian Curriculum: Mathematics, represents the first successful implementation of a curriculum by all eight Australian states and territories.

Also evident from the table of policies and initiatives, is the influence that the national agenda has had on curriculum policy and implementation decisions in

Queensland. Historically, Queensland, like all other Australian states and territories, has been autonomous in education decision-making. Queensland has its own education authorities, charged with supporting Queensland schools. However, over the past 26 years, national curriculum attempts have increasingly influenced the development of curriculum in Queensland. The Core Curriculum for Australian Schools (Curriculum Development Centre, 1980) did not lead to a significant redevelopment of the Queensland curriculum. However, the National Statements and Profiles (Curriculum Corporation, 1991), and policy positions supporting this second attempt at a national curriculum, influenced the Queensland education authorities to consider an outcomes-based education philosophy. The Schools Assistance Act (2004) and the resulting National Statements of Learning (Curriculum Corporation, 2006) led to the development of a new curriculum developed for Queensland schools in Years One to Ten. Finally, the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority, 2010a) has been adopted as the curriculum required to be used in Queensland schools without alteration or adaptation.

Table 2.1 outlines the rapid level of curriculum change that the Queensland education system has undergone in the last 26 years. These changes reflect Queensland-instigated curriculum initiatives, as well as national policies and initiatives.

2.3   AUSTRALIAN CURRICULUM INITIATIVES

Since 1980, there have been four attempts at the implementation of a national curriculum for Australia (Australian Government, 2014). Each attempt has involved a different structure and format, reflective of contemporary research and trends in education at the time. Additionally, each attempt has been responsive to the political landscape, which has determined the implementation requirements and schedule in all states and territories.

The first formal attempt to deliver a national curriculum in Australia was published in 1980 by the federally funded Curriculum Development Centre (Australian Government, 2014). The publication of the *Core Curriculum for Australian Schools* provided learning processes and capabilities in nine subject areas. The subject areas included: arts and crafts; communication; environmental studies; health education; work, leisure and lifestyle; mathematical skills and reasoning and

their application; scientific and technological ways of knowing and their social applications; social, cultural and civic studies; and moral reasoning and action, value and belief systems (Curriculum Development Centre, 1980).

The Curriculum Development Centre stated that their approach to a national curriculum was not to stipulate the curriculum content and pedagogy that must be used. Rather, they aimed to provide an overall picture of the learnings and experiences that students could typically expect from their schooling (Australian Government, 2014).

As a nation, in 1989, the educational authorities of the eight states and territories commenced working towards greater consistency in schools and schooling, with the development and publication of the *Hobart Declaration on Goals for Schooling* (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 1989). The Hobart Declaration was instigated by the Ministerial Council on Education, Employment, Training and Youth Affairs (Australia) (MCEETYA), the Standing Council of Education Ministers from each State and Territory alongside the federal Minister for Education. At that time the council was chaired by the Minister for Education in Tasmania.

The Council aimed to provide support for the challenges schools were facing through the articulation of ten national goals for schooling; these goals have been the subject of commentary in the years that have followed their provision (The Standing Council on School Education and Early Childhood, 2014). The ten goals represented a joint commitment to supporting schools to face the common challenges of the time. Subsequent national partnerships' work provided the necessary support for the second attempt at a national curriculum, through the development of common curriculum goals. The *National Statements and Profiles* (Curriculum Corporation, 1991) had provided detailed statements of expected outcomes for students in eight learning areas that were to influence state and territory curriculum policy. The learning areas included The Arts, English, Health and Physical Education, Languages other than English, Mathematics, Science, Studies of Society and Environment, and Technology. However, the statements and profiles were not fully endorsed by Education Ministers, which resulted in variable implementation across the country (Australian Government, 2014).

In 1993, the Australian Education Council merged with the Council of Ministers of Vocational Education, Employment and Training, and the Youth Ministers Council, to form The Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA). MCEETYA was responsible for the development of *The Adelaide Declaration on National Goals for Schooling in the 21st Century* (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 1999), which superseded The Hobart Declaration.

The Adelaide Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 1999) gave a stronger direction toward national curriculum consistency. The Adelaide Declaration stated the importance of curriculum for students in eight key learning areas. The learning areas were the same learning areas for which curriculum had been described for the National Statements and Profiles initiative. The Adelaide Declaration stated that students should have the opportunity to attain the high expectations in knowledge and skills of the eight key learning areas across the compulsory years of schooling. At the time, in Australia, the compulsory years of schooling were Years One to Year Ten (students in the age range of approximately five to fifteen years). The requirement to complete the year prior to year one is variable across the country. In Queensland, the Preparatory Year or Prep (the formal year of schooling prior to Year One) was made compulsory for all Queensland children in 2016.

The development of the *Schools Assistance Act* (2004) instigated the third attempt for a national curriculum in Australia. The Schools Assistance Act (2004) was to support a push towards greater consistency in schools across the country and has led to a number of curriculum, assessment and reporting initiatives. From the Schools Assistance Act (2004) the *National Consistency in Curriculum Outcomes* (Curriculum Corporation, 2006) were developed as the *National Statements of Learning* in English, mathematics, science, and civics and citizenship. To boost curriculum consistency, the States and Territories were required to embed the Statements of Learning in their jurisdictional curriculum documents by the beginning of 2008 (Australian Government, 2014). The timeline provided to the jurisdictions was set to coincide with the first administration of the *National Assessment Program Literacy and Numeracy (NAPLAN)* test in 2008, an assessment initiative of the Schools Assistance Act (2004). *NAPLAN* is a census testing program administered to

students in Years Three, Five, Seven and Nine each year in May (Australian Curriculum, Assessment and Reporting Authority, 2013a). Since 2008, *NAPLAN* has been developed using the National Statements of Learning as the curriculum base. This has recently changed and for the first time, in 2016, *NAPLAN* was developed using the Australian Curriculum.

In 2008, the release of *The Melbourne Declaration on Education Goals for Young Australians* (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 2008) paved the way for the most recent attempt at a national curriculum in Australia. The Melbourne Declaration was developed to set the direction for Australian schooling for the next 10 years. Within the Declaration, a commitment to action entitled *Promoting world-class curriculum and assessment* laid the foundations for the development of a new national curriculum to replace the existing curriculum of each State and Territory. It set the course for the development of nine learning areas including English, Mathematics, Sciences, Humanities and social sciences (including curriculum specified for History, Geography, Economics and Business, and Civics and Citizenship), The Arts, Languages, Health and Physical Education, Information and Communication Technology and Design and Technology. This list was later revised to combine Information and Communication Technology and Design and Technology into Technologies, and add a new learning area, Work Studies, to support vocational education and training.

As part of the building motivation toward the development of a national curriculum, the Department of Education, Employment and Work Relations (the Federal Education Department in Australia in 2008) appointed various educational experts to commence work under the auspices of the interim National Curriculum Board (iNCB). Under an act of parliament, in May 2009, the iNCB became the *Australian Curriculum, Assessment and Reporting Authority* (ACARA) in May 2009 (Australian, Curriculum, Assessment and Reporting Authority Act, 2008). ACARA was established as a statutory authority of the federal government of Australia.

ACARA has been charged with multiple tasks relating to the national education system. Their charter includes the national curriculum from Foundation to Year 12, national assessment program aligned to the national curriculum, and a national data collection and reporting program (Australian, Curriculum, Assessment and Reporting Authority, 2009b). The term *Foundation* refers to the formal school

year prior to Year One. Across Australia, four different terms were used to describe the year prior to Year One at the time of the development of the Australian Curriculum. In the Australian Curriculum the term Foundation was used by ACARA, as at the time it was a term that was not used by any other State or Territory. Since the publication of the Australian Curriculum some jurisdictions have changed to use the term Foundation for the year prior to Year One. In Queensland the decision was made to continue to use the term Preparatory Year or Prep.

ACARA delivered the fourth, and most successful, attempt at a national curriculum in December of 2010 (version 1.0) (Australian Curriculum, Assessment and Reporting Authority, 2016). Developed in three phases, the Australian Curriculum has provided curriculum content and achievement standards developmentally sequenced across Foundation to Year Ten. ACARA published the Australian Curriculum digitally to allow for updates and modifications to the curriculum over time to be responsive to issues, correction and current research (Australian Curriculum, Assessment and Reporting Authority, 2010b). In January 2014, the Australian Curriculum version 5.2 was available, when the Federal Minister for Education, the Hon. Christopher Pyne, announced that a review of the Australian Curriculum would be undertaken.

The Review of the Australian Curriculum (Australian Government, 2014), conducted by Professor Kenneth Wiltshire and Dr Kevin Donnelly, provided recommendations to address the criticisms of the curriculum structure, over-crowdedness and support for students with disability. ACARA's revisions to the Australian Curriculum were endorsed by the Education Council in 2015. The Education Council is comprised of the State, Territory and Commonwealth Ministers for Education and is responsible for strategic policy on school education, early childhood and higher education. At the time of completion of this thesis, the Australian Curriculum version 8.2 was available for use in schools across the nine learning areas.

2.4 QUEENSLAND'S CURRICULUM HISTORY

In 1980, when the first attempt at a national curriculum for Australia was published, Queensland education decision-makers were considering the recommendations of the *Report of the Select Committee on Education in Queensland (Ahern Report)*

(Queensland Legislative Assembly, 1980). The Ahern Report was comprised of six separate interim reports, targeting various aspects of the Queensland education system. It was concluded by a final report, which articulated recommendations for the system. Curriculum recommendations in the report focused on the importance of a balance between consistency of curriculum specification and flexibility to allow teachers to meet the individual demands of their students. The Ahern Report, however, did not lead to an update of the mathematics curriculum at this time.

Further analysis of the Queensland education system was undertaken and published in *Education 2000: Issues and options for the future of Education in Queensland, a Discussion Paper* (The State of Queensland (Department of Education), 1985). The discussion paper suggested the development of a framework for curriculum in Years One to Ten. The proposition was put forward, to support moving towards curriculum consistency as a state, to establish frameworks for curriculum development across learning areas.

The discussion paper inspired work on a curriculum framework for Queensland. *The P-10 Curriculum Framework* proposed a curriculum framework encompassing pre-school to Year Ten (The State of Queensland (Department of Education), 1987a). At the time, pre-school, while not compulsory, offered children learning interactions with a teacher, often within the grounds of the local primary school. *The P-10 Curriculum Framework* (The State of Queensland (Department of Education), 1987a) led to revision of the syllabi and the *Years 1 to 10 Mathematics Syllabus* was released by the Department of Education in 1987 (The State of Queensland (The Department of Education), 1987b). In 1993, the syllabus was supported by the release of the *Years 1 to 10 Mathematics Teaching, Curriculum and Assessment Guidelines* (The State of Queensland (Department of Education), 1987c) and later the *Mathematics Syllabus Support Document: A Content Core for a School-Based Program in Queensland Primary Schools* (The State of Queensland (Department of Education and Training), 1993). The *Mathematics Syllabus Support Document*, commonly known as the *Sourcebook*, contained ideas and activities to support classroom activities in mathematics.

In the early 1990s, the push toward a national curriculum through the release of the Hobart Declaration sparked a review of the Queensland curriculum. *Shaping the Future: Report of the Review of the Queensland school curriculum (Wiltshire*

Report) (The State of Queensland (Department of Education and Training), 1994) proposed entering a period of major curriculum reform in order to more closely align with the national curriculum direction suggested in the Hobart Declaration. The *Queensland Schools Curriculum Council* was established to develop the proposed syllabi and guidelines for Preschool to Year Ten, while the already established *Queensland Board of Senior Secondary School Studies* was to implement the recommendations in the senior (Years 11 and 12) curriculum (The State of Queensland (Department of Education and Training), 2013a).

The eight learning areas, described in the *National Statements and Profiles* (Curriculum Corporation, 1991), were used as the structure for the suite of curriculum that was then developed in Queensland by the Queensland Schools Curriculum Council. The Years 1 to 10 Key Learning Area syllabi (KLA) led to a shift towards outcomes-based curriculum. The KLA syllabi were developed and published in pairs, beginning with the release of Science and Health and Physical Education syllabi in 1999. The final syllabus Mathematics was released in 2004. The English Syllabus had been paired with the release of the Mathematics Syllabus. However, *The Years 1-10 English Key Learning Area Syllabus (Open trial)* (The State of Queensland (Queensland Studies Authority), 2005b) remained an Open Trial Syllabus and was never finally approved for use in general implementation by schools. English was the only learning area not to have a published syllabus at the end of the project.

The KLA syllabi were grounded in an outcomes-based approach. Outcomes-based education describes the movement towards organising the education system around the learning considered essential for students to have mastered at the end of their learning journey (Spady, 1994). The learning outcomes in the Queensland KLA syllabi were described as core and discretionary (The State of Queensland (Queensland Studies Authority), 2004). Core learning outcomes expressed essential learnings for students, whilst discretionary learning outcomes were used to state learning beyond what was deemed essential (Watt, 2005). Learning outcomes were provided for six levels across Years One to Ten. This structure provided two to three years for students to grasp the content and skills described in each level.

Accompanying each of the Key Learning Area Syllabi was a publication of the curriculum support documents. As the curriculum documents were released, the

supporting resources evolved. To support the syllabi released in 1999, teachers received two books, the sourcebook modules and the sourcebook guidelines, in addition to the syllabus document. In contrast, in 2005, teachers using *The Years 1 to 10 Mathematics Key Learning Area Syllabus* (The State of Queensland (Queensland Studies Authority), 2004) were given a comprehensive suite of resources packaged in a thick ring binder, which included summaries of curriculum content strands and sample information sheets, research papers on each of the strands of curriculum content, and elaborations of the curriculum content (The State of Queensland (Queensland Studies Authority), 2005a). At the time, the support materials published to accompany *The Years 1 to 10 Mathematics Key Learning Area Syllabus* were seen as an unprecedented level of curriculum support. By 2006, teachers were expected to have fully implemented *The Years 1 to 10 Mathematics Key Learning Area Syllabus* (The State of Queensland (Queensland Studies Authority, 2004).

However, by the conclusion of 2005, the requirement to embed the National Statements of Learning and to meet the reporting demands of the Schools Assistance Act (2004) had led to a shift in the curriculum and assessment focus in Queensland. *The Queensland Curriculum, Assessment and Reporting Framework* (The State of Queensland (Department of Education and the Arts), 2005) paved the way for this movement in Queensland including the development of a whole new curriculum in Years 1 to 10. *The Queensland Essential Learnings and Standards* (The Essential Learnings) (The State of Queensland (Queensland Studies Authority), 2007) embedded the National Statements of Learning as per the federal agreement and were published for the eight key learning areas for implementation in schools in 2007. The Essential Learnings were developed across junctures and specified core content for students to engage with, across two year bands. The junctures represented Years Three, Five, Seven and Nine, providing two years for the development of the concepts they described. This structure aligned with the curriculum provided in the National Statements of Learning. However, the absence of curriculum for the early years and Year Ten caused some consternation. Criticisms about the need for curriculum Year One and Year Ten were addressed through the publication of the the Year One Learning Statements (The State of Queensland (Queensland Studies Authority), 2009a), and the Year Ten Guidelines (The State of Queensland (Queensland Studies Authority), 2009b) respectively.

The Schools Assistance Act (2004) meant a change to the reporting structure used in Queensland. Report cards shifted from a school-based template, with a primarily prose format. The new format used a five-point standards-based achievement scale to report student achievement in addition to comments that described the learning that had been undertaken and how the student had been progressing.

The standards accompanying the Essential Learnings curriculum structure changed the nature of assessment from the expectation outlined in the KLA Syllabi. Key changes were related to the nature of the description of learning and assessment. The KLA syllabi were outcomes-based syllabi, which were based in a nested approach to describing student development, whereas the Essential Learnings provided broad concepts in the form of learning objectives, which spanned two-year junctures. The Essential Learnings made use of a more identifiable standards-based assessment structure for reporting student achievement. However, both curricula used a structure that did not align content to particular year levels, thus providing flexibility for teachers. Description of content across junctures provided teachers with flexibility to assist students to access the learning appropriate to the student's development. This structure was also used by the National Statements of Learning, which described essential content at Years Three, Five, Seven and Nine.

The message to schools with the release of the Essential Learnings was that it would support schools to build an assessment culture. This message was not just from the curriculum documents themselves, but from the accompanying initiatives of the *Assessment Bank* and *Queensland Comparable Assessment Tasks* (QCATs), which supported the alignment of assessment as, of and for learning. The Assessment Bank was a digital repository of assessment resources including assessment tasks, guides to making judgement (criteria sheets), and factsheets about aspects of assessment, e.g., making comparable judgments, and providing feedback to students. The QCATs were standardised-assessment tasks administered between 2009 and 2012 (The State of Queensland (Queensland Curriculum and Assessment Authority), 2014a). The QCATs were administered to Years Four, Six and Nine students in English, Mathematics and Science. They provided an opportunity for moderation of student work by teachers to assist in building teacher assessment capacity and therefore, the assessment culture in Queensland.

In the second year of implementation of the Essential Learnings and Standards, MCEETYA released the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs (Australia), 2008), paving the way for another curriculum change in the form of the Australian Curriculum published in 2010. The major curriculum shift initiated by the advent of the Australian Curriculum was the structural change of the curriculum for Queensland teachers. The Australian Curriculum provides content described at each year level in mathematics. The Australian Curriculum has provided much more detailed content descriptions at yearly intervals from Prep to Year Ten. This was a change from the broader concepts described across two to three junctures that Queensland teachers had been accustomed to, from Queensland curriculum policy documents.

In June 2010, Geoff Wilson MP, Minister for Education and Training, made an announcement about the timeline for the implementation of the Australian Curriculum in Queensland. The announcement stated that all Queensland schools were required to commence implementation of the Australian Curriculum with English, Mathematics and Science in Prep to Year Ten from the beginning of 2012, with History to follow in 2013 (Trenwith, 2010). In 2013, this was revised to include implementation of Geography in Prep to Year 10 from 2014 (Queensland Teachers' Union, 2013). Implementation timelines for the other learning areas and subjects of the Australian Curriculum are still under negotiation (Queensland Teachers' Union, 2016).

2.4.1 Resource development to support implementation of the Australian Curriculum

Since its establishment, ACARA has promoted its primary curriculum role to be the development of the Australian Curriculum content and achievement standards. It has maintained the position that the implementation of the curriculum, issues about assessment, and reporting requirements, are the responsibilities of the state-level authorities. The justification of this perspective lies with the notion that the state- and territory-based curriculum and schooling authorities are in the best position to understand the specific issues affecting schools in their jurisdiction. Further, while there are no moves toward national certification and/or tertiary entrance procedures, the states and territories across Australia are better equipped to provide students with

the necessary preparatory knowledge and skills for the assessment techniques used in certification requirements in the State and Territory programs for Years 11 and 12.

In Queensland, support for the Australian Curriculum commenced with the establishment of the *Transition to the Australian Curriculum Steering Committee*, a committee combining senior officers of the education authorities (the Queensland Studies Authority, Department of Education and Training, Independent Schools Queensland and the Queensland Catholic Education Commission). The Queensland Studies Authority (known as the Queensland Curriculum and Assessment Authority since 2014) was the statutory authority responsible for Kindergarten to Year 12 curriculum, assessment and certification in Queensland. In 2002, The Queensland Studies Authority formed as an amalgamation of the Queensland Schools Curriculum Council, the Queensland Board of Senior Secondary School Studies, and the Tertiary Entrance Procedures Authority. In Queensland, the responsibility for government schools rests with the Department of Education and Training. Independent Schools Queensland is an association that represents independent schools, such as non-denominational schools, non-Catholic faith-based schools, and special assistance schools. The Queensland Catholic Education Commission is a coordinating body of the five Catholic education authorities in each diocese (or region) of Queensland: Brisbane, Cairns, Rockhampton, Toowoomba, and Townsville.

The Transition to Australian Curriculum Steering Committee provided the strategic direction for policy and resource development for Queensland. However, the majority of the work of the committee was undertaken by the Queensland Studies Authority, which also performed a secretariat role to the committee.

The first resources published to support the Australian Curriculum in Queensland were the exemplar whole school, year level and unit overview planning documents for English and mathematics. Published in January 2011, these resources were co-developed with teachers to guide their planning, as they implemented the Australian Curriculum. They were published, by the Queensland Studies Authority, as a set of example planning materials with guidelines for planning at each level to assist the process of schools in developing their curriculum planning documents. These documents formed the basis of the Curriculum into the Classroom (C2C) project, which is discussed in Section 2.4.2.

Between 2011 and 2014, the Queensland Studies Authority produced over 1,000 resources and over 100 professional learning workshops to support the Australian Curriculum. The resources were regularly updated during this time to match the updates to the Australian Curriculum published by ACARA. In July 2014, the Queensland Curriculum and Assessment Authority replaced the Queensland Studies Authority. Resource and professional development have continued to be provided by the Queensland Curriculum and Assessment Authority. The QCAA, like the QSA (Queensland Studies Authority) before it, has responsibility for the development and delivery of curriculum and assessment policy in Queensland.

2.4.2 Curriculum into the Classroom (C2C)

Following the 2011 publication of the year plans by QSA for English and mathematics, Education Queensland (the branch of the Department of Education and Training responsible for government schools) commenced a project developing additional resources for state schools. The project, initially known by the fictitious school name on the products *Scribbly Gum State School*, came to be known as the *Curriculum into the Classroom* project or C2C. The C2C project supported teachers in Queensland State Schools by rebranding and releasing the Queensland Studies Authority year plans via the Learning Place. The Learning Place is the secure eLearning repository of digital resources and eSpaces developed by the Department of Education and Training for State School staff (The State of Queensland (Department of Education and Training), 2016a). The Department of Education and Training used the year level plans to develop a comprehensive suite of resources to support state schools. The C2C materials included eight unit plans for each year level plan, 25 lesson plans for each unit plan, activity sheets and/or digital resources for each lesson, assessment tasks for each unit and task specific standards for the assessment task.

Since the original release of C2C in 2012, Education Queensland has refined the product for English and Mathematics and developed the same suite of resources for all other learning areas. However, the size of the comprehensive suite of resources has meant that the Department of Education and Training has had to make strategic decisions about when to update the materials to the various versions of the Australian Curriculum. For example, the initial publication, of the first set of C2C materials, was based on version 1.2 of the Australian Curriculum. At the same time,

ACARA had available version 3.0 of the Australian Curriculum for use in schools. Since the publication of the C2C materials, there have been 22 published versions of the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority, 2016).

In 2014, the Queensland Minister for Education, John-Paul Langbroek, made the C2C resources available to all Queensland schools. The version released to Independent and Catholic schools did not contain the full complement of resources, but it did provide Queensland schools with a suite of planning documents to support implementation (The State of Queensland (Department of Education and Training, 2015).

In a time of uncertainty, following years of constant curriculum change, the C2C materials were seen by some as a potential saviour for many schools. The materials were pre-prepared planning documents that many assumed would require only minor adjustment to contextualise them to ensure they were suitable for all the students in the classroom. However, upon the initial release of the materials, mixed messages surfaced about the requirement for schools to use the C2C materials without adaptation. Teachers were receiving messages from their Principals and Regional Directors that they were compelled to enact the C2C materials in their classrooms, unchanged. Several communications from senior Department of Education officials attempted to remind schools, teachers and administrators that the C2C materials were resources to support implementation of the Australian Curriculum and not a mandated requirement (The State of Queensland (Department of Education and Training), 2012; Queensland Teachers' Union, 2012). However, teachers continued to report pressure to use the materials (Chilcott, 2012a; Chillcott, 2012b). The difficulties with communication about the materials sparked the use of a message about the use of the materials; schools were informed that they were able to "adopt or adapt" the resources for use in their schools (The State of Queensland (Department of Education and Training), 2015). The message was to support schools wishing to utilise the materials as written (adopt), as well as schools wishing to contextualise the materials to suit the students in the classroom/school (adapt). The "adopt or adapt" message continues to be provided with the resources, however, mixed messages about the variation of interpretations about the requirement to

implement C2C continue to be reported (T. Kennedy, personal communication, March 29, 2016; K. Scott, personal communication, September 15, 2016).

2.5   CHAPTER SUMMARY

This chapter has presented a summary of the key policy documents and curriculum reforms that have shaped the National and State curriculum landscape between 1980 and 2016. Section 2.2 highlighted the key policies and curriculum documents that set the context for the present study. This included highlighting the influence that the national agenda has had on the timeline for major reform in the State of Queensland.

Section 2.3 drew attention to the key reforms and policies that shaped the national curriculum landscape. It has outlined the four major attempts at a national curriculum for Australia. The synopsis included description of the most recent and first successful attempt, the Australian Curriculum, as developed by the Australian Curriculum, Assessment and Reporting Authority. It also referenced the Review of the Australian Curriculum and consequential revisions to the curriculum.

Emphasising the effect of the national agenda on Queensland education reforms, Section 2.4, reviewed key policy and curriculum documents published in Queensland across the same time period. This precis highlighted the swift and constant nature of curriculum reform. Between 2006 and 2012, teachers of Mathematics in Queensland were required to implement three structurally and fundamentally different mathematics curricula. This section also provided an overview of the resources that have been produced to support the implementation of the Australian Curriculum in Queensland, including the Curriculum into the Classroom (C2C) materials produced by the Department of Education and Training.

Chapter 3 provided further description of the relevant literature that has been considered for this study. The chapter explored curriculum definitions, curriculum theory, and literature relating to the process of curriculum interpretation. It also explored relevant literature relating to commonly cited influences on curriculum decision-making. The literature analysed, forms the basis of the definitions for the purpose of the study, the analytical framework, and the research questions.

Chapter 3: Literature Review

3.1 INTRODUCTION

This study has explored the processes of curriculum interpretation used by teachers. It sought to identify the processes used by individual teachers of Mathematics and ascertain the influences impacting upon these processes. While relevant literature about curriculum interpretation was explored, a large body of research is not available for all aspects of the process of curriculum interpretation used in the base model of this study.

The review of relevant literature presented in this chapter is divided into four sections. First, Section 3.2 explored curriculum definitions, including a comparison of the main terms in the process of curriculum interpretation. Section 3.3 considered teachers' interpretation of curriculum and the supporting structures provided, including exploration of the processes of alignment used by curriculum theorists. Section 3.4 presented an analysis of established curriculum theory as a basis for exploring commonly cited influences on decision-making during curriculum interpretation. The chapter culminated in the articulation of definitions for the purpose of the study, which are integral to the analytical framework and articulation of the research questions (Section 3.5). Finally, Section 3.6 provided a summary of this chapter.

3.2 DEFINING CURRICULUM

In commencing research on interpretations of curriculum, it is prudent to commence by attempting to gain clarity about the concept of curriculum itself. This section pondered definitions of curriculum as portrayed in literature. In particular, this section sought to interrogate definitions of key terms for this study, including intended curriculum, planned curriculum and enacted curriculum.

The section considered the definitions prescriptive curriculum and descriptive curriculum (Section 3.2.1). In Section 3.2.2, it consulted references to the planned curriculum, which leads to a discussion of the hidden curriculum (Section 3.2.3). Definitions of curriculum in Australian and Queensland policy are considered to

provide context for the study. Finally, a summary of this section provided the definitions of intended, planned, and enacted curriculum to be used for the study.

3.2.1 The dichotomy of prescriptive versus descriptive curriculum

Pinar introduced a new term to the curriculum debate in a paper presented at the annual meeting of the American Research Association (Pinar, 1975). In his paper, Pinar introduced the notion of the lived experience of the curriculum, which he termed the *currere* (the Latin root of curriculum) (Pinar, 2011). Pinar's introduction of the term *currere* was a radical change to the way researchers viewed curriculum. It changed the perception of curriculum as a noun, a thing to be described, to consider curriculum as a verb, a process that is experienced by the learner (Pinar, 2011). The *currere* refers not only to the intent of the curriculum but the experience of the curriculum.

By considering *currere*, Pinar suggested that the focus of research should shift from the traditional researcher role of observing and describing the artefacts and processes of curriculum to the role of understanding the educational experience of the individual, that is, the experience of the student as reported by the student (Pinar, Reynolds, Slattery, & Taubman, 1995). In this way, Pinar has challenged researchers and theorists to seek to understand the influences on curriculum, rather than simply implementing or evaluating it (Pinar et al., 1995). The notion of seeking to understand the curriculum has been the fundamental belief of the reconceptualist movement in curriculum, with which Pinar has been strongly associated.

Pinar's challenge to strive to understand the curriculum experience, rather than just studying it, led to his later work in explicitly unpacking the various influences on curriculum, including gender, race, culture, politics and sexual orientation (Pinar et al., 1995). His focus on describing these influences guided further research to explore some of these influences more specifically. Further, Pinar sought to depict the strength of these influences on numerous education and curriculum decisions in recent history, particularly from an American context (Pinar, 2004; Pinar et al., 1995). Pinar's work was strongly focused on identifying the influences on curriculum and understanding the way in which these influences affect the educational experience.

Pinar's work has influenced many curriculum researchers, including this present study. His radical change to the way curriculum was defined has sparked and fuelled many debates about defining curriculum. Further, his notion of curriculum influences has shaped the design of curriculum and led to fundamental questions about equity within curriculum. This study seeks to understand the way teachers interact with curriculum and the influences that mould and shape their process of curriculum interpretation. Thus, this study will focus on analysis of teacher interaction with and interpretation of curriculum, in order to define teacher pathways to curriculum enactment. At the same time, this study will recognise Pinar's notion of curriculum as a process and seek to understand the influences that impact upon these pathways to enactment. In order to understand and describe the teacher pathways to enactment, the various definitions of curriculum need to be explored. *Curriculum Perspectives*, the first Australian journal about curriculum, was developed and published as a tangible demonstration that curriculum was emerging as a concern amongst the Australian academics monitoring the Australian education landscape. In the inaugural issue, Paul Klohr (1980) was invited to look at Australian education and curriculum and provide an outsider's perspective on what he observed, in terms of the place of curriculum theory in Australia. At that time, Klohr was a well renowned American researcher in curriculum theory, who had recently commenced a fellowship in Melbourne. This gave him a unique perspective on curriculum, which was, at the time, an emerging area of Australian research. Klohr was asked to provide an overview of the field of curriculum theory. In describing the arguments, movements and controversies of curriculum, he stated: "One thing seems certain: the time is surely past for highly simplistic ways of describing curriculum theory as either "hard" or "soft" or the earlier, more widespread, "descriptive" or "prescriptive" categories" (Klohr, 1980, p. 5).

Klohr held the view that a more complex definition of curriculum needed to be developed to lead the theoretical debate. He did not agree that the debate was as simplistic as a choice between two definitions of curriculum, but rather that the notion of curriculum provided many further shades that needed to be explored and unpacked.

As Klohr (1980) has suggested, defining curriculum is a complex task. There are many permutations of purpose, artefact and audience to flavour the definition,

and this can be seen in the research that is further unpacked in this chapter. However, it is interesting to note that in spite of Klohr's advice, the dichotomy of prescriptive versus descriptive curriculum still pervades research, and there are multiple definitions of the multifaceted relationship between curriculum and those who create and/or use it.

Arthur Ellis demonstrated explicit connections between curriculum theory and practical classroom models in his text *Exemplars of Curriculum Theory* (Ellis, 2004). In the text, he surmises that definitions of curriculum typically fall into defining the purpose of curriculum as either prescriptive or descriptive. The prescriptive curriculum is defined as the intentions of what could be taught in the classroom. Ellis has suggested that since the prescriptive curriculum is the curriculum as developed by the curriculum developer or the teacher, then it is a construct of their individual reality; this aligns with a constructionist view. Ellis (2004) described the prescriptive curriculum as a defined sequence of learning, without the actions or pedagogy that bring it to life. The prescriptive curriculum describes a plan for a learning area or year level but does not include the actual teaching and learning experience. While Ellis's (2004) definition makes mention of teacher involvement in prescriptive curriculum, the definition describes the curriculum plans, which teachers create to focus a series of lessons or a teaching sequence, rather than the actual implementation of this sequence in the classroom.

The second category of descriptive curriculum is described by Ellis (2004) as what can be observed when the prescribed curriculum is enacted in the classroom. The descriptive curriculum characterises what is observed in the classroom. The descriptive curriculum is outcomes focused, in that it is driven by the teacher's desire to adequately enact the curriculum for their students to meet the achievement standard set by the prescriptive curriculum for that period of schooling. Ellis (2004) views the descriptive curriculum as an action that is observed, rather than an artifact that is produced, that is, it is the act of enlivening the curriculum for students to aid their learning, not the artifact that a student produces to demonstrate their learning.

In summary, this thesis takes the position of the descriptive curriculum as the complete classroom experience encompassing all the possible opportunities for learning that occur in the course of enacting the curriculum. The descriptive curriculum describes the learning journey that is undertaken by teachers with their

students as they work towards a common goal, or perhaps an understanding about a topic, or the completion of a project. This notion of curriculum encompasses those activities that have been planned in the teaching sequence as well as some of the unplanned consequences of following, for example, a student-driven question, reacting to a current event or supporting the diversity of the needs of the students and taking an alternate course.

In a report written during a fellowship with the Australian Government, Reid (2005) was asked to investigate why numerous attempts at developing a national curriculum for Australia had failed over the previous 35 years. Reid provided a comprehensive literature review, outcomes of his research project and recommendations, which have paved the way for the most recent, and first fully implemented, attempt at developing an Australian curriculum. During the literature review, Reid (2005) clarified the terminology to be used in the report. In doing so, he associated Pinar's idea of curriculum as a verb with the debate about curriculum in Australia. He mentioned the numerous definitions of the term *curriculum* in educational debate and provided two clear definitions of curriculum for the purposes of the report.

The first definition provided by Reid (2005) referred to curriculum as an official document providing a clear definition of discipline knowledge and intent. Reid stated that this definition of curriculum is dominant in many education systems. He likened this definition to the metaphor of "curriculum as a noun" inspired by Pinar (1975) (Reid, 2005, p.11). That is, in this definition, Reid described curriculum as the thing or idea, typically a set of documents, that is referred to when discussing what students are required to learn.

An alternate definition for curriculum, provided by Reid (2005), is a process of interaction between teachers and students in a classroom. He explained that this definition responds to the process that is undertaken in the classroom as students learn, as well as the process undertaken by teachers to organise the learning. For this definition Reid used Pinar's (1975) metaphor of "curriculum as a verb" (Reid, 2005, p.11). This definition talks about curriculum as the action or process of learning.

Reid's (2005) two definitions still demonstrate a pervading dichotomy between the artefacts of curriculum development (the prescriptive curriculum or curriculum as a noun) and the process of enactment between teachers and students (the descriptive

curriculum or curriculum as a verb). The difference between the definitions posed by Ellis (2004) and Reid (2005) is the positioning of the role of teacher preparation and planning.

Ellis (2004) included teacher planning as part of the notion of prescriptive curriculum, that is, he included teacher planning as an element, which sets the course of study prior to enactment with students. In contrast, Reid (2005) positioned teacher planning as part of curriculum enactment and so therefore a component of the active process of doing curriculum. The lack of agreement as to the positioning of teacher preparation in definitions of curriculum, supports Klohr's (1980) sentiment that the notion of curriculum is more complex than just exploring it as a dichotomy between two opposing ideas.

According to Sherin and Drake (2009) there are three common definitions for curriculum used in the United States of America. They aimed to identify patterns in the curriculum strategies used by elementary-school teachers during their initial implementation of a reform-based mathematics curriculum. The definitions Sherin and Drake identified centred on the artefact of curriculum that was being defined. The definitions were:

1. curriculum as a set of resources provided to teachers that include the textbook, teacher guides and assessment materials

2. curriculum as the lesson that is enacted in the classroom with the students

3. curriculum as the learning objectives for students as determined and published by the state or district authority.

The definitions provided by Sherin and Drake (2009) still align with the notions of prescriptive and descriptive curriculum previously discussed. However, Sherin and Drake's definitions highlight the range of curriculum artefacts, actions and purposes that are encompassed within the broad definitions of curriculum. That is, while Sherin and Drake's (2009) second definition of curriculum as the enacted lesson aligns well with the notion of a descriptive curriculum definition, it does not mention the aspect of teacher planning previously discussed. Also, it could be said that Sherin and Drake's (2009) other two definitions (curriculum as a set of resources and curriculum as the learning objectives) align with the notions of prescriptive curriculum without mention of the aspect of teacher planning previously discussed.

Furthermore, there are aspects of curriculum that are not covered in Sherin and Drake's (2009) definitions. Sherin and Drake's (2009) definitions of curriculum artefacts provided to teachers (both learning objectives from a curriculum authority and the curriculum resources) aligned with the notion of the prescriptive curriculum. Meanwhile their definition of the curriculum in the classroom, or as enacted with the students, aligned with the definition of descriptive curriculum. Neither definition discussed the process or artefacts of curriculum planning undertaken by teachers to prepare the artefacts provided to them for curriculum enactment.

From the definitions explored, there is little clarity about the positioning of teacher planning within the prevailing definitions of curriculum. Some definitions position teacher curriculum planning within the notions of curriculum as an artefact of the prescribed course of learning, charting a way forward as the teacher navigates the curriculum landscape. Other definitions of curriculum position teacher curriculum planning within the descriptions of the active processes of curriculum enactment, describing the intentions of the teacher for enlivening learning in the classroom setting. For the purposes of this study, teacher planning will be considered as a separate category of curriculum in its own right. It is both the action of curriculum interpretation as well as the artefact of planning that assists the teacher to plot their course for student learning. Metaphorically, teacher curriculum planning is the planned course that the teacher charts, to cover the curriculum that is mapped in prescribed curriculum documents. Further, it provides the planned course for the journey that the teacher will take the students on, during curriculum enactment in the classroom.

In his work analysing teacher interaction with curriculum materials, Porter (2004) has sought to observe and examine numerous aspects of teacher enactment of mathematics curriculum. Porter has published numerous works studying teacher decision-making, accountability and the effects of teacher decision-making on students' opportunities to learn. Porter (2004) has suggested that there are three measurable types of curriculum: the intended, enacted and assessed curriculum. Porter also suggested that powerful information for teachers and other stakeholders in the education community is in knowing the content of each, and the degree of alignment that exists between them (Porter, 2006). In this section, Porter's definitions of curriculum will be explored. Porter's work will be revisited in later

sections of this chapter during the discussion of curriculum alignment and the process of curriculum interpretation.

According to Porter (2004), the intended curriculum is provided by the content standards for the subject and grade level and reveals the instructional content targets for the enacted curriculum. This definition is similar to the definitions previously explored for the prescriptive curriculum. The enacted curriculum is defined as the content of the instruction delivered by the teacher and highlights what students have the opportunity to learn. By suggesting a more interactive view, the enacted curriculum aligns more closely to the notion of the descriptive curriculum.

In addition to the identification of the intended and enacted curriculum, Porter (2006) defined the assessed curriculum as the curriculum measured by assessment and discloses the content that is the subject of assessment by the teacher: that which students are expected to know. By using the term assessed curriculum, Porter is describing the curriculum that is reflected in the assessment tools teachers' use, not the curriculum, which by completing the assessments, students have had the opportunity to demonstrate. This is an important distinction as it alters the perspective from which the assessed curriculum would be viewed. Porter (2006) described the assessed curriculum as a way of indicating that what is taught in the classroom is not always assessed; however he described that what is assessed is almost always viewed by the teacher as the most important elements of what the students' need to learn.

3.2.2 The planned curriculum

Kurz, Elliott, Wehby, and Smithson (2010) built on Porter's work and looked to ascertain differences between the lenses of mathematics curriculum expectation in a general classroom, compared to the expectation in a special education classroom. Using Porter's methodology, they attempted to determine the degree of alignment between versions of curriculum during enactment. Their study used Porter's terminology and definitions of intended and enacted curriculum, but also acknowledged an intermediary dimension by which to categorise curriculum, that is, the planned curriculum. While they do not directly define the term in their work, Kurz, et al. (2010) briefly described a notion that reflected an insight into teachers' intent to teach the state standards. Further, it is stated this insight provided an opportunity to understand the degree of alignment between what the teacher intended

to teach in the classroom, what was taught in the classroom, and what was required by the state standards.

A more detailed description of the planned curriculum can be found in Solomon's (2009) work. Solomon, a researcher in the fields of educational administration and policy, further describes the planned curriculum as a component of curriculum enactment whereby the teacher interprets the intended curriculum into a schedule of activities aimed at preparing for classroom instruction. Solomon's (2009) text did not provide a definitive definition for the planned curriculum. However, her description does state that the planned curriculum ultimately may not be enacted in its entirety, but that classroom practice may represent a combination of planned and unplanned curriculum. Solomon (2009) stated that the enacted curriculum may constitute activities or learning experiences that are not "written" into the plan. Thereby, she has positioned the planned curriculum as the plan that the teacher has developed for covering the intended curriculum, but not the act of teaching the curriculum in the classroom. Thus, the planned curriculum is part of teacher preparation not created during classroom enactment of the curriculum.

3.2.3 The hidden curriculum

In her definition of curriculum, Solomon (2009) referred to the unplanned activities that occur in classroom practice; in curriculum terminology, this is referred to as the hidden curriculum. According to Solomon (2009), the hidden curriculum describes those activities or learning experiences that are not included in the planned curriculum, but which are enacted in the classroom.

Other researchers and theorists have attributed the hidden curriculum to other aspects of the curriculum discussion. Pinar et al. (1995) wrote of the hidden curriculum, asserting that it can be the avenue for other political agendas or priorities. That is, those imperatives that are not embedded within the intended curriculum but become the requirements of classroom. These imperatives can include a political focus on a particular area of learning, a response to a societal cause or issue, or a school-based focus or response to a local concern or school change. Each of these ideas constitutes an observable aspect of current school curriculum.

American philosopher and educational reformer, Dewey (1938), was a major voice in progressive education for over a century. In his work, *Experience and*

education, Dewey (1938) defined the notion of "collateral learning" (Dewey, 1938, p.48), which is often the basis of most definitions of the hidden curriculum. Dewey (1938) defined collateral learning as the affective elements that students develop from their learning of subject matter (for example, behaviours, attitudes and habits). Further, Dewey argued that the development of such behaviours, attitudes or habits were more significant than their content learning in the subject, as they also permeated a student's future interactions with the subject matter.

Each definition of the hidden curriculum has provided a different slant on what encompasses the hidden curriculum. While Dewey's (1938) definition is the most often referred to in discussions about the hidden curriculum, all three definitions have posed aspects of the curriculum that are evident in classrooms, but which are seldom defined in the intended curriculum materials presented to teachers. Therefore, each of these aspects, whether describing the unplanned activities in the lesson (Solomon, 2009), the social and political issues that permeate learning (Pinar, 2005) or the values and attitudes that spark a life-long love of learning (Dewey, 1938), constitutes a potential deviation from what is presented in the intended curriculum. Each of these aspects provides a plausible deviation in the classroom from what the students are intended to learn in accordance with the curriculum as set by the curriculum authority. In Porter's view, each of these aspects could contribute to a misalignment between what has been intended by the curriculum developer (intended curriculum) when compared with the actual interactions of the classroom (enacted curriculum).

Vos, Taconis, Jochems and Pilot (2010), researchers in chemistry education, designed a framework to analyse the interactions of teachers with context-based curriculum materials designed to support teaching in chemistry. Vos et al. (2010) determined that classroom implementation of context-based curriculum in chemistry could be hindered by two factors: incoherencies in the intended curriculum as provided to teachers, or the teachers' underlying preference for an emphasis not supported or suggested in the intended curriculum. Vos et al. (2010) provided another method for identifying inconsistencies and misalignments between the curriculum that is intended and the curriculum that is enacted. This was based upon an earlier process in the interaction, that is, from the teacher's first reading of the curriculum. At the first reading, the teacher interprets the curriculum in preparation

for enactment in the classroom; it is here that Vos et al. (2010) identified an opportunity for misalignment, as the intended curriculum may be difficult to interpret or the teacher may view the curriculum through a lens not actually suggested by the curriculum. Curriculum authorities are aware of the potential for ambiguities to occur within curriculum policy and often this is the focus of accompanying professional development or additional resources.

3.2.4 Definitions of curriculum in policy

Currently, in Queensland, the intended mathematics curriculum that teachers are required to teach across the Preparatory Year through to Year 10 is the Australian Curriculum. In Australian Curriculum documentation, ACARA have defined the term curriculum content as identifying "what teachers are expected to teach and students are expected to learn" (Australian Curriculum, Assessment and Reporting Authority, 2013, p.5). The definition expresses curriculum content as the described "knowledge, understanding and skills" (Australian Curriculum, Assessment and Reporting Authority, 2013, p.5) for a learning area or subject at the year level that is being taught.

The QCAA is charged with support for the Australian Curriculum and its implementation in Queensland. It is interesting to note that the QCAA has not adopted the ACARA definition for curriculum content, while it has assumed the Australian Curriculum unmodified. The QCAA definition of curriculum makes the distinction between curriculum as content and the experienced curriculum (The State of Queensland (Queensland Curriculum and Assessment Authority), 2014b). The definition for curriculum as content states: "The selected traditions of knowledge, skills and practices that education systems deem to be of value for construction by, and transmission to, successive generations of learners" (The State of Queensland (Queensland Curriculum and Assessment Authority), 2014b, p. 5).

The QCAA definition for curriculum as content aligns with the notion of intended curriculum, as it makes reference to curriculum as constructed by curriculum authorities and distributed to teachers for transmission to students. The QCAA definition of experienced curriculum states: "The sum of the learning and development experiences that are offered by a school, formally and informally, in class and out of class" (The State of Queensland (Queensland Curriculum and Assessment Authority), 2014b, p. 5).

The QCAA definition of the experienced curriculum, while aligning conceptually with enacted curriculum, also encompasses the three definitions of the hidden curriculum previously explored. It acknowledges the unplanned activities that can occur in lessons by using the distinction between formal and informal experiences. Through the reference to the "sum of the learning and development experiences" (The State of Queensland (Queensland Curriculum and Assessment Authority), 2014b, p.5), it alludes to the broader learning experiences encompassing the social and political issues that can permeate learning and the values and attitudes that are established and developed.

The QCAA and ACARA each define the term 'curriculum content', but not the term 'curriculum'. However, neither organisation provides a description of the relationship between the two terms. The definitions provided by both organisations seem to imply that curriculum content is a sub-element of curriculum containing the specific aspects of the discipline that teachers are required to teach.

3.2.5 Summary: Definitions for the purpose of the study

Section 3.2 has provided an exploration of the literature relating to defining curriculum. It has examined the common definitions that have been held of curriculum and the different notions of curriculum, including analysis of the definitions of curriculum held by key organisations in the context of this study.

Through the literature, it has been observed that commonly, two key curriculum definitions permeate research, with many additional terms and definitions used to describe other aspects of curriculum as needed. Those two key definitions relate to the curriculum as developed by a "curriculum developer" or "the state", and curriculum as enacted in the classroom. For the purposes of this study, these aspects will be termed the *intended curriculum* and the *enacted curriculum*.

The literature that has been considered mentions the notion of teacher curriculum planning. This planning is not explored in detail, nor has it been effectively defined. The notion of teacher curriculum planning has been inconsistently treated within the literature. It has been described as aligning to the intended curriculum, as the teachers' intention of what they will cover (Ellis, 2004; Sherin and Drake, 2009), while other researchers have positioned it as an aspect of curriculum enactment (Solomon, 2009). It is argued, in the present study, that teacher

curriculum planning is an aspect of curriculum in its own right. It is the interpretation of the intended curriculum by the teacher in preparation for enactment, however, it is not necessarily followed exactly or completed fully in the process of enactment. In this study, this notion will be termed the *planned curriculum*.

The three key terms aforementioned - intended curriculum, enacted curriculum and planned curriculum - are integral to the conceptual framework of the present study. From the exploration of curriculum definitions and referents to them, these key terms will be defined accordingly for the purposes of this study.

Intended curriculum

Definitions of the intended curriculum in the present study were informed by Ellis (2004), Reid (2005), Porter (2004), Sherin and Drake (2009). Ellis (2004) described the prescriptive curriculum as outlining the intentions of what could be taught in the classroom. Added to Ellis's definition are Reid (2005) and Sherin and Drake's (2009) notions of centralised development and publication through an official document or authority. Finally, Porter (2004) has also influenced the definition for the study through the conception of instructional targets and alignment of these to a particular subject or grade level, thus providing a goal for the achievement of such curriculum targets.

In the present study, the intended curriculum was defined as the curriculum that is provided as the overarching goals of a course of study in a year level and/or learning area. The intended curriculum maps the educational landscape for the learning area, subject or discipline, by setting the direction for the teaching, learning and assessment for the population who are required to become skilled in that learning area, discipline or subject. Delivered in the form of curriculum policy, it is prepared by policy makers and/or curriculum developers from the curriculum authority of the jurisdiction, for use by teachers and schools.

Planned curriculum

In contrast to the definitions posed by Ellis (2004), Solomon (2009) and Sherin and Drake (2009), in the present study the planned curriculum was considered as a curriculum aspect in its own right. Solomon (2009) positioned planned curriculum aspects within the realm of curriculum enactment. In contrast, Ellis (2004) and Sherin and Drake (2009) considered curriculum planning as an artefact of intended

curriculum. The notion of the planned curriculum for the present study aligned with that of Remillard and Heck's (2014) concept of the *teacher-intended curriculum*, that is, the curriculum interpretations and decisions that teachers make in the process of planning for instruction in the classroom.

In the present study, the planned curriculum was defined as an interpretation of the intended curriculum, which teachers develop as they chart a course for their learning area and year level in their school. It is individual to a school context, as it is prepared by teachers often in conjunction with heads of department/curriculum, and represents the total planned learning experiences that have been designed for their students. The process of preparation often involves reading and interpretation of the intended curriculum in conjunction with other supporting resources and/or professional development. It also often includes identification of relevant school-based resources as a means to prepare for the requirements for teaching in the classroom.

Enacted curriculum

For the present study, the enacted curriculum was defined in keeping with Pinar's (1975) conception of curriculum as a process of enactment, *currere*. The construction of the present study's definition developed through engagement with writers such as Ellis (2004), Porter (2004), and Sherin and Drake (2009). Ellis's (2004) and Sherin and Drake's (2009) definitions of the descriptive curriculum highlight engagement of the prescribed curriculum in the classroom with the students, while Porter's (2004) enacted curriculum further specifies the responsibility of the teacher, as it is an aspect of the teacher's delivered instruction.

In the present study, the enacted curriculum was defined as the interpretation of the intended curriculum, which is actually delivered in the classroom. It is presented by teachers to students, the journey into which is undertaken by the teacher and students in learning the specified content. It often encompasses those experiences outlined in the planned curriculum, however, it can be flexible enough for adjustments to be made to cater for the needs of all learners, and consequently may contain more or less of the learning experiences identified in the planned curriculum dependent upon a number of influences. Typically, these influences relate to the teacher's knowledge and beliefs (including knowledge of their students'

understanding and knowledge of assessment), time constraints and access to teaching resources.

3.3   CURRICULUM CHANGE, INTERPRETATION AND ALIGNMENT

The curriculum context of this study has analysed teachers' interpretations of curriculum during a time of curriculum change. This section will consider research relating to curriculum change and support for interpreting the curriculum. Section 3.3.1 will consider literature addressing curriculum change and support for teachers during the time of reform. Section 3.3.2 will then address teacher interactions with curriculum, including the notion of teachers as the implementers of curriculum reform. Section 3.3.3 will then discuss literature pertaining to the determination of curriculum alignment during the process of curriculum interpretation. Section 3.3.4 will provide a summary of the discussion.

3.3.1 Supporting curriculum change

According to Cuban (1988), change within schools brought about by a reform can be interpreted by teachers as criticism of their teaching practices. As a former superintendent, Cuban maintained an open dialogue with the administrators of schools, to allow discussion of policy issues to inform his research thinking. Cuban (1988) stated that by asking the question of how teachers can help these students more effectively and then using this information to develop reform, which is handed to teachers to implement, resentment of the 'top' will continue to be seen. He contends that a plan developed in isolation of the teachers it involves, breeds resentment through a perceived distrust of the teachers and a view that centrally-devised reform is telling teachers what to do, rather than supporting them to address the problem or issue.

In an article contributed to the Australian curriculum journal, *Curriculum Perspectives*, Griffin (1998) assessed the understanding of a group of teachers involved in the implementation of outcomes-based education in Australian schools. In the article, Griffin (1998) reported that outcomes-based education and the implementation of the reform were not well understood by the teachers in his research. Further, he stated that support in the form of professional development was key to teachers feeling that they had a shared commitment to achieve the reform

outcomes, as well as to build understanding of the reform and the capacity of teachers to implement it.

Griffin's (1998) view was that the design of curriculum needs to be responsive and must change to meet the range of contexts in learning and assessment programs that it will support. He argued that the constructions of discipline learning areas constrain the curriculum delivery and consequently, many schools and teachers can say that they are 'doing the curriculum' by merely adhering to the course as defined by the curriculum documents. Griffin viewed this as a superficial implementation of the curriculum rather than an implementation that marries the underpinning philosophy and intention demonstrated through the teaching and learning (the how) with the aspects of curriculum content described in the curriculum (the what). Griffin contended that this should not be the case. Instead, the integration of the underpinning philosophy of the curriculum should be a fundamental factor as it is integral to full implementation of the curriculum.

Griffin (1998) further reasoned that a lack of understanding about what it means to be 'doing the curriculum' was clearly prevalent amongst the teachers in his study. He declared that teachers need additional support to build the understanding required for implementation of large-scale reform agendas: "… teachers need a great deal more support and professional development if the approach is to be successfully implemented" (Griffin, 1998, p.17). Griffin (1998) was referring to outcomes-based education reform when he stated that teachers needed a greater level of professional support. He particularly specified professional development as a mechanism for supporting change reform agendas. Fullan (2000) would suggest that a greater level of support was needed than just professional development.

Fullan (2000) stated that successful change within school will not be seen until a majority of teachers can feel more like the providers than the recipients of the change. Fullan's statement aligns with Cuban's (1988) view about top-down reform agendas, as well as Griffin's (1998) claim of the necessary shared commitment. The layers of complexity involved in the change process for the successful implementation of school reform has been illustrated and described by Fullan (2000) in *Phi Delta Kappan*, in which he presented three stories of school reform. In that article, Fullan stated that successful schools see themselves as responsible for two change agendas. Successful schools take responsibility for school improvement

agendas, as well as teacher education, which they see as key to successful change management. That is, in times of reform, effective schools see the change as an enhancement of the teaching profession. The schools in Fullan's (2000) study ensured that they invested in their teachers, realising that the teachers ultimately had carriage of implementation of the reform.

In the Australian context, Perillo and Mulcahy (2009) have analysed changes in education and have co-written articles based on their research in educational management, leadership and curriculum change. In an article about curriculum change in schools, Perillo and Mulcahy (2009) wrote: "'Doing' curriculum change is not a simple matter of applying curriculum knowledge acquired through institutionalised learning to professional practice" (Perillo & Mulcahy, 2009, p.49). Perillo and Mulcahy reflected that learning about a curriculum change does not mean automatic implementation of that curriculum, but rather that there needs to be a personal interconnection of the underlying notions of the change with the professional practice. They continued that, in their view, curriculum change is a complex co-construction which translates the products of learning and professional practice from the curriculum as presented and that it is the personal journey of the teacher that enables the curriculum change to be implemented. Writers such as Perillo and Mulcahy (2009) highlighted the need for curriculum change to be seen as a local reform imperative rather than a system-wide directive. They argued that it is through the lens of local reform that the meaningful changes of relations between people and things are most likely to occur. Perillo and Mulcahy (2009) noted that teachers need to develop the shared commitment and understanding of any curriculum framework to assist in their implementation of the curriculum.

Cuban (1988), Griffin (1998), Fullan (2000), Perillo and Mulcahy (2009) share a common viewpoint: for a change agenda to be adequately understood, adopted and correctly implemented, teachers need to feel involved. Teachers need to feel that they are represented as fundamental instigators and co-developers of the change. They do not gain the essential understanding of the change necessary to implement it, if they are bystanders to the decisions and development of the change process. This view of teacher engagement is echoed in the curriculum development experience of the researcher of the present study.

In her professional role, the researcher of the present study is a Manager at the Queensland Curriculum and Assessment Authority, the statutory authority currently responsible for the support of Queensland's 1,723 schools across three schooling sectors (Catholic schools, Government schools and Independent schools). Presently, the researcher is responsible for the development of policy, resources and professional learning opportunities to assist schools to implement the Australian Curriculum in Queensland across Preparatory Year (the year before Year One in Queensland) to Year 12 (the final year of school in Queensland). The researcher has over 11 years of curriculum development experience, during which she has been involved with multiple change reform agendas in state and national curriculum. She has observed that it is the reforms that engage the teachers from the outset that have had the smoothest transitions.

3.3.2 Teachers' curriculum interpretation

Sherin and Drake (2009) suggested that while a gap exists in literature analysing the way teachers use curriculum materials, there have been a small number of studies attempting to analyse the curriculum experience of teachers in the classroom. They acknowledged that no curriculum material or lesson can be taught exactly as written and inevitably adaptations will be made by teachers to these curriculum materials. Through their study, Sherin and Drake sought to analyse teacher adaptations of curriculum materials by using a framework to characterise elementary teachers' use of reform-based mathematics curricular. In their study, they observed and interviewed a group of teachers implementing new curriculum materials for the first time and sought to classify the teachers' interactions with the curriculum materials. From their observations, Sherin and Drake (2009) developed the curriculum adaptation spectrum, which has been included in Figure 3.1.

Omit	Replace	Create

Figure 3.1. The curriculum adaptation spectrum (Sherin & Drake, 2009, p.487).

The spectrum serves to categorise the patterns Sherin and Drake (2009) observed in the way in which teachers interacted with the curriculum materials in the classroom. Their evaluations placed the teachers at one of the three points along the spectrum. Teachers were seen to:

- **omit** aspects of the lesson – leaving the element out entirely if they did not understand the mathematical requirement of the aspect or if they felt the aspect reflected a 'game' rather than an educational activity for learning the content

- **replace** aspects of the lesson – if the teacher felt they knew a 'better' activity to replace that suggested in the curriculum materials or if the teacher felt the students needed more support on a particular aspect of the curriculum, e.g., one teacher changed multiple-digit addition for single-digit addition to give her students more time to grasp the basics of addition

- **create** new aspects to be included in the lesson – teachers created new activities where they felt the curriculum materials were lacking, e.g., one teacher created transition activities to help her students move from one activity to the next.

Generally, Sherin and Drake (2009) commented that teachers fitted into one of the categories along the spectrum and rarely changed over the course of the study. These findings confirmed their position that teachers inevitably make adaptations to the curriculum in the process of enactment. Further, Sherin and Drake (2009) suggested that no lesson is implemented exactly as written in curriculum materials.

Miriam Ben-Peretz has researched extensively in the areas of curriculum design, teacher education and professional development. She presented a conceptual framework for the interpretation of curriculum materials, which outlined a similar but slightly alternate view to those previously presented, i.e., Cuban (1988), Griffin (1998), Fullan (2000), Perillo and Mulcahy (2009). Instead of looking at teachers as the only interpreters in the process of curriculum enactment, Ben-Peretz (1990) described each layer of curriculum development as an interpretation, which includes the curriculum developers' initial development of the curriculum as well as the teacher's interpretation of the curriculum provided to them.

Ben-Peretz (1990) described the curriculum developer as the first level of interpretation as they take the scholarly subject matter and transform the subject matter into an intended curriculum in the form of curriculum materials for teachers. These curriculum materials then guide teachers as they interpret them to become the planned curriculum for the classroom.

Ben-Peretz (1990) expressed that the second level of interpretation is performed by the teacher as the transformation that takes content knowledge and develops it to be responsive and adaptive to the students in the classroom. The second level of interpretation aligns to Pinar's (2004) notion of bringing the content matter to life, which was previously considered in this chapter. Ben-Peretz (1990) suggested that through the process of interpretation, teachers perform a development role in curriculum, even when the curriculum is externally developed, as they are developing a curriculum that is appropriate for the students they are to teach. She proposed that teachers' modifications of curriculum occur at a number of levels dependent upon a number of influencing factors. These factors are dominated by the teachers' level of experience. As such, the curriculum that is delivered in the classroom may be a modification of the original intention of the curriculum developer. Together with Connelly, Ben-Peretz described three avenues for modification of curriculum, which are outlined in Figure 3.2.

(a) Teachers as users of teacher-proof curricula	(b) Teachers as active implementors	(c) Teachers as partners in development	Key:
X to X'	X to X'	X to X'	X= developers' curricular ideas
Materials designed to minimise teacher influence	Teacher assumed to have impact of implementation of curricular ideas. Implementation-oriented strategies aimed at helping teachers understand curricular innovation.	Teachers assumed to be full partners in development as user-developers. Teacher inquiry oriented toward discovery of curriculum potential, change and transformation of materials, and devising of new alternatives.	X'= translation of ideas into curriculum material X"= implementation of curricular ideas in classroom Y, Z= alternative versions of curricular ideas
to X"	to X"	to Y to X" to Z	

Figure 3.2. Possible interactions between teachers' curricula and research results (Connelly & Ben-Peretz, 1980, p.106).

In stream (a), the teacher views the curriculum provided by the curriculum developer as unchangeable. They may see their role as a transmitter of the ideas contained within the curriculum materials and feel restricted to making changes to what has been provided. In the classroom, students are provided with a direct replication of the curriculum as it was intended by the curriculum developer, with minimal modifications by the teacher.

In stream (b), the teacher is provided with the curriculum materials and professional development, which unpack the intent of the curriculum developer who developed the materials. In this stream, the teacher is given direct insight into the decisions and intentions of the curriculum developer assisting their interpretation. In the classroom, students are provided with a direct replication of the curriculum as it was intended by the curriculum developer with minimal modifications by the teacher. Connelly and Ben-Peretz (1980) suggested that through direct insight into the development process the teacher now understands the journey the curriculum developer took to create the materials, and therefore chooses to maintain the integrity of the curriculum materials as they are written.

In stream (c), the teacher assumes "full-partnership" (Ben-Peretz, 1990, p. 57) in the curriculum development process. Connelly (1972, cited in Ben-Peretz, 1990) terms the role of the teacher in stream (c) the "user-developer" (Ben-Peretz, 1990, p. 57) as the teacher modifies the curriculum to meet the specific educational situation in their classroom, as part of interpreting the curriculum materials that have been provided by the curriculum developer. According to Ben-Peretz (1990) in the classroom, the students may be provided with curriculum with varying degrees of modification, dependent upon the decisions the teacher has made during interpretation. The teacher ultimately decides how closely aligned the curriculum in the classroom will be to the curriculum materials provided by the curriculum developer. In Figure 3.2, the alternate pathways taken by teachers in the curriculum interpretation have been illustrated through the introduction of 'Y' and 'Z' as alternative versions of curricular ideas (Connelly & Ben-Peretz, 1980).

Connelly and Ben-Peretz (1980) indicate stream (c), teachers as partners in the development, as their preferred method of curriculum interpretation. They express their preference in subsequent publications of the ideas and diagram (Ben-Peretz, 1990). They explain that stream (c) allows the curriculum potential to be realised, something which is only possible by the teacher bringing the curriculum materials to life for the students. In this way, it is only the teacher who will be able to account for the full range of students and teaching situations that are faced in the classrooms where the curriculum materials must be taught (Ben-Peretz, 1990).

Stream (c) describes a similar relationship to that explored through the notions of intended and planned curriculum. The curriculum intention provided in the

curriculum materials by the curriculum developer is akin to that which has been explored in the intended curriculum. The interpretation of the teacher unpacking the curriculum materials and tailoring the curriculum to meet the needs of the students in their classroom is analogous to the notion of the *planned* curriculum.

Ben-Peretz's (1990) perspective of curriculum development aligns with the intentions of the Queensland Curriculum and Assessment Authority and, at a national level, by the Australian Curriculum, Assessment and Reporting Authority. Each curriculum policy document and its accompanying curriculum materials are developed as a description of the content and standards for teachers to use in developing the course for their students. It is not intended to be a rigid and prescribed outline of what must be covered and in what order, but rather a guide that can be followed in whichever way best suits the travellers (students) in partnership with their guide (the teacher).

According to Fogelman, McNeill and Krajcik (2011), a tension exists in the way researchers conceptualise teachers' use of curriculum materials. Fogelman, et al. (2011) investigated how teachers adapted inquiry-based science curriculum to ascertain the degree of adaptation in conjunction with the teacher's degree of self-efficacy and experience. Fogelman et al. (2011) admitted that teachers' adaptations can have positive and negative influences on students' learning of the materials that they are teaching. The influence can be positive if it brings relevance to the concept or ideas, or if the alterations allow for students to engage in content pitched more appropriately to their level of learning. However, adaptations can pose an adverse effect by lessening the alignment of learning to the curriculum designers' intentions, and ultimately the curriculum standard of learning that has been set for those students (Fogelman et al., 2011).

Although curriculum materials provide an essential support to teachers in the preparation and understanding of curriculum reform, there are a range of outcomes from research as to the effect of teacher adaptation of curriculum materials (Fogelman et al., 2011). Findings in research range from those recognising the necessary role teachers have in adapting the resources to support the individual and unique learning of the students in their classes, through to those studies that emphasise the need for teachers to remain true to how the curriculum materials were designed (Fogelman et al, 2011; Pinto, 2005).

Pinto (2005) coordinated a research project founded by the European Union entitled *Science Teacher Training in an Information Society*. Pinto (2005) provided an overview of the papers developed from the project spanning four European countries. Pinto (2005) concludes that transformations of the curriculum materials are rarely accidental. Transformations occur necessarily in the process of communicating the curriculum, with many transformations having a neutral effect as teachers adapt the innovation to their specific contest. However, often adaptations with adverse effect on student learning develop from the teacher's misunderstandings of a concept or differences in opinion on the subject matter they are required to teach (Pinto, 2005).

The process of curriculum enactment involves teachers interpreting the curriculum in order to implement it. The notion of teacher preparation including the process of curriculum interpretation is supported by Schnepp, an American veteran mathematics teacher who worked with researchers involved in analysing curriculum materials. Schnepp has claimed that often, curriculum materials are intended to be interpreted by teachers as they contextualise them to enact with the students in their care (Schnepp, 2012). As teachers interpret the curriculum in this process of co-development the curriculum itself begins to change shape. The teacher makes decisions about which aspects to retain, which aspects to modify and, at times, which aspects to leave out of their planning. The teacher also determines the sorts of activities they will plan to introduce concepts to their students and what sorts of activities will help students revise concepts that may have been previously covered during other teaching times. These decisions may not necessarily be the same decisions made by all teachers. Teacher planning of activities for the classroom is a part of the teacher attempting to enliven the curriculum for their students.

3.3.3 Ascertaining the alignment of interpretations of curriculum

According to Polikoff, Porter and Smithson (2011), there are three methods for ascertaining the alignment of curriculum standards and assessment. These are Webb's alignment procedure: Resnick, Rothman, Slattery and Vranek's Achieve procedure; and Porters' Surveys of Enacted Curriculum. The approaches developed by Webb and Resnick et al. each rely on direct comparison of the two curriculum aspects for the purpose of ascertaining the alignment. Porter's approach, however, uses alignment to a standardised model prior to comparison in order to gather a

broader basis for the analysis and thus more comprehensive data for purposes of comparison (Polikoff et al., 2011). Porter's (2011) alignment tool was used during the development of the Australian Curriculum.

Porter (2011) has worked to develop quantitative tools to quantify the alignment between the intended, enacted and assessed curriculum. As discussed in Section 3.1.2, Porter (2006) defined the intended curriculum as that expressed by the state content standards, the enacted curriculum as the instruction or what it is that happens in the classroom, and the assessed curriculum as tests of student achievement. Further, Porter (2006) defined curriculum assessment to mean: "Measuring the academic content of the intended, enacted, and assessed curricula as well as the content similarities and differences among them" (p. 141).

Porter noted that these definitions of different curricula were central in his endeavour to ascertain the specific contents of each in an attempt to determine the degree of alignment between them. From this, he was then able to determine the level to which the enacted curriculum has reached the content target as an interpretation of the intended curriculum. Throughout his research on teachers' content decision-making, Porter's (2002) aim has been to develop a language standard for describing curriculum content. It has culminated in the development of a number of tools for measuring the alignment of content including the Surveys of Enacted Curriculum (SEC) approach, which provides a method of mapping the alignment of curriculum interpretations (Porter, 2002).

Porter's earlier work (see, for example, Freeman, Kuhs, Porter, Floden, Schmidt, & Schwille, 1983) sought to analyse the content of standardised tests, mathematics textbooks and other instructional materials to ascertain the level of consistency in topic coverage. Measuring consistency between standardised tests, textbooks and other materials led to the development of a three-dimensional taxonomy, which has been the basis of much of Porter's curriculum research over several decades (for example, Freeman & Porter, 1989; Porter, 2002; Smithson & Porter, 2004; Porter, McMaken, Hwang & Yang, 2011).

Porter's three-dimensional taxonomy aimed to describe, and ultimately compare, the content of elementary school Mathematics curriculum based on general intent (the applications, skills and conceptual understandings), the mathematical topics of instruction (e.g. fractions), and the mathematical operation that students

were required to perform (e.g. estimation, multiplication) (Freeman et al., 1983, p. 502). Over time, the use of the taxonomy has provided a measure of the degree of variability across topic coverage of the resources interrogated, as well as the capacity to compare instructional time and relative complexity of the concept developed. Measuring the degree of variability of topics covered, instructional time and relative complexity has been the foundation of the development of the Surveys of Enacted Curriculum (Porter, 2002).

The Surveys of Enacted Curriculum approach is a tool to make direct comparisons of curriculum or assessment. The approach requires curriculum analysts to define the intersection of topic and cognitive demand, employing a two-dimensional framework (topics and cognitive demand) (Porter et al., 2011). The topic dimension has been developed across a number of discipline content areas describing general topic areas. The cognitive demand dimension is comprised of five levels of cognitive demand unique to the subject that is being described. In mathematics, these are memorise, perform procedures, demonstrate understanding, conjecture, and solve nonroutine problems. The two dimensions are usually displayed in a table: the mathematics table has been replicated in Figure 3.3.

Topics	Categories of Cognitive Demand				
	Memorize	Perform procedures	Demonstrate understanding	Conjecture, generalize, prove	Solve nonroutine problems
Multistep equations					
Inequalities					
Linear, nonlinear relations					
Rate of change/ slope/line					
Operations on polynomials					
Factoring					

Figure 3.3. Design of the Surveys of Enacted Curriculum mathematics analysis tool (Porter et al., 2011, p. 104).

The analyst is required to code each objective of curriculum or assessment item into one or more of the cells according to their understanding of the intersection between the topic covered and cognitive demand required (Porter et al., 2011). All documents are considered by three to five analysts trained in the use of the approach.

Each survey tool completed for a document is converted into proportions and averaged across the analysts involved in the comparison. This results in a matrix of proportions for use in calculating alignment. The extent of alignment of two documents (for example, content standards and assessment designed to assess the content standards) is then calculated using the alignment index (Porter et al., 2011). The alignment index is a number less than one that represents the extent to which the cell proportions of topics and cognitive demand are equivalent across the two documents being compared; the alignment index is calculated according to the equation:

$$\text{alignment index} = 1 - \frac{[\sum |x_i - y_i|]}{2}$$

where x_i and y_i stand for the proportion in cell i for documents x and y respectively

<div align="right">(Porter, et al., 2011, p.104)</div>

Porter et al. (2011) graphically represent the degree of alignment observed in the analysis using topographical maps. In the maps, the topics dimension is represented like lines of latitude (on the x axis), while the degree of cognitive demand is illustrated as lines of longitude (on the y axis). An example of a topographical map from Porter et al. (2011) appears in Figure 3.4.
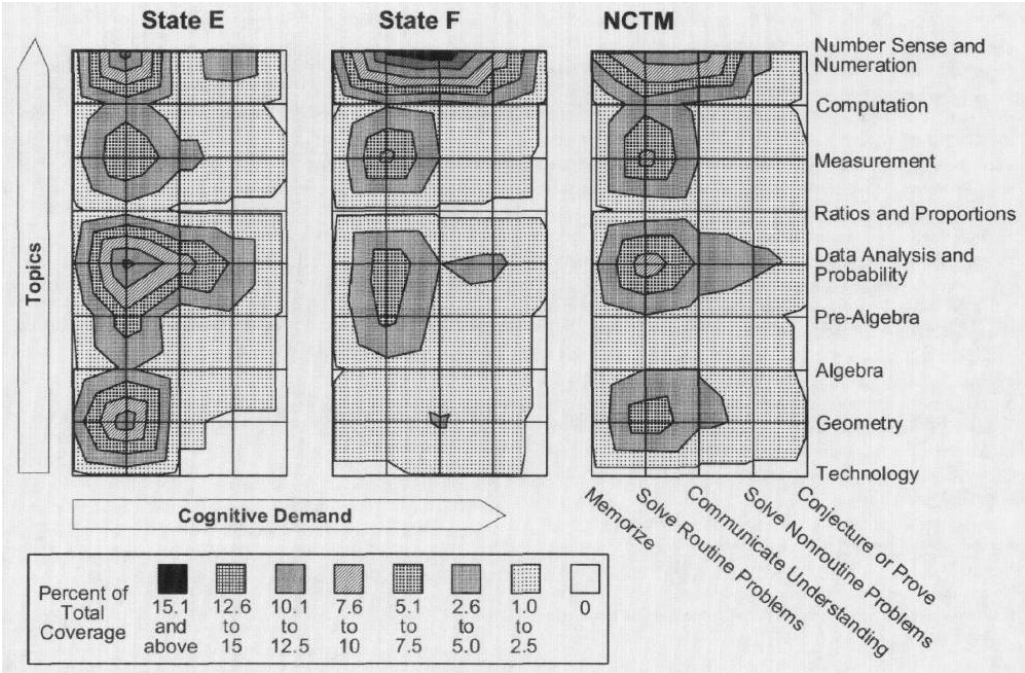
Figure 3.4. Representations of mathematics curriculum using the Surveys of Enacted Curriculum
(Porter, 2002, p.8)

Through the use of the graphical representation, a further dimension of the curriculum is able to be exhibited, that is, the time that has been spent in the teaching of the topic (Porter et al., 2009). The depth of treatment is represented by the colouring used on the map, deeper colours for longer engagement with the topic. The maps created represent the topics and cognitive demand of the curriculum analysed and can therefore be used as a means of comparison to other curriculum through comparing and contrasting the maps of the two curricular.

The Surveys of Enacted Curriculum mapping tool, and its accompanying topographical mapping representations, were used by ACARA in the development of the Australian Curriculum. National and international curriculum comparisons guided refinement of the draft Australian Curriculum for English, mathematics, science and history (Jane, Wilson & Zbar, 2011). ACARA commissioned a team of researchers to lead a mapping process to allow a number of comparisons to be made. The process of curriculum mapping was undertaken in five stages (stages 1, 2, 3, 4, and 4a).

Stage 1 asked curriculum developers from each State and Territory to map the draft Australian Curriculum and two other State or Territory curriculum documents (Jane, Wilson & Zbar, 2011). Stage 1 was a comparison of the mapping of the current intended curriculum of each state and territory with a mapping of the draft Australian Curriculum to ascertain similarities and differences in the coverage of topics and cognitive demand required. Stage 2 involved teachers mapping their reflections of a recently completed period of teaching, using the same tool to develop a map of the current enacted curriculum in each state and territory for comparison to the Australian Curriculum. Stage 3 invited a smaller, select group of curriculum developers to map the draft Australian Curriculum and two different international curriculum documents (the draft Australian Curriculum: Mathematics, was compared with Mathematics curriculum from Finland and Singapore). The third stage was to provide an international benchmark against which to compare the draft Australian Curriculum. Finally, stages 4 and 4a (4a was for mapping of the English curriculum only) involved the mapping of the finalised Australian Curriculum for purpose of comparison (Jane, Wilson & Zbar, 2011). As a Queensland curriculum developer in Mathematics, the researcher of the present study was involved in multiple stages of the curriculum mapping process.

The aim of the study was to provide advice to ACARA during the development of the curriculum, and also to ascertain areas of need for teacher development in the implementation of the curriculum. The final report (Jane, Wilson & Zbar, 2011) presented ACARA with a picture of the degree of alignment within the curriculum with the state and territory curriculum documents and therefore an indication of areas of need for greater support during implementation.

3.3.4 Summary

This section has reflected on curriculum change and the considerations for ensuring adequate support to teachers for understanding the purpose and intent of reform. The research referred to in this section suggests that one of the key factors to successful reform is the involvement of teachers. The section has also analysed the interactions that teachers and other education professionals have with curriculum. Further, it has considered the processes by which curriculum interpretation is supported. Finally, the section discussed a method for ascertaining the alignment of curriculum interpretations that has been used as a component of the development process for the Australian Curriculum.

The process of curriculum interpretation is not isolated. Curriculum interpretation occurs while education professionals accommodate competing demands from numerous sources. Some of the competing demands affect the decisions that are made in relation to curriculum; this is the focus of the next section.

3.4   INFLUENCES ON CURRICULUM INTERPRETATION

Section 3.4 explores the influences that impact upon curriculum interpretation. Led by a conceptual framework developed by Remillard and Heck (2014), this section will explore the influences on curriculum decisions made on the path to curriculum enactment. Section 3.4.1 examines influences that emanate from teacher beliefs, practices and knowledge. Section 3.4.2 considers teacher support for the needs of students, including consideration of the pitch of curriculum and assessment. Teacher access to resources and support is the focus of Section 3.4.3, before the impact of time is considered in Section 3.4.4.

Remillard and Heck provided leadership to the Centre for the Study of Mathematics Curriculum. The centre was established with the goal of mapping the interactions between American teachers and the curriculum (Centre for the Study of

Mathematics Curriculum, 2011). It was hoped that ultimately the work undertaken by the centre would allow for the analysis of the curriculum decisions teachers make. Remillard and Heck (2004) considered that analysis of teachers' decisions would allow for them to discern the sorts of influences that impact upon each aspect of the decision-making process. Remillard and Heck (2014) have refined the framework used by the centre as the basis of the research and have published a conceptual framework for describing the curriculum enactment process. The conceptual framework (Remillard & Heck, 2014) is specific to decisions made with mathematics curricula. The research presented the artefacts of the decisions that mathematics teachers make when interpreting curriculum, for example, the teacher-intended curriculum and student outcomes. Further, they identified the influencing factors upon these decisions. The conceptual framework that was developed is included at Figure 3.5.
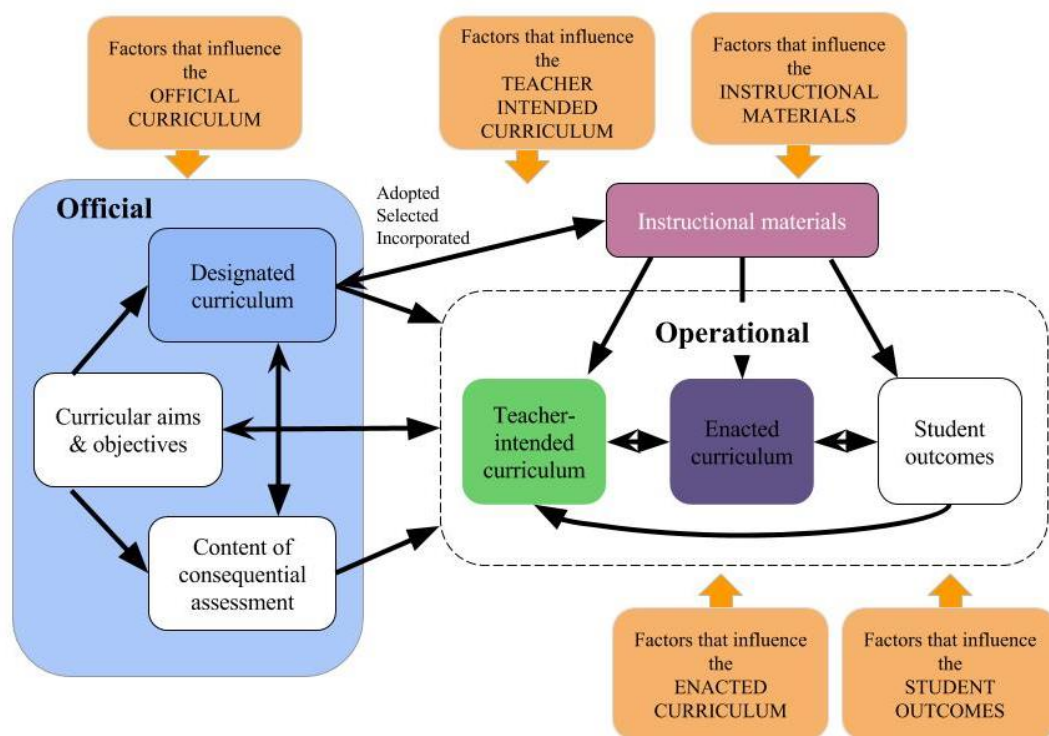
Figure 3.5. Visual model of the curriculum policy, design, and enactment system (Remillard & Heck, 2014, p. 709).

The visual model of the curriculum policy, design, and enactment system outlined a distinction between the official curriculum and the operational curriculum (Remillard & Heck, 2014). The official curriculum is described as provided by a curriculum authority, in this case, the curriculum as specified at state and local levels

within the United States. Within the official curriculum, Remillard and Heck (2014) identified three components; they were:

- designated curriculum – defined as the set of plans as specified by the authority intended to offer guidance to teachers working towards implementation of the curriculum goals

- curricular aims and objectives – the specified learning expectations set by the authority, which articulate the outcomes for students who learn from the curriculum

- content of consequential assessment – the content assessed in official assessments set by the authority and used to track progress of a school, teacher or student.

Remillard and Heck (2014) articulated that all three of these aspects contribute to the official curriculum that is intended to be taught. The framework specifies designated curriculum as an aspect of the official curriculum to account for jurisdictions where an authorised textbook/s is/are a mandated aspect of the curriculum as written.

The framework accommodated those jurisdictions where there is a mandated textbook chosen from an array of commercial products, through the use of the instructional materials as an element of the framework outside the border of the official or operational curriculum structures. Further, the inclusion of the element of *instructional materials* is to acknowledge that the nature and content of texts has changed through digitisation and the availability of the Internet.

The framework included the operational curriculum, as the curriculum that is enacted by the teacher. Remillard and Heck (2014) felt that the distinction between the official curriculum and the operational curriculum was necessary, as it acknowledged that teachers adapt the curriculum from what is presented as they enact it in the classroom. The operational curriculum also had three aspects, they were:

- teacher-intended curriculum – the interpretations and decisions that teachers make in the process of planning for instruction

- enacted curriculum – the interaction of the teacher and students during the instruction of the lesson, including the planned and unplanned activities and exchanges of the classroom

- student outcomes – the learning, in the form of knowledge and skills, that students have gained from engagement with the lesson.

Remillard and Heck (2014) described each of these aspects as affected by the teacher's engagment with the curriculum. They also intimated that these aspects were the most difficult to observe and measure. Remillard and Heck (2014) suggested the teacher-intended curriculum is often the hardest to observe, as it is in its most detailed version within the teacher's mind. The enacted curriculum was described as difficult to measure, as it is unique to the interaction that occurs between the teacher and the class. The enacted curriculum was likened to a live performance. Through their metaphor, they suggested that the enacted curriculum has a structure developed from the script or teaching plan (Remillard & Heck, 2014). However, the enacted curriculum is also responsive to the audience, and may change to suit the needs and interests of the students.

Remillard and Heck (2014) highlighted that at each point in the framework, factors influence the decision-making process. In their model, Remillard and Heck (2014) identified factors that influence the official curriculum, the content and design of instructional materials, the teacher-intended curriculum, the enacted curriculum and the student outcomes. They have identified the factors that have been most commonly cited in literature from the United States of America to highlight the influences, which they acknowledge range from subtle to explicit and include both conflicting and reinforcing factors.

In the framework, the aspects pertaining to teacher-planning decisions and enactment decisions (entitled "teacher-intended curriculum" and "enacted curriculum" respectively) are directly related to influences on teacher decision-making in relation to the curriculum. The other aspects identified by Remillard and Heck (2014) pertain to influences on curriculum developers' decision-making (factors influencing the official curriculum), influences on textbook and other resource writers (factors influencing the content and design of instructional materials) and influences on students (factors influencing student outcomes). Table 3.1 includes the most commonly cited influencing factors on the teacher-intended

curriculum and the enacted curriculum according to Remillard and Heck's (2014) research.

Table 3.1

Most commonly cited influencing factors on components of curriculum system (Remillard & Heck, 2014, p. 714)

	Factors (beyond other elements of the system) known to influence:
Teacher-intended curriculum	• Teacher knowledge of, beliefs about, and practices with mathematics, pedagogy, learning, and curriculum resources
	• Access to resources and support
	• Teachers' understanding of particular students' needs
	• Expectations of the local context, school, community
Enacted curriculum	• Teacher and student knowledge, beliefs and practices
	• Access to resources, such as instructional technologies
	• Contextual opportunities and constraints

The influences cited by Remillard and Heck (2014) can be grouped into three themes: (1) teacher beliefs, practices and knowledge, (2) teachers' understanding of particular students' needs, and (3) teacher access to resources and support. Additionally, prevalent in research is the issue of time constraints. These four themes will be explored in more detail in the sections that follow.

3.4.1 Teacher beliefs, practices and knowledge

Researchers in the field of educational psychology, such as Kagan (1992) and Pajares (1992), write of the importance of teacher beliefs in understanding subjective decision-making processes of teachers. Teacher beliefs lie at the heart of all teaching, as teachers act more from their beliefs than from their knowledge (Kagan, 1992). Kagan asserted that teacher belief may be the clearest measure of teacher professional growth as it demonstrates the characteristics that lie at the heart of teaching.

Often in the literature, the notions of teacher beliefs are used interchangeably with the meaning of other constructs such as values, attitudes, judgements, opinions, personal theories and repertoires for understanding (Pajares, 1992). Regardless of the terminology, teacher beliefs underpin subjective and evaluative components that mirror the individual judgements made by teachers in the classroom, and numerous

studies have outlined the correlation that exists between them and the pedagogical instruction employed by the teacher in the classroom (including Wilcox-Herzog, Ward, Wong & McLaren, 2015). Teacher beliefs are not static but dynamic and able to further enhance teachers' educational experience (Wilcox-Herzog et al., 2015). Wilcox-Herzog et al., (2015) focused on early childhood teachers and their beliefs about developmentally appropriate practice, finding that across a number of studies, teacher beliefs were correlated with their behaviours. With education and training, behaviours could be positively influenced, however, often the pressures of school-life preclude teachers from actualising their full beliefs about quality teaching practices (Wilcox-Herzog et al., 2015). Thus, Wilcox-Herzog et al.'s (2015) finding suggested that at times, knowledge of effective practice is not sufficient to allow for quality practice to be enacted by teachers in the classroom.

Increases in teachers' pedagogical content knowledge, as well as increases observed in teachers' content knowledge, was seen to correlate with improvement in students' science achievement (Kanter & Konstantopoulos, 2010) Through analysis of the impact of project-based science curriculum on student achievement and attitude, Kanter and Konstantopoulos (2010) sought to analyse the experiences of students from minority backgrounds due to their low representation in science and engineering related careers. In spite of evidence that quality teaching practices can make a difference to student outcomes, Wilcox-Herzog et al. (2015) suggested that the pressures of school-life can preclude teachers from the capacity to engage in the quality practices and pedagogies described by Kanter and Konstantopoulos (2010).

Shulman introduced the notion of pedagogical content knowledge to combine the previously divergent fields of teacher subject knowledge - the *what* of teaching - and teacher pedagogy - the *how* of teaching (Shulman, 1986). The concept of pedagogical content knowledge works to define the necessary aspects of content-specific knowledge a teacher requires to interpret discipline content into a form that is more accessible to the students (Shulman, 1987). Shulman viewed it as a form of practical knowledge that a teacher uses to contextualise the learning to the classroom setting.

Magnusson, Krajcik and Borko (1999) aimed to further Shulman's work by developing a detailed model of pedagogical content knowledge that conceptualises it as a transformation of several types of teacher knowledge. Magnusson et al. (1999)

developed a model for pedagogical content knowledge that highlights the connection between knowledge of subject matter, pedagogy and context, particularly within the field of science. The model developed by Magnusson et al. (1999) expanded upon previous frameworks to highlight five key components of pedagogical content knowledge. They are:

1. knowledge and beliefs about teaching the discipline at a particular year level

2. knowledge of the intended curriculum alongside knowledge of any resources deemed necessary

3. knowledge of the students' level of understanding of discipline knowledge, encompassing students' prior knowledge, specific requirements for learning and areas of identified difficulty

4. knowledge of assessment including the discipline-specific dimensions to assess, and methods of assessment

5. knowledge of particular strategies to assist students' comprehension of discipline-specific concepts.

The comprehensive model of pedagogical content knowledge developed by Magnusson et al. (1999) was used by Chen and Wei (2015) in a study in Macau. Chen and Wei (2015) proposed that the five components of pedagogical content knowledge identified by Magnusson et al. (1999) could be used as the basis of observations of chemistry teachers to assess their adaptations of curriculum materials. Conducting classroom observations and semi-structured interviews with five teachers, Chen and Wei aimed to identify discrepancies between the operational (enacted) curriculum and the intended curriculum.

Chen and Wei (2015) determined there were seven distinct categories of discrepancy between the operational and intended curricula; they included "… teachers' PCK [pedagogical content knowledge], teachers'; belief about science, time constraint, teaching resources, class size, peer coaching, and lab safety" (Chen & Wei, 2015, p.264).

The focus of the work by Chen and Wei (2015) was upon aspects of pedagogical content knowledge that influenced the discrepancies observed between curriculum materials and observations. The analysis of results concentrated on

aspects related to Magnusson et al.'s (1999) model of pedagogical content knowledge (Chen and Wei, 2015). The study determined that four of the components from the model (knowledge of students' understanding, knowledge of assessment, knowledge of instructional strategies and knowledge of the curriculum) influenced teacher adaptations of the curriculum and, notably, the two most influential components were knowledge of students' understanding and knowledge of assessment.

3.4.2 Teachers' understanding of particular students' needs

Shulman (1986) stated that the necessary pedagogical-content knowledge for teachers to have is an understanding of the conceptions and preconceptions that students of different ages will bring to particular aspects of content frequently taught. In addition, teachers need knowledge of successful strategies to assist students to overcome the typical misconceptions associated with the conceptions. Shulman's (1986) seminal interpretation of pedagogical content knowledge has been built on by many researchers since.

Ball, Thames and Phelps (2008) contended that teachers' knowledge of students' conceptions, misconceptions, ways of thinking and self-efficacy are essential for developing students' mathematical learning. Ball et al. (2008) attempted to develop a practice-based theory of teacher content knowledge that builds on Shulman's (1986) work on pedagogical content knowledge. Their review of the literature, since Shulman's introduction of the concept, suggests that Shulman's (1986) original work lacked the necessary empirical basis to support the work that has built upon the concept of pedagogical content knowledge since. Ball et al. (2008) claimed that while the notion itself is sound, the understanding of the concept of pedagogical content knowledge has been used to make general claims without links to specific content areas, and thus without the empirical testing required across content areas.

Ball et al.'s (2008) research has been to build the empirical foundation to pedagogical content knowledge. In their work, Ball et al. (2008) elaborated on Shulman's work, defining four sub-domains, which they viewed as sub-domains of pedagogical content knowledge. One of the sub-domains, *knowledge of content and students (KCS)*, is the combination of knowing about the students the teacher is teaching and knowing about the mathematics that is being taught. That is, Ball et al.

(2008) described it as necessary for the teacher to be able to predict the examples that students would likely find confusing in order to pre-empt the difficulties and be immediately responsive to student needs. Additionally, they suggested that a teacher's ability to pre-empt areas of difficulty in learning new mathematical concepts would also include the capacity for the teacher to interpret students' responses to examples and activities, even when the response may be incomplete or in non-mathematical language. Ball et al.'s (2008) definition of knowledge of content and students raises two clear distinctions in teacher knowledge of students' understanding, pitch of the content and examples, and interpreting student responses.

Pitch of the content and examples

Ball et al. (2008) suggested that teachers need knowledge of the mathematics that they are teaching and the typical ways that students of the age-group that they are teaching will interact with this new knowledge. They stated that teachers' knowledge of how students would typically react to the mathematical concepts being taught would be further demonstrated through the teachers' involvement in selecting the specific examples that they would use in teaching the topic and that were provided to students for practice. They indicated that a teacher needs to consider and predict the tasks that their students will find motivating, as well as those that they will find easy and those that will be more challenging. Knowledge of typical student areas of support in learning new mathematical concepts is developed and acquired in order to tailor the learning of the specified curriculum to meet the educational needs of the students in the classroom. That is, the teacher is able to pitch the curriculum content and activities to meet the students' learning needs.

Even and Tirosh (1995) cited Ball's earlier work in an article that described the nature of teachers' planned presentations of subject-matter as one aspect of pedagogical content knowledge. Even and Tirosh (1995) suggested that while teachers' subject-matter knowledge and pedagogical content knowledge are often cited as interrelated, they found little evidence to support this interrelatedness. However, they discuss the changing nature of the concept of teachers' subject-matter knowledge as a reason why the evidence is not supporting the interrelated nature of teachers' subject-matter knowledge with pedagogical content knowledge. Even and Tirosh (1995) described that while previously, teachers' subject-matter knowledge was defined quantitatively according to the number of courses taken in college or test

scores that teachers attained, the nature of the measure is changing to measures of cognitive processes and understanding of facts and concepts.

In their article, Even and Tirosh (1995) cited Shulman (1986) in distinguishing two aspects necessary for teacher subject-matter knowledge: "knowing that and knowing why" (Even & Tirosh, 1995, p. 2). They suggest that "knowing that" equates to knowledge of the research-based common conceptions and misconceptions of students in relation to the topic that the teacher is teaching. The teacher needs knowledge of student conceptions and misconceptions to assist in predicting where the difficulties will likely arise in teaching the topic and allow for the necessary scaffolding in order to support student learning. Further, teachers also need to "know why" in order to understand the basis of the misconceptions and how they may be addressed to ensure student understanding of the topic (Even and Tirosh, 1995). Even and Tirosh's (1995, p. 2) proposition of the importance of "knowing that and knowing why" aligns with Ball et al.'s (2008) suggestion that the teacher needs an understanding of the curriculum content and the possible areas of difficulty in order to pre-empt the issues students will likely experience, and be able to tailor the enacted curriculum to the students' level of knowledge and skill, which may not necessarily be the level prescribed in the intended curriculum.

Perpetuating the "myth of homogeneity by virtue of chronological age" (Tomlinson et al, 2003, p.119), teachers require knowledge of the conceptions and misconceptions of a wide array of levels of the curriculum content. Tomlinson, Brighton, Hertberg, Callahan, Moon, Brimijoin, Conover and Reynolds (2003) conducted a review of literature related to differentiating instruction as part of an educational research project funded by the American government. Tomlinson et al. (2003) found that research suggests that in order to support the differing needs of the students in the classroom, teachers often make adjustments to differentiate what is being taught to make it accessible to a wider range of students in the classroom, for example, by making adjustments to the pitch of the curriculum content. Tomlinson et al. (2003) argued that equality in classrooms can only be possible when students are provided with instruction that is suited to their needs, including readiness to learn particular content, interest, and learning style.

Rice and Smilie (2014) suggested that curriculum differentiation supports learners having access to appropriate content when they are ready to engage with it.

Further, that curriculum differentiation assists to better meet students' needs, while not doing so can have ongoing detrimental effects to a student's wellbeing. In order to differentiate effectively, teachers need to be responsive to the needs of students; student conceptions and misconceptions can be ascertained from student responses to activities and assessments.

Interpreting student responses

The second distinction raised by Ball et al. (2008) concerns the teacher's capacity to interpret and be responsive to students' responses. They further proposed that knowledge of content and students' developing understandings means that at times the teacher may have to interpret emerging or incomplete mathematical thinking, which may or may not be expressed in accurate mathematical language. By identifying emerging thinking, the teacher would be responsive to the elements of the concept that still need to be developed in the student's conceptual understanding.

An, Kulm and Wu (2004) proposed that knowing students' conceptions includes being able to build on the ideas that students present. In their comparison of the pedagogical content knowledge of teachers in American and China, An et al. (2004) identified marked differences between approaches in the two countries. Chinese teachers accentuated the development of procedural and conceptual knowledge through traditional methods of teaching, while the American teachers highlighted a variety of activities which promoted creativity and inquiry to build understanding. An et al. (2004) stated that both approaches had advantages and limitations. They did conclude that knowledge of student conceptions provides opportunities to address students' misconceptions, motivation and engagement and ultimately promote students' thinking about learning in mathematics.

In her text, *Math in Plain English*, Benjamin (2013) used her expertise to develop literacy strategies for mathematics classrooms. She suggests that in mathematics there are critical components for the students that allow them to engage with mathematics. She states that students need instruction in mathematical language and the syntax of mathematical examples and problems. Benjamin (2013) further claimed that mathematical language should be explicitly taught to students, given the complexity of the language (e.g., terminology with strange consonant combinations such as *rh,* e.g., rhombus), the lack of contextual cues from the text (i.e., the students are often learning the concept at the same time as learning the language and therefore

cannot use traditional strategies from gathering contextual cues in the text), and the use of frequently used words to represent mathematical applications (e.g., value, variable). Additionally, she suggested that academic words of mathematics, such as common words that take on additional meanings to refer to processes or applications of mathematics, should be taught implicitly by immersing students. Benjamin (2013) claimed that in this way, students will develop the understanding of these words and their broader meanings and contexts. Understanding of student conceptions and misconceptions allow for the teacher to make use of student work to ascertain their understanding. Additionally, student conceptions and misconceptions can be seen through the assessment responses that students provide, although this is dependent upon the masterful development of the assessment task by the teacher.

Teacher knowledge of assessment

Further capacity to reflect student learning needs comes from the teacher's ability to engage in formative monitoring of students' conceptual understanding (Gottheiner & Siegel, 2012). Gottheiner, a middle school teacher, and Siegel, a science researcher, (2012) studied the assessment of literacy of five middle school teachers in order to ascertain the teachers' knowledge of assessment tools and assessment interpretation in light of their views of learning. According to Gottheiner and Seigel's (2012) study, the teachers were able to assess students' prior knowledge of curriculum topics and understanding of topics being taught, and ascertain student misconceptions from skilfully developing formative assessment. Gottheiner and Seigel (2012) stated the importance of teacher assessment knowledge, but cite research that teachers can lack the necessary knowledge and skills to devise incisive tasks to ascertain student understanding. They assert that the teacher's view of learning shapes their construction of assessment.

Gottheiner and Seigel (2012) maintained that the learning that teachers' value will be prevalent in the assessment tasks that they create. That is, a teacher who values the memorisation of facts will design tasks that assess students' recall of information, whereas a teacher who values students developing understanding will design monitoring tasks that assess student's development of knowledge across the course of the topic. They argue that a teacher's assessment literacy is integral to their capacity to develop assessment that targets understanding. Gottheiner and Seigel (2012) defined assessment literacy as the ability to interpret assessment information,

convey the information gathered to the students to assist with the status of their understanding and utilise this information in order to chart the course for further learning goals. Further, Gottheiner and Seigel (2012) outlined two key aspects of teacher knowledge of assessment; they are knowledge of tools and knowledge of interpretation.

Knowledge of tools is the teacher's understanding of the assessment formats, techniques, instruments and strategies specific to and appropriate for collecting data about student learning in the subject or discipline being taught (Gottheiner & Seigel, 2012). Knowledge of interpretation refers to the teacher's capacity to interpret the data collected from assessment and act on the information to support short and long term curriculum goals for the students in the class (Gottheiner & Seigel, 2012). The information gleaned from well-crafted assessment is key to developing and devising classroom curriculum plans that are responsive to the students.

3.4.3 Teacher access to resources and support

Research into curriculum materials generally centres on two key areas. Either it is to assess the effect of curriculum reforms led by the development and distribution of the curriculum materials, or research is conducted in order to analyse the effectiveness of implementation of particular curriculum materials (Charalambos and Hill, 2012). In an introductory paper prefacing a multiple-case study presented across four case study papers, Mathematics education researchers, Charalambos and Hill (2012), provided an overview of the analytical framework and methods used to guide the studies, which aimed to study how mathematical knowledge for teaching and curriculum materials contribute to the quality of mathematics instruction (Charalambos and Hill, 2012). Regardless of the area, research centred on curriculum materials generally targets either the role of curriculum resources as a mechanism for teaching teachers' important concepts, or pedagogical techniques in order to change teaching practice (Charalambos and Hill, 2012). Often, studies are aimed at assessing the effect of the curriculum materials on changing instruction but not simultaneously the relationship of the curriculum materials on enhancing teacher content knowledge (Charalambos and Hill, 2012). Attending to both aspects could enhance them concurrently and lead to insightful recommendations to curriculum authorities.

Remillard (2005) suggested that the trend of using curriculum materials to drive curriculum reform leads to a situation where the curriculum materials that

teachers are required to interpret and adopt are foreign in form and contain content that is unfamiliar, because their purpose expands to more than just outlining the content of the course but also to promote the reform. Sherin and Drake (2009) maintained that teachers need time to adjust and experiment with new curriculum for at least a year in order to be able to understand the differences in the new reform and how to accomplish the curriculum goals outlined in it. For curriculum materials to be effective means that for teacher learning, further research needs to analyse the way that teachers use curriculum materials (Sherin & Drake, 2009). The use of new curriculum materials requires the teacher to change practice while simultaneously learning about the initiative or reform agenda contained within the materials (Sherin and Drake, 2009).

Textbooks pose another opportunity to shape the reform landscape. Porter (1989) considered that textbooks were among the elements that instruct teachers on the policy environment. He found that emphasis on particular classroom techniques could be traced to the nature of examples in the textbooks used. Archbald and Porter (1994), American researchers with interests in educational policy analysis and evaluation, aimed to study high school mathematics and social studies teachers' sense of autonomy and job satisfaction in jurisdictions with curriculum control policies. They found that in some jurisdictions across the United States of America, textbooks had been centrally mandated to reduce the potential variability of mathematics course content within schools. They determined that a control policy such as mandating the textbook had the largest effects on content decisions in mathematics, and that these decisions ultimately influenced the design of testing policies in these locations.

Nearly a decade on from The 1999 Third International Mathematics and Science Study (TIMSS) Video Study, Australian mathematics education researchers Vincent and Stacey (2008) sought to consider the procedural complexity of Australian textbooks. Vincent and Stacey (2008), concerned about the outcomes of the TIMSS study, sought to analyse the problems posed in current textbooks in order to ascertain if a shift had occurred in the complexity of the mathematical examples that students were provided.

Vincent and Stacey's concerns emanated from the findings of the TIMSS study (Hiebert et al., 2003) relating to Australian textbooks, in particular, the findings that

the textbooks that featured in 91% Australian mathematics lessons had at least 63% of mathematics problems posed of low procedural complexity, with less than 12% of the problems of high procedural complexity. Additionally, they found that Australia had the highest proportion of low complexity problems being posed in eighth-grade mathematics lessons.

Vincent and Stacey (2008) determined that although some variation existed between the topics covered in the textbooks used in their study to those used by teachers recorded in the study conducted by Hiebert et al. (2003), the proportions of types of problems in the textbooks were very similar (Vincent & Stacey, 2008). They warned that for the development of conceptual understanding, students require a range of problems to practice, which provide simple to complex, routine to non-routine situations. They stated that each type of problem has a pedagogical role to play in developing students' conceptual development. However, without the necessary teacher resource that illustrates the pedagogical intent, teachers are left to rely on their knowledge to effectively select from the problems (Vincent & Stacey, 2008).

Mathematics education researcher, Birgit Pepin, has conducted numerous studies and written many articles about mathematics textbooks over more than a decade. Pepin provided a commentary to a special edition of *ZDM – The International Journal on Mathematics Education* centred on reporting research about the enacted mathematics curriculum. In the article, Pepin discussed the evolution of e-textbooks (Pepin, 2014). While the first generation of e-textbooks provided the user with an electronic copy of the hard copy textbook that was being used, second generation e-textbooks are capitalising on developments in digital web-based resources. Pepin discussed flexibility, integration of interactive elements and the capacity to individualise the text to the course that is being taught. Accompanying the many technological changes that e-textbooks bring, Pepin (2014) notes that the advent of e-textbooks will also change the nature of course development and teaching in mathematics courses. Previously, teachers often followed the linear design of the textbook through a similarly linearly designed course. While not always teaching directly from the text, the course would follow the development of concepts outlined in the text as a progression from simple to complex mathematical concepts. The nature of the second generation e-textbooks allow for a network-like structure.

The advance to e-textbooks 2.0 will mean that teachers will be required to develop their own courses, which may need to be responsive to the progression of their students' conceptual development, and not necessarily follow a linear structure of concept development. The potential changes that the second generation e-textbooks present will further emphasise the perspective of Vincent and Stacey (2008), that teachers will require strong pedagogical content knowledge to enable them to establish the intent of examples and activities and ensure appropriate selection of these to emphasise the development of particular concepts.

Compounding the issue of textbook usage in student learning, according to Knight (2015), is the changing nature of young people and their learning. Knight, a Queensland teacher education researcher, considered students' expectancies and needs in a recent article that discussed teachers' use of textbooks in the digital age. He acknowledged that students in classrooms of the current era have an unprecedented access to a continuous flow of information (Knight, 2015). Young people have the capacity to find information as they need it, influencing their desired pace of learning. Through access to technology, they no longer need to rely on the teacher and the textbook as the source of their information (Knight, 2015). Thus, the development of e-textbooks and other educational digital resources needs to be responsive to multiple users. The digital resources need to be responsive to the teacher intending to use them to craft the course for learning, as well as the student who will learn from them, with and without the teacher as the guide.

Through a series of school-based studies, Ertmer (1999), a researcher in educational technology, has categorised the issues that she has observed with embedding digital technology in classrooms. Ertmer (1999) highlighted two categories of barriers. First-order barriers refer to issues external to the teacher, for example, issues of access to technological devices or particular software, insufficient teaching time, and deficient technical support. Second-order barriers are those that are about the teacher; these include teacher beliefs about digital technology, appropriate pedagogy, and reluctance to engage with technology (Ertmer, 1999).

Ertmer (1999) stated that both first- and second- order barriers hinder teacher efforts to embed digital technology in the classroom. However, she suggested that second-order barriers can be more difficult to overcome. First-order barriers are typically about resourcing, thus once sufficient resources are received, the problem is

resolved (Ertmer, 1999). However, second-order barriers involve personal beliefs and are intrinsic to the teacher. Thus, Ertmer (1999) suggested that the first obstacle to overcoming them may be identification of the root of the issue. Once the issue has been identified, only then can appropriate steps be taken to start to address the problem.

3.4.4 Time constraints

Time constraints are a frequently raised issue of educators (Keiser & Lambden, 1996). In spite of the prevalence of the issue of time constraints in educational research, Keiser and Lambden (1996) called for further research to be undertaken in order to analyse the effects that reforms in schooling and curriculum as well as innovation in suggested pedagogical content knowledge of mathematics have had. They investigated time constraints for teachers during mathematics reform, and found that implementation of the reform was most often dependent upon flexibility in class scheduling. Their concern emanated from the suggestion that while significant change and reforms had occurred over time, decisions and recommendations about the amount of class time that should be made available for mathematics had not been reciprocally considered.

The National Education Commission on Time and Learning (National Education Commission on Time and Learning, 1994) delivered a report titled *Prisoners of Time*, on the relationship between time and learning in American schools. The Commission determined that students were being asked to learn significantly more content in core academic subjects in significantly less time, compared with schools in Germany and Japan. Recommendations from the report asked for legislators and administrators to look to reform schools and the way the school day is considered, as well as to seek to provide teachers with additional time for planning and preparation. A decade later, the report was re-released in the hope that it would re-ignite the debate around the issue of time constraints in teaching, as little had changed in that time (National Education Commission on Time and Learning, 2005).

Clark and Linn (2003) found a strong and significant relationship between decreased instructional time on scientific topics and diminished student knowledge of complex scientific concepts. They concluded that a curriculum that provides students with shallow exposure to a wide range of topics will result in a superficial

understanding of scientific topics by students. Clarke and Linn (2003) argued that sustained study of concepts is required in order to develop students' deep conceptual understanding. More time is required to support teachers' planning for these in class experiences as well as the necessary professional development that teachers may require in order to successfully design these learning opportunities.

In her doctoral thesis about how additional planning time is used by teachers, Timberlake (2008) expressed findings that while teachers did have some planning and preparation time, it was often limited and quickly consumed by other essential tasks. The other essential tasks often included administrative paperwork, lesson preparation and collaboration with colleagues. That is, while it was demarcated directly for extended planning, often this was not the sole use of the allocated time. Additionally, preparation time for these tasks is consumed as teachers locate adequate teaching resources to support in-class activities.

Fogelman et al. (2011) stated that teachers are continually attempting to balance the difficulties of ensuring coverage of subject matter with providing students the necessary time to develop understanding of concepts taught. Further, research undertaken in the classroom has shown that in order to meet the balance between coverage of subject matter and time for the development of understanding, teachers have omitted activities, aspects of units or more time-consuming pedagogical techniques (such as student-led inquiries) because of a lack of time. Additionally, Fogelman et al. (2011) found that the provision of time for students to complete activities in the classroom for themselves rather than having the teacher demonstrate the activity to them provided greater student gains in learning. Thus, research about teacher time constraints is not limited to teacher preparation time, but also the time necessary for instruction.

3.4.5 Summary

The conceptual framework proposed by Remillard and Heck (2014) outlined key influences on curriculum decision-making in mathematics curricula. These influences were suggested upon the points of curriculum interpretation from the initial development of the curriculum through to the observed student outcomes. In this section, the specific influences on teacher curriculum interpretation have been further explored.

Section 3.4 has provided an outline of the influences on curriculum interpretation as determined from literature. The conceptual framework developed by Remillard and Heck (2014) provided a frame to begin this discussion. The framework outlined the influences such as teacher beliefs, understanding of students, access to resources and time. Remillard and Heck (2014) derived the influences from comparison of research studies. This study seeks to ascertain the influences that impact teachers, from teacher experience during a time of curriculum change. To support this, Section 3.5 will outline the theoretical and conceptual framework for the present study.

3.5   THEORETICAL AND CONCEPTUAL FRAMEWORK

Section 3.5 provides the theoretical and conceptual framework for the present study, which draws on the literature that has been cited across the previous sections of this chapter. The definitions of curriculum (see Section 3.2.5) that will be used for this study have been provided as they set the foundation for the theoretical framework that is outlined in Section 3.5.1. Finally, the conceptual framework for the present study will be explained in Section 3.5.2.

Literature considered in this chapter has explored aspects of curriculum development and interpretation. It has examined the process of development and interpretation, and the influences that impact upon curriculum decision-making during these processes. This section will consider the research that has specifically shaped the development of the conceptual framework and how this will be used to frame the present study.

Aspects of research focused the framework of the present study. The research has provided insights into the terminology used for curriculum development and interpretation, as well as the processes and influences. Each of these aspects will be considered and highlighted in regards to relevant research.

3.5.1 Theoretical framework

Two key models influenced the development of the theoretical framework for the present study: (a) Porter's (2002) three-dimensional curriculum alignment model and the Surveys of Enacted Curriculum and (b) Remillard and Heck's (2014) model of the curriculum policy, design, and enactment system.

Process of curriculum interpretation

Porter (2002) conducted numerous studies to investigate content alignment in American mathematics curriculum. He aimed to examine the alignment between mathematics curriculum materials provided to teachers, which he termed the intended curriculum. A portion of Porter's research was to assess alignment between the curriculum materials, the enacted curriculum, and the assessed curriculum as demonstrated in students' work. Other research conducted was to examine the alignment between content standards and assessment, while studies by Porter were also conducted to analyse the content of instructional materials.

Throughout his research, Porter used a three-dimensional model to map each of the curricula (intended, enacted and assessed) according to cognitive demand. Three variables influenced Porter's model - teaching focus, topics of instruction, and time devoted to teaching the topic. Subsequent research has involved modifications to the model in order to analyse other aspects relating to mathematics curriculum, for example, mathematical skills taught.

Porter's research has provided a strategy to examine the content of instruction and assisted in providing evidence for recommendations about improvements to curriculum materials. Further, Porter has been able to anticipate and predict the influences that lead to teachers' decisions about content coverage and depth of treatment. Porter, however, has not used his tools to ascertain the content decisions that operationalise curriculum policy. Exploring the curriculum decisions that teachers make to operationalise curriculum policy poses an unexplored area of research.

Remillard and Heck's (2014) model of the curriculum policy, design, and enactment system describes the relationship between the curriculum objectives as presented in the official curriculum and the operational curriculum. In defining the operational curriculum, they focus on three key aspects: teacher-intended curriculum, enacted curriculum, and student outcomes. The terms used by Remillard and Heck (2014) aligns with the terminology aforementioned as the basis of Porter's (2002) model. Table 3.2 provides a representation of the aligned terminology used in the two models.

Table 3.2

Aligned terminology used in the Surveys of Enacted Curriculum (Porter, 2002) and the model of the curriculum policy, design, and enactment system (Remillard & Heck, 2014)

Surveys of Enacted Curriculum (Porter, 2002)	The model of the curriculum policy, design, and enactment system (Remillard & Heck, 2014)
Intended curriculum The intended curriculum is provided by the state content standards for the subject and grade level and reveals the instructional content targets for the enacted curriculum	**Official curriculum** The official curriculum as provided by a curriculum authority, comprised of the designated curriculum, the curricular aims and objectives and the content of consequential assessment
Enacted curriculum The enacted curriculum is the content of the instruction delivered by the teacher and highlights what students have the opportunity to learn	**Enacted curriculum** The enacted curriculum is the interaction of the teacher and students during the instruction of the lesson, including the planned and unplanned activities and exchanges of the classroom
Assessed curriculum The assessed curriculum is measured by assessment and discloses the content that is the subject of assessment by the teacher (that which students are expected to know)	**Student outcomes** Student outcomes refects the learning, in the form of knowledge and skills, that students have gained from engagement with the lesson

Table 3.2 highlights the similarities between the terminologies used in the two models. The definitions of the intended curriculum (Porter, 2002) and the official curriculum (Remillard & Heck, 2014) are underpinned by the fact that they are developed by an authority (external to the school) and provided to the teacher for enactment. The two definitions of the enacted curriculum describe the process and interaction of the curriculum as the teacher instructs the students. Finally, similarities can be seen between the definition of the assessed curriculum (Porter, 2002) and student outcomes (Remillard and Heck, 2014). They both focus on the outcomes of learning as demonstrated by students in their assessment items.

Remillard and Heck (2014), however, define another dimension of curriculum, the teacher-intended curriculum. In their model, the teacher-intended curriculum is the curriculum intention of the teacher as determined through interpretation of the intended curriculum in preparation for teaching in the classroom. The teacher-intended, or planned, curriculum represents the teacher's interpretation of the intended curriculum during the process of planning for enactment of the curriculum.

While the notion of the planned curriculum is described in Remillard and Heck's (2014) model, it is not the focus of their work in describing teacher decision-making. The planned curriculum is an aspect that has not been explored in the mapping that Porter (2002) has undertaken in utilising the Surveys of Enacted Curriculum. It therefore poses a gap in the current exploration of the process of curriculum interpretation by teachers.

The present study will seek to investigate and analyse the process of curriculum interpretation by teachers in a government primary school. The analysis will endeavour to demonstrate the process of curriculum interpretation from the intended curriculum, as provided to teachers in the form of the Australian Curriculum. Further, it will analyse the path from the intended to the planned curriculum, as developed by the teachers charged with teaching the curriculum. Finally, the analysis will address the path from the planned to the enacted curriculum, the activities that are used in the classroom by the teacher with the students. This process will be undertaken to address the first research question for the study: what is the process of curriculum interpretation used by individual teachers?

Influences on curriculum interpretation

As described by Porter (2002), the process of curriculum enactment is driven by influences on teacher decision-making. In the view of Porter (2002), each adaptation or alteration during the process of interpretation leads to a misalignment from the original intention of the curriculum.

Remillard and Heck's (2014) model of the curriculum policy, design, and enactment system (see Figure 3.5) described the process of enactment as well as the factors that impact upon curriculum decision-making. In their model, Remillard and Heck (2014) identified five points at which key decision-making occurs in the process of interpretation, which could influence their described process of curriculum enactment. These points are at the:

- initial development of the curriculum (influences on the curriculum developer writing the official curriculum)

- stage of teacher preparation (influences on the teacher-intended curriculum)

- enactment of the curriculum (influences on the enacted curriculum during interactions in the classroom)

- collection of evidence of student learning (influences on student outcomes of the curriculum)

- development of supporting resources to assist teachers (influences on instructional materials).

Remillard and Heck's (2014) identification of key decision points in the process has influenced the design of the present study. Remillard and Heck (2014) described factors that are commonly cited in research as affecting the decision points which they identify in their process.

In mapping the process of curriculum interpretation in the present study, it is proposed that the influences on the process of curriculum interpretation are identified and explored to ascertain if the influences are consistent across teachers teaching different year levels within the same school. These influences will be organically derived from the data collected from the teachers during their processes of curriculum interpretation. These influences will be identified and explored in order to address the second research question for the study: what are the specific influences which impact upon teachers' curriculum interpretation?

3.5.2 Conceptual framework

Porter's (2002) Surveys of Enacted Curriculum and Remillard and Heck's (2014) model of the curriculum policy, design, and enactment system each describe the process of curriculum interpretation and enactment. These models each informed the development of the conceptual framework for the present study.

The definitions highlighted in Section 3.2.5 were used as the basis for the model of curriculum interpretation that will be the focus of the present study. The definitions posed describe the interrelationships which exist between the structures of curriculum (intended curriculum, planned curriculum and enacted curriculum). The interrelationships that are the focus of this study can be explained through furthering the metaphor of curriculum first used by Dewey (1902).

Dewey (1902) illustrated the objective of the intended curriculum as providing the teacher with the map of the discipline or subject. Dewey's (1902) metaphor creates imagery of the curriculum spanning a vast area that can be travelled via

different courses. The relationships between the key definitions for this study can be described through this metaphor. The intended curriculum maps the topography and landmarks which we are able to see in a defined piece of the terrain (subject). The planned curriculum is then the outline of the teachers' intentions for tackling that terrain, that is, the charted course. It is the course for how the teacher will assist their students to tackle the course and the challenges that are predicted to be met along the way. The journey is the enacted curriculum. It reflects the charted course, in that the teacher attempts to follow as much as possible the route that was intended to be taken, but it also accommodates the detours, the unplanned encounters that make up the experience. Figure 3.6 provides a summary of these proposed relationships, integrating the terminology, metaphor and the definitions previously described.

Intended curriculum (The map)	Planned curriculum (The chartered course)	Enacted curriculum (The journey)
Curriculum policy documents which set the direction for a defined population of schools in a particular learning area, discipline or subject. Constructed by curriculum authorities.	An interpretation of the intended curriculum presented in the form of documents to organise a prepared way through the curriculum policy document. Constructed by teachers and/or head of department/curriculum in accordance with schooling sector/employer policy, as well as other purposefully designed resources and/or professional development.	The total classroom experience, comprising all the planned and unplanned activities and interactions that take place as part of learning. Constructed by teachers and students as together they bring the curriculum "to life".

Figure 3.6. A model of curriculum interpretation: the intended (the map), planned (the charted course) and enacted (the journey) curriculum.

The conceptual model provides an articulation of the process of curriculum interpretation from the intended curriculum (the map) to the planned curriculum (the charted course) to the enacted curriculum (the journey). This study proposes to look at the interpretations that teachers create of the curriculum and to consider teachers' interpretations as they convert the intended curriculum into their plans, and to analyse the interpretation of the planned curriculum as it is enacted. The model of curriculum interpretation was replicated and modified for each individual teacher in the study to describe the curriculum interpretation pathway they took to curriculum

enactment. The modified models aimed to address the first research question; what is the process of curriculum interpretation used by individual teachers?

Porter (2002) and Remillard and Heck's (2014) models describe the process of curriculum decision-making from the intended curriculum to the enacted curriculum. Porter (2002) highlights aspects of alignment and misalignment from the intended curriculum on the path to curriculum enactment, whereas Remillard and Heck (2014) articulate the factors that have been cited as influencing these decision points. In the present study the arrows in the model outlined in Figure 3.6 identify interpretations. That is, the planned curriculum is an interpretation of the intended curriculum, and the enacted curriculum is an interpretation of the planned curriculum. These interpretations are subject to influences, which shape the interpretation.

In the present study, the teachers' descriptions of their processes of interpretation were analysed to identify the unique influences that impacted upon their process to curriculum enactment. To highlight these influences, the modified curriculum interpretation models describing each teacher's process to curriculum enactment will be annotated to identify the influences that impacted on their curriculum interpretation. These annotations to the modified models aimed to address the second research question, what are the specific influences that impact upon teachers' curriculum enactment?

3.6   CHAPTER SUMMARY

This chapter has presented an analysis of the research and literature that has been used to inform and shape the present study. Section 3.2 provided an overview of definitions of curriculum, including the definitions of the dichotomy of prescriptive and descriptive curriculum. The two terms do not address the importance of the planned curriculum, the curriculum written by the teachers in the process of preparing to teach the intended curriculum in the classroom. This section culminated in the definition of integral terms of the study; intended curriculum, planned curriculum, and enacted curriculum.

Section 3.3 addressed notions of curriculum change. It discussed views of the necessary supports for curriculum reform and the interpretations of curriculum developed by teachers during implementation. The section considered the importance of involvement of teachers in the process of curriculum reform, and the notion that

teachers will interpret the curriculum or supporting materials within the confines of their knowledge of the purpose and justification for the reform. Finally, Section 3.3 also considered a method for ascertaining the alignment of interpretations of curriculum, which was used for calibration of the Australian Curriculum.

Factors that influence curriculum interpretation were explored in Section 3.4. This section addressed the influences on curriculum decision-making commonly cited in research. The section also addressed research that aims to ascertain the degree of alignment between curricula, during the process of interpretation.

Section 3.5 outlined the theoretical and conceptual framework for the present study. The section highlighted the relationship between the intended, planned, and enacted curriculum and their comprising the foundation to the conceptual framework of the study.

In Chapter 4, the research design and methods for the present study are explained. The chapter explored the interpretivist research paradigm within which the present study has been placed. Further, it unpacked the methods undertaken to perform the exploratory case study design.

Chapter 4: Research Design and Methods

4.1 INTRODUCTION

The previous chapter considered the literature pertaining to curriculum interpretation. In particular, the chapter explored definitions of curriculum emanating from the purpose and audience for which it is written and used. It also sought to describe the processes of curriculum interpretation captured in literature as well as the influences on curriculum interpretation. Finally, it framed the theoretical and conceptual framework for the study, including posing the research questions, which are:

1. What is the process of curriculum interpretation used by individual teachers?

2. What are the specific influences that impact upon teachers' curriculum interpretation?

This chapter outlined the research design for the study that will serve to address the research questions. The chapter outlined the architecture of this exploratory case study providing a justification for this style of qualitative methodology. The methodological approach, research design, data collection processes and data analysis techniques was explicated as the method for addressing the research questions of the present study.

In this chapter, Section 4.2 provided a rationale for the interpretive research approach for the study, including an explanation of the epistemological view of the researcher. Section 4.3 articulated the research design, followed by specification of the research setting and participants in Section 4.4. The data sources and research plan articulated the instruments used and research procedure in Section 4.5. Section 4.6 outlined methods of data analysis used. The quality and rigour of the study is discussed in Section 4.7, including a summary of the methods used to ensure trustworthiness and credibility, role of the researcher. Ethical considerations for the research are described in Section 4.8. Finally, a summary of the chapter is provided in Section 4.9.

4.2 INTERPRETIVE RESEARCH APPROACH

The research was guided by an interpretivist theoretical paradigm. Denzin and Lincoln (2011) have contributed extensively to the research on epistemological perspectives and research practices, including commentary comparing and contrasting the paradigms of qualitative research. They define a paradigm to be a human construction, the underpinning beliefs that guide human actions. Denzin and Lincoln (2011) articulated that a paradigm consists of the epistemology, ontology, methodology and ethics of the researcher.

Underpinning the interpretivist paradigm is the work of Berger and Luckman (1967). These researchers introduced the term *social construction* into social sciences research in the late 1960s. The term denoted that meaning is derived through the interactions of people and groups, and that reality is jointly constructed through these social interactions (Berger & Luckmann, 1967). They posit that reality is a social construct and so it is constantly changing (Berger & Luckmann, 1967). Their work has been the basis of the interpretivist approach, which is based on their assumption of reality, that is, that the researcher and the world are internally related to the lived experience of the researcher reporting them.

More recent researchers of qualitative methodology include Schembri and Sandberg (2002), and Weber (2004). Schembri and Sandberg (2002) suggested that in an interpretivist approach the world is not separate from the considered experience of the researcher and therefore, the prior experiences of the researcher are active in making sense of the world that is being experienced (Schembri & Sandberg, 2002). Weber (2004) further suggested that the analysis of interpretivist research must acknowledge that the object of the research is interpreted in respect to the reality of the researcher's experience. Therefore, he proposed that the structure of meaning is constituted within the paradigm of the researcher's subjective reality (Weber, 2004).

Subjectivity is an inseparable part of our existence. Peshkin's (1988) research process involved his immersion into the community and lives of the participants of the research. Through this degree of immersion, he hoped to develop a first-hand understanding of the world view that shaped his research participants. Peshkin (1988) implied that subjectivity is not something that can be controlled and suppressed at will, stating: "Subjectivity is not a badge of honour, something earned

like a merit badge and paraded around on special occasions for all to see". (Peshkin, 1988, p.17)

Peshkin (1988) suggested that it is not sufficient for a researcher to acknowledge that their research will be influenced by their own subjectivity. Instead, encouraging the researcher to consider during the course of the research exactly how their subjectivity may be shaping the research and the potential of their subjectivity on the research outcomes (Peshkin, 1988).

In their text *Research Methods in Education,* Cohen, Manion and Morrison (2011) stated that an interpretivist research perspective seeks to understand the meanings and actions that people bring to situations and so comprehend their reality. Further, they assert that interpretivist researchers aim to understand the interpretations of the individuals they are observing. Through the present study, the researcher aims to understand the interpretations of teachers in enacting curriculum. The researcher has sought to comprehend the meanings the teachers derive from the curriculum and the actions that they undertook in order to convey these meanings to their students.

4.3 RESEARCH DESIGN

A case study methodology was adopted as the basis for this study. Yin (2009) stated that case studies are generally the preferred method for qualitative studies, dependent upon three conditions:

- the type of research question that has been posed – case studies are pertinent for addressing exploratory (*what*) or explanatory (*how* or *why*) questions

- the degree of control the researcher has over the events they are observing – case studies allow observation of events where the researcher has little control

- the focus of the research – case studies allow for the observation of real-life contemporary phenomenon.

Further, Yin (2012) used these three conditions to categorise case studies as exploratory, explanatory or descriptive according to the purpose of the study that is to be undertaken. An exploratory case study is used to investigate a phenomenon or

situation that may not have yet been well-researched. An explanatory case study seeks to explain why a particular phenomenon is occurring. A descriptive case study aims to describe the phenomenon or situation that is the focus of observation (Yin, 2012). Yin (2009) further suggested that research questions that lead with *what* are most often explored through an exploratory case study, whereas questions that begin with *how* or *why* are more likely to be the subject of explanatory case study.

The aims of the present study were (1) to investigate the process of curriculum interpretation used by teachers in a single school implementing the Australian Curriculum: Mathematics, (2) to explore the influences that impact upon the process of curriculum interpretation, and (3) to investigate the notion of teacher curriculum planning and enactment. The present study uses a conceptual framework that repositions teacher curriculum planning as a separate artefact of the process of curriculum interpretation. This conceptual framework is used for the first time in a Queensland context. Consequently, from the conditions posed by Yin (2009), this research is best categorised as an exploratory case study.

Schwandt (1994) stated "to understand the world of meaning, one must interpret it" (p.118). The choice of interpretive, exploratory case study as the methodology for the present study addresses the research aim, of describing and understanding the processes that teachers use to interpret curriculum and the influences that impact upon this process in the environment in which teachers typically perform this process. The research questions for the study are concerned with real life, teacher curriculum interpretations and thus they are best understood through the depth of analysis of the lived experience that is provided by the case study method. Referring to Yin's (2009) conditions for supporting the use of case studies in qualitative methodology, the present study seeks to:

1. Investigate the process of teacher curriculum interpretation, and the influences that impact upon teacher curriculum decision-making

2. Uncover the process and influences where the researcher has little control over what they are observing

3. Observe real-life contemporary phenomenon *in situ*, that is, the process of curriculum interpretation undertaken at Joanlee State School during the implementation of the Australian Curriculum: Mathematics.

In accordance with Yin's (2009) conditions, the present study meets the necessary design elements for exploratory case study.

This study involved the Principal, Deputy Principal, Head of Curriculum, and five classroom teachers at a single school. The case for the study is defined as the process of curriculum interpretation at Joanlee State School during the implementation of the Australian Curriculum. The three members of the school administrative time provided a description of the curriculum context of the school, while the five teacher participants contributed insight into the case to allow a thorough exploration. The exploration of the five teacher participants' experiences provided a means by which to compare and contrast the individual teachers' processes in regard to curriculum interpretation, and how these processes have been shaped by various factors, including the school environment in which they operate.

4.4 RESEARCH SETTING

The research took place at Joanlee State School (false name), a public school situated approximately 70km from the Central Business District of Brisbane, Queensland. The co-educational, state primary school is situated in a lower socio-economic area. At the time of data collection, the school had approximately 600 students enrolled across eight years of schooling (Prepatory Year to Year 7), with 33 full-time teaching staff.

The research setting was chosen as the researcher was acquainted with the Principal at Joanlee State School. The researcher had assisted the Principal with the implementation of the previous Queensland mathematics curriculum, the *Years 1 to 10 Mathematics Key Learning Area Syllabus* (The State of Queensland (Queensland Studies Authority), 2004) with teachers at the Principal's previous school. The researcher had not worked with the Principal since he commenced his posting at Joanlee State School and was unknown to the teacher participants in the study.

The administrative team of Joanlee State School stated they were committed to supporting their teachers with the implementation of the Australian Curriculum. In 2009, to prepare for implementation of the Australian Curriculum: Mathematics, the school administrative team had (prior to this study) embarked on developing an interim mathematics program that met the curriculum standards from the New South Wales curriculum. In 2009, Queensland schools were expected to be using the

Queensland Essential Learnings and Standards as the basis of their curriculum, while the Australian Curriculum was in development. The Principal strongly believed that the Australian Curriculum would present a significant increase in curriculum demand in contrast to the Queensland Essential Learnings and Standards. The Principal was particularly concerned that the students at Joanlee State School would struggle with the significant increase in curriculum demand regarding the development of mathematics concepts.

The Principal explained that he had heard that the new Australian Curriculum was more closely aligned to the New South Wales curriculum than the Queensland Essential Learnings and Standards (Interview: James, Principal). Consequently, he directed the development of the interim school mathematics plan that used the New South Wales curriculum content. Further to align with this plan, he ordered textbooks from New South Wales to support the curriculum change. The school purchased textbooks based on the New South Wales curriculum to support the shift. The administrative team were unanimous that the preparatory work they undertook with the teachers supported them to make the transition to the Australian Curriculum: Mathematics.

The Australian Curriculum was published in late 2010. Initial Curriculum into the Classroom (C2C) (see Section 2.4.2) resources were available from late 2011. Developed by the Queensland Department of Education and Training, the resources were designed specifically for Queensland state schools to support implementation of the Australian Curriculum commencing in 2012. Following the Department of Education and Training decision, Joanlee State School commenced implementation of the Australian Curriculum in 2012. The administrative team of Joanlee State School decided that the school would use the C2C materials as the base for their curriculum planning to support their implementation. The administrative team felt that the school had made the decision to adopt the materials as the basis for their planning documents as part of their transition strategy to the Australian Curriculum. Nonetheless, the administrative team had conveyed to the teachers at Joanlee State School that they could make alterations and adapt the C2C materials to suit the individual needs of their students and classes.

The C2C materials provided by the Department of Education included unit plans and lesson plans. The school year was divided into eight units (two units to be

covered in each of the four terms of the school year), each unit representing five weeks of scheduled school time. Figure 4.1 outlines the distribution of C2C units across the school year.
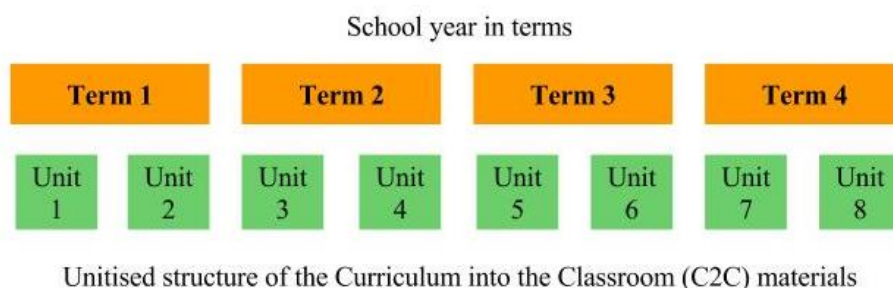
Figure 4.1. The unitised structure of Curriculum into the Classroom (C2C) across the school terms in one year.

The unit plan articulated the course of topics to be covered in each of the eight units. The lesson plans outline the segments of teaching time across the course of each unit. In the mathematics materials, there are five lesson plans per week across each of the five weeks of each unit. The lesson plans articulate the concepts to be taught, activities and resources to be used and the order in which these are done. Further, for lessons covering assessment, the lesson plan provides the instructions for administering the assessment and the guide to making judgements for assessing the students' work. The unit plans and lesson plans were provided to schools in the term preceding delivery (i.e., Term 2 materials were provided to schools at the commencement of Term 1) to allow time for preparation for teaching.

4.4.1 Participants

The participants of the study were members of staff at Joanlee State School. There were two categories of participants in the study:

1. Administrative team (*n*=3)

2. Classroom teachers (*n*=5)

Administrative team

The administrative team of the school sets the strategic direction for the school and is responsible for decisions made in regard to the curriculum taught. From this respect, the administrative team were asked to participate in the study in order to assist in clearly defining the curriculum environment of the school. This process assisted to clarify the distinction between influences that may have originated from decisions

made by the administrative team rather than by the teacher participants in the study. The administrative team participating in the present study included the Principal (James), Deputy Principal (Lesley), and Head of Curriculum (Amy). These, and the names of other participants, are all pseudonyms.

The Principal is the ultimate decision maker within the school. Following a message from the Director General, Julie Grantham (Department of Education and Training, 2012), it fell to the principals of schools to implement the directives for government schools about the implementation of the Australian Curriculum. The Principal has been interviewed with the aim to collect a description of policy influences on the school and school demographics, in order to study the alignment of the school message to the reflections of the teachers.

The Deputy Principal of the school provided further insights into the whole school curriculum planning process. The Deputy Principal is responsible for the determination of professional development opportunities for the teachers; this ultimately provides teachers with understanding of the factors that the administrative team see as valuable and important to the implementation of the curriculum. The Deputy Principal has participated in the study through an interview, which collected a description of the school's curriculum pathway and the relevant messages provided to teachers during the implementation in order to study the alignment of the school message to the reflections of the teachers.

The Head of Curriculum of the school provided insights into the whole school curriculum planning process and the relative importance placed upon elements of the curriculum planning process. The Head of Curriculum has participated through an interview aiming to collect a description of the school curriculum pathway in order to study the alignment of the school message to the reflections of the teachers.

Classroom teachers

The participants who were the focus of research in the present study were teachers from Joanlee State School. An expression of interest was provided by the Principal to the teaching staff and teachers were asked to self-nominate if interested. The expression of interest outlined that five teachers of Mathematics were sought, one from each year level in Years Three to Seven. Including a teacher from each year

level across Years Three to Seven aimed to provide a cross-section of the experiences within the school to be examined.

The teachers (*n*=5) who expressed interest in participating in the study were all female and represented a diversity of teaching experiences. The teacher participants were selected through convenience sampling, that is, they were selected because of their willingness to participate in the study (Creswell, 2008). The teachers each had over 10 years of teaching experience and held a Bachelor degree in the area of education, in addition to other qualifications. They each had experience in teaching mathematics to students from a number of primary school year levels. Three teachers taught classes that comprised students from a single year level (that is, a class with students from one year level only, e.g., Year 3), while two teachers taught combined (or multi-aged) classes (that is, the class contained students who were identified as from two different year levels, e.g., Years 4 and 5). The teachers were all enacting curriculum plans developed to implement the Australian Curriculum: Mathematics, using the Education Queensland C2C materials. The experiences of the teachers participating in the study are contained in Table 4.1.

Table 4.1

Experience of the teacher participants in the present study (n=5)

Name (Pseudonym)	Year level taught	Teaching experience
Lyn	Year Three	• has been a teacher for 35+ years • has taught mathematics to children from preschool age to Year Seven (age 12 years) • had been at Joanlee State School for 10-15 years, at the time of the study.
Winnie	Year Four	• has been a teacher for approximately 10-15 years • has taught mathematics across Year Four to Seven in Queensland • had been at Joanlee State School for 10-15 years, at the time of the study
Hillary	Year Four and Five (combined class)	• has been a teacher for 35+ years • has taught mathematics across Year One to Six in Queensland • had been at Joanlee State School for 10-15 years, at the time of the study
Miriam	Year Six	• has been a teacher for 15-20 years

Name (Pseudonym)	Year level taught	Teaching experience
Abigail	Year Six and Seven (combined class)	• has taught all aspects of mathematics in primary classrooms (specifically Preparatory year and Years Two, Four, Five, Six and Seven) • had been at Joanlee State School for less than 5 years, at the time of this study • has been a teacher for 10-15 years • has taught maths across Years One to Seven • had been at Joanlee State School for 15-20 years, at the time of this study

4.5   DATA COLLECTION AND RESEARCH PLAN

This section provides an overview of the data sources that contributed to the present study and the procedure for their use. Section 4.5.1 of this chapter outlines the instruments used in the present study to collect data. Section 4.5.2 outlines the procedure and timeline for the use of these instruments in the present study.

4.5.1 Instruments

Semi-structured interviews were conducted with the three members of the Administrative team: the Principal, Deputy Principal and Head of Curriculum. These interviews were conducted to assist with deepening the researcher's understanding of the school's curriculum decisions and direction. The questions used during the interview with the Head of Curriculum are attached in Appendix E, with the Deputy Principal in Appendix F, and with the Principal in Appendix G.

In regard to the teacher-participants, two instruments were used to collect data from the participants across the three stages of the project. Yin (2009) suggested that multiple sources of evidence are an essential component of case study design in order to triangulate themes observed during analysis. Further, he suggested that the multiple sources of evidence should represent a mix of direct contact with the research participants and the use of personal records kept by the research participants (Yin, 2009). The stages of the present study aimed to include a mix of direct and indirect sources of evidence; these have included:

1. one-on-one audio recorded, semi-structured interviews conducted in the week before teachers undertook a five week unit with their classes, these will be referred to as the *pre-unit interviews*. The questions used during these interviews are included in Appendix B.

2. teachers maintaining a journal of their preparation to teach, and reflections following each mathematics lesson during the five week unit written in response to questions contained in a journal provided to them. The questions contained in the journal are included in Appendix C.

3. one-on-one audio recorded semi-structured interviews conducted in the two weeks following completion of the unit; these will be referred to as the *post-unit interviews*. The questions used during these interviews are included in Appendix D.

The present study was conducted over three stages. The order of the three stages reflects the chronology of the data collection periods. Figure 4.2 outlines the stages of data collection in relation to the weeks of the school terms.
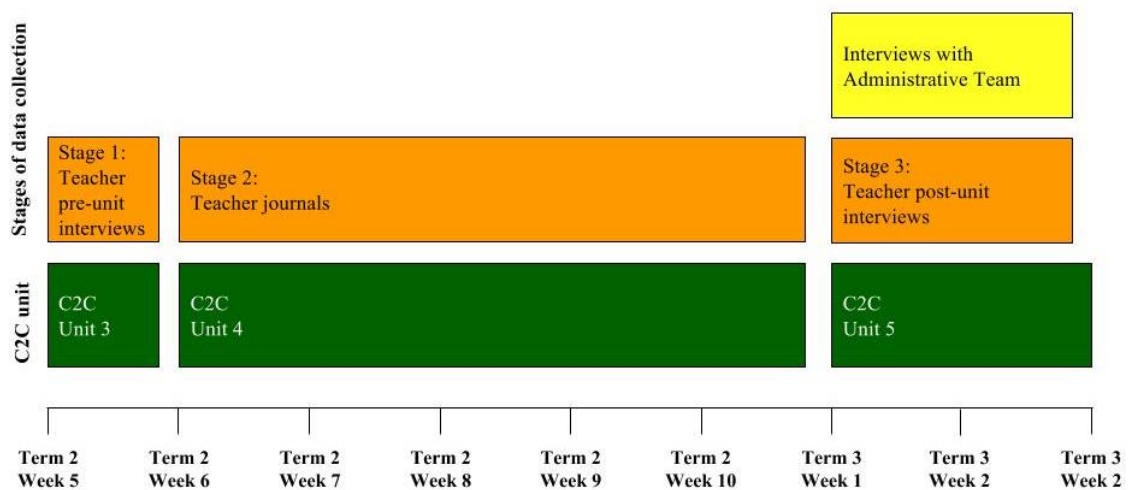
Figure 4.2. Stages of data collection in relation to school terms.

Figure 4.2 highlights that the first stage of data gathering occurred prior to commencement of Unit Four. Data gathered during Stage 1 sought to target the teachers' preparation for teaching the unit, including the activities they had undertaken and resources they had consulted. During the second stage data were gathered throughout the enactment of the unit. Data collected during Stage 2 sought to provide a continuous capture of the curriculum decisions that teachers were making during the course of the unit and the influences on those decisions. In the

third stage data were gathered following conclusion of the unit of work. Data gathered during Stage 3 sought to collect teachers' reflections on the preparation for and enactment of the unit. Data from Stage 3 provided confirmation of data collected during Stages 1 and 2.

The questions posed in each of the stages of the project attempted to draw from the participants, information that would assist the researcher to describe: (1) the process they used to interpret the curriculum for enactment in their classroom, to address Research Question 1, and (2) the specific influences that impacted upon their curriculum interpretation, to address Research Question 2. The sections that follow will provide further detail of the instruments used to collect data during the project.

Semi-structured interview

Stages one and three of the project involved the use of semi-structured interviews as the means of data collection. Whiting (2008) defined interviews as a method of data collection whereby one person, typically labelled the interviewer, is able to ask questions of another person, often labelled the respondent. Further, semi-structured interviews are a technique whereby the interviewer maintains control over the interview by asking questions of the respondent, but generally offers little else (Whiting, 2008). The technique of semi-structured interviews allows open and direct questioning in order to elicit the detailed narrative of the respondent. Yin (2012) suggested that this form of data collection can elicit richer and more extensive data responses from the respondents, describing interviews as one of the most important sources of data for case studies (Yin, 2009). This is because often, case studies are used to investigate human or behavioural events, and interviews provide first-hand insight into such experiences.

Interviews with the teachers were conducted during stages one and three of the research (see Figure 4.2). The interviews were semi-structured, one-to-one interviews between the researcher and each participant separately. The interviews were audio taped recorded and then transcribed verbatim. The teachers were interviewed twice during the course of the study:

1. During Stage 1 of the data collection, prior to the sequence of lessons being taught in the classroom, interview questions centred on the teachers' process of preparation for teaching the unit they were about to commence. The specific questions used during these interviews are contained in Attachment B.

2. During Stage 3 of the data collection, following the conclusion of the unit, to discuss experiences in teaching the unit as well as reflections on the unit and alterations to the curriculum planning they had undertaken during the course of the unit. The specific questions used during these interviews are contained in Attachment D.

Each interview was held in a private office away from the students and other staff on the school premises. An hour was allocated for each interview, however not all interviews required the full allotted time.

Journals

Teachers were asked to record their plans and reflections in a journal to capture their experiences and materials used during the course of the unit. Journals provide a record of events that can be tracked across the course of time (Boud, 2001). The recording of events following their occurrence aids the journal writer in their reflective practice and enables them to use their experiences to guide their learning.

Janesick (1999) provides insight into qualitative methods through extensive articles, chapters and books. Journaling has been a method of maintaining and recording historical events and context (Janesick, 1999). Journals provide an opportunity for the participant to reflect upon events as they occur, rather than utilising memory after some time is passed. It also provides a mechanism to triangulate data collected via other means and check historical content and context within the study (Janesick, 1999).

A spiral bound book was provided to each teacher participant. Each page of the book contained five questions (provided in Appendix C) to encourage reflection on each mathematics lesson during the unit. Teachers were asked three questions about the intentions for the lesson, which were to be answered prior to teaching the lesson. The remaining questions were reflective in nature and asked about what occurred during the lesson and were to be answered after the lesson was taught.

The nature of each journal entry was designed to be short in order to minimise any inconvenience for teacher participants, as they were asked to complete a number of journal reflections throughout the course of the study (approximately 20-25 entries). Teachers returned the journal to the researcher at the post-unit interviews. Only one teacher, Abigail (the Year Six and Seven teacher), did not complete reflections for the full course of the unit.

4.5.2 Procedure and timeline

The 2012 school year officially commenced on January 23. At this time, schools commenced implementation of the Australian Curriculum. In negotiation with the school, it was deemed that Unit 4 (to be taught in the second half of Term 2) would be the most appropriate time to conduct the research. The researcher negotiated the start of the research project with the school administrative team. Unit 4 was determined to be the most appropriate time for the project to be conducted as the administrative team felt this would give teachers enough time to get to know the students in their class and commence implementation of the curriculum in earnest. The researcher felt that the optimal time to observe the teachers was once implementation had begun in earnest.

Teachers were interviewed for the first time and presented with their journals in the week before commencing the unit, as per the dates outlined in Table 4.2. Following further negotiation with the school, the post-unit interviews were conducted in the first week of Term following the mid-year school holiday. Unfortunately, one of the teachers, Miriam (the Year Six teacher), was not available (she was on school camp), so the interview with Miriam was conducted one week later as per the dates outlined in Table 4.2.

Table 4.2

Timeline for the research

Stage	Activity	Date
1	Pre-unit interviews with teachers	Term 2 Week 5
2	Commencement of unit and journal entries	Term 2 Week 6
	Conclusion of unit and journal entries	Term 2 Week 10
3	Post-unit interviews with teachers and context interviews with administrative team	Term 3 Week 1

Stage	Activity	Date
	Remaining interviews (Miriam and one administrative team interview)	Term 3 Week 2

4.6   DATA ANALYSIS

The data collected from the three stages of the project were intended to provide insight into how each of the teachers interpreted the curriculum, in response to Research Question 1, and identify influences that have impacted upon their curriculum interpretation, in response to Research Question 2. This analysis was conducted in three steps: 1) thematic analysis was applied to the data of each teacher, 2) the themes identified assisted in the development of a model of each teacher's process of interpretation and the factors that influenced their process and then 3) a comparison of the teacher data was examined.

Section 4.6.1 of this chapter outlines the technique of thematic analysis and a suggested approach from Braun and Clarke (2006). The process of thematic analysis used in the present study has been outlined in Section 4.6.2. Section 4.6.3 illustrates the process of comparison that has been used to compare the teacher data in the present case study. Table 4.3 provides a summary of the research program from the present study. It serves to map the research questions of the present study to the data sources and analytical procedures used to address them.

Table 4.3

Summary of research programme

Research question	Data source	Data analysis
1. What is the process of curriculum interpretation used by individual teachers?	• Semi-structured interviews • Journals	• Thematic analysis • Development of models of curriculum interpretation • Comparison of models
2. What are the specific influences which impact upon teachers' curriculum interpretation??	• Semi-structured interviews • Journals	• Thematic analysis • Analysis of teacher data through broad themes • Comparison of broad themes

4.6.1 Thematic analysis

Firstly, the data corresponding to each teacher was examined using thematic analysis. Additionally, thematic analysis was used to examine the interview data from the school administrators to establish an understanding of the environment in which the teachers worked.

Qualitative methods were used to analyse the data collected during this study. Thematic analysis was employed to assist in the identification of the recurrent themes from the interview transcripts and journals. According to Braun and Clarke (2006), thematic analysis is a widely used analytical method of qualitative research. They state that thematic analysis is an analytic method that can be used to address most types of research questions (Braun & Clarke, 2014). Thematic analysis is used to generate meaning by grouping gathered data according to identified patterns (themes).

Guest, MacQueen and Namey (2012) stated that thematic analysis often requires more involvement and interpretation from the researcher. The requirement of thematic analysis is more than counting of words or phrases (Guest, MacQueen & Namey, 2012). Rather, thematic analysis requires identification of the implicit and explicit ideas that are contained in the data, which are known as themes, description of the themes and then application of the themes to the raw data for analysis.

4.6.2 Process of analysis

The process of thematic analysis employed in the present study was based on Braun and Clarke's (2006) six phases of thematic analysis. The six phases include: *familiarising yourself with your data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report* (Braun & Clarke, 2006, p.87). The data gathered for each teacher participant was considered as a whole and analysed individually, that is, all three items for one participant (the pre-unit interview transcript, the unit journal, and the post-unit interview transcript) were analysed before analysis commenced on the items from another participant. The paragraphs that follow outline the phases of analysis undertaken for the present study. The process of analysis is outlined in Figure 4.3.
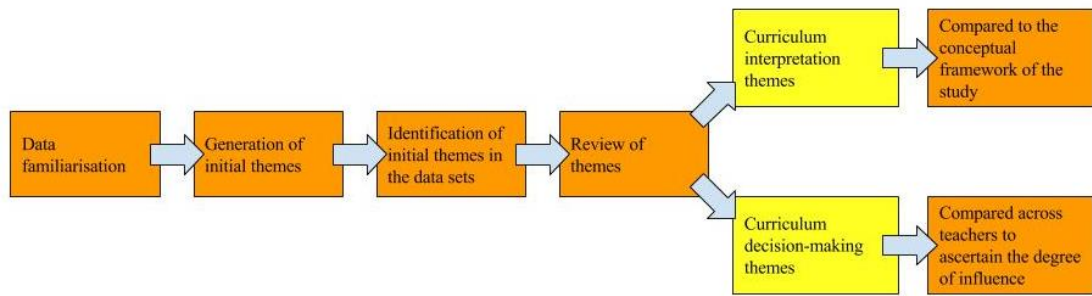
Figure 4.3. Process of analysis for the present study.

The processes used to analyse data have been included in the darker boxes in Figure 4.3. The lighter boxes denote the two categories of themes identified. Details of the processes of analysis presented in Figure 4.3 have been provided in the sections that follow.

Data familiarisation

The pre-unit and post-unit interviews were transcribed from the audio recordings. Each data set, that is the transcription of the pre-unit interview, transcription of the post-unit interview and journal for each teacher, was considered individually and read through in its entirety to orientate the researcher. Additionally, the audio recordings of the interviews with the administrative team were transcribed. These transcriptions were also read through in their entirety.

Generation of initial themes

The researcher then reread each item looking for ideas or statements that were recurring from the participant. For example, in Abigail's data, a variety of comments were made describing the challenge of meeting the educational needs of the students in her classroom, for example: *"... I even go down to looking at Year Five stuff, because I do have some lower learners in [Years] Six and Seven, so I do need to go into the Five [content]"* (Pre-unit interview: Abigail). In this comment Abigail is referring to the curriculum planning materials that she engages with in preparation for a unit of work. While her class is a combined Years Six and Seven class comprising of students from both year levels, she has found that her students require substantial additional support. In providing additional support for her students, Abigail has found that she needs to refer to the curriculum plans for Year Five in order to meet the learning needs of all of the students in her classroom. Abigail made multiple references to the pitch of the curriculum content that she was required to

teach. These comments were categorised as contributing to the initial theme of *curriculum content pitch*.

Across each data set (that is, the three data sources for each teacher) Abigail made numerous references to the additional support that she felt her students required to learn the new concepts in the unit, for example: *"[The unit needs] more basic ideas and lessons to give them [the students] the foundation of [concept] development first before moving on to what was required here in that unit"* (Post-unit interview: Abigail). In this example, Abigail is explaining that she feels that the curriculum plan as it is written does not provide enough of the basic concepts and skills as a lead into the more complex concepts that are described in the plan. "Were you able to address all the mathematical concepts you planned to? No. Why or why not? We [the students] were still grasping the concepts from [the] previous lesson. Students needed to consolidate before moving on [to a new topic]" (Journal entry 3: Abigail). In this journal entry, Abigail expresses that she was not able to address all of the mathematical concepts she had planned to tackle with her students as they were still building an understanding of the concepts from the previous lesson and not ready to tackle the new content.

These comments from Abigail's data set describe the challenge she felt in meeting the diversity of students' needs in her classroom with activities pitched appropriately for their learning. These comments were categorised as belonging to the initial theme of *curriculum content differentiation* in Abigail's data.

Identification of initial themes in the data sets

The researcher then re-read the data sets highlighting the themes that had been identified to ascertain their recurrence in the data. The process was completed separately for each data set to ensure the themes were identified uniquely for each participant.

Review of themes

The initial themes identified for each data set were then reviewed. Related themes were combined where appropriate and a clear set of themes was established. Highlighted data were consulted to ensure the themes reflected the broad themes.

The identified themes were compared across participants to ascertain the level of similarity that existed across the identified themes. From the administrative data,

the broad themes related to curriculum planning support and staff development. These broad themes served to describe the curriculum context at Joanlee State School.

From the teacher data sets, the broad themes identified included: Process of curriculum interpretation, Content/pitch of the curriculum, Time, Mathematical language, Textbooks or other resources, Digital technology, and Assessment. The broad themes were attributed to two distinct types of themes, themes that related to the process of curriculum interpretation and themes related to the influences on teacher curriculum decision-making. The two types of themes have been highlighted in Figure 4.3 in the lighter yellow boxes. This is to denote that different processes were used to analyse and present the data related to the types of themes.

Curriculum interpretation themes

The responses from the teacher participants that were categorised as contributing to the theme of *Process of curriculum interpretation* were compared to the conceptual framework for the present study (see Figure 3.6). Through this comparison, models were developed that represent each teacher's process of curriculum interpretation in relation to the conceptual framework of the study. This process is further detailed in Chapter 4. This analysis of data attributed to the theme of *curriculum interpretation* and the models developed during the analysis of this data were used to address Research Question 1: what is the process of curriculum interpretation used by individual teachers?

Curriculum decision-making themes

The responses from the teacher participants that were categorised as contributing to the recurring themes of *Content/pitch of the curriculum*, *Time*, *Mathematical language*, *Textbooks or other resources*, *Digital technology*, and *Assessment*, represent influences that impacted teacher curriculum decision-making. These themes were used to unpack the data for each teacher individually in Chapter 4. The use of these themes to analyse the teacher data served to address Research Question 2: what are the specific influences which impact upon teachers' curriculum interpretation?

4.6.3 Comparison of teacher data

Each teacher in the present study constitutes an instance of the case. In order to answer the Research Questions of the present study, the instances have been compared and contrasted to ascertain similarities and differences across the experiences of the teacher participants. The comparison has involved the analysis of the findings from each of the individual teachers to ascertain similarities and differences in relation to the processes each teacher used for curriculum interpretation and the identified influences on curriculum decision-making. This has supported the comparison of the individual models developed to represent the teachers' process of curriculum interpretation in Chapter 5. The comparison of the models aimed to ascertain similarities that existed in how teachers from this school interacted with the curriculum and how aligned these models were to the theoretical model underpinning the present study.

The five unique models of curriculum interpretation developed from the teacher's data were used as the basis of comparison. The diagrams constructed for each teacher used the analytical framework as a base to outline the unique pathway that each teacher has taken in engaging with the intended curriculum, curriculum planning and enacting the curriculum in the classroom. While they are a simplification of these processes (that is, they do not acknowledge the iterative processes that teachers may use to plan for their classrooms), they provide a generalisation of the process of curriculum interaction by these teachers for means of comparison. Similarities and differences were identified and reported according to the components of the curriculum interpretation. Comparisons were considered in the way teachers interacted with the intended curriculum, the processes they used in curriculum planning and the methods by which they enacted their curriculum plans. This process was undertaken to answer Research Question 1: what is the process of curriculum interpretation used by individual teachers?

The comparison of the teacher data also sought to compare the influences on curriculum decision-making by the teachers in the present study. The identified broad themes have been compared and contrasted in Chapter 5 to ascertain the extent of overlap between the teachers and the significance of any overlap that exists.

This comparison was performed at two levels. The first level was a comparison of the frequency of the influences aligned to the teachers, that is, how many teachers

identified each of the influences. The second level of comparison was a deeper comparison of the specific data contributing to the identification of that influence in each of the teachers' data sets. This second level of comparison identified sub-themes from the teachers' data and analysed the contributing sub-themes for similarity and difference in the references teachers made. These analyses of the identified influences served to address Research Question 2, what are the specific influences which impact upon teachers' curriculum interpretation?

4.7 RESEARCH QUALITY

Lincoln, Lynham and Guba (2011) questioned the notion of validity in interpretivist research. They asked if the data that is collected is a reflection of the reality of the participant, then how can it be considered invalid? They do not advocate for ignoring the concept of validity, rather they suggested that the traditional concepts of validity, reliability and objectivity are more conceptually aligned to positivist research. Lincoln, et al. (2011) instead suggested that consideration of trustworthiness and authenticity is more relevant. Based on Lincoln and Guba (1985), Marshall and Rossman (2011) suggested that the notion of trustworthiness is akin to the notion of soundness, which includes credibility, transferability, dependability and confirmability.

4.7.1 Credibility

Marshall and Rossman (2011) liken credibility to the positivist notion of validity, that is, that the results of the research are believable. They cite a number of techniques for ensuring credibility within qualitative research, including triangulation of data; soliciting feedback from those familiar with the setting and from strangers; and peer debriefing.

As discussed in Section 4.5.1, triangulation is an essential technique suggested by Yin (2009) in case study design. Using multiple sources of evidence, especially when using a mix of direct contact techniques and personal accounts from the participants, assists to triangulate the themes observed by the researcher during analysis. In the present study, two research instruments, that is semi-structured interviews and journals, were used to collect data from the participants across three stages. These methods represent a mix of direct contact techniques (semi-structured interviews) with person accounts of the participants (journals). These methods across

time allowed for triangulation of the data and observations made by the researcher in analysing the results. Additionally, the researcher engaged in peer debriefing with the supervisory team for the present study to support credibility in the analysis and presentation of results.

4.7.2 Transferability

According to Marshall and Rossman (2011), transferability refers to the generalisability of the study and findings to other similar situations. Simons (1996) stated that one of the advantages of case study research is the capacity to delve in depth into complex and unique contexts. Conversely, the deep and narrow focus of case study is the reason that it is difficult to generalise from a single case. Simons (1996) stated that over-generalising is an issue for the case study. However, citing Stake (1978), Simons (1996) suggested that the burden is on the researcher to write a compelling report of the research. Ultimately, it is the reader who will determine the transferability of the research dependent upon the degree of alignment between the presented research and the epistemological perspective of the reader (Simons, 1996). Marshall and Rossman (2011), however, suggested that the transferability of a study can be established through reference to the conceptual frame of the study. They asserted that a conceptual framework that has been developed from concepts and models in well-reasoned research provides a suitable basis for transferability.

The conceptual framework for the present study has been developed from the concepts and models of contemporary mathematics curriculum researchers who have provided considerable thought and intellectual rigor to the field over a sustained period of time. The researchers cited provide insight into defining curriculum (Ellis, 2004; Pinar, 1975; Reid, 2005; Sherin & Drake, 2009), curriculum theory (Pinar, 1975; Ellis, 2004), mathematics curriculum (Porter, 2002; Remillard & Heck, 2014; Sherin & Drake, 2009) and curriculum interpretation (Porter, 2002; Remillard & Heck, 2014). Each of these perspectives has shaped the conceptual framework of the present study, providing depth to the concepts that were tested through the study.

Transferability for the present study would be limited by the time and space within which this study has been conducted. The context for the study represents the first implementation of a national curriculum in Australia. Further, the context of this study represents the reaction and provision of support provided by the State of Queensland to its teachers on the advent of the first time the State has not been the

developer of its own curriculum. From this position, it is also the first time that teachers had been provided with the curriculum support materials, such as the Curriculum into the Classroom (C2C), to support implementation of the curriculum. This context is very unique and as such would be difficult to recreate.

4.7.3 Dependability

Dependability, in a qualitative study, ensures that all relevant information is reported so that another researcher may replicate the approach taken (Marshall & Rossman, 2011). The notion of dependability includes a well-articulated rationale for the research methodology, as well as the provision of the necessary steps to ensure the study could be repeated. Dependability aligns with the quantitative notion of reliability.

In qualitative research, the notion of dependability also recognises that the research context that is being observed is evolving (Trochim, 2006). Thus, it cannot be understood *a priori* as a singular moment in time, and the same thing cannot be measured twice. Instead, dependability is about the capacity for the researcher to account for the changing research context and describe the changes that occur, including how the research approach must be adapted to accommodate. The description and justification provides the reader with the capacity to use the methodology, albeit in a different context.

It is believed that the methods used in the present study could be replicated in a different context. The thematic analysis undertaken in the present study was based on the work of Braun and Clarke (2006) and could be replicated to establish themes in a different context. While the curriculum models developed for each of the teachers are individual to the teacher they represent, the process used in the present study could be replicated to represent other teachers' processes of curriculum interpretation. The influences identified align with the research undertaken about influences on curriculum enactment (see Section 3.4); this alignment will be further discussed in Chapter 5.

4.7.4 Confirmability

Confirmability represents the degree of neutrality, in which the findings of the research study have been shaped by the participants and not the researcher's bias, motivation or self-interest (Marshall & Rossman, 2011). Confirmability is in

reference to the effectiveness of data collection and treatment of the data during analysis. It refers to the degree to which the results of the study could be corroborated.

Trochim (2006) suggested that a strategy for enhancing the confirmability of the research is to implement procedures for checking and rechecking the data throughout the course of the study. The process of thematic analysis, based on Braun and Clarke's (2006) six phases, has assisted to provide a number of documented checks of the data throughout the study, which has further aided in confirmability of the reported results.

4.8   ETHICAL CONSIDERATIONS

The fundamental principle in all research, regardless of methodology, is to *do no harm* (Simons, 2009, p. 97). This principle has been in the forefront of the researcher's mind, given her professional role. The researcher of the present study has been conscious that her professional role as a full time employee of the state curriculum authority the Queensland Curriculum and Assessment Authority (or Queensland Studies Authority as it was named during the data collection phase of the project) could represent perceived unequal power relations in this study. This was particularly important for consideration due to the interpretivist nature of the research. This consideration was managed by commencing the first interview with each participant by acknowledging the researcher's professional role and by outlining the researcher's personal research interest. As the researcher, it was important within the current curriculum climate to ensure that the participants did not feel at any time during the study that the research interest related to an evaluation of their classroom practice, or that the research was a way in which the Queensland Studies Authority was inspecting their classroom or school.

Ethics approval was sought and gained for this study from the Queensland University of Technology (Queensland University of Technology Ethics Approval Number 1200000182). The study was conducted in accordance with the National Statement on Ethical Conduct in Human Research (2007). Additionally, ethical approval was sought and provided by the Queensland Department of Education and Training, as the research was conducted in a Department of Education and Training school.

The present study was a low risk project. The potential risks to participants were made apparent to participants before they agreed to participate in the study, including the capacity to withdraw from the study at any time. However, harm to participants can be unforeseen through elements of stress, anxiety and guilt (Murphy & Dingwall, 2001), which can be associated with their participation in additional activities that the teachers feel may detract from their teaching role. All participants were volunteers in the study, and it is the researcher's hope that the participants saw this project as an opportunity for reflective practice, as has been noted in studies such as Sherin and Han (2004), rather than as an additional burden to their teaching load.

4.9 CHAPTER SUMMARY

This chapter has presented the methodology and research design for the study of teachers' curriculum interpretation and the influences upon their curriculum decision-making. It has explored the interpretivist research paradigm and how this influences the subjectivity of the researcher in the present study. The methodology of the study, an exploratory case study (Yin, 2009), has been discussed, including the relationship of this design to the reflections of Porter (1989), whose work has influenced the theoretical framework of the present study. Porter (1989) has acknowledged that few qualitative studies in this field have been undertaken, even though the reward for this style of research design to understanding curriculum alignment would be highly beneficial.

The chapter has provided an overview of the research setting at Joanlee State School. The teacher participants from Joanlee State School were self-nominated and represented a cross-section of the teaching year levels of the school. The experiences and perceptions of the teacher participants were obtained through semi-structured interviews at the commencement and conclusion of a five-week unit of Mathematics, representing stages one and three of data collection. They were complemented by the reflections captured in journals kept by the teachers during the unit, representing stage two of data collection.

The data collected was analysed through thematic analysis, based on the work of Braun and Clarke (2006). The phases of analysis lead to the distillation of a number of themes across the five data sets of the teachers. These themes contributed to the development of models representing the teachers' individual process of

curriculum interpretation and the influences that have impacted upon their curriculum decision-making.

This chapter has provided a case study justification, explained the research context, described the data collection and data analysis procedures, highlighted methods to ensure trustworthiness and authenticity, explained the researcher's role and outlined the ethical considerations of the study.

In Chapter Five, the research findings were presented for each of the participants in the study. The chapter outlined the data collected and the themes extracted from the analysis of the data. It also provided the individual models developed to represent the teachers' process of curriculum interpretation and the influences that have impacted upon their curriculum decision-making.

Chapter 5: Results

5.1   INTRODUCTION

This chapter presented the data and its analysis, in particular of the experiences of five teacher participants in this study. The data described is extracted from the pre and post-unit interviews ($n = 5$) and journals ($n = 5$). Each teacher data set is presented, analysed and summarised separately before commencing the presentation of data for subsequent teachers. The analysis is presented in two parts: firstly, each teacher's process of curriculum design, interpretation and enactment in their classroom is summarised; and secondly, the influences upon the teacher's process are described.

This chapter has the following structure. The curriculum context of the research setting is described in Section 5.2 to provide an overview of the direction that had been provided to the teachers about the implementation of the Australian Curriculum at Joanlee State School. Section 5.3 reiterated the approach taken to analyse and describe each teacher's curriculum interpretation practices (this approach was thoroughly described in Chapter 4). Sections 5.4–5.8 presented the analysis of each teacher's practices and the influencing factors to ascertain the process of curriculum interpretation used by each of the teachers in this sample and to begin to look at the specific influences that impact upon teachers' curriculum enactment. Finally, Section 5.9 concluded the chapter.

5.2   CURRICULUM CONTEXT OF THE RESEARCH SETTING

As stated in Section 4.4, the administrative team of Joanlee State School were quite dedicated to supporting their teachers in implementing the Australian Curriculum. They had made a number of strategic decisions to prepare for implementation. Through the interviews with the administrative team, James (Principal), Lesley (Deputy Principal) and Amy (Head of Curriculum), a number of key messages to the Joanlee State School staff were able to be discerned. These key messages may have influenced the process of curriculum interpretation employed by the teachers in the present study. For this reason, this section has been included to highlight some of the key decisions presented by the administrative team to staff that may have influenced

the processes that the teachers have undertaken to interpret the Australian Curriculum. In particular, potential influences have been considered in regard to the strategic curriculum direction that the administrative team had determined for Joanlee State School. These influences are evident in the: (1) curriculum planning support provided to staff, and (2) the staff development that was used to support the teaching staff with implementing the Australian Curriculum.

5.2.1 Curriculum planning support

The semi-structured interviews with James (Principal), Lesley (Deputy Principal) and Amy (Head of Curriculum) gave an insight into how staff at Joanlee State School were expected to implement the Australian Curriculum in their classrooms. In their interviews, each member of the administrative team made reference to the initiatives that had been put in place at the school to prepare for the implementation of the Australian Curriculum. Details of the curriculum support provided to Queensland schools have been provided in Sections 2.4.1 and 2.4.2.

James spent considerable time talking through some of the initiatives that the school had undertaken in the last few years to prepare for the commencement of the Australian Curriculum. Specifically, in the area of Mathematics, James had led the school to increase the complexity of the Mathematics curriculum content that was being taught in each year level.

> *... we wrote a maths program ... three years ago ... that was aimed at increasing the level of content ... we actually pulled the New South Wales stuff ... and the targets that we found in New South Wales schools and we actually put a program together based on that ... So we felt we started preparing back then because we were getting kids used to a different line of content.*
>
> <div align="right">(Interview: James, Principal).</div>

Prior to the publication of the Australian Curriculum, James strongly believed that the Australian Curriculum would likely present a significant increase in academic demand for his students. Consequently, James directed the development of an interim curriculum plan based upon the New South Wales curriculum materials. This decision represented a move away from the policy position for Queensland schools; at that time schools were required to use the Queensland Curriculum, Assessment and Reporting Essential Learnings for Mathematics. James perceived

that the Queensland curriculum was not as demanding as what he had seen from drafts of the Australian Curriculum. He predicted that the New South Wales curriculum content would be closer aligned to the Australian Curriculum than the Queensland curriculum. This process was discussed in Section 4.4. Lesley and Amy made reference to the interim mathematics curriculum plan during their interviews, though neither were staff members of the school at the time of the change.

James stated that he felt that it was the nature of teachers to feel concern for their students in times of uncertainty and transition. Consequently, he felt that while they proactively made changes to prepare for the Australian Curriculum, he was uncertain as to whether this decreased the anxiety that his teachers felt in regard to the curriculum change. However, once the Australian Curriculum became available, James did work to support teachers to prepare for the curriculum change.

> *We did use the Australian Curriculum - that was in the early days before we had C2C - so they had a bit of an understanding of what actually was in the Australian Curriculum ... Then when C2C came into play we largely used that for our unit.*
>
> (Interview: James, Principal).

James recalled that, prior to the release of the C2C materials, the administrative team at Joanlee State School supported the teachers to engage with the Australian Curriculum as provided by ACARA. He stated that this was a strategy used to commence teachers' engagement with the new curriculum. The administrative team, led by Amy, the Head of Curriculum, gave teachers a folder of photocopied resources about the curriculum. Additionally, Amy provided updates to the teaching staff about any professional development she attended about the curriculum. However, once the C2C materials became available, James stated that the focus changed. The administrative team supported teachers to use the C2C materials as the main resource to support curriculum planning.

Responses about using the C2C materials were derived from interview questions directly relating to the school's decision about how it intended to use the C2C materials. The questions asked (see Appendix E and F) were:

> *Has the school chosen to use C2C as a resource for planning, teaching and/or assessment? Why has the school chosen to use C2C in this way?*

How is the school using the C2C resource?

[Is the school choosing to 'adopt' or 'adapt' C2C?]

These questions sought to clarify the school position on the use of the C2C materials. James discussed the position that the administrative team outlined for their teachers:

> *Fortunately, I suppose C2C has provided the content so it's all set out there, and you could actually go and teach it holus bolus if you want. A lot of people thought they had to do that initially ... we kept saying that wasn't the case, you've got to teach the Australian Curriculum, you've got to have the assessment item common across the class but how you get the kids there and how you have to differentiate is different.*

<div align="right">(Interview: James, Principal).</div>

James explains that in the time of change he felt that the teachers were fortunate to receive the level of support that the C2C materials provided. However, he was adamant that the teachers were told they did not have to use all aspects of the product. The message he wanted the teachers to understand was that they were required to teach the Australian Curriculum. They could do this by using the curriculum content set out for each of the C2C units and ensuring it was consistent across all classes in the year level. Additionally, the teachers had to use the assessment task provided by the C2C materials to assess the students' understanding of the curriculum content for the purpose of comparability. He felt strongly that how the teachers taught the curriculum content, and how they differentiated to support their students, should be unique to meet the needs of the individual students in their classrooms.

The three administrative team members each categorised the school's use of the C2C materials as "adopting and adapting". They each felt that the school had made the decision to adopt the materials as the basis of the school's curriculum plan to assist the transition to the Australian Curriculum. They each expressed that the position they had maintained in relation to the materials was to inform their teachers that they could make alterations and 'adapt' the C2C materials to suit the individual needs of the students and classes. Amy illustrated this perspective on C2C materials as she discussed the work that she had been doing to support teachers. During her planning days with the teachers, she and the teachers were noticing that it was not

possible to implement the full suite of suggested resources in the C2C materials due to time constraints.

> *Well, in the beginning we were adopting it, but I think as the teachers have become more familiar with it, and also since we've realised that, really, it's so extensive that it's not possible to do everything, the teachers have become better at adapting it.*
>
> (Interview: Amy, Head of Curriculum).

Amy felt that while initially the school was prepared to genuinely implement the C2C materials in their entirety, since the school had commenced working with the C2C materials and considered the enormity of the resource they had reconsidered this position. Consequently, teachers were being encouraged to select the most relevant resources to support the learning needs of their classes. Amy attributes increasing teacher confidence to this gradual release.

5.2.2 Staff development

The three administrative team members each made reference to the structure of the planning days that the school had initiated to support teacher planning and preparation. They each viewed this process as integral to the success of the transition at the school and the professional development of staff. Planning days are a strategy James employed to allow teachers time to work through the materials with their year level team members. Twice each quarter (Term) commencing in Term 4 of 2011, teaching teams were given planning days to allow them to work with Amy to discuss the implementation of the Australian Curriculum, the C2C materials and the support they may need for teaching. *"The planning day structure at the moment exists that we have three teachers in the school that release people and they come off and plan together with Amy"* (Interview: James, Principal). As James explains, to enable the school to conduct the structure of the planning days, James had made the decision to temporarily restructure his staff so that there were three teachers available who could relieve the main teaching staff of their classes on particular days to allow for the planning days to occur. Each member of the administrative team referred to conversations with the teaching teams, in which they expressed that the nature of the planning days could change now that they were beginning to feel more confident with the curriculum and the C2C materials.

As part of her role Lesley has also described that she provides support to the teachers that is beyond the nature of typical professional development.

... because we do those planning days there's a lot of support ... I've taken them a step further now to say okay you've got your head around it, now ... I want you to read the intent. I want you to read the assessment task, and I want you to spend 10 minutes in your head working out how you would teach that [concept] to get here [the assessment task].

(Interview: Lesley, Deputy Principal).

Lesley has tried to take the teachers through the process of using the C2C materials as the basis for their unit planning. Initially, she gave them time to engage with the materials, but now that this has occurred Lesley has spent time trying to focus their attention on how to build programs that meet the needs of the student in each teacher's classroom. Lesley directs the teachers to look at the final assessment task as the destination for the unit and then asks the teachers a series of questions to inspire their thinking about the unit they are preparing. These questions include asking the teachers to plan their own units using the knowledge of their students and the relevant data that they have collected. She also asks those teachers to let her know what they might need in the way of support to reach the destination.

Each of the aspects of curriculum planning support and staff curriculum development have been influenced by the strategic curriculum direction as determined by the administrative team at Joanlee State School. The messages that they have given to staff have influenced the ways in which the teaching staff at Joanlee State School will have perceived the curriculum change. The sections that follow describe the process of curriculum interpretation undertaken by five teachers of the Joanlee State School teaching staff and the influences that altered their processes of curriculum interpretation.

5.3 MODELLING THE PROCESS OF TEACHERS' CURRICULUM INTERPRETATION AND IMPLEMENTATION

In order to investigate how teachers interpreted and implemented the curriculum, data were gathered in three stages: (1) pre-unit teacher interviews; (2) teacher journals, and (3) post-unit interviews (see Section 4.5). The interviews and journal entries gave an insight into how each of the teachers interacted with the curriculum, as well as reflections on their experiences with the curriculum across the course of

the unit. The participant data have been analysed using a process of thematic analysis based on Braun and Clarke's (2006) six phases of thematic analysis.

Each teacher's data were analysed individually, one after the other. The process of thematic analysis used for each teacher's data have been described in detail in Section 4.6.2. A summary of the process is provided, but in brief, this process involved:

- Data familiarisation – an initial reading and re-reading of the data set for each teacher in full and individually prior to the commencement of a subsequent teacher

- Generation of initial themes – re-reading of the teacher's data to identify recurring ideas and statements

- Identification (coding) of the data sets using the initial themes – re-reading of the data sets to highlight themes that had been initially identified in order to ascertain their recurrence in the data set

- Review of themes – initial identified themes were reviewed across the teachers' data, combined where appropriate, and a clear set of broad themes established. The broad themes were applied to highlighted data.

The broad themes were classified into two distinct types: themes that related to the *process of curriculum interpretation* and themes that related to *influences on teacher curriculum interpretation*. The sections that follow explore how these two categories of themes have been presented.

5.3.1 Process of curriculum interpretation

The data categorised as contributing to the theme of *process of curriculum interpretation* was used by the researcher to develop individual representations of the method each teacher used to implement the curriculum. The representations created for each individual teacher used the present study's conceptual model as the base demonstrating the interaction between the intended, planned and enacted curriculum for each teacher. The base of the model is included in Figure 5.1.
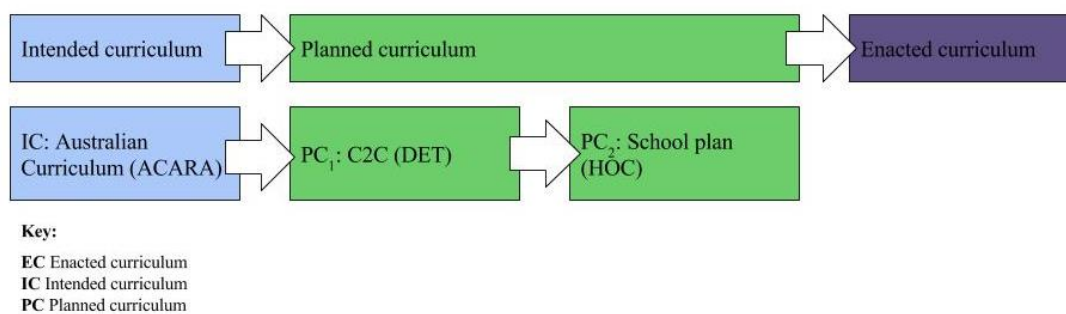
Figure 5.1. The base used for the development of the individual representations of curriculum interaction.

The base model captured in Figure 5.1 illustrates the assumed sequential path of curriculum interpretation, that is, the teacher interprets the intended curriculum in order to develop a curriculum plan, which is ultimately enacted in the classroom. The top row of the diagram illustrates the path from intended to planned to enacted curriculum. The second row allows for the specifics of the context of the teacher it is endeavouring to capture. For the teachers in the present study, the intended curriculum provided to them is the Australian Curriculum as written by the Australian Curriculum, Assessment and Reporting Authority (ACARA). The planned curriculum is the interpretation of the intended curriculum, in the present study the first interpretation was undertaken by the Department of Education and Training (DET) in the development of the Curriculum into the Classroom (C2C) resources. At Joanlee State School, the Head of Curriculum (HOC) adopted the C2C materials as the basis for planning at the school and labelled them the School curriculum plan. The Head of Curriculum's version of the C2C resources was then uploaded into the Department of Education and Training's OneSchool portal to be recorded as the official curriculum documents for Joanlee State School. These materials were provided to teachers to adapt to suit the context of the students in their classroom. These curriculum interactions have been captured diagrammatically in Figure 5.1.

The conceptual model was then elaborated according to the comments categorised as contributing to the theme of process of curriculum interpretation from each individual teacher's data set. The elaborations to the base model (Figure 5.1) allowed for the development of a representation of each teacher's process of curriculum interpretation. The teacher representations served to capture the process the teacher has used to interact with the curriculum. Each diagram is a representation of how the teacher interacted with the intended, planned and enacted curriculum, and

serves to address Research Question 1 about the process of curriculum design, interpretation and enactment of individual teachers in the Queensland context (in particular amongst State Schools).

The diagrammatic representations of the teachers' processes of curriculum interaction follow a sequential path in the curriculum implementation process (i.e., from intended curriculum to planned curriculum to enacted curriculum). They do not represent the iterative processes involved in the undertaking of teaching in these classrooms but rather are designed to represent a generalisation of the process undertaken by each teacher in interpreting the curriculum for the purpose of comparison.

The diagrams illustrate how each of the teachers implemented the curriculum. In some cases, the actions are direct and intentional. An example is when a teacher has made a decision to create an alternate curriculum plan to cater for different student needs by developing additional activities pitched at a lower or higher degree of difficulty. However, some actions may also be unintended or involuntary: for example, the decisions that may not have been made by the teacher but rather were a school or sector-wide decision that a teacher has followed (Figure 5.2).
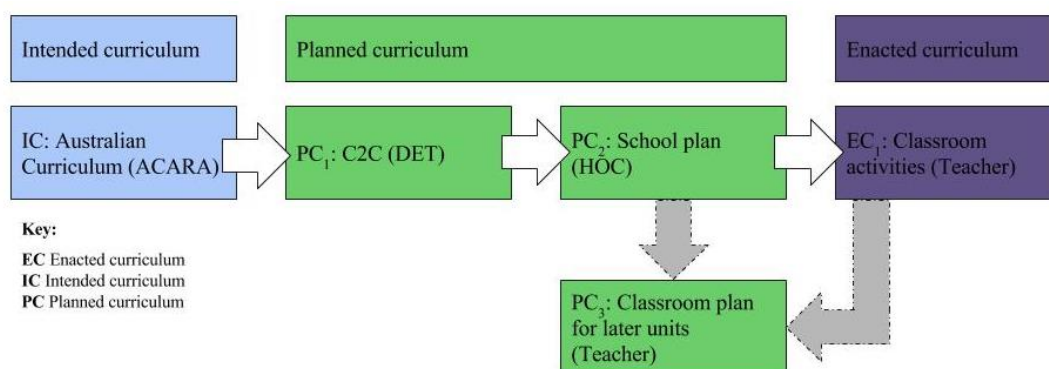
Figure 5.2. Example model of curriculum interpretation.

Figure 5.2 represents an example model of a teacher's process of curriculum interpretation. In this example model, the second row outlines the teacher's specific process of curriculum interpretation. As previously described, the intended curriculum used as the basis for all curriculum planning is the Australian Curriculum as developed by ACARA. In curriculum planning, the teacher has consulted the C2C materials provided by the Department of Education and Training (DET) and the

school's curriculum plan as developed by the school's Head of Curriculum. Finally, the teacher enacted these plans in the classroom with their students.

The arrows within the diagrams represent the process of interpretation on each of the iterations of curriculum. That is, in Figure 5.2, the white arrow with solid outer lines between the *IC: Australian Curriculum* and *PC$_1$: C2C* represents the process of curriculum interpretation that was undertaken by the Queensland Department of Education in interpreting the Australian Curriculum to develop the C2C materials. The darkened arrows with dotted lines denote processes that were affected by elapsed time, that is, those processes that occurred after the processes in the lighter arrows with solid lines. In Figure 5.2, the darkened arrow with dotted lines denotes the curriculum content that was not taught during curriculum enactment (EC$_1$) and that the teacher decided to teach during a later unit (PC$_3$).

In the models of curriculum interpretation, each box represents an artefact of the interaction, while each arrow represents a process of interpretation that moves the teacher from one box to the next (i.e., from the intended curriculum to the planned curriculum).

5.3.2 Influences on teacher curriculum interpretation

The analysis of teacher interviews showed that there were recurring themes that influenced curriculum interpretation and its subsequent implementation. The themes of *Content/pitch of the curriculum*, *Time*, *Mathematical language*, *Textbooks or other resources*, *Digital technology*, *Assessment*, and *Monitoring*, represent influences which impacted teacher curriculum interpretation. The identified themes contributed to the teacher participants making the adjustments to the process of their curriculum interpretation. These six recurring themes were the most often cited reasons that influenced the process of curriculum interpretation from intended curriculum to planned curriculum to enacted curriculum.

A second iteration of the diagrammatic representations of each teacher's process of curriculum interpretation includes annotations to illustrate the influences on the process. The models make reference to the themes contributing to the influences on teachers' curriculum interpretation that were identified from the thematic analysis of the teacher's data. The annotated diagrams highlight the influences that impacted upon the teacher's decisions made during the unit, which

led to modifications in the path from intended curriculum to planned curriculum to enacted curriculum. An example has been included in Figure 5.3.
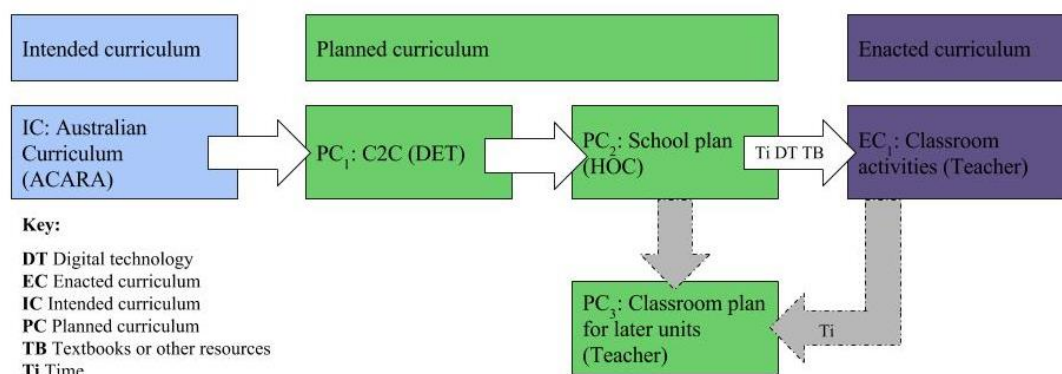
Figure 5.3. Example diagram of influences on curriculum interaction.

In Figure 5.3, the influences are labelled on the relevant arrow using letters to represent the influence upon the teacher's curriculum interpretation. In the example represented in Figure 5.3, the curriculum decisions made by the teacher in enacting the planned curriculum were impacted upon by mathematical language to be taught, the assessment task for the unit, and the available digital technology. Each of these figures is supported by a key that describes the codes and is followed by an explanation of the influence with respect to that particular teacher in the text.

Each teacher's data and analysis has been presented separately in Sections 5.4–5.8. Each section represents a teacher and will provide an introduction, including her teaching experience, familiarity with teaching Mathematics and time teaching at Joanlee State School. The findings for each teacher are presented in three sections: (1) devoted to the teacher's process of curriculum interpretation including the diagrammatic representation of this process; (2) an explanation of the data relating to the influences on the teacher's curriculum interpretation, and (3) a summary of the findings related to that teacher.

5.4   TEACHER 1 - LYN

Lyn is an experienced teacher, having taught in primary schools for over 35 years. Over the course of her career she has taught mathematics to children from preschool age to Year Seven (age 12 years). At the time of the study, Lyn had been at Joanlee State School 10 – 15 years and was teaching a Year Three class. According to the school mathematics plan provided by the Head of Curriculum, in this unit Lyn was

teaching her students content from the following Australian Curriculum strands and sub-strands:

- Number and algebra: number and place value; patterns and algebra

- Measurement and geometry: shape; location and transformation.

5.4.1 Lyn's process of curriculum interpretation

Lyn had been using the curriculum plan (C2C materials) to set the course for what she did with her students in the Year Three classroom.

> *I've just been looking at the C2C ... I think that's enough for me to be looking at ... often I just don't have the time and then I think if the work's there, I'm just relying on that and what other worksheets and things I've done before, basically. What I've used in the past.*
>
> (Pre-unit interview: Lyn).

Lyn used the C2C materials as her primary resource for planning, accompanied by resources that she had used in past years. She used these materials as she felt that she did not have time to invest in any new resources. She felt that the work had been done by the Queensland Department of Education and Training (DET) in providing the C2C materials to ensure the curriculum plans adhered to the Australian Curriculum requirements and, therefore, there was no need to look beyond this resource for further curriculum support. This decision stemmed from Lyn's feeling that the volume of information that accompanied the curriculum plan (C2C) was a little overwhelming.

> *I've been a bit at sea with it all, actually, because there's just so much to do ... There's just so much reading. At least you can hone in and say, well if I can't read it all, at least I know what I've got to get over ... It is very time-consuming.*
>
> (Pre-unit interview: Lyn).

Lyn found that the quantity of reading and resources that accompanied the curriculum plan led to a situation where she did not have time to read all of the materials. Instead, as she insinuated, she prepared notes of what she needed to *hone in* on and used these notes to guide her lesson (Pre-unit interview: Lyn). An example of Lyn's lesson notes is included in Table 5.1.

Table 5.1

An example of Lyn's lesson notes (Journal entry 1: Lyn)

Unit 4 Lesson 1: Symmetry 1

1. Teacher makes blob – butterfly painting

    - Children make small ones – discuss

    - Terms

    - <u>Symmetrical</u> – exactly the same on both sides of <u>line of symmetry</u> – divides shape in half – mirror image

2. Digital slide show

3. 3 groups –   1. Symmetry hunt – camera around room

    2. Symmetry sort – cards

    3. Symmetry fold – symmetry – chart, magazine pages, cut out, fold and glue

4. Cut blob painting in half along fold line - swap and match

Lyn felt that instructing the students in the curriculum content and providing the students the activities from her lesson notes meant that she had sufficiently completed the essential elements of the lesson plan as written in the school's curriculum plan. The notes that she devised broke the lesson into smaller sections that included: teacher tasks and instructions, terminology that is essential for students to learn in order to engage with the curriculum content, technology resources and small group tasks or practice items to consolidate the learning. Lyn commented that keeping written notes had been an evolution from her initial processes using the C2C materials.

> *It was much better than first term when I was sort of trying to read this and trying to keep it all in my head, whereas here I have sort of taken out all the bits and pieces and just given myself steps and tried to go through those steps because ... I lose my place when I look at that [the C2C unit plan].*
>
> (Post-unit interview: Lyn).

Lyn found that keeping the written notes provided her with a lesson plan that was easier for her to follow. In previous units she had been trying to unpack the C2C materials and keep the information in her head during curriculum enactment; she had found this difficult given the amount of information that was provided. Lyn stated that she tended to lose her place in the C2C materials when trying to use them as a prompt in the classroom, whereas her lesson notes gave her an overview of the steps

(including curriculum content, activities and resources) that she needed to work through with her students. Lyn admitted that this was not her preferred way of lesson planning:

> *Probably for me to follow the plan properly I had to look carefully at the steps ... whereas probably if I was planning it I would just have a couple of activities and just work on those rather than a number of things [activities] happening ... I do not own it because I did not plan it.*

> (Post-unit interview: Lyn).

Lyn stated that she was following the school's curriculum plan as set out in the C2C materials and because of this she had to spend more time carefully looking over the materials. She felt that it is necessary to spend this additional time, for while she felt confident teaching the curriculum content of the lessons in this unit, the steps described in the curriculum plan were not Lyn's preferred way of teaching these concepts. As a consequence, Lyn felt that she did not have ownership of the lessons that she was teaching in her classroom. Figure 5.4 summarises Lyn's process of curriculum interpretation.
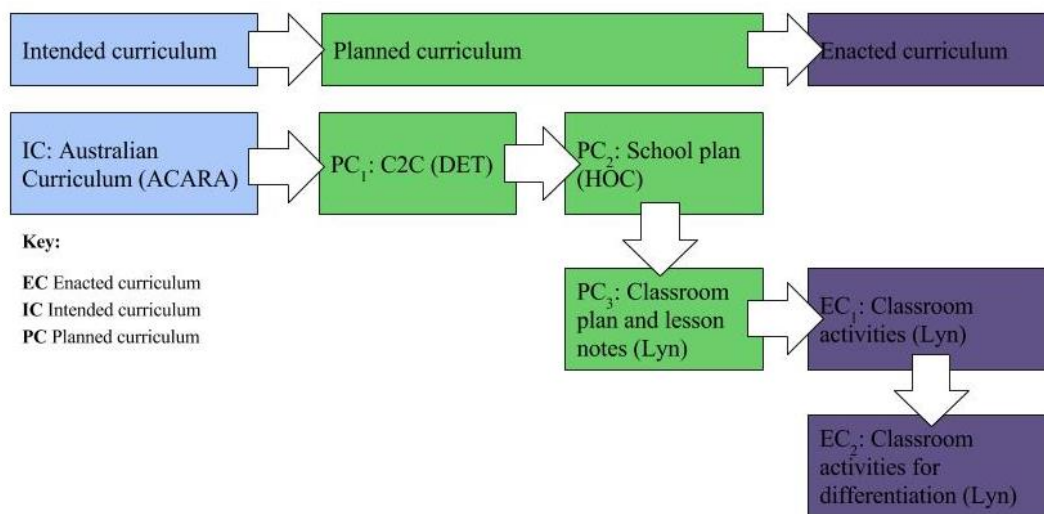
Figure 5.4. Lyn's process of curriculum interpretation.

In Lyn's preparation for a unit, she consulted the curriculum plan proposed in the C2C (PC_1) documents, followed by the school plan developed by the HOC (PC_2) to develop her lesson notes (PC_3). These notes included: teacher tasks and instructions, mathematical terminology, names of technology or physical resources to be used as examples and small group tasks or practice items to consolidate the learning. The

lesson notes did not include all of the activities, resources or suggestions included in the C2C materials, nor in the school curriculum plans.

From her lesson notes (PC$_3$), Lyn instructed the students in her class, for example, engaging in some direct teaching, class group work, activities and practice questions to assist the students to develop their understanding of the curriculum content of the lesson (EC$_1$). Lyn felt that she did not have the capacity to determine activities to differentiate for students prior to the lesson commencing.

> *I know you are supposed to differentiate but because this was new work it is not until I am doing it that I can see who are the ones [the students] who needed help. So I was helping them, and some of them were quite slow ... to perform the activity.*
>
> (Post-unit interview: Lyn).

Lyn felt that this unit involved the introduction of new mathematical concepts and the best way for her to differentiate for her students was to deliver the initial lessons and from there ascertain which students required additional support. In this way, Lyn did not pre-plan activities or concepts that she would teach to students requiring additional support. Rather, Lyn used her instinct during the enactment of the lesson, to provide these students with more of her attention during the class time. Instead of alternate prepared activities, Lyn thought that she would assess during the lesson the areas where the students may need additional support and provided these students with individual teacher time to support them in working towards completing the tasks that she had set, specifically for them to develop their understanding of the concepts she was teaching. This alternative enacted curriculum is represented in Figure 5.4 as Classroom activities for differentiation (EC$_2$) and has been developed from the classroom activities that Lyn was enacting with her class (EC$_1$).

5.4.2 Influences on Lyn's curriculum interpretation

The previous section described Lyn's process of curriculum interpretation including the decisions that she made in designing her classroom plan (PC$_3$). Lyn wrote lesson notes to guide her teaching of each lesson, which outlined the important aspects of the curriculum content, activities and resources for each lesson. Her interpretation of curriculum was influenced by factors that will be discussed in the sections that follow.

Content/pitch of the curriculum

Content/pitch of the curriculum was an influence observed during the process of Lyn's curriculum enactment. Rather than investing in developing an alternate curriculum plan to support these students, Lyn made alterations to the activities she was enacting in the classroom during her lessons to accommodate the differentiated needs of her students. Lyn's curriculum enactment decisions were influenced by the pitch of the curriculum.

Lyn made numerous references to the specific curriculum content of the unit that she was teaching.

> *... we've got symmetry in the measurement and geometry [strand]. In number and algebra [strand] it's place value, partitioning and rearranging numbers to 10,000, recalling addition facts and related subtraction facts in single digit numbers. Patterns and algebra it's continuing patterns using addition and subtraction to continue, describe and create the patterns in numbers.*

> (Pre-unit interview: Lyn).

Lyn often referred to the specific curriculum content of the unit to outline what she would need to cover in the unit. In the curriculum plan (PC$_2$), this unit draws content from each of the Number and Algebra and Measurement and Geometry strands of the Australian Curriculum. Lyn made reference to each of these topics in her lesson notes and the strategies that she was planning to use to introduce them to her students.

Lyn made reference to the difficulties she was feeling in differentiating using the C2C materials (PC$_1$) as the basis of the curriculum plan (PC$_2$). *"There is a lot of directed teaching in it [the C2C materials], which makes it hard to then differentiate because those children are not getting your modelling ... If you are modelling to one group what are the others doing?"* (Post-unit interview: Lyn). Lyn highlighted the challenges that she is facing accommodating the needs of all the learners in her classroom. She felt that the C2C materials and the curriculum plan require a substantial amount of direct teaching of concepts and modelling of the mathematical concepts to the whole class of students. In Lyn's estimation, this makes differentiating for her students difficult as she is unable to model concepts in a targeted way to smaller groups of students, thereby explaining the concepts at

different levels to accommodate where all of her students are at regarding learning of the concept. Lyn has considered that perhaps additional resources may provide an answer to the dilemma.

> *Possibly seek out some more ... worksheets; more for my better ones to get them working on bigger numbers or just practising while I can devote my time to the ones who need more work. I mean the slower ones; you know you cannot give them a worksheet because they are the ones who need you working with them. So the other ones, if I can get something a bit stimulating rather than just ... I have got some children who just love to do pages and pages of sums, but I do not know if that is good enough.*

> (Post-unit interview: Lyn).

Lyn has considered that some select worksheets may provide a reasonable extension activity for those of her students who have grasped the concept. She feels that a variety of selected worksheets will engage the students who have moved quickly through the activities, while she devotes more time to work closely with the students who need more support to understand the concepts. Lyn feels that the students in her class that need additional support, require one-on-one support. Thus, she describes that these students will not benefit from being provided a worksheet in isolation of the explanation and will find time to sit with them and explain the concept whenever possible.

Time

Time was a major influence on the decisions that Lyn made when unpacking the curriculum plan (PC$_2$) and devising her lesson notes (PC$_3$). She referred to one instance to emphasise this point.

> *Time constraints. We've got a long weekend coming up, which means we won't have five full days every week. Next week we've got [an] artist in residence, so that's my whole morning taken out. I've got to do some reporting and testing ... for my first semester reports, so I'm going to be a bit short of time trying to fit in running records and things like that. So time is a constraint.*

> (Pre-unit interview: Lyn).

As Lyn interacted with the curriculum plan in preparation to teach this unit, her mind was already filled with the difficulties that she felt she would face trying to fit

this unit into the designated time. Lyn can list a number of activities, both school-based and beyond, which she can see will impact upon her capacity to deliver the 25 lessons in the unit effectively. For Lyn, this influences the number of activities that she will plan to use from the curriculum plan (PC$_2$) during curriculum enactment. As well, there is the consideration of how she will ensure students have access to the curriculum content in the school curriculum plan that she does not cover with them during the allotted time for Unit Four. Lyn described opportunities to fit these moments into her future teaching: *"... I was thinking ... they have their little switch-on bit at the beginning of each lesson; I was thinking I could try and fit it in there possibly"* (Post-unit interview: Lyn). Lyn has proposed that she will use the time that is dedicated to warm-up activities at the commencement of her mathematics lessons, to prepare her students to think mathematically, as an opportunity to cover content that she will not have the time to complete in the regular lesson time. She sees this as additional time devoted to mathematics that could be used to cover some of the areas she will not have the capacity to cover in the scheduled mathematics lesson times. However, Lyn later admits that she has considered this time as an opportunity to revisit concepts also.

> *They do need revisiting. That is another thing I am used to in my teaching, is to do basically nearly every topic every week, just a little bit of it rather than bunches ... if you are not doing it all the time they forget so quickly ... I have really got to plan it I think - plan when I can fit that in. But maybe those few minutes to switch the children on is a good time.*
>
> (Post-unit interview: Lyn).

As Lyn describes, she feels that the school curriculum plan (PC$_2$) and C2C materials (PC$_1$) do not allow her to revisit concepts as regularly as she would like. This is because Lyn would usually teach the mathematical concepts in smaller parts, allowing for students to have regular engagement with a wider range of topics. In this way, students are exposed to small amounts from across the full suite of the curriculum content on a regular basis, which is regularly revised. Using the curriculum plan (PC$_2$), Lyn is finding that she is required to teach fewer topics for longer periods of time. The same amount of content is still covered but the frequency of revisiting concepts from across the curriculum content areas is diminished. Lyn has considered how she can give her students more regular exposure to a wider range

of concepts and has suggested that she could use the time available for warming up her students (switching them on) to thinking mathematically.

This demonstrates the complexity of issues that Lyn is feeling in relation to time. The "switch on" period is not particularly long, approximately 5-10 minutes at the beginning of a lesson. However, Lyn feels that she needs additional time for a variety of reasons and has considered using this small period each day to try to accomplish two broad tasks – introduction of new concepts and repetition of previously taught ideas.

Digital Technology

Availability and accessibility of digital technology influenced Lyn's curriculum planning and enactment. Lyn made alterations to the activities she had planned to use in the classroom to accommodate issues with available digital technology. Lyn has identified resourcing issues regarding access to computers as impacting upon her capacity to use digital technology with her class.

> *Another one is computer use. I've got two computers in the classroom for children, so that's useless. When we go to computer, which is a Monday, it's very hard to get around to - some children are still struggling logging on.*
>
> <div align="right">(Pre-unit interview: Lyn).</div>

Lyn's class have access to a dedicated computer laboratory, outside of their classroom, for one lesson per week. The time in the computer laboratory is what Lyn is referring to when articulating *"when we go to computer"*. Lyn described that this, one lesson per week, is often consumed with issues with remembering the processes and relevant personal information related to logging on due to the students' lack of practice at accessing the computers. This issue of digital technology usage may be compounded by Lyn's feelings toward computers.

> *… I am trying all the resources because a lot of them are new to me … because I am an old fashioned teacher; I am chalk and talk and touching and moving things rather than [using a] computer. So a lot of the digital learning objects and whatever I am not used to using. So it is a different style of teaching for me. So I have got to see whether to me this is working or whether I want to go back to the hands-on more.*
>
> <div align="right">(Post-unit interview: Lyn).</div>

Lyn expressed hesitation when it came to using the digital resources for teaching the concepts from the curriculum plan (PC$_2$). She felt that she did not have the requisite knowledge of the computers to explain how to use the digital resources nor to demonstrate their use to her students. Lyn also felt that she did not possess the necessary teaching strategies to embed these resources in her lessons. Consequently, Lyn viewed the digital resources as an addition to the learning rather than a tool to enhance the development of the concept.

> *... I have found the digital things - the learning objects and whatever - good and the kids enjoy them. So I would like to keep those. Maybe set those up on my spare computers for the kids to go to as a little bit of a reward time or the ones who finish [early]. So that is a bit of a business because you have got to get on the Internet and have it all set up.*

<div align="right">(Post-unit interview: Lyn).</div>

Lyn stated that she does see value in the digital resources, including learning objects, but then continues to describe them as useful as rewards for students who finish their work earlier rather than seeing these resources as potential ways to unpack, model and explore the curriculum content. This further demonstrated that Lyn did not have understanding of the design and purpose of the learning objects. She saw the learning objects as an addition to the learning rather than a tool through which the students could build their understanding.

Mathematical language

Lyn made reference to two aspects of language that influenced the sorts of activities that she chose to use from the C2C (PC$_1$) and the planned curriculum materials (PC$_2$). The aspects are the English literacy demand of the resources and the introduction of new mathematical terminology.

English literacy demand of the resources

Lyn suggests that a difficulty for the students trying to engage with the resources presented in the curriculum plan is the English literacy of the resources. She feels this is particularly an issue for the assessment task that is presented to the students: *"... it's a lot of reading for the children in the ... assessment ... reading of those instructions, I'm a bit uncertain of how well the children are going to - whether I'll need to alter it a little bit"* (Pre-unit interview: Lyn). Lyn has discussed the difficulties that she felt some students faced when engaging with the resources. She

believed that some of her students did not have a sufficient English literacy level to engage with the resources to assist with the development of their mathematics understanding. In this example, Lyn expressed particular concern regarding student engagement with the assessment task as she believed some students would be unable to read the instructions for the task. Inability to read the assessment task would hamper their capacity to demonstrate their learning of the mathematical concepts of the unit she has been teaching. Lyn worried that some students would not have an adequate level of literacy to engage with the assessment task sheet and, therefore, would not understand the questions that they are being asked to complete for assessment of the unit.

Lyn has considered that she may need to re-word aspects of the assessment task sheet before presenting it to the students. She has made alterations to other resources that the students use in the classroom to assist them with accessing the mathematics. In this way, she felt that she would be able to assist them to access the mathematics, rather than spending the time unpacking the language used in the questions and activities. Lyn altered the literacy demand of the questions in the assessment to allow students to engage with the assessment task and demonstrate the mathematical knowledge that they gained during the unit. However, this was not the same strategy that she employed when tackling the specific mathematical terminology that accompanied understanding of the unit, as described in the curriculum plan.

Introduction of new mathematical terminology

Lyn felt that the students needed additional support to develop the mathematics terminology they were learning in regard to the mathematics concepts in the unit.

> *... they [the students] are not au fait with their maths language. So I would need to work on the language side of things a bit more, and Chance, I found it was very deep, and I just did not get through it all.*
>
> (Post-unit interview: Lyn).

Lyn expressed that some of her students had difficulty with the mathematical language; by this she was referring to new mathematical terminology. Lyn felt that the students would require further support to develop their knowledge and understanding of relevant mathematical terminology. Lyn particularly gave the example of language relating to the concept of chance (probability), as this had been

a unit that required students to learn a substantial amount of relevant terminology. Lyn admitted that there was too much for her to get through with her class and that some of this language was not taught during the designated time for this unit.

Textbooks or other resources

Textbooks or other resources influenced the curriculum decisions Lyn made about the aspects of the C2C resource to use with her students.

Textbooks

Lyn used the C2C materials as the basis of her planning documents, but made alterations to suit her students and her teaching style. Lyn made use of resources such as textbooks to support extension of students.

> *So I'm going to try to either put work on the blackboard for extension or find some worksheets that aren't in the C2C that I think would be good. Just some old texts that they used, GO Maths, and ... the text that we used last year [Signpost Maths] was very good maths text.*
>
> (Pre-unit interview: Lyn).

Lyn's primary resources, aside from the C2C materials, are those textbooks that she has used in the past. She describes that GO Maths (Irons, Burnett, Irons, & Shield, 2005) and the text used last year, Signpost Maths (McSeveny, 2005), are resources that she will use to provide students with opportunities for extension (Post-unit interview: Lyn). Lyn uses these texts for the students who are ready for additional challenge during the course of her lessons, to provide them with additional examples.

Hands-on resources

Lyn made reference to other resources that she has used during this unit.

> *Some of the equipment is a bit of a concern, like in the past ... the children have been expected to have their own calculators, but ... parents have been complaining about the cost of their book lists, so they cut out calculators. So I don't believe I'll have enough calculators, I'm going to have to try and search those out. Also the MAB we've got, there isn't enough so far for the children. I've got to limit how many numbers they have.*
>
> (Pre-unit interview: Lyn).

To support student learning in mathematics, Lyn and her colleagues have tried to encourage parents to buy each student their own calculator as part of the annual

book list of required resources for the year. Unfortunately, Lyn does not have a class set of calculators in her classroom for students to use instead. Following complaints from parents at the rising cost of the annual booklist for school resources, the school has made the decision to remove the requirement for students to bring a calculator. This has meant that Lyn cannot ensure her students will each have access to an individual calculator in the lessons in which they are required.

Lyn also has difficulty in accessing the school set of MABs (Multi-base Arithmetic Blocks). The set that Lyn had access to was not sufficient to enable the whole class to use MABs to assist with their learning during the development of concepts. Lyn feels that this lack of resources limits the activities that she is able to provide for her students.

Assessment

Lyn has had difficulty in past units regarding making adjustments to the assessment to support differentiation. While initially Lyn followed the curriculum plan as written, she found that this caused her to steadily fall behind the pace set by the curriculum plan.

> At the beginning I was sticking right to the C2C and I was going through everything. I was just getting so far behind. They said, no, just take out of it what you can. Same with the assessment. I didn't do bits that I thought I really hadn't covered very well because I didn't have enough time
>
> (Pre-unit interview: Lyn).

Lyn made the decision during an earlier unit to make adjustments to the assessment task that her students were given to reflect the curriculum content that she had taught during class time. Lyn taught the students as much of the content as she could, however, felt some content areas were not covered in sufficient depth and consequently made the decision to leave off aspects of the assessment task, in particular the questions that related to areas of curriculum content that she had not taught her students. Lyn has found that this has led to difficulties for her with reporting. "*Now I've come unstuck because of the reporting because they're saying you've got to use the C2C assessment ... that's how I've got to do my reports. So yesterday I went back and gave them the questions that I hadn't done*" (Pre-unit interview: Lyn). During the course of the school year, Lyn has been provided with updated advice from the administrative team at Joanlee State School to clarify that

the teachers are required to administer the assessment tasks as written in the school mathematics curriculum plan. This decision has been made for the purposes of reporting to parents at the end of semester reporting period, using a comparable assessment task across the year level. These assessments will form the basis of reporting to parents on individual end-of-semester report cards, which describe the student's achievement in curriculum areas, including mathematics, on a five-point scale. Using a common assessment task for all students in the year level allows for comparability of the assessment and reporting, as well as for the school to use the data as a point of comparison across the students in the year level.

Lyn had not completed the full assessment task with her students as it is outlined in the curriculum plan and, therefore, has been required to ask students to complete further aspects of the assessment in class time for the purposes of reporting. She has followed these instructions despite having a student in her class that she knows will not be able to complete the task based on their knowledge of the topic.

Monitoring

Lyn observes her students' understanding of mathematical concepts by employing monitoring activities during the units she teaches. *"[I] Work out what I'm going to do [and] how I'm going to do the monitoring"* (Pre-unit interview: Lyn). In the process of curriculum interpretation, Lyn will spend time working out exactly what she needs to teach and how she will monitor how well the students have grasped the concepts she has taught. Lyn employed a monitoring strategy as an alternative to using continuous formal assessment tasks with her students. However, this was not always an easy task during this unit.

> *… I felt as though I was rushed all the time and did not … have time to … really get around and see if the children were understanding it unless I did an activity, and I could see a show of hands or whatever.*
>
> (Post-unit interview: Lyn).

Lyn felt that the rushed pace of this unit meant that she did not give adequate time to ascertaining her students' level of understanding of the concepts taught during the unit. She was not always able to use the monitoring devices that she had established to ascertain how the students were progressing, resorting at times to quick activities that asked students to raise their hands to demonstrate an understanding of a concept. For example, Lyn's lesson notes (attached to Journal

entry 11) noted the use of a worksheet that Lyn had intended to use as a quiz on the symmetry of world flags. An annotation to the lesson notes records that on this particular day the world flag worksheet was instead used via the Interactive White Board as a general quiz for the whole class to participate in, rather than as an individual task.

5.4.3 Summary

Section 5.4 has provided a summary of the data collected from Lyn, a Year Three teacher at Joanlee State School. Lyn has described the process that she has undertaken to prepare and teach Unit 4 to her students; this has been depicted in Section 5.4.1. Her process of curriculum interpretation has been distilled from the data and is provided as a diagrammatic representation in Figure 5.4.

Lyn developed a classroom plan from the school curriculum plan and C2C materials as a way to unpack the content of the lesson plans. She felt that once she had a condensed summary of the lesson she would be better able to manage her time in the classroom effectively.

Lyn has described that she has found that the C2C materials (PC_1) and curriculum plan (PC_2) are very involved, containing a great deal of detail that she needs to unpack to get to the nub of what she needs to teach. To assist her understanding of what she is required to teach, Lyn has developed lesson notes as a personal classroom plan, that give a brief overview of each lesson including curriculum content, activities and resources. The lesson notes that Lyn has developed have assisted her to see the direction for each lesson while she is teaching.

Figure 5.5 includes the influences upon Lyn's process of curriculum interpretation. Figure 5.5 is a reproduction of the diagram included at Figure 5.4. The process of Lyn's curriculum interpretation has been included unchanged. The addition in Figure 5.5 of the annotations on the arrows denotes the influences that have impacted upon the process of Lyn's curriculum interpretation, as described in Section 5.4.2.
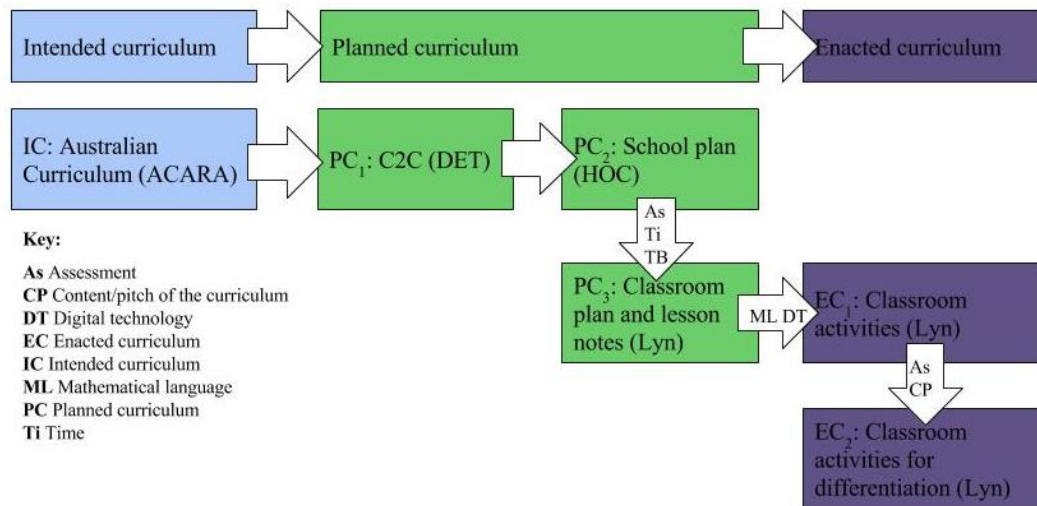
Figure 5.5. Influences on Lyn's process of curriculum interpretation.

During the lessons of Unit 4, the influences of assessment, time, and available resources (including textbooks) determined aspects of the C2C materials that Lyn included in her classroom plan and lesson notes. Lyn felt constant time pressures during the unit and consequently tailored the final assessment task to better represent the content actually covered during the unit. Unfortunately, this approach was not supported and has meant that Lyn has needed additional time to assess the students using the remaining questions from the assessment that she had removed. Lyn has attempted to use additional resources in the unit to engage the students but has often found that due to time limitations she is drawing from familiar textbooks used by the school in previous years.

During the enactment of her classroom curriculum plan Lyn was often influenced by the mathematical language required to be taught, and the available digital technology. These influences impacted whether her curriculum plan was taught in full or whether alterations were required. Lyn made alterations to her plan if she deemed the students needed additional support for the literacy levels that she was teaching or if she was introducing new mathematical terminology. Lyn also made adaptations to her curriculum plan when the digital technology she had chosen was not available.

During her lessons, Lyn has been able to ascertain which students need additional support and differentiate her instruction to assist the learning requirements of these students. Catering for the diversity of her students has often meant manipulating her curriculum plan to ensure she is spending more time with students

who require additional support while other students are occupied with resources for further practice of a concept or task. She has also made alterations to the final assessment task based on these curriculum changes, to ensure students are assessed on what they have had opportunity to learn.

5.5   TEACHER 2 - WINNIE

Winnie has been a teacher for over ten years. During her teaching career she has taught students in Years Four to Seven, including in composite classes; she has taught mathematics to students in each of these year levels. At the time of the study, Winnie had been at Joanlee State School for over ten years and was teaching a Year Four class. According to the school mathematics plan provided by the Head of Curriculum, in this unit Winnie was teaching her students content from the following Australian Curriculum strands and sub-strands:

- Number and algebra: number and place value; patterns and algebra

- Measurement and geometry: location and transformation; geometric reasoning.

5.5.1 Winnie's process of curriculum interpretation

Winnie credited C2C as her primary planning resource for her classroom. *"... I'm really just looking at C2C at this stage because we're not using - or I'm not using other documents or many other resources"* (Pre-unit interview: Winnie). Winnie said that she found the curriculum plans and resources available in the C2C documents provided her with the necessary activities and resources she needed to teach her class. Winnie felt that it had been very rare for her to need to consult other materials as she felt the C2C documents provided her with all that she needed. *"There's lots of resources that are embedded within the C2C documents so very rarely do you need to go elsewhere so much anymore"* (Pre-unit interview: Winnie). Winnie suggested that the quantity of resources available for her to use through the C2C documents meant that she did not need to look elsewhere for support from other materials. She felt that what is provided in the C2C resources is sufficient for her to use for her class. This, however, does not mean that she has followed the C2C curriculum plan religiously. *"... we have been strongly encouraged to follow the C2C documents. To use them, not follow them like a script ... but to pick and choose what's most important for them [the students]"* (Pre-unit interview: Winnie)

Winnie said that she has used the C2C documents as her curriculum plan for her students but has used some discretion to ensure she is teaching what is most important to the students in her class. In this way, Winnie chose to adapt the materials rather than adopt the materials with no change. Winnie's decisions about which aspects of content to teach were led by the assessment for the unit: *"... [I] choose what's most important for them [the students] ... obviously [by] looking at the final assessment task and working backwards to see where they're [the students are] at"* (Pre-unit interview: Winnie). Winnie said that she chose the curriculum content she deemed to be important for her students to learn from the C2C materials by using the final assessment task for the topic. Winnie read through what her students will be required to do in the final assessment task to ascertain which areas of curriculum content described in the curriculum plan will be necessary for the students to know and be able to do, to complete the assessment task for that particular unit. From this selected list of content, Winnie designed her classroom plan to ensure her students had a good grasp of the necessary content to complete the assessment task. Figure 5.6 summarises Winnie's process of curriculum interpretation.
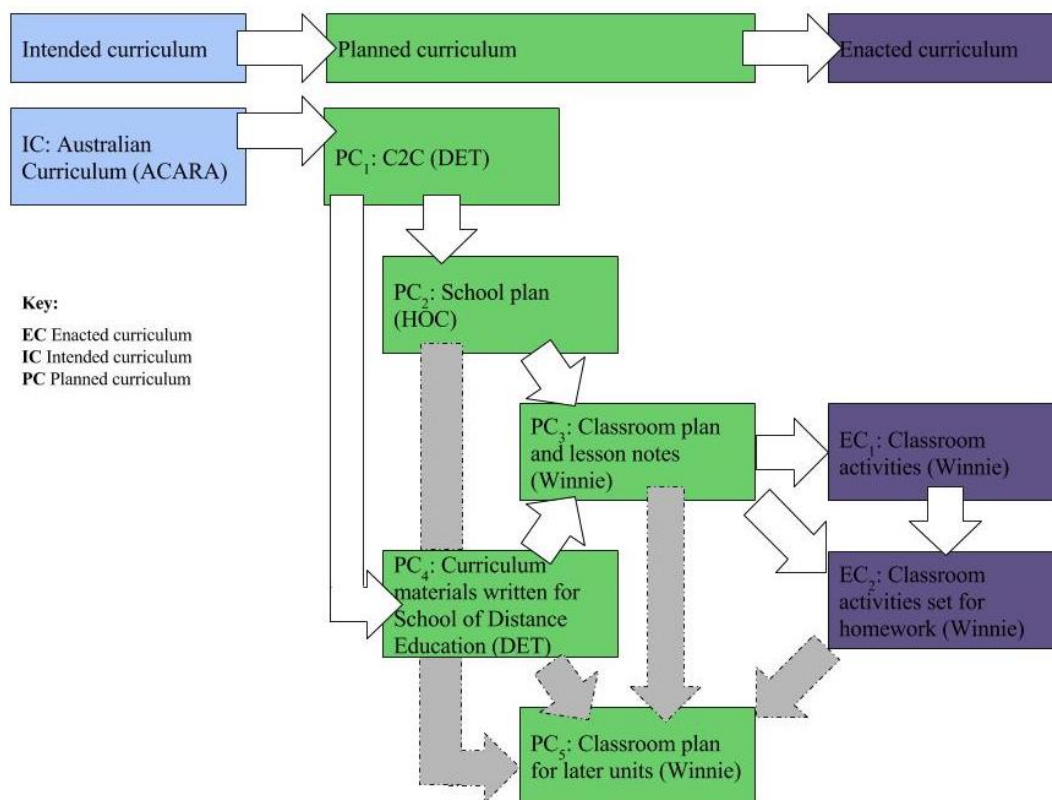
Figure 5.6. Winnie's process of curriculum interpretation.

As shown in Figure 5.6, Winnie's preparation for a unit involved two initial steps. First she consulted the curriculum plan proposed in C2C (PC_1). This was followed by the Joanlee State School mathematics curriculum plan (PC_2). Winnie also found that the materials from the Department of Education and Training developed for the School of Distance Education (PC_4) were very useful during the delivery of this unit.

> *Another resource that we were introduced to was the School of Distance Education [materials]. What they have done is looked at each of the C2C lessons, and they've actually created a lesson plan for distance education students ... it's really good at being able to gauge where they are at and be able to keep all of that questioning related to what we're looking at.*

> (Post-unit interview: Winnie).

Winnie found that the resources developed for the School of Distance Education provided her with further detail about the aspects of the unit that had been deemed to be important within each of the C2C lessons. She also felt that the School of Distance Education resources gave more support regarding developing her students' capacity for solving word problems regarding the topic they were learning (which Winnie has referred to as 'questioning related to' the topic that is being addressed in the lesson). The resources that Winnie has used from the School of Distance Education have been included in her curriculum interaction at PC_4 (Curriculum materials written for School of Distance Education). These resources are also a product of the Queensland Department of Education and Training; however, they are written by a different team of writers.

Initially, Winnie used the final assessment task to ascertain which aspects of curriculum content were essential for the students to develop understanding in order to complete the assessment task. Winnie then interpreted the school's curriculum plan (PC_s) into her own classroom plan (PC_3) wherein she gives priority to the curriculum content that she has deemed essential from the assessment task and used these areas as the focus of the unit. Other content and resources from C2C are used if time permits.

> *What I did do, at the start of the unit, was look at what the assessment item was, made sure that I did all of the lessons that would then satisfy all of the knowledge they needed for their assessment ... So I did do all of the lessons*

and cover all of the content [from C2C] that was needed before the assessment item.

(Post-unit interview: Winnie).

During her preparation, Winnie started with reading through the final assessment task. From the final assessment task, she was able to ascertain which aspects of the curriculum content and, therefore, which lessons during the unit would be essential to her students' success in the assessment task. Winnie then used the assessment task to guide the mathematics topics and C2C lessons that she taught during the unit. Winnie would then use different methods to pick up the remaining C2C lessons and activities.

When it goes on to the multiplication - okay, so, I got pretty well through the multiplication and division, but the patterns and algebra missed so that I know I have to look at throughout the year at other times. But the assessment task was only related to location and symmetry and angles.

(Post-unit interview: Winnie).

Winnie has said that she uses the assessment task to set the priority areas for which C2C lessons were taught during the unit. This unit covered curriculum content relating to location, symmetry, angles, multiplication, division, and patterns and algebra, however the assessment task for this unit was only focused on curriculum relating to location, symmetry and angles. Consequently, Winnie gave priority teaching time to the activities and lessons related to location, symmetry and angles as these would be the focus of the assessment for the unit. Winnie has stated that she did do some of the curriculum content relating to multiplication and division with her students but did not cover the curriculum content relating to patterns and algebra. Winnie has acknowledged that the content relating to patterns and algebra will, therefore, need to be included as a focus in at least one of the remaining units for the year, particularly those where patterns and algebra feature in the assessment task. This is denoted in Figure 5.6 as PC_5 (Classroom Plan for later units), which relates to content on the curriculum plan that was not covered during the unit and, therefore, is to be taught in conjunction with related content in a future unit. The darkened arrows with dotted lines denote that content not covered in previous units is not the only contributor of content to the Classroom Plan for later units (PC_5). The Classroom plan for later units (PC_5) will also be developed from the C2C materials (PC_1),

Joanlee State School mathematics curriculum plan (PC$_2$) and the Curriculum materials written for the School of Distance Education (PC$_4$). This is not Winnie's only method of ensuring coverage of this missed content.

> *I also stick it in with their homework because that way, I do a brief explanation of what it is at the start [of the lesson]. [Then] I set the tasks for homework. We mark our homework together and then I can have a look at the kids that are able to do it. I don't have to set it for homework again. The ones that are still having trouble, then I know that I can focus on it later.*

> (Post-unit interview: Winnie)

Winnie also makes use of homework as an opportunity to cover aspects of the curriculum content not covered in class time. Winnie provides the students with some explanation of the curriculum content and then sets the practice exercises as homework. Students are therefore attempting to use new content or skills by themselves at home without the support of their teacher. The homework is then marked collaboratively to allow Winnie to see which students have understood the content and processes and which students are not able to do this work. This process is included in Figure 5.6 as EC$_2$: Classroom activities set for homework. This is to denote a difference between the homework activities and EC$_1$ which refers to the classroom activities that are completed in the classroom environment.

Winnie uses the homework as a monitoring task to guide whether she needs to devote more time to the teaching of this concept. She feels that the homework allows her to see how many and which students did not understand the concept. An arrow with a dotted outline denotes that the outcome of students' work from their homework (EC$_2$) determines the teaching of concepts in future units (PC$_5$).

5.5.2 Influences on Winnie's curriculum interpretation

The previous section described Winnie's process of curriculum interpretation, including the decisions that she made in designing her classroom plan (PC$_3$) after ascertaining the priority areas of curriculum content from consulting the assessment task. Her interpretation of curriculum was influenced by factors that will be discussed in the sections that follow.

Content/pitch of the curriculum

Winnie frequently referred to the specific curriculum content students would be required to know in order to engage with the final assessment task for the unit. *"The final assessment incorporated both location as well as symmetry and looking at right angles and all of those things as well, so I thought it was quite a good culminating task"* (Post-unit interview: Winnie).

Winnie made repeated references to the curriculum content that she felt the students would need to complete in order to successfully engage with the final assessment task for the unit that she was teaching. Winnie had used the assessment task from the school curriculum plan (PC_2) to set the course for the classroom plan she developed for teaching the content of the unit to her students (PC_3). This unit encompassed curriculum content relating to location, symmetry, angles, multiplication, division, and patterns and algebra. However, as the assessment task focussed on only location, symmetry and angles, Winnie prioritised these areas for her teaching. Winnie acknowledges that this may be a limiting perspective:

> *... I just made sure that I covered everything that needed to be covered for their assessment. I know that's sort of teaching to a test in a way, but I'm not going to put something in front of them that we haven't worked at together.*
>
> (Post-unit interview: Winnie).

Winnie felt that the best way for her to prepare her students for the assessment was to prioritise the areas that were covered in the culminating assessment task. She believed that to teach only those areas may be teaching with the aim of the particular assessment that has been written for the unit, rather than to give the students exposure to the range of mathematical concepts that are suggested in the C2C materials (PC_1) and the school curriculum plan (PC_2). However, Winnie felt that planning in this way is justifiable as it ensures that students do not engage with unfamiliar concepts for the first time in the final assessment task for the unit.

In regard to curriculum content, Winnie also made reference to the pitch of the curriculum content of the Australian Curriculum for her students.

> *Even though I didn't teach Grade Four last year, speaking with the other Grade Four teachers, they've said that they've [the curriculum writers] definitely upped the ante. As a school we had only very recently ... written a new maths policy for our school knowing that the Australian Curriculum*

was going to come in, so we had already upped the ante a bit … but we've
noticed that it's definitely above that again.

Winnie made comment about the discussions she has had with her former Year Seven colleagues as well as her new Year Four colleagues about the pitch of the Australian Curriculum. In this example she is referring particularly to the conversations she has had with her colleagues teaching Year Four. Both groups of colleagues share her opinion that the Australian Curriculum is more difficult for students than the former Queensland Curriculum. Winnie has said that she and her colleagues were prepared for an increase in the level of difficulty of the curriculum but underestimated the degree of difference between the Queensland Curriculum and the Australian Curriculum.

Time

A major influence on Winnie's curriculum interpretation was time. From the commencement of the unit, Winnie felt time pressures:

> *Probably one of the things that I found with the unit is because … I was a*
> *week behind [with Unit 3] … I had to wait a week before I started this*
> *particular unit [Unit 4], and then the last week [of Unit 4] had so much*
> *sport, because we had field events and sports day, that in the end I only did*
> *15 lessons of the 25 that were in the unit.*

Winnie started the unit a week late as the previous unit (Unit 3) had taken additional time to complete; because of this, she felt time pressures in regard to this unit from the outset. The last week of the unit (Unit 4) was the week of the Joanlee State School athletics carnival and significant out-of-class time was required to ensure all field events (which were conducted in short periods of time across numerous days) as well as the track events (organised as a full day out of the classroom for the athletics carnival) were completed. As a result, the unit was compacted into 15 lessons rather than the required 25 lessons that is recommended in the C2C materials and school curriculum plan. For Winnie, this was one of the primary reasons that she considered the curriculum content required to complete the assessment to be a priority. "What influenced your planning? The C2C – the activity/lesson had many questions similar to that on the assessment task" (Journal

entry 5: Winnie). As Winnie states in this journal entry, she would often prioritise C2C lessons that explicitly taught the curriculum content that she had ascertained would be on the final assessment task or she would prioritise activities that bore a resemblance to the final assessment task. This meant that there were lessons from the unit that were not taught.

> *... in terms of all of the lessons that are within Unit 4; I didn't finish all of them at the end. I just ran out of time, but that's why I just made sure that I covered everything that needed to be covered for their assessment.*
>
> (Post-unit interview: Winnie).

As previously discussed, Winnie used the final assessment task to guide her selection of curriculum content to cover in the unit. She tried to ensure that students had adequate preparation, focussing as a priority on the topics that would be assessed in the final assessment task. Winnie selected the appropriate lessons relating to the prioritised curriculum content from the C2C materials and school curriculum plan to teach. However, as this meant that there were lessons from the C2C materials that were not taught, Winnie had a plan to cover these lessons:

> *Yes, I've actually got them printed out, and they're in my diary, so I just keep moving it. So this week, I'm like, okay, I'm not going to have time this week, but just so that I can have that constant reminder.*
>
> (Post-unit interview: Winnie).

Winnie used a print version of the lesson plans from the C2C materials and school curriculum plan that were not covered during the unit, as a reminder of the lessons that were not taught. She kept these in her school diary as a constant reminder that these lessons still needed to be taught to the students. Over the course of the remainder of the school year, Winnie has said that she will find opportunities to teach this content. Winnie described that she would either use the lesson plans in her diary as the foundation knowledge the students would need before commencing subsequent units, or as homework tasks for the students to complete across the course of the remainder of the year.

While Winnie acknowledged that she felt she needed to work to improve her own time management, she felt the way she approached preparation for the unit had merit.

Hopefully, I'll get better at my time management so I'll be able to start it a bit earlier. But I don't know if I would do much different to prepare it, because I find it good to make sure that I always look at what the assessment item is first, read through and find out exactly what they need to know within the assessment, the content that they need to complete the assessment. I feel like … I made sure that they were the main focuses on what I needed to cover so that they [the students] were as prepared as they could be for it.

(Post-unit interview: Winnie)

Winnie conceded that she would need to improve her time management in the future to enable her sufficient time to complete the unit in the time recommended in the C2C materials and school curriculum plan. However, Winnie felt that approaching the unit by looking at the curriculum content that the students would need to complete the final assessment task provided her with the knowledge of the priority areas for teaching across the course of the unit. She felt that using the areas she deemed to be a priority as the main focuses of the unit ensured that she was able to cover the necessary curriculum content before the students were required to demonstrate this knowledge in a culminating assessment.

Mathematical language

Winnie made numerous references to the teaching of mathematical language in the entries recorded in her journal. Using the term 'mathematical language' she was referring to mathematical terminology. Two such excerpts follow. "Mathematics concept(s) to be taught: Using mathematical language to find locations and describe pathways" (Journal entry 5: Winnie). "Mathematics concept(s) to be taught: Using mathematical language to describe location/pathways" (Journal entry 6: Winnie). These two examples were taken from a short series of lessons, in which Winnie was teaching concepts related to the topic of location to her students, including the use of map reading. In her entries, it is evident that she prioritised the development of new mathematical terminology relating to the concept as an important aspect of teaching the concept. Several references to the explicit teaching of the necessary mathematical language were made during the unit, in additional entries detailed in Winnie's journal.

Additionally, Winnie felt that one of the difficulties that her students were having with the final assessment task was in relation to the English literacy level of

the language used in the actual assessment. Some students were challenged by the text.

> *... they're still struggling reading the questions, but a lot of that is a literacy thing. Even though I had the questions read to some of the students, they get so bogged down on the literacy that they have trouble then switching over to what [is] actually numeracy within the question.*

<div align="right">(Post-unit interview: Winnie).</div>

Winnie noticed that some of her students were so caught up trying to unpack the complexities of the English language used in the assessment tasks that they were unable to use the numerical references to decode the gist of the question. Consequently, some students were unable to demonstrate their learning on the assessment as they were unable to ascertain what they were being asked to demonstrate. For some students, this includes the guide to making judgements: "What changes would you consider making to the lesson if you were to teach it again in the future? Read the GTMJ [guide to making judgements] the session before the assessment task – [it] seemed overwhelming for some students" (Journal entry 13: Winnie).

Winnie observed that the English language demand of the guide to making judgements was overwhelming for some of her students. She also determined that the process of coupling the requirements of what the student was required to do according to the task sheet, with the quality of expectation outlined on the guide to making judgements, was too complex a task for some of her students. Winnie felt that in the future, she would need to spend time prior to the assessment task unpacking the requirements stated in the guide to making judgements to ensure the students understand exactly what is being asked of them in the assessment and have the best opportunity for success. Winnie's observations of the guide to making judgements are further described in section describing the influence of assessment on Winnie's process of curriculum interpretation.

Textbooks or other resources

Winnie felt that she required very little in the way of resources outside of those suggested in the C2C materials. *"There's lots of resources that are embedded within the C2C documents that very rarely do you need to go elsewhere so much anymore"* (Pre-unit interview: Winnie).

Winnie used many of the resources embedded within the C2C materials and school curriculum plan for the majority of her lesson planning. She felt that rarely did she need to consult other resources as the comprehensive nature of the resources available in the C2C and school curriculum plan were sufficient for her to teach the concepts in the plans. Winnie did make reference to other resources that have supported her curriculum planning: *"I felt confident in teaching it, especially with the School of Distance Education resource"* (Post-unit interview: Winnie). Winnie made use of the School of Distance Education materials written by the Department of Education and Training from the C2C materials to assist with her teaching of this unit. She has said that the additional support boosted her confidence for teaching the unit. Also, Winnie used textbook resources as support for other elements of her teaching practice.

> *Where I start and what I need to cover in the C2C lessons ... or what they already know and I can skip past ... and it's ... the convenience of being able to find a page that has some of the information that we're going to be looking at.*
>
> (Pre-unit interview: Winnie).

Winnie pointed out that textbooks were a convenient way of constructing diagnostic tasks to ascertain students' prior knowledge of the content that they would be covering in the lesson. She acknowledges that being able to establish students' prior knowledge influenced the amount of time that she felt she would need to spend on teaching particular concepts in lessons from the teaching sequence.

Assessment

The final assessment task for the unit was the key driver for the majority of curriculum decisions Winnie made about the unit she was teaching. *"[I] just looked at the curriculum plan topics and the content descriptions ... so I had an idea of where I was going over the term and looked at the assessment task summaries related to C2C"* (Pre-unit interview: Winnie).

During the pre-unit interview, Winnie described her preparation to teach the new unit. Winnie commenced preparations for the unit by looking at the topics of the lessons in the school's curriculum plan and C2C materials, taking note of the listed content descriptions from the Australian Curriculum. She also looked at the assessment task to begin to ascertain what areas of curriculum content would be

essential for her students to have, in preparation for the assessment. During the pre-unit interview, Winnie was able to describe in detail the final assessment task that the students would be required to complete.

> *So it all wraps us with an assessment ... that has got the guide to making judgements all with it which then forms our assessment for our report cards ... they're [the students are] given a map and then they have to ... explain how [to get from] the location of one [thing] to another using compass directions. Then ... there's a little symbol to say this is where the bathroom is or this is where something else is and they have to create symbols to match and those symbols have to be symmetrical so it pulls in all of the knowledges.*

<div align="right">(Pre-unit interview: Winnie).</div>

Winnie's preparation for teaching a unit of work centres on a thorough understanding of the culminating task for the unit. Winnie sees the assessment as setting the priority areas for her teaching during that unit. For this unit, Winnie has a thorough knowledge of the content related to the culminating assessment task. The task is related to students' understanding of location, which they demonstrate through the use and annotations that they make to a map that is provided to them.

Winnie also made reference to the guide to making judgements (or the criteria sheet for the assessment task) which she feels to be critical to her students demonstrating success:

> *For example, they had to construct a symmetrical symbol and pattern containing one line of symmetry. The question in the test was: draw a new symbol that contains a line/lines of symmetry. So, if they drew a new one that had just one line of symmetry, they satisfied a C, but if they read up here [the guide to making judgements] and saw that [the criteria relating to] question 10 said, creates a symmetrical symbol and pattern containing more than one line of symmetry, and they drew one with more than one, that's how they then shoot up closer to those Bs and As.*

<div align="right">(Post-unit interview: Winnie).</div>

Winnie expressed that her students need to engage with the guide to making judgements to ensure that what they are doing in the assessment is sufficient to demonstrate achievement across the full range of achievement levels. She has demonstrated that reading and answering the question in the assessment alone is not

sufficient evidence in the student's work to demonstrate the high achieving levels on the five-point scale used in Queensland schools. Instead, Winnie acknowledges that answering the question may only demonstrate knowledge sufficient for an 'at level' rating, and that students need to read the question in conjunction with the guide to making judgements in order to realise the additional information that may be required in the response in order to demonstrate the high levels of achievement. She has discussed that the assessment task sheet gives students the information about what they have to do while the guide to making judgement for a savvy student will clue them into the degree to which they need to complete the question to achieve the higher achievement levels (A or B). Winnie has stated that this has become a focus for her teaching.

> *Teaching them that when they're up to question 6, having a look on here [the guide to making judgements] and finding what question 6 is actually asking them to do, how I'll be marking it and using that to help them with how they're going to answer the question. So that's what I'll be working on for this next unit and all of the units after that ... because ... they'll get that extra exposure of learning how to read them properly. It's just that it's so new to them, and they have their task sheet and they read it and then they answer the question; they're just not used to going back [to the guide to making judgements].*
>
> (Post-unit interview: Winnie).

Winnie felt that the guide to making judgements gives students insight into the important aspects of the assessment, what is valued in the assessment and how she will be reading and marking their work. Therefore, Winnie sees it as important to spend time with her students to teach them to effectively use the guide to making judgement in order to discern the critical aspects on which the assessment is seeking evidence of their learning. Winnie has stated that she wishes to make this a focus for subsequent units, to assist students with their future assessments.

Monitoring

In the pre-unit interview, Winnie made reference to the difficulty she was having with devising and implementing monitoring tasks for her students. *"... where I'm finding the most difficulty is finding effective ways to monitor the students without it just being the test format"* (Pre-unit interview: Winnie).

Winnie felt that she was struggling to find activities or strategies to monitor her students that were not in the format of the typical test. She wanted to find ways to ensure that the students understood the content that was being taught.

> *So five weeks where they're looking at both measurement and geometry as well as number and algebra but there only being one formal piece of assessment ... it's just getting used to the C2C and not having to rely on that formal assessment. Being able to trust the monitoring and what happens in the classroom.*
>
> (Pre-unit interview: Winnie).

Across the five weeks of the unit C2C unit (PC_1) adopted in the school's curriculum plan (PC_2) there is only one piece of assessment described and that was the culminating final assessment task. The final assessment task assessed students' knowledge and understanding of the curriculum content of the unit, in this example taken from the measurement and geometry strand of the Australian Curriculum. The culminating assessment task did not touch on the curriculum content taught in lessons emanating from the number and algebra strand. Winnie felt that without some form of monitoring task, she would not have a clear picture of the students' understanding of the curriculum content not contained in the culminating formal assessment task.

Winnie thought she needed to engage another strategy, and ultimately this came from the homework strategy she had employed.

> *We mark our homework together and then I can have a look at the kids that are able to do it. I don't have to set it for homework again. The ones that are still having trouble, then I know that I can focus on it later.*
>
> (Post-unit interview: Winnie).

Winnie is referring to the curriculum content that is not taught during the unit but that is instead set as homework tasks (EC_2). Tasks that are not completed in class time Winnie uses to set for homework to ensure that they are covered. Students are set the task and when the homework is checked collaboratively in class, Winnie can see how the students have understood the concepts. From this homework strategy Winnie is able to monitor the students' understanding and can ascertain whether the curriculum content will need further time invested in explanation of the concepts in later units, when it is a focus of the assessment.

5.5.3 Summary

Section 5.5 has provided a summary of the data collected from Winnie, a Year Four teacher at Joanlee State School. Winnie has described the process that she has undertaken to prepare and teach Unit 4 to her students; this has been depicted in Section 5.5.1. Her process of curriculum interpretation has been distilled from the data and is provided as a diagrammatic representation in Figure 5.6.

Winnie (see Figure 5.6) developed a classroom plan as a way of integrating the resources that she was using from the school curriculum plan and C2C materials for Year Four and the School of Distance Education materials for Year Four. Her classroom plan was driven by the assessment for the unit and ensuring her students had adequately engaged with the concepts to be assessed in the formal assessment task. Figure 5.7 includes the influences upon Winnie's process of curriculum interpretation. Figure 5.7 is a reproduction of the diagram included at Figure 5.6. The process of Winnie's curriculum interpretation has been included unchanged. The addition in Figure 5.7 of the annotations on the arrows denotes the influences that have impacted upon the process of Winnie's curriculum interpretation, as described in Section 5.5.2.
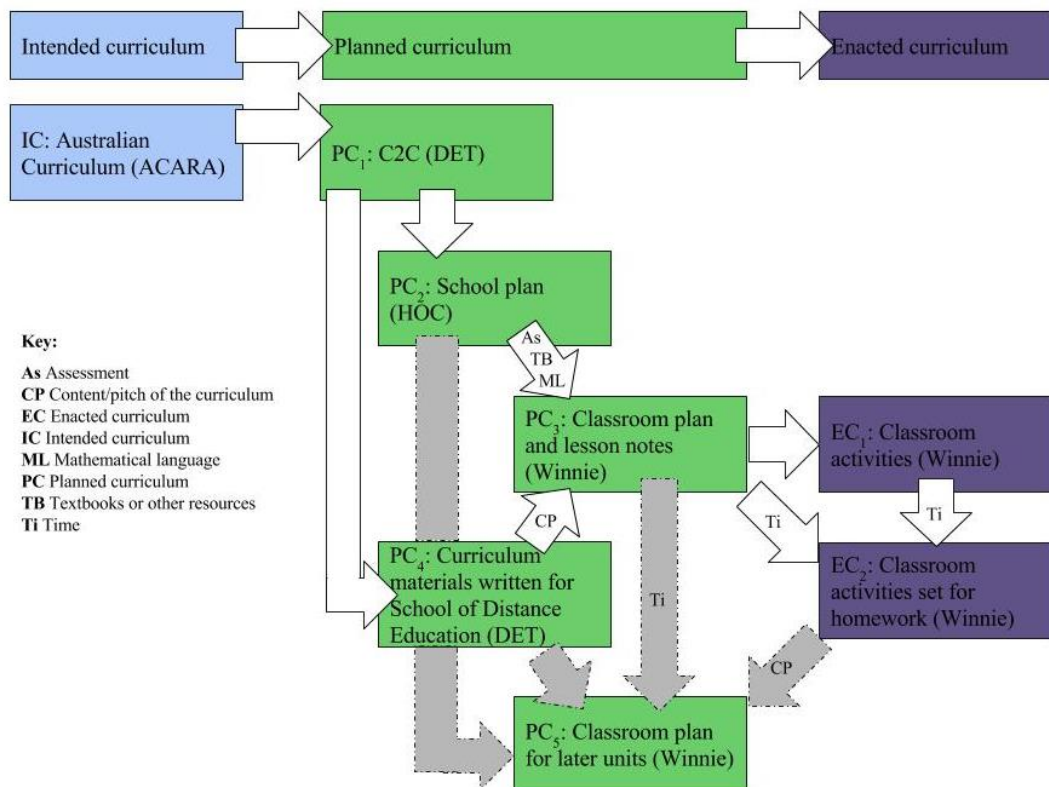

Figure 5.7. Influences on Winnie's process of curriculum interpretation.

Winnie acknowledged that the final assessment task for a unit is the most influential component for her planning. She will engage with the C2C materials (PC_1) and school curriculum plan (PC_2) commencing with the assessment task for the unit. She uses the assessment to determine which areas of curriculum content are crucial for her students to undertake the final assessment. Additionally, Winnie uses the materials written for the School of Distance Education (PC_4) as a resource to support her planning, as they provide alternative strategies and activities that she can use with her students (PC_3).

The curriculum content required for completion of the assessment drives the curriculum content that Winnie teaches to her students. Winnie recognised that the amount of time allocated to complete the unit has influenced the coverage of curriculum content not covered in the assessment. She stated that the content that is contained in the unit but not covered in Winnie's teaching needed to be taught to the students in a later unit (PC_5). Alternatively, Winnie might set content and activities not taught as homework for students to complete (EC_2). Winnie also admitted to using the homework tasks as a device for ascertaining the level of understanding her students demonstrate for the aspects of curriculum content not previously taught. The students' capacity to accurately complete the homework tasks in turn influences the amount of time Winnie plans to spend on curriculum content in future lessons.

Winnie admits that a determining factor for her enactment of the curriculum is time. She has found that across the course of this unit she has not had the recommended time outlined in the curriculum plan to complete the content of the unit. This has meant that aspects of the unit, particularly in the areas of patterns and algebra, have not been taught to her students during this time and, therefore, she will need to spend further time ensuring these aspects are taught to her students at a later date in the year.

5.6   TEACHER 3 - HILLARY

Hillary has been a teacher for close to 40 years. She has taught in a number of different states of Australia, but predominately in Queensland. Hillary has taught across Years One to Six in Queensland and has taught all aspects of mathematics in those year levels. At the time of the study, Hillary had been at the school for $10 - 20$ years, and was teaching a combined Year Four/Five class, which meant that she had

students from the Year Four cohort and the Year Five cohort in her classroom during lessons for all learning areas. According to the school mathematics plan provided by the Head of Curriculum, in this unit Hillary was teaching her students content from the following Australian Curriculum strands and sub-strands:

- Number and algebra: number and place value; fractions and decimals; patterns and algebra

- Measurement and geometry: location and transformation; geometric reasoning

- Statistics and probability: chance.

5.6.1 Hillary's process of curriculum interpretation

At the time of the present study, Hillary was teaching to a combined cohort of students in her classroom. For Hillary, this meant teaching half a class of students who were designated as Year Four students and half a class of students who were designated as Year Five students in the same classroom at the same time. Each cohort of students was required to be taught the appropriate curriculum content for the designated year level. Hillary was required to teach from both the Year Four and Year Five curriculum in her classroom each lesson. *"Being the first year of the C2Cs and not having anything in multi-level specifically for the four/five, I've had to do two separate grades totally. So that's been quite a challenge"* (Pre-unit interview: Hillary).

Hillary's approach to teaching the combined group of students has been to teach the groups in parallel, that is, Hillary has been teaching each year level separately in the same classroom for each lesson. Hillary has performed this by teaching each group of students the appropriate curriculum content separately while providing the alternate group another task to perform in the interim. As she states, at that stage there had not been a multiple year level plan designed as part of the C2C materials and because of this, the school had decided not to undertake to design one. This had been a challenge for Hillary, as she describes during the unit: *"Having a [Year] Four/Five [class] and expected to teach separate lessons in the same timeframe, it's been challenging. There's no 'multi-level' plan for Four/Five. So time is of the essence"* (Journal entry: Hillary).

Hillary has expressed the difficulties that she has faced teaching to both cohorts of student in the same lessons. As there were no multi-level curriculum materials available, she was required to teach the unit plans for two year levels simultaneously. Hillary described discussions she had undertaken with Amy, the Head of Curriculum, in trying to find ways to streamline the delivery of her lesson content to the two year levels.

> *Now last term it was suggested that I do a [combined years] three/four and extend it for the fives ... it was mentioned by my curriculum coordinator that I could perhaps do the Five/Six/Seven ... But then when we had our last planning day, she was concerned that ... the fours may come across the same maths next year in [Year] Fives and that that wouldn't be viable to do the Five/Six/Seven multi-level, so it'd be better to do two separate grades. So that's what I've been doing. It is quite challenging.*

<div align="right">(Pre-unit interview: Hillary).</div>

In the pre-unit interview, Hillary explained that discussions had been undertaken with Amy to try to develop a way forward using the curriculum plans available. In order to support the students with their learning, Hillary had been asked to consider a variety of options using the school curriculum plans for several different year levels. During discussions about combining the curriculum plans it was thought that students who moved out of the combined class at the end of the year may repeat the same mathematics content using the same examples as taken from the curriculum plan in the following year. For example, Year Four students in Hillary's class for the current year may be allocated to a single cohort Year Five class the following year and if Hillary were to use the Year Five examples with her class, then Year Four students would have already been exposed to the Year Five content and examples prior to entering Year Five. Following these discussions, the notion of combining the curriculum plans for the class was not supported by the administrative team. Hillary pointed out that to juggle the challenge of implementing the curriculum to two different year levels in the same classroom each lesson, she had tried to combine the group where the curriculum content aligned in the two curriculum plans, that is, where similar concepts were being taught to the two cohorts.

> *Sometimes it's exciting when I come across something that it similar, because we had to do tangrams last term and the [Year] Fours got a lot of pleasure out of doing it as well as the [Year] Fives ... It was possible to*

combine it because [of] the fact that the [Year] Fours would need to do data and interpreting data and so on, so I could work the lessons into just extend for the [Year] Fives. So when that happens, it can be really a great lesson. But when it's two separate entities, it can be challenging.

(Pre-unit interview: Hillary).

As Hillary explains, the content between the two year levels occasionally aligns and this leads to a "rich" classroom activity. In this instance, Hillary describes that in a unit that included tangrams and data collection in both year levels, she was able to teach similar concepts to the full class and provide some additional information to the Year Five cohort to meet the additional sophistication of the content described in the Year Five curriculum plan.

Following the unit, in the Post-unit interview Hillary was able to share that further discussions with Amy (Head of Curriculum) had brought about a change of thinking.

I requested at the end of last term that the format was not successful and I wasn't prepared to do it again this term. I felt there had to be a better system to do the right thing by the children and to be fair … I'm looking at doing the Grade Four plan and upping the ante for the [Year] Fives. We're actually looking at what the Fives are mandated to do, straight five. What the Fours - having the planning and then see what we can just extend for the Fives rather than do two separate lessons on two separate topics.

(Post-unit interview: Hillary).

Hillary felt that she had successfully argued for the curriculum plans for the class to be combined. She had proposed that, in order to meet this new arrangement for the delivery of the curriculum content, she could reorganise the content in the Year Four and Year Five curriculum plans to align the content areas. In this way, Hillary proposed that she could teach the whole class similar concepts and then provide additional curriculum content to the Year Five students to meet the additional curriculum content required at their year level. Hillary felt that the composite class arrangement was unfair. She expressed that as she was required to teach the two groups of students separately during the same class time, the arrangement often resulted in her feeling that her students missed out.

Fairer because it just was frustrating saying, sorry, Grade Four, we need to leave it there now. You just keep working ... I just felt I was rushing everybody because of the situation. I only had the same amount of time every straight class has for one lesson. I was teaching two separate ones.

(Post-unit interview: Hillary).

Hillary felt that the arrangement would be fairer for the students because it would mean that she felt more time would be given to teaching the students the topics and content of the mathematics plans. In the arrangement she has described, often Hillary would teach the Year Four students a concept and have to be mindful that she would have to stop instructing them after a certain time in order to give the Year Five students a similar amount of instructional time. Hillary felt that often this would need to happen, regardless of whether the students in the first group had grasped the concept she had been teaching or required additional support, as she needed to ensure the two cohort groups were given equitable access to instructional time from her. In the new arrangement, she felt she would be able to combine the time for instruction, teaching both groups the content of the Year Four plan and then spending a little additional time instructing the Year Five students on the additional content they required to meet the pitch of the content for Year Five as articulated in the school curriculum plan. Figure 5.8 summarises Hillary's process of curriculum interpretation.
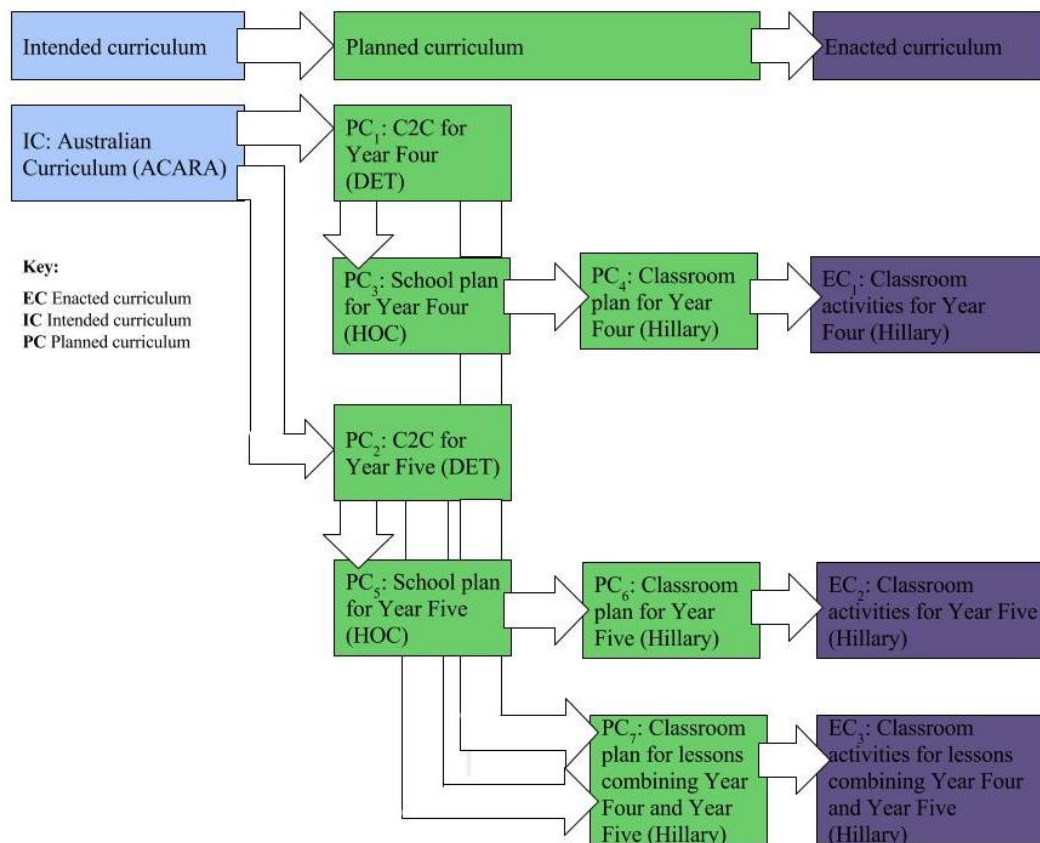
Figure 5.8. Hillary's process of curriculum interpretation.

As shown in Figure 5.8, Hillary's curriculum planning documents were derived from the C2C materials (PC_1 for Year Four and PC_2 for Year Five) and the Joanlee State School mathematics curriculum plan (PC_3 for Year Four and PC_5 for Year Five). Hillary derived her classroom plans for her class from these documents. During preparation for teaching the unit, Hillary engaged with the resources and topics for teaching, determining what she needed to teach within the time she had for each group of students. These classroom plans have been labelled PC_4 for Year Four and PC_6 for Year Five respectively.

Hillary described that during this unit she tried to follow the curriculum plans (PC_1 for Year Four and PC_2 for Year Five) as closely as possible.

> *They [the C2C plans] specifically guide you through with the expectation of the objectives. You just follow those through. If you get the time to do every single lesson, it's all extremely prescriptive for it to guide through to the final guides to making judgements*
>
> (Post-unit interview: Hillary).

Hillary described that the C2C plans (PC_1 for Year Four and PC_2 for Year Five) were extremely prescriptive in the amount of detail provided and the sequence of learning provided. Following the C2C plans closely, allowed for a direct line of sight through the lesson sequence of the unit through to the assessment of the unit and ultimately the criteria by which student achievement would be judged (the guides to making judgement).

Hillary also looked for opportunities to combine the two groups of students in her classroom to teach one concept to the entire group. In the combined lessons, Hillary would teach the Year Four content initially to both groups and then provide the Year Five students with additional detail to teach the more sophisticated concept that they are to learn, as instructed by the curriculum plan. These lessons are a combination of the C2C plans for both year levels. Hillary's classroom plan for teaching combined lessons is labelled PC_7 in Figure 5.8.

The boxes labelled EC_1 for Year Four and EC_2 for Year Five represent the enacted curriculum, or that which occurred in the classroom when the students were taught the content in separate year level groups. EC_3 represents activities that occurred in the classroom when the students were taught together as one class, a combined Year Four and Year Five group.

5.6.2 Influences on Hillary's curriculum interpretation

The previous section described Hillary's process of curriculum interpretation, including the decisions that she had made in terms of how to enact the multiple curriculum plans she was using for her class. Her interpretation of curriculum was influenced by factors that will be discussed in the sections that follow.

Content/pitch of the curriculum

At times, during the unit, Hillary gauged from the students that additional time or conversely, less time, may be required on particular topics.

> *You might find, like I did with the decimal fractions, that we actually blitzed that. We didn't have to spend longer on it. So I could then pick up the next lesson for the maths. So that is a possibility that can come out of the woodwork without you even planning it. … sometimes I would have to, for those that weren't able to - because I had to differentiate, those ones that are*

slower always understood that their expectations were reduced as far as the amount that had to be achieved.

(Post-unit interview: Hillary).

Hillary has explained that there were instances during the unit where students in class time readily understood the content of the lesson and demonstrated it through the planned activities in less than the time that had been allocated for them to be done. She mentions an example in the teaching of decimal fractions to the class where the students understood the activity involving hundredths, as they had done the same activity the previous day involving tenths. In these situations, Hillary found that she was able to move through her classroom plans (PC_4 for Year Four, PC_6 for Year Five and PC_7 for combined Year Four and Five lessons) at a quicker pace and move on to cover subsequent topics to those she had planned to teach.

Hillary also describes instances where additional support was required for her students to grasp a concept sufficiently. In these lessons, additional time was given to support student learning. "More time to allocate to students who weren't ready to process this concept immediately" (Journal entry 8: Hillary). In this journal entry, Hillary is referring to a lesson on inverse operations that was taught during the unit. In this lesson, the students were developing their capacity to solve equations through the understanding that addition is the inverse of subtraction and multiplication is the inverse of division. During this lesson, Hillary found that some students required additional support to understand the relationships between the operations and consequently Hillary made the decision to allow additional time to that allocated in the curriculum plan for students to grasp this important concept before moving on to the next topic (PC_6 for Year Five).

Time

Hillary made multiple references to the challenges associated with teaching a combined class; one of the challenges was the time available to teach all the required concepts to the two groups of students. During the Pre- and Post-unit interviews, Hillary mentioned issues relating to time management of the classroom as well as the amount of time required for preparation for classroom activities. *"Being a Four/Five, I'm always chasing my tail because I have to get both lessons in with the same amount of time"* (Pre-unit interview: Hillary). Hillary makes reference to the fact that while she needs to teach two-year levels of content in each lesson, she does not have

additional time with the students to ensure she adequately covers the concepts, nor to ensure that students have grasped the understanding through practice problems.

In some journal entries, Hillary has made reference to the influence of students' prior knowledge on the pace for a lesson. "Many children had the prior knowledge from previous grades to be prepared for these lessons" (Journal entry: Hillary). As Hillary asserts, if students have the requisite prior knowledge from previous lessons or previous year levels it prepares them to build connections for new learning to occur. When asked in each journal entry why or why not Hillary was able to address the mathematical concepts that she had planned to Hillary often made reference to student preparedness and prior knowledge about the content of the lesson she had taught. She often expressed when lessons had not kept the pace that had been expected that her students were missing or had forgotten important concepts that would assist in providing meaningful connections for their new learning.

Hillary spoke of time as an issue outside of classroom instruction time, making a comment on the time required for preparation for teaching the students.

> *... having to photocopy enough for the groups, laminate them and then cut them out, we don't get the aide time. So you do it yourself. Many a night, midnight am, you're still cutting out to get them organised for the next day.*
>
> (Post-unit interview: Hillary).

In this instance, Hillary is referring to the time requirements to prepare some of the activities that she had adopted from the C2C materials. There were two activities that developed students' understanding about decimal fractions (exploring tenths and hundredths). Each of these activities was accompanied by sets of cards that included examples of decimal fractions, appropriate terminology, pre-partitioned shapes and diagrams of grouped counters. These activities were a matching exercise that reinforced the students' understanding but required a set of cards to be prepared for each student (63 cards per student). As Hillary mentions, without teacher aide time to support such activities, it falls to the individual teacher to prepare the appropriate resources for the activity prior to the lesson.

Digital technology

Hillary spoke of digital technology in relation to the challenges of access and the problems that can be associated with stable Internet connection.

> *So you have to be very clever and be logged on and ready to go and check it out well and truly before you have your lesson. So you can perhaps be doing a little bit of warm up while you're waiting for it to - and then typing your log on in, go into the learning place. It all takes time.*
>
> (Pre-unit interview: Hillary).

Hillary is referring to the fact that all the resources included in the C2C plans (PC$_1$ for Year Four and PC$_2$ for Year Five) are accessible via the Department of Education and Training Learning Place. The Learning Place is a secure eLearning repository of digital resources and eSpaces for collaboration and networking. In this large online space, which is very secure, teachers can access all of the resources that have been created to accompany the C2C plans. Some of these resources are learning objects that require an Internet connection to run and often will be played via the teacher's computer on an interactive whiteboard for the students to observe as a group. Hillary is referring to the reliance on the Internet that these sorts of resources create and the necessity for the teacher to be logged on to the Learning Place to access them ahead of the teaching time in which the teacher wishes to use them. This can be a time consuming process, as the Learning Place is an extensive online hub incorporating curriculum planning software (such as the school plans and accompanied resources). It also includes other important programs and processes (e.g., classroom attendance roles, student information database, reporting, human resources and financial transactions accessible through different levels of security for the appropriate school staff) and consequently the number of staff across the State of Queensland that can be logged on to the Learning Place at any one time can be substantial.

In relation to digital technology, Hillary also made reference to the difficulties in physical facilities (e.g., computer labs) for accommodating two-year level groups within one classroom. *"... only one smart board. That's where I have to juggle a little bit with the two grades, because of only having the one smart board to work off"* (Pre-unit interview: Hillary). In the majority of lessons for this unit, Hillary had to teach each year level within her classroom separately. This often meant juggling

the information that was being presented to the students on the interactive whiteboard (smart board) so that students being instructed by the teacher could see the information that was being presented to them. That also meant that she was unable to leave information on the screen for students to come back to during the lesson, as often she would need the board to instruct the other year level.

Mathematical language

Hillary spoke of two challenges regarding mathematical language: (1) the need for students to explain and justify their thinking and (2) the literacy levels of students and how this impacts upon the language that they are able to access.

Mathematical communication

Hillary described that a number of students found it difficult at times to explain their thinking when working independently on mathematical problems in their workbooks.

> *... many of them haven't been accustomed or don't find it easy to explain how they got that answer - the ways of working. Many times you have to send them back and say, now think about what you did and how you put that process into [find] the final answer.*

> (Pre-unit interview: Hillary).

Hillary explained that many of her students are unaccustomed to describing and logically demonstrating the processes they have used to get to a final answer when solving problems. For example, when working with the students, Hillary recalled an interaction she has had frequently:

> *Some of them have no idea how to explain – "I just did it, I used my brain". You get so frustrated and you say, "I know you used your brain, but what did your brain - go through the steps and stages that you had to do to get that answer."*

> (Pre-unit interview: Hillary).

Often Hillary will need to ask her students to reconsider the way in which they have communicated the processes that they have undertaken in order to calculate a result. She surmised that some of her students do not see this part of the process, but viewed it rather as an additional requirement to solving mathematical problems.

> *Even some of the more than capable mathematicians in the room prefer not to mess around by having to tell you because they think that's good enough,*

I've got the answer, be satisfied. I think they think it's a waste of time to have to explain through how they came to that final outcome with the answer.

(Pre-unit interview: Hillary)

In this example, Hillary articulated that she believes some of her students do not see the explanation and justification of answers as an important part of the problem-solving process; the students felt that getting to an answer should be sufficient. Hillary explained why she believes the communication of the process to be an integral part of problem solving: *"So they need to know because it's important. If they know and understand how they came by that answer, it holds them instead, then, for if that comes up again"* (Pre-unit interview: Hillary). In this excerpt, Hillary explained that she wished her students would appreciate that the process of explaining their thinking and communicating how they came about calculating a result completes the process of solving the problem. She described that in communicating the process of problem solving, students are able to glean an understanding of how they came about the answer, which assists them (and the teacher) in understanding where they may have had difficulty or why they were able to find the correct answer. Additionally, by articulating how they calculated the result, they will be able to use this knowledge in related problems in the future.

English literacy demand of the resources

Hillary also described the challenges of supporting students with low English literacy levels to access the mathematics for their year level.

It was the rules, the associative rule, the distributive rule, partitioning ... that language was a little confusing to some of them [the students], even though I did find each one, we [the class and the teacher] did one rule separately each time. I think that had to be readdressed because some of them don't have the language skills to relate to that definition.

(Post-unit interview: Hillary).

In this excerpt, Hillary is providing an example of some of the mathematical concepts that she has taught in the unit that demand high levels of student literacy in English. The students' capacity to understand complex words such as associative, distributive or partitioning can hinder their comprehension of the terms that give them access to understanding the mathematical process they are required to

complete. In this class, Hillary has stated that she has some students who require substantial support for their literacy levels:

> *So the [Year] Fours are pretty capable. I'd still have many in the [Year] Fives that would be less capable than many of the Fours. Some of them are almost literate ... Some that their reading level is just barely hitting five-year-old. So that's where that has a bearing on their understanding of much of the language of maths.*
>
> <div align="right">(Post-unit interview: Hillary).</div>

Hillary has found that while her Year Four students are quite capable of understanding the mathematical terminology that she has been teaching, she has some in her Year Five class (chronologically aged 10) who have a reading age equivalent to a 4-5-year-old. As Hillary states, this has an effect on the mathematical language that these students are able to access and understand. In her journal, Hillary has made reference to other terms that she uses to make such terms more accessible to her students, for example, "the distributive (break up) property" (Journal entry 7: Hillary). In this way, Hillary is making the mathematical concepts accessible by using terminology that is student-friendly and matches their literacy levels.

Textbooks or other resources

In her pre- and post-unit interviews, Hillary has made reference to two types of resources: (1) textbooks and (2) other resources, including hands-on resources and the support of teaching colleagues .

Textbooks

Hillary made reference to a variety of textbooks and resources that she used to support her classroom teaching. *"So I'll sometimes look up hard copies of different resources, just to check [if] there's anything that might be good as a fast finisher or as a reinforcement of what the lesson objective is all about"* (Pre-unit interview: Hillary). Hillary makes use of textbooks to find opportunities for students, who might finish the planned activities ahead of other students, to solve further examples of problems using the same skill or concept in different situations. She also uses textbooks in a similar way to reinforce concepts with the whole class by giving them additional problems to those that have been outlined in the school's curriculum plan (PC_3 for Year Four and PC_5 for Year Five).

Hillary describes that she also uses a mathematics textbook that is not related to the school's curriculum plan (PC_3 for Year Four and PC_5 for Year Five) to do "maths mentals" with her students each day:

> *... we have kept a mentals textbook. The reason we decided that we would like to keep that is it has such a good array of maths thoughts ... So that has been good as a kick start - as a warm up for the maths. As they often say, warm them up first. Then we go on to the content.*
>
> (Pre-unit interview: Hillary).

Hillary explains that they use a textbook designed to build and strengthen mental computation skills in students as a way of engaging students in the mathematics lesson. She is able to "warm up" the students for the mathematics lesson by practising mental computation strategies using a range of different mathematics topics, concepts and strategies. In this way, she feels that students are able to revise concepts and topics that are not otherwise the focus of mathematics lessons: *"Sometimes if they specifically like one of the units - we did perimeter and area - it still pops up regularly enough for the children to have to think back of the formula and follow it through"* (Pre-unit interview: Hillary). In this quote, Hillary has made reference to the topics of perimeter and area that have been covered in previous units. As the mental computation textbook is not related to the school's curriculum plan (PC_3 for Year Four and PC_5 for Year Five), the textbook does not follow the same order of topics. The mental computation text therefore, provides opportunities for students to revisit topics and concepts that have been previously covered during class time.

Non-textbook resources

Hillary makes reference to a series of other resources, which she uses in the classroom to support student learning. *"We have a big maths tub ... access [to] the counters, the MAB blocks or the resources that are in there, the dice and things that we needed"* (Post-unit interview: Hillary). The "big maths tub" is a resource that is located in "the haven" - the school's resource centre for teachers, situated near the school staffroom. The big maths tub has a range of concrete materials and manipulable resources, which support hands-on learning of mathematical concepts. The teachers have access to any of these resources to support their students in

learning the concepts being taught in lessons and teachers are willing to share these with each other to support teaching and learning across the school.

According to Hillary, her teaching colleagues are another resource that supports her teaching:

> *... I do talk with my peers. We pick our brains and see - we talk about how we might approach something. We just discuss it and try and work out maybe this is the way - would be the best solution. So quite often we pick each other's brains.*

<div align="right">(Post-unit interview: Hillary).</div>

Hillary acknowledges that sometimes the professional conversations with colleagues can provide a source for new ideas, activities and alternate strategies to support learning in her classroom.

Assessment

In planning for a unit, Hillary discussed the importance and significance of assessments.

> *... the guidelines for making the judgements. You have to be aware of what is expected as the final outcome of these objectives ... often it's good to look at your final assessments of them, so you know what is going to be, the guidelines to judge these children with their As through to their Es with their knowledge.*

<div align="right">(Pre-unit interview: Hillary).</div>

Hillary states that the assessment and accompanying guides to making judgement carry the key to where the unit is heading, the content that will be critical for students to learn and the characteristics of student work that will be expected for each of the levels of achievement (A through E).

5.6.3 Summary

Section 5.6 has provided a summary of the data collected from Hillary, who teaches a combined Year Four and Year Five class. Hillary has described the process that she has undertaken to prepare and teach Unit 4 to her students; this has been depicted in Section 5.6.1. Her process of curriculum interpretation has been distilled from the data and is provided as a diagrammatic representation in Figure 5.8.

Hillary (see Figure 5.10) developed classroom plans as a way to determine what she needed to teach for each cohort of students in her class. She used the school curriculum plan and C2C materials for each separate year level (Year Four and Year Five) to ascertain topic areas and content that she needed to teach each year level. In her classroom Hillary would teach each of the cohorts of students separately in turn. She felt this was not an efficient method by which to teach her students. On the occasion that the curriculum content of the year levels aligned, Hillary developed a combined classroom plan to allow her to teach all the students in her classroom at the same time. Hillary felt that the combined lessons allowed for her to provide better learning experiences for her students through the devotion of more targeted support time.

Building on Hillary's process of curriculum interpretation, Figure 5.9 includes the influences upon her process of curriculum interpretation. Figure 5.9 is a reproduction of the diagram included at Figure 5.8. The process of Hillary's curriculum interpretation has been included unchanged. The addition in Figure 5.9 of the annotations on the arrows denotes the influences that have impacted upon the process of Hillary's curriculum interpretation.
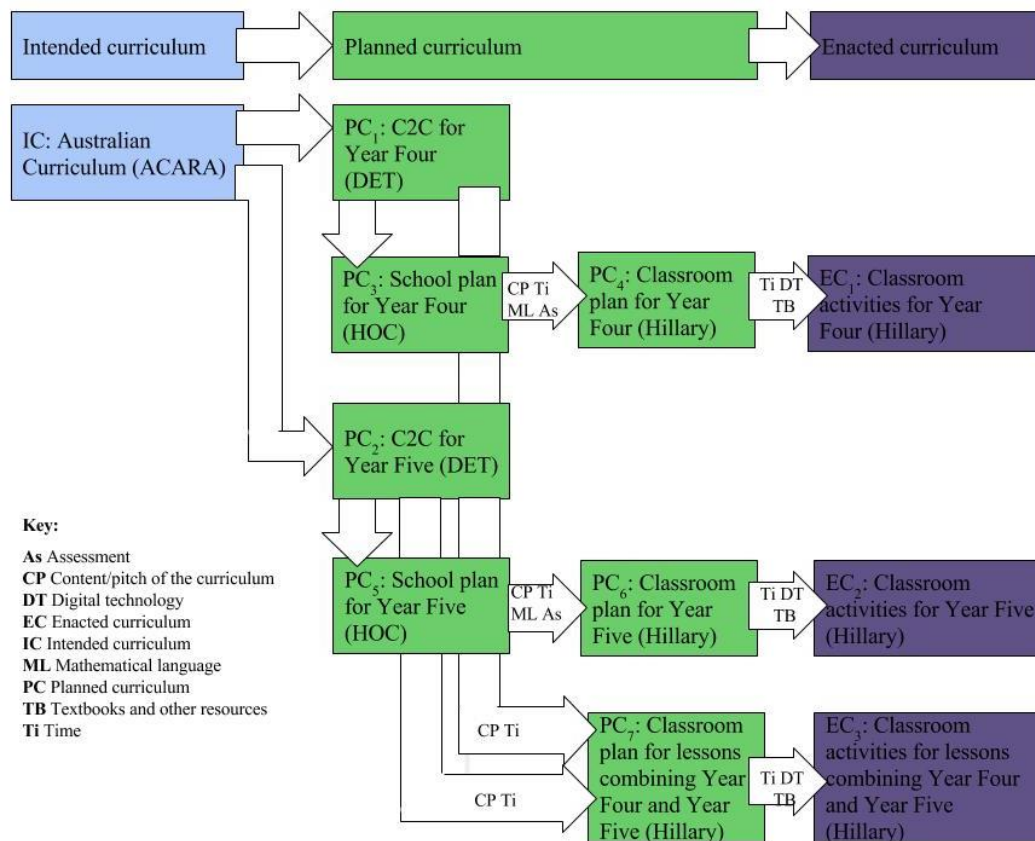
Figure 5.9. Influences on Hillary's process of curriculum interpretation.

Hillary's process of curriculum interpretation was shaped by the students in her classroom. The expectation that she would teach a combined class as two separate groups of students meant that she was required to consult two sets of school curriculum plans (PC_3 for Year Four and PC_5 for Year Five). Hillary's desire to teach the two groups as one class of students led to her developing three classroom plans (PC_4 for Year Four, PC_6 for Year Five and PC_7 for combined Year Four and Five lessons); she developed a combined Year 4 and Year 5 classroom plan for teaching her students when curriculum content aligned in the school curriculum plan. Hillary then enacted these three plans in the classroom (EC_1 for Year Four, EC_2 for Year Five and EC_3 for combined Year Four and Five lessons). The main influence behind this desire was time dedicated to supporting her students.

Hillary was very conscious that she needed to devote adequate time to each group of students in teaching concepts, as well as checking practice problems and offering support to her students. She has had many discussions with her school administration to try to consider potential solutions to this issue, as she feels that currently the students are not getting sufficient support from her. Hillary also

discussed the time requirement on teachers to prepare the resources expected in the curriculum plans for classroom activities.

Other influences have prompted her to make adjustments to the curriculum plans (PC$_3$ for Year Four and PC$_4$ for Year Five), including the students' understanding of content and mathematical language, which sometimes led to an adjustment of when she commenced new content to account for students' readiness to learn the content or the necessity for additional time on a topic. Hillary also referred to the influence of student literacy levels and their effect on learning mathematical language. She expressed that students' subsequent association and understanding of mathematical concepts and processes can be adversely affected because of an inability to access the mathematical terminology. Hillary also discussed that having the assessment and criteria for success (guide to making judgement) influences her curriculum planning, as in her mind it sets the end goal for the unit.

In enacting her curriculum plans, Hillary discussed the difficulties accessing digital resources in preparation for delivery in the classroom and the continued reliance on some seasoned resources (both textbooks and concrete materials) to support student learning. She also addressed the issue of time in relation to how she managed to juggle the needs of the two groups of learners in her classroom.

5.7 TEACHER 4 - MIRIAM

Miriam has been a teacher in Queensland and New South Wales for over 15 years. She has taught all aspects of mathematics in primary classrooms (specifically Preparatory year and Years Two, Four, Five, Six and Seven). At the time of the study Miriam had been at Joanlee State School for less than 10 years, and was teaching a Year Six class. According to the school mathematics plan provided by the Head of Curriculum, in this unit Miriam was teaching her students content from the following Australian Curriculum strands and sub-strands:

- Number and algebra: fractions and decimals; number and place value

- Statistics and probability: chance; data representation and interpretation.

5.7.1 Miriam's process of curriculum interpretation

Miriam described the process that she used throughout the year to prepare for teaching. Miriam always began with the school plan. At the start of the year, Miriam began with the year plan to get a feel for what would be required and what content would be taught and when. Then Miriam read through each unit plan and the accompanying documents approximately one week before the commencement of the respective unit.

Miriam described that the key point for information to prepare for a unit was to go directly to the C2C plans and read through the information. She acknowledged that in this way she can read the content descriptions that have been used as the basis for the development of the unit. This thought process demonstrates an understanding that the resources that are being used stem from the intended curriculum (the Australian Curriculum), which Miriam stated directly in her Pre-unit interview: *"... you've got ACARA, is the starting block, fed down through C2C, fed down to the school level, at which point you differentiate for individual classrooms. That's my theory anyway; I'm sticking to it"* (Pre-unit interview: Miriam). However, while Miriam acknowledged the Australian Curriculum as the starting point for devising a path for students' learning, Miriam did not use the Australian Curriculum as the preparatory material for her personal unit planning. Without prompt, Miriam offered that there is no need to go to the Australian Curriculum website as a lot of the necessary information contained on the site is passed on to the teachers via Amy, the Head of Curriculum (HOC), and/or Lesley, the Deputy Principal, through planning sessions. Miriam intimated that this makes them particularly lucky as they do not need to go to the Australian Curriculum; that job is done for the teachers at Joanlee State School.

> *I don't go to ACARA [website] much at all, because ... we're fortunate that we've got Curriculum Coordinator [HOC] and Deputy Principal and they both do a fabulous job of passing that information through to us in our planning sessions, more so Curriculum Coordinator [HOC].*
>
> (Pre-unit interview: Miriam).

Miriam admits that she does not see a need to visit the Australian Curriculum website as she feels her administrative team provide relevant and current information to the teachers at the school about the curriculum. She particularly feels that the year

level planning sessions, which she attends weekly with Amy (HOC), support her knowledge of the new Australian Curriculum while also providing time for her to focus on planning for her class.

Following the unit, Miriam described her approach to interacting with the unit and preparation for teaching. The C2C materials (PC_1) and curriculum plan for each unit (PC_2) was read in the week prior to commencement of teaching to the students.

In the first lesson of the unit, Miriam would ascertain what level of additional support the students in her class would need to be able to engage with the unit as a whole. Miriam would use the first lesson as a quasi-pretest of her students to determine which students seemed familiar with the topic and which students demonstrated no prior knowledge of the topic. After discerning how many students would require support to understand foundation knowledge for the topic, Miriam would make a decision about how to proceed with the unit. Figure 5.10 describes Miriam's process of curriculum interpretation, including the decision point at the conclusion of the first lesson in the unit that determined the level of student support required for the first concept in the unit.
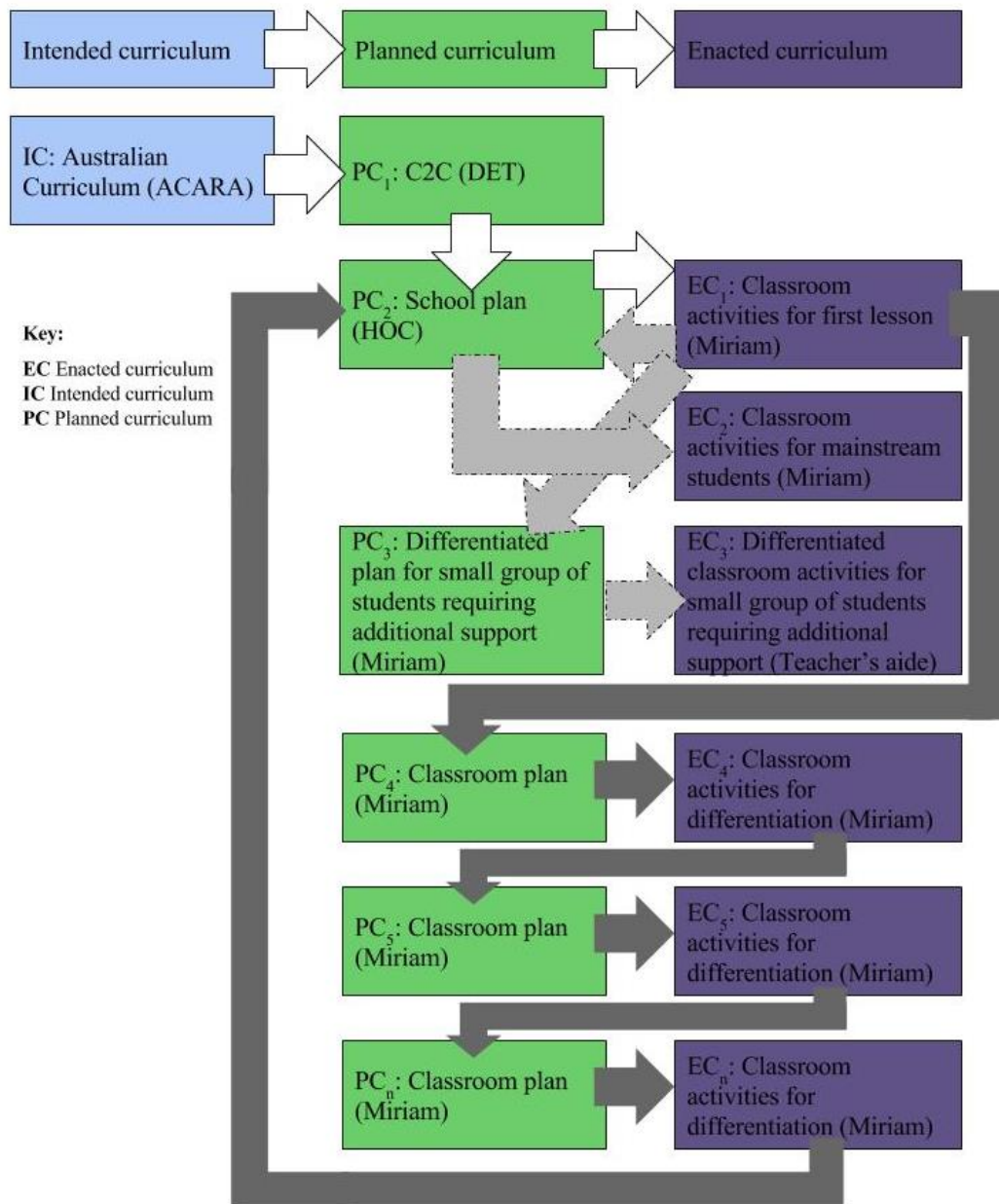
Figure 5.10. Miriam's process of curriculum interpretation.

Due to the complexity of Figure 5.10, the components will be discussed using a series of components that together construct the full diagram. The sections that follow illustrate the information contained within the Figure 5.10.

Figure 5.10 illustrates that Miriam commences her curriculum planning by using the C2C materials (PC_1) and the Joanlee State School mathematics curriculum plan (PC_2). Miriam directly enacted the first lesson of the unit in the classroom with her students, in order to assist her to gauge the level of understanding and familiarity her students had with the mathematical concept that she was required to teach (EC_1). These aspects have been included in Figure 5.11.
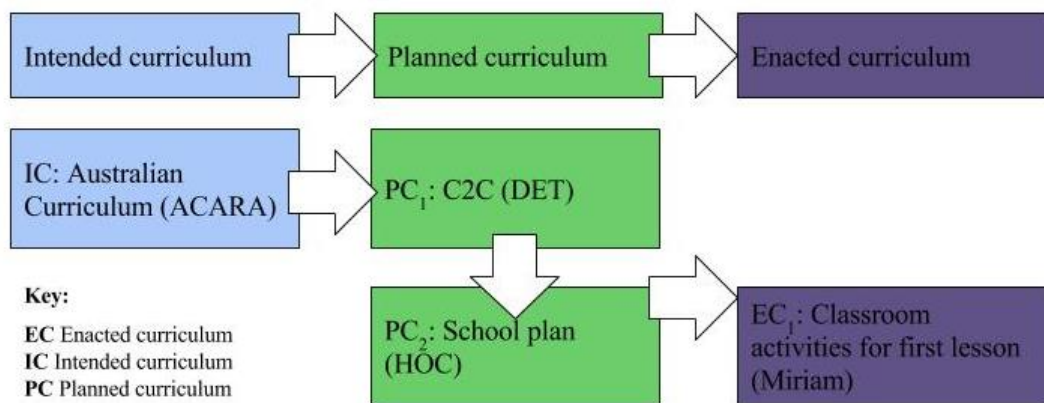
Figure 5.11. Miriam's initial process of curriculum interpretation.

Figure 5.11 outlines the initial process Miriam adopts at the commencement of a unit of teaching. It illustrates that Miriam uses the C2C materials (PC$_1$) and Joanlee State School curriculum plan (PC$_2$) as the basis for teaching the first lesson of the unit.

At the conclusion of the first lesson, Miriam assesses her students' abilities to engage with the content of the unit and makes a decision about which of two courses of action she should proceed with, in regards to the content of the unit. Each of these courses of action has been explained separately in the following sections.

Pathway One - Curriculum interaction when a small number of students in the class require additional support

Following Miriam's assessment of the class, if the group of students needing additional support to understand the content of the unit was relatively small (up to five students), Miriam would organise for a learning support teachers' aide to withdraw the students to allow for additional time and support for these students to understand the concept. *"… once the majority of my group could do that [concept], that smaller group that couldn't do it were withdrawn into a learning support capacity"* (Post-unit interview: Miriam).

The assistance of a teacher aide was sought to support students who did not have the relevant prior knowledge of a topic. These students would be withdrawn from the classroom so that they were given an opportunity to develop the relevant knowledge before engaging with the new concepts on hand. Miriam would teach the remaining students the concepts contained in the unit using the activities and pedagogy suggested in the C2C materials (PC$_1$) and school curriculum plan (PC$_2$).

This initial process involving the withdrawal of some students has been described in Figure 5.12.
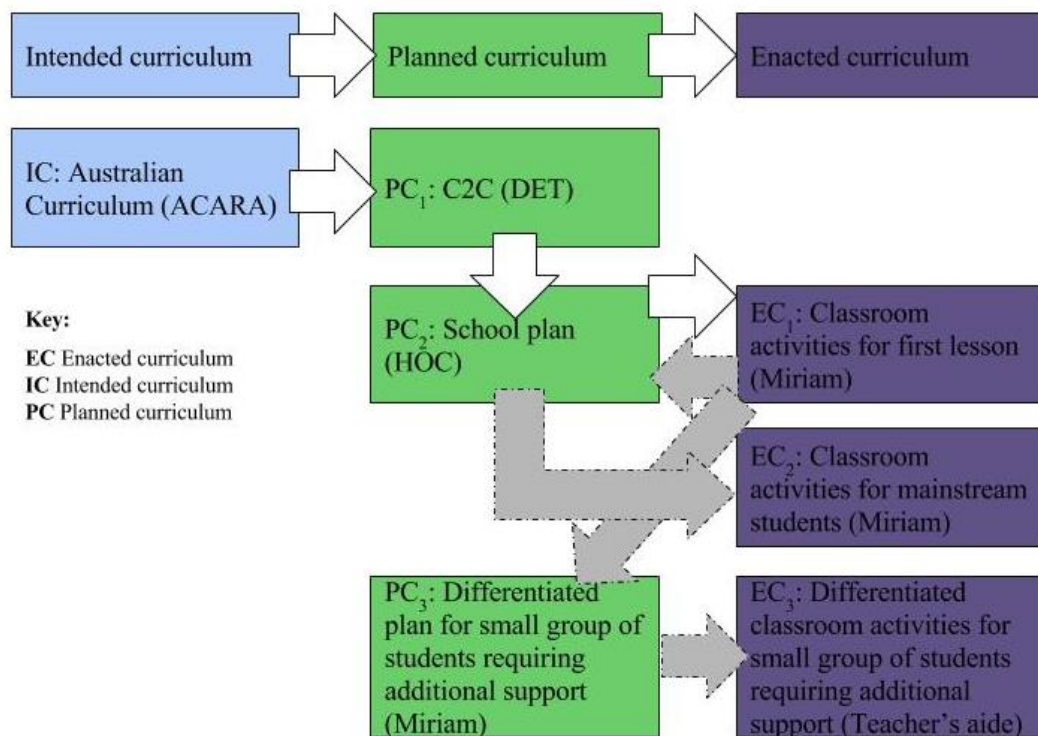
Figure 5.12. Miriam's process of curriculum interpretation when a small number of students require support.

Miriam enacted the first lesson of the curriculum plan as she had read it (EC_1) and used the initial lesson to gauge students' capacity to comprehend the material. From this assessment, she was able to develop an alternate plan for students requiring additional support or to access additional content for students ready for more challenging concepts (PC_3). Miriam organised for the small number of students requiring additional support to be withdrawn from class time to work with a learning support teacher-aide who would provide more individual attention. Miriam and the teacher-aide discussed the content that needed to be covered, including some relevant activities (PC_3). Thus, this setting provided students more one-on-one time with the teacher-aide to assist the students to grasp the concept, ask questions and build their knowledge of the concept (EC_3). Once they had sufficient knowledge of the concept as determined by the teacher-aide in consultation with Miriam, the students would re-join the class to continue with the topic. Using the initial process described, Miriam was able to ensure that she followed the curriculum plan (PC_1) closely in the classroom (EC_2) with the remaining students. All teachers in the present study had

teacher aide support in their classrooms. Miriam was the only teacher to use this support to withdraw students in this way.

The process outlined as Pathway One, used when Miriam determined only a small number of students required additional support, has been denoted in the Figure 5.10 and Figure 5.12 through the use of arrows with broken outlines.

Pathway Two - Curriculum interaction when the whole class requires additional support

If Miriam determined that the majority of students in her class did not understand the concept that was the focus of the introductory lesson, Miriam would revisit and revise the concept and underpinning concepts until the majority of the class demonstrated understanding of the concept. An example of this process has been illustrated in an entry from Miriam's Journal.

> Were you able to address all the mathematical concepts you planned for?
> No.
> Why or why not?
> Much time was spent needing to reinforce basic subtraction strategies including trading before considering – of whole and decimal numbers.
> What changes would you consider making to the lesson if you were to teach it again in the future?
> Allow more time for revision and consolidation of basic concepts.
>
> (Journal entry 11: Miriam).

In this particular lesson Miriam states that the students required additional time to revise and reinforce the basic foundations of subtraction strategies before she was able to teach the curriculum content that she had planned to cover in the lesson. Upon seeing that the students needed more support for the basic concepts underpinning the curriculum content of the lesson, Miriam changed her lesson plan and instead spent much of her time reinforcing basic subtraction strategies with the students using concrete materials. Figure 513 shows the alternative process Miriam used to revisit concepts to provide further support to all students in the class.
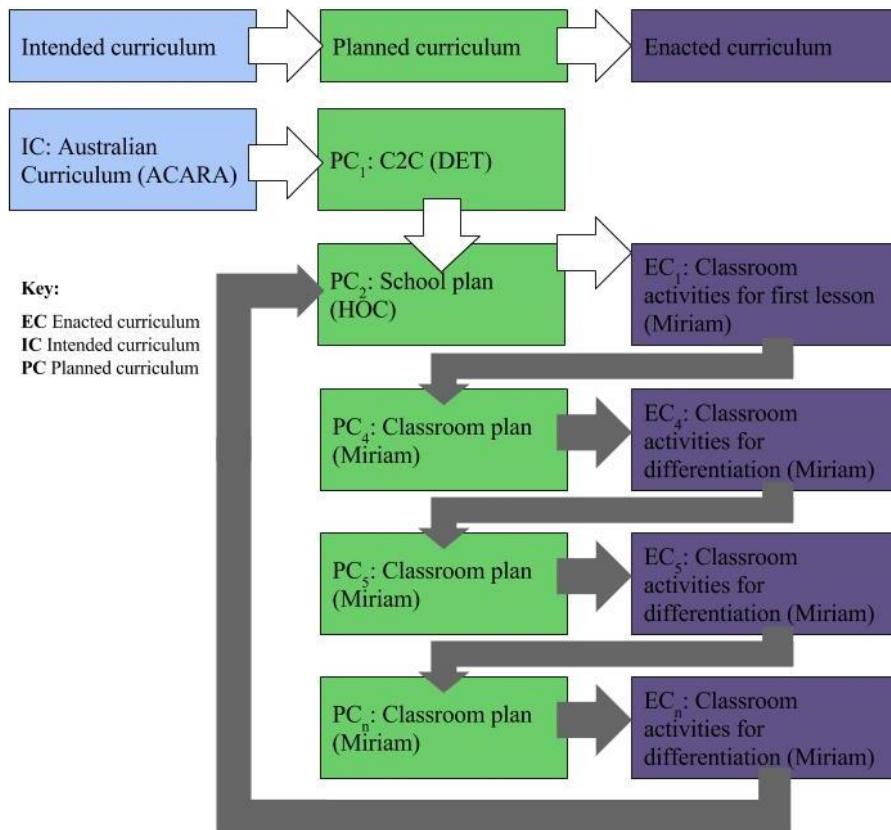
Figure 5.13. Miriam's process of curriculum interpretation when the majority of the class requires additional support.

Figure 5.13 describes the process Miriam undertakes when the majority of her class requires additional support to understand a concept that is the focus of a teaching topic. During the first lesson (EC_1) Miriam gauges students' capacity to comprehend the material. From this ascertainment, she developed an alternate plan for the development of student understanding of the concepts of the unit (PC_4). Miriam enacted the alternate activities and content in her classroom and made a determination as to whether further instruction was required. If so, she would develop further additional content and activities to continue teaching the concept. From this assessment, Miriam gauged the students' need for additional support and refined the plans accordingly. This further assessment, planning and enactment is represented as PC_n and EC_n respectively, denoting that this process may go on repeatedly within a unit multiple times.

Once Miriam felt that the students had gained sufficient understanding of a concept, the final arrow denotes a return to the school plan (PC_2) to begin the next

concept. At this point, the process begins again. The arrows in Figure 5.10 and Figure 5.13 used to denote this process have been darkened.

Miriam used a similar process to make modifications to the planned curriculum (PC_2) for students who were able to comprehend concepts more quickly. After ascertaining that these students were ready to progress with their learning beyond the scope of the school plan, Miriam would develop activities that would allow them to progress with new related concepts not planned for introduction until *"further in the year"* (Post-unit interview: Miriam). This has been illustrated through the example below:

> *Some stayed at that stage of just multiplying whole numbers. We all did a lesson on multiplying decimals ... I then extended that group ... to do the multiplication of decimal numbers ... that's not in the curriculum until further in the year. But for some of my - I've probably got six or seven kids that could do this consistently, they were bored, so I had to take them somewhere else.*
>
> (Post-unit interview: Miriam).

Miriam explains that while teaching the concept of multiplying whole numbers, she noticed that some of her students seemed to quickly grasp the concept. To provide the students who had readily understood the concept with meaningful learning, Miriam introduced them to a more complex concept (multiplication of decimal numbers) as she acknowledges this content is not planned for the students to engage with until later in the year. Miriam thought it preferable to move these students along by teaching them additional curriculum content to engage with, rather than having them disengage with the lesson entirely. To devise this learning Miriam did not access the school plan, but rather designed her own activities for the students to develop their knowledge. She employed a similar process (see Figure 5.13), where she would develop content and activities, provide them to the students and then ascertain if they were ready to proceed or re-join the other students in learning from the school curriculum plan.

5.7.2 Influences on Miriam's curriculum interpretation

The previous section described Miriam's process of curriculum interpretation. The section described the decisions that she had made, in terms of how to enact the

curriculum plans she was using for her class. Her interpretation of curriculum was influenced by factors that will be discussed in the sections that follow.

Content/pitch of the curriculum

As described previously, Miriam used the introductory lesson of the unit to make initial decisions about the development of alternate pathways for students. Miriam ascertained the students' capacity to engage with the curriculum content that she planned to teach, and following this determination, she implemented one of two courses of action.

If the group of students needing additional support was relatively small, she would organise for a learning support teacher's aide to withdraw these students to allow for additional time and support to understand the key concept that was to be taught. Concurrently, Miriam continued to teach the rest of the class the lessons as described in the curriculum plan. This was observed when Miriam was introducing the concept of equivalent fractions to the class:

> Were you able to address all the mathematical concepts you planned to? Yes.
> Why or why not?
> I was able to address the strategy for most but low-level learners will need continual support in making equivalent fractions with visual supports.
>
> > (Journal entry 5: Miriam).

Miriam used her designated learning support teacher aide to support those students she has identified as "low-level learners". These students were then withdrawn from the classroom for additional support, in this example to develop further their understanding of making equivalent fractions using concrete materials, to support their learning.

However, if the majority of students did not understand the concept, she would revisit and revise the concept with the class as a whole until the majority of the class demonstrated understanding of the concept. This was observed when Miriam introduced addition of fractions: "Much time was spent revising basic addition strategies before beginning decimal work" (Journal entry 1: Miriam). Lessons following this journal entry focussed on developing knowledge of strategies relating to mathematical operations and the order of operations, rather than continuing with fractions and decimals as had been planned. Once Miriam felt the students had

grasped the foundational concept, she then resumed teaching from the school's curriculum plan using the same process.

Miriam also made modifications to the planned curriculum for students who were able to comprehend concepts more quickly, allowing them to progress with new related concepts not planned for introduction until "further in the year". *"I then extended that group that got that [concept] to be able to do the multiplication of decimal numbers. ... and that's not in the curriculum until further in the year"* (Post-unit interview: Miriam). Miriam is referring to a lesson in which a small group of students grasped the curriculum content that was the focus of the lesson quite quickly and Miriam spent time teaching them more complex content to engage with, so that their interest was not lost from the lesson. In these situations, Miriam would opt to teach the small group of students that she was extending rather than work with the majority of the students in her class by utilising her teacher aide. "Details of the lesson (e.g. context, resources to be used): Taught by Teacher-Aide (Learning Support) with extension given by me for high-level learners" (Journal entry 2: Miriam). As Miriam described, when she identified that there were a group of students requiring extension, she would invest her time teaching those students the more complex concepts and utilise her teacher's aide to teach the remaining students the curriculum content that had been planned for the lesson, even if this meant that the teacher's aide was working with the majority of the class.

Time

Miriam identified time as a critical factor, especially when she had to sort through the planning documents (PC_1 and PC_2) and check all of the suggested resources mentioned in the plans.

> *Finding the time to read through things is an issue, finding time to open up all of the resources and compare those resources to these resources to differentiate, it's not an issue, but it just takes time, it takes a lot of time.*
>
> (Pre-unit interview: Miriam).

Miriam felt it was a time-consuming but necessary task to work her way through all of the materials provided as resources in the C2C and school curriculum plans. She felt this was important, to ascertain whether the resources were going to be useful for her class, particularly to assess the resources for whether they were of the appropriate content pitch and whether they used an age-appropriate context.

Additionally, Miriam identified that this time was necessary to plan appropriately for differentiation activities for students requiring additional support or further challenge. *"I could go straight to the C2C document, I could go straight to the lesson plans, but it's not going to cater to the needs of my students. So I do need to differentiate"* (Pre-unit interview: Miriam). Miriam acknowledged that she felt that working directly and exclusively from the C2C materials or school curriculum plan would not adequately meet the full range of learners in her classroom. That instead, she needed to plan for differentiated learning experiences for her students.

At the conclusion of the unit, Miriam identified time as an influence in the classroom also. Miriam felt that often time was a limiting factor in the planned curriculum (PC_1 and PC_2). In particular, Miriam mentioned the minimised opportunities for her to model a process for students to practice an algorithm or strategy for solving a problem. *"I don't think that there has been enough time for us to model it for - enough time allowed for us to model that [process] for them [the students]"* (Post-unit interview: Miriam). She often felt that the flow of concepts could be too quick for some students and there was a necessity to ensure students had comprehended concepts before moving on to the next. Miriam has stated that she does not feel that there is enough time within the curriculum plan for modelling of strategies and processes to her students. For this reason, Miriam felt it was appropriate to withdraw some students from the classroom at times, to ensure they received sufficient time to develop an understanding of concepts rather than just push on to the next concept on the plan. Alternatively, Miriam modified the plan during enactment (EC_3) to provide additional time for students to consolidate concepts. *"I don't think I would make any other changes. Spending more time on the fractions, allowing more time just in the curriculum … in my timetable, for that to be taught"* (Post-unit interview: Miriam). Miriam states that the only alterations that she would be likely to make to the curriculum plan would be to build in additional time for her to teach the concepts that were planned and for students to be given additional opportunities to consolidate their learning of the concepts.

Miriam also believed that that the curriculum plan (PC_1) lacked adequate time for repetition and consolidation of the concepts during teaching sequences. She felt that to assist students in consolidating concepts, it was necessary for them to be given

multiple opportunities to practise the algorithm or strategy that accompanied the concept, as she explained in a quote from her pre-unit interview:

> *We also found that with a lot of the resources that were coming through, there's not enough practice in them for the kids, there's not enough practical applications - not enough opportunity for them to actually practically do ... There were like five questions for the kids to have a practice, not enough, they need that constant repetition.*
>
> (Pre-unit interview: Miriam)

Miriam described that she felt additional time needed to be built into the curriculum plan (PC_1 and PC_2) to allow for students to apply their learning through practical examples. She felt that often there were far too few opportunities for the students to consolidate their learning through application of the concept. The influence of Miriam's desire for additional time for repetition influenced many decisions about the progression of lessons in the classroom. These decisions manifested in Miriam's classroom plans through the continuous review of a topic with the class until she felt confident that the students had adequately grasped the concept before commencing a new topic (PC_n).

Digital technology

Miriam described two aspects of digital technology (1) her personal access to curriculum planning documents and (2) access to websites in the classroom.

Access to curriculum planning documents

Miriam was excited by the opportunities she felt were afforded by the C2C materials (PC_1). Miriam was very positive about the capacity to access the school curriculum plans (PC_2) anywhere, at any time, via OneSchool or using a memory stick. OneSchool is the Queensland Department of Education and Training's school portal that provides access to curriculum and learning resources for teachers and education staff (The State of Queensland (Department of Education and Training, 2013b).

> *... if I'm out and about and I don't have a stick or I need to access something, even if it's on my phone while I'm waiting for the bus with my children ... I can log in through OneSchool to check stuff. So from that perspective it's fantastic.*
>
> (Pre-unit interview: Miriam).

Miriam enjoyed the flexibility of being able to access the curriculum plans and resources remotely via multiple technological platforms. She felt this level of technological access gave her opportunity to engage more frequently and flexibly with the teaching programme to prepare for classroom teaching.

Access to websites in the classroom

From Miriam's point of view, access to computers in the classroom was an issue. The Department of Education and Training blocked some websites, which compounded the issue of accessibility to educational websites during classroom time.

> *There have been a few times too when you can go into a resource and it's actually blocked. So checking the resources …, you can check them at home and it will be fine. It's then coming to work in the morning and checking them to make sure that for some reason or other it actually hasn't been blocked.*

<div align="right">(Pre-unit interview: Miriam)</div>

Miriam commented that the C2C materials (PC$_1$) were developed by the Department of Education and Training with a minimum level of access to computers assumed. She was frustrated because she was unable to use the suggested online resources. Her frustration emanated from the websites and online resources suggested in the C2C materials sometimes being blocked by the school or Department of Education and Training server. She was exasperated, as she felt that as they were suggested resources, additional care should have been taken to ensure they were accessible.

Miriam relayed that there had been occasions where she had checked resources at home to find that the firewalls at school did not allow her to visit that website. This has meant that she has needed to check the websites that she wishes to use in her classroom before the commencement of the class to ensure that she can access them. There were also times when Miriam faced a dilemma in terms of making a choice between valuable teaching time and waiting for a useful online resource to download. She said that precious teaching time was lost by the time some of the resources downloaded: *"Being able to access some of those sites, you do it as a whole class activity, it takes too long and with all the talking, there's not enough teaching time left over for the children to apply the knowledge"* (Pre-unit interview: Miriam). Miriam conveyed that the time taken to access some of the digital resources

coupled with direct teaching of the concept meant that the time left for students to practice the strategy or process was greatly diminished. She feels that the time for students' to practise is necessary for students to consolidate their understanding of the topic.

Miriam also expressed that printing and photocopying of the resources were not viable options, as it was expensive and did not allow for students to interact with the activity as it was intended:

> *I guess too, the other thing is with the resources that are coming out, just the amount of photocopying and the amount of paper. Again that's an issue because some of these things, they should be able to do if they have a computer - they don't. So we have to print it off, photocopy it, or find an alternate way to do it.*

<div align="right">(Pre-unit interview: Miriam)</div>

Miriam felt that the curriculum plan already required a significant amount of photocopying to support student learning. She sensed this was primarily due to the curriculum plan having an assumed minimum level of technological access. Miriam expressed that unfortunately her students did not have the requisite access to digital technology assumed by the curriculum plan and, therefore, more often she has been required to print or photocopy resources so that her students could engage with them individually.

Mathematical language

Miriam described two aspects of mathematical language during the course of data collection; these related to (1) the requirement to reason and justify in mathematics, and (2) the English literacy demand of assessment tasks.

Mathematical communication

Miriam made multiple references to her perception of a change in the requirement for students to communicate mathematically. She felt the change had been brought about by a change in the technical mathematical language deemed appropriate for students to learn. Miriam felt this to be a new stipulation of the Australian Curriculum when compared to the previous Queensland curriculum. Miriam also referred to her perception that there was an increased demand on students' use of language due to a change in the requirement for students to explain and justify their problem-solving strategies and solutions,

During the interviews Miriam commented consistently that classroom activities in the C2C materials (PC₁) had not provided students with adequate opportunity to explain and justify their mathematical reasoning in the way that the lesson objectives of the C2C materials (PC₁) suggested the students should. Miriam felt that this sort of justification used to be a skill the teacher demonstrated, but not a requirement of students themselves. She expressed this use of language to be one of the main new requirements of the Australian Curriculum comparative to previous mathematics curriculum. This is expounded in an explanation made by Miriam in her post-unit interview.

> *... really getting them to think about, what is a pattern, and using mathematical language to explain their thinking. That's ... a whole new skill, and I guess from our perspective at this Year Six level, and I'm guessing that it's probably right through, getting them to apply that mathematical language that we've always stood out the front and talked about, but never really expected them to be able to demonstrate an understanding through language.*

> (Post-unit interview: Miriam)

Miriam described that she perceived the requirement for her students to explain their thinking as a new aspect of the Australian Curriculum. She expressed that she felt under previous curricula that teachers would talk about justification, reasoning and communication in mathematics, but that it had not been an expectation that students would be able to do this themselves. Thus, while Miriam suggested that mathematical communication would not be entirely new to the students from experiencing the teacher's explanations, she perceived that the notion that they needed to develop their capacity to communicate mathematically and use this during assessment, was a new requirement. This position is amplified in another quote from Miriam's post-unit interview.

> *They've come from Year Five, where you got an A if you got 100 percent on your test, and that's fair enough. But now, trying to explain to them that that's not an A anymore, that's a C - if you can do everything, if you can perform the operation and get the correct answer, then that's the C. ... an A, you really need to be able to explain your way of working and justify why you worked that way.*

> (Post-unit interview: Miriam)

Miriam's reflections here suggest that she has perceived from the C2C materials (PC_1) and school curriculum plan (PC_2), an importance in the requirement for students to develop and use mathematical language. It is her view that in the past, the emphasis was on answering questions correctly in order to see high achievement described on the student's report card. Miriam perceives that the requirement in the new curriculum is for students to continue to answer questions correctly and additionally explain and justify the processes they have used to answer the questions. She now attributes the capacity to answer the questions correctly to a sound level of achievement (C on the five-point scale) when assessed with the new curriculum, whereas students who answer questions correctly and explain their thinking can access the higher levels of achievement (an A or B on the five-point scale).

English Literacy demand of assessment tasks

Miriam described one further aspect of mathematical language as it refers to her students. She sees that some of her students have difficulty demonstrating what they have learnt in a unit due to the literacy demand of the language used in assessment tasks. This is evident in her explanation of difficulties with the first assessment the students were required to complete for the year:

> *… I had the first assessment task that we did where the kids just didn't do it. I had four children that did not even attempt to do it or answered two questions and just gave up because … they were so overwhelmed by the language.*

> (Pre-unit interview: Miriam).

In Miriam's experience, the high literacy demand of the assessment tasks that are provided as part of the C2C materials (PC_1) and the school's curriculum plan (PC_2) have made it difficult for some of her students to demonstrate their learning. Miriam recalls that when administering the first assessment task for the year, she had four students that were not able to engage with more than two questions. Miriam attributes this to the English literacy demand of the assessment rather than their knowledge of the concepts that were being assessed. She pointed out that those students who do not have a sufficient English literacy level are unable to demonstrate their mathematical understanding, as they are unable to access the questions in the assessment task. The complexity of the English language used prevented some students from engaging fully with the assessment task. Consequently, Miriam has felt

it necessary to modify the assessment or find alternative assessment tasks for some students in her class.

Textbooks or other resources

In her pre- and post-unit interviews, Miriam has referred to two types of resources: (1) textbooks, and (2) hands-on resources.

Textbooks

Miriam stated that she relied on the additional resources that were suggested within the C2C materials (PC_1) and the school's curriculum plan (PC_2). She felt that the resources suggested by the curriculum plans gave most of the additional information necessary to unpack unfamiliar concepts in preparation for teaching in the classroom. However, Miriam also used textbooks that were used by the school during the preceding year (i.e. prior to the school's implementation of the Australian Curriculum). Miriam explained that as these textbooks were written by national, rather than Queensland-based publishing companies, and thus she felt that these resources would be able to support the national curriculum.

Miriam used textbooks to provide additional material for reinforcing concepts to students (such as additional examples for students to practice particular algorithms or strategies).

> *The only issue that we have with the resources is that there's not enough meat in them for the kids to practise what they need to be doing. Too much talking - too much of us talking and not enough of them being able to apply what they're doing.*
>
> (Pre-unit interview: Miriam).

Miriam feels that the resources in the curriculum plan do not provide enough opportunity for her students to practise the concepts that she is teaching. She believes that the curriculum plans emphasise talking about the mathematical concepts rather than providing opportunity for application. Miriam has used other resources in order to support the curriculum plan, for example:

> *Order of operations - I didn't use the C2C documents, I used the Australian Signpost Maths, which I - well, I didn't change, it was just presented really nicely and in a really easy way for the kids to understand. So, I scanned it and put it up on the board, gave a nice explanation, off we went.*
>
> (Post-unit interview: Miriam).

In preparation for this lesson Miriam felt that the textbook that she had used the previous year, Signpost Maths (McSeveny, 2005), provided a clear explanation of order of operation. Consequently, rather than using the suggested resources from the C2C materials, Miriam used the Signpost Maths textbook (McSeveny, 2005) via her classroom's Interactive White Board. Miriam has also used this textbook to provide differentiated learning activities for her students:

> *I also have the Signpost 4 maths book, which I will also use to differentiate for a number of children in my class. I'll look at the concept that we're doing, and then I'll go back by about two years and see what concept it is that comes before that.*

> (Pre-unit interview: Miriam)

Miriam has used the Signpost Maths book to assist her in unpacking the necessary prior knowledge that her students require to engage with the concept that she will be teaching. She goes through editions that are targeted at prior year levels and uses these ideas to pitch appropriate learning experiences for those students who require additional support. Further, Miriam will use textbooks to provide alternative assessment tasks to those described in the curriculum plan:

> *The assessment task for this [unit], my average-to-higher-level children will cope with it. So it's more than likely ... my middle-to-higher children will do that assessment task [from the curriculum plan], my lower children will only do this one [from the Tracker].*

> (Pre-unit interview: Miriam).

Miriam has expressed that while the majority of the students in her class will demonstrate their learning using the assessment designed to accompany the school's curriculum plan (from the C2C materials), some of her students will not be able to engage with this assessment. Instead, Miriam will utilise a textbook that she uses for the purposes of monitoring to design activities that assess the curriculum content that they have been learning in parallel to the other students.

Hands-on resources

Miriam also made reference to other materials that she felt were necessary to the teaching of mathematical concepts that were not specified in the school's curriculum plan (PC_2). She used a number of concrete materials (such as MAB, unifix cubes) to allow students to build their understanding of a concept through touch and physical

manipulation, alongside the more abstract understanding as expressed in the curriculum plan: *"these kids need these hands-on resources to be able ... to do it"* (Post-unit interview: Miriam). Miriam feels that to support the development of her students' conceptual understanding, she needs to utilise concrete materials in activities with her students. She feels that this provides the necessary grounding for her students to develop understanding of the concept that she is teaching.

Assessment

Miriam mentioned assessment in both the Pre-unit and Post-unit interviews, particularly in relation to the influence that the assessment tasks and their respective guides to making judgements (or criteria sheets) have on what she taught in the unit. *"... looking at the assessment task and going okay, there's the guide to making judgements, there's an A, that's what they need to be doing"* (Pre-unit interview: Miriam). During the pre-unit interview, Miriam discussed the support that the guide to making judgements gave her to be able to ascertain the standard expected for the task from the writers of the C2C material. She used the guide to making judgements to determine what her students needed to do to attain a high level of achievement on the assessment task. During the post-unit interview, Miriam discussed the alignment of her classroom plan with the curriculum plan.

> *I guess the biggest change that I made between the first time we spoke and now, is that I made the change to go back and teach directly from some of the C2C units. I think that's probably because it was - especially with the data interpretation and being so aligned to the assessment task - that it was very explicit in the language that was being used, and the questions that were being given on the assessment task.*
>
> (Post-unit interview: Miriam)

Following reflection on Units 1 to 4 (Semester One of the school year), Miriam made the decision to align more closely with the C2C materials (PC$_1$). She felt that there was a clear alignment between the curriculum content of the lesson plans and the assessment task that the students were going to be required to complete. Miriam made particular reference to the mathematical language that was included in the C2C materials and the direct alignment that she could see to specific questions on the final assessment task.

Miriam described looking directly at the assessment task and guide to making judgements to determine which concepts in a unit specifically needed to be taught for students to be able to attempt the assessment task. Miriam admitted that this influenced her curriculum decisions. She articulated that she thought the achievement data on students collected from the assessment tasks was quite narrow as often they only provided one opportunity to demonstrate knowledge of a few aspects of a topic, rather than gathering evidence of the full range of concepts and process taught during a topic within the unit. To ensure the students had adequate knowledge of the aspects that would be assessed and sufficient opportunity to complete the task, Miriam found herself teaching concepts and skills directly relevant to the assessment tasks.

> *I guess we were talking about the assessment tasks - it's difficult to report because you can only report on the actual assessment task itself, and they've been quite limited in the information that you can get from them.*
>
> (Pre-unit interview: Miriam).

Miriam found the decision to use the final assessment task as the only evidence for reporting on student development and achievement quite limiting. She felt that the assessment tasks were quite narrow in their scope, especially as they usually did not cover all of the curriculum content taught during a unit. This meant that there were aspects of the curriculum content being taught that did not have any corresponding evidence of student work or understanding for Miriam to use to make comments or report achievement. As the teachers had been directed to use the assessment task alone as evidence of student understanding and achievement, this meant that aspects of the topics taught would not feature in the judgements reported to parents about student learning and achievement.

Miriam also stated that the assessment tasks that she had used prior to this unit did not necessarily give students the capacity to demonstrate their full higher-order thinking skills (such as *justification of thinking and reasoning* (Pre-unit interview: Miriam)). She stated that during this unit she felt more able to give students the exact assessment as described in the C2C materials (PC_1). Miriam attributed this to teaching to the planned assessment tasks (PC_1), as she did in this unit, combined with the students' enhanced familiarity with the format of these assessments granted through the students' assessment in English.

I think I'd mentioned to you that, prior to this unit, we had been using other materials and other assessments ... but it wasn't giving the opportunity for the kids, for the higher-order thinking, to be able to justify their thinking and their reasoning. Because they had their heads around the English tasks and the actual assessment tasks as they were, we decided it was time to introduce the actual C2C assessment task. Just with the language and everything that was involved, I decided to go back directly and teach directly from the C2C planning and expose them to those graphs so that when they did the assessment task, it was exactly what was there.

(Post-unit interview: Miriam).

Earlier in the school year Miriam had been designing her own assessment task for her students, as she was not satisfied that the assessment tasks provided with the C2C materials were meeting her students' level of understanding. Miriam's opinion of the assessment tasks changed as she realised the students' familiarity with the style of the assessments had grown, and also as she had decided to teach lessons more closely aligned to the C2C materials (PC_1). Consequently, Miriam chose to return to using the assessment tasks directly from the C2C materials to assess her students.

Monitoring

During the data collection, Miriam made a distinction between 'assessment' and 'monitoring'. Miriam described that the designated assessment tasks described in the curriculum plan (PC_1) were the only assessment that could be used for decision-making purposes, as outlined in her response during the post-unit interview: *"... for reporting purposes ... we could only assess the assessment tasks, we were allowed to incorporate the monitored tasks in the comment bank"* (Post-unit interview: Miriam). Miriam is referring to the distinction that had been made between the assessment tasks provided in the C2C materials and the in-class tasks that she gave to her students to assess their understanding. Rather than ask her students to complete selected activities in their mathematics exercise books, Miriam would ask her students to complete them on a separate piece of paper that she could incorporate into their portfolio. Each student had a portfolio that was a collection of the work that demonstrated how well the student was able to demonstrate the curriculum content that they had been learning. While Miriam did adhere to the school decision that only the final assessment task that was provided as part of the C2C materials would be

used for the purposes of reporting, Miriam also felt it necessary to undertake regular monitoring activities to get a better picture of the students' levels of understanding. She used these tasks in the comments she made to parents about the students' development in mathematics, particularly in the comments section of their mathematics school reports. Miriam unpacked this point further during her post-unit interview:

> *... what we will continue to do are the tracking tasks or the monitoring tasks, rather than just ... looking at what is in their book, because sometimes you don't always get around to them ... it's a mini test, basically. It just lets you know ... it's got the knowledge, and it's got the application part at the bottom.*

(Post-unit interview: Miriam)

Miriam acknowledged that it was not always possible to spend time with each student every lesson to see if the students had understood the concept that they had been taught. The small monitoring tasks that Miriam set were like smaller assessment tasks that would influence her plan for future lessons, as they gave her further information about whether the students had understood the concept of the lesson and whether they were able to apply it. From this information, Miriam then adapted her plan (PC_n) if further teaching of the topic was required. Additionally, the monitoring tasks served to justify for her continuing with the school's curriculum plan (PC_2) unchanged if the students had grasped the concept.

5.7.3 Summary

Section 5.7 has provided a summary of the data collected from Miriam, a Year Six teacher at Joanlee State School. Miriam has described the process that she has undertaken to prepare and teach Unit 4 to her students; this has been depicted in Section 5.7.1. Her process of curriculum interpretation has been distilled from the data and is provided as a diagrammatic representation in Figure 5.10.

Miriam (see Figure 5.10) used the first lesson of the unit from the school curriculum plan and C2C materials to ascertain what level of additional support was required to support student learning of the topic. From there, she developed a classroom plan dependent upon the degree of additional support she felt her students would need to engage with the content of the unit.

Building on Miriam's process of curriculum interpretation, Figure 5.14 includes the influences upon her process of curriculum interpretation. Figure 5.14 is a reproduction of the diagram included at Figure 5.10. The process of Miriam's curriculum interpretation has been included unchanged. The addition in Figure 5.14 of the annotations on the arrows denotes the influences that have impacted upon the process of Miriam's curriculum interpretation.
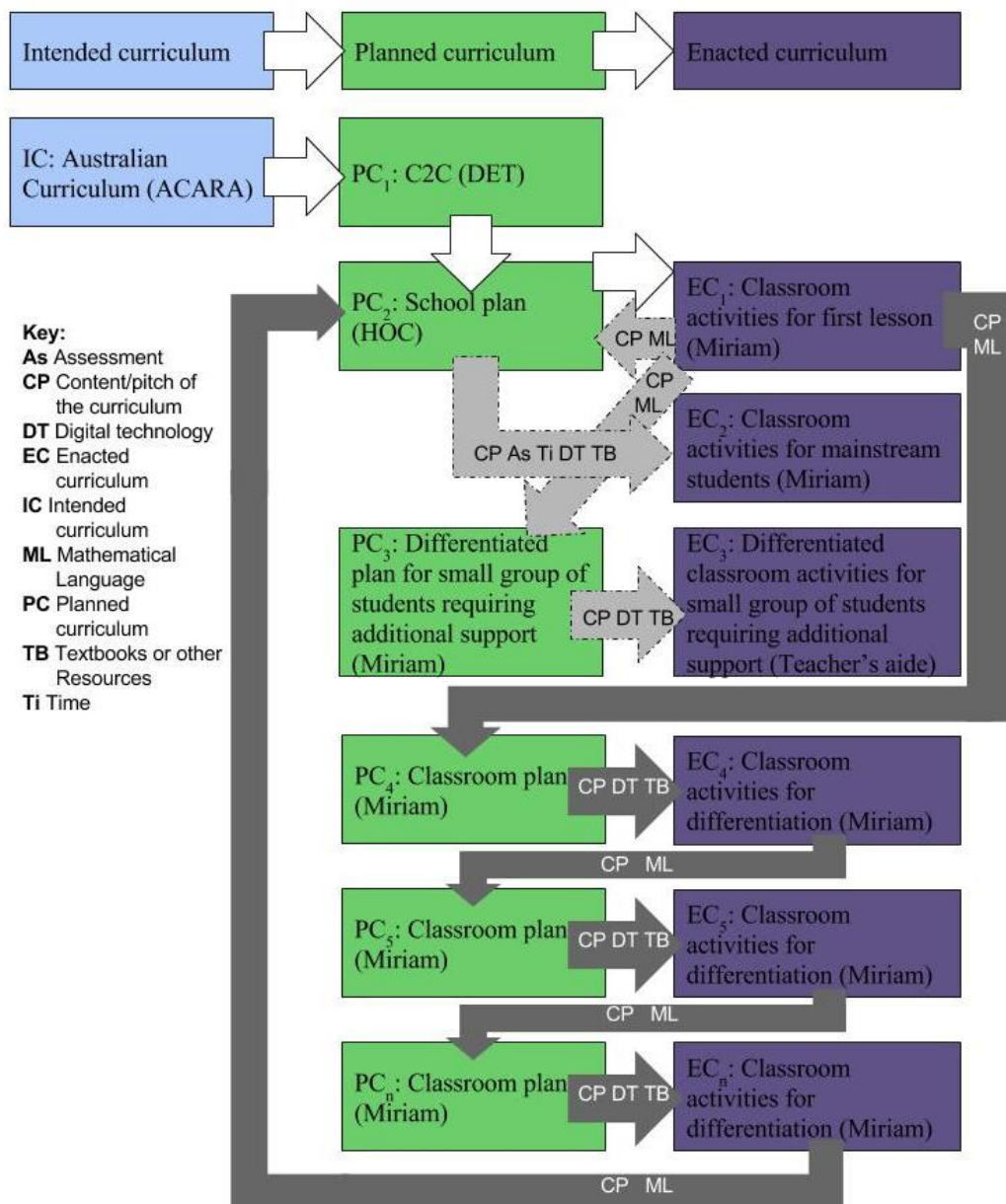

Figure 5.14. Influences on Miriam's process of curriculum interpretation.

Miriam's curriculum interaction was shaped by her desire to meet the students' needs directly by pitching the content of the lesson sequence to where students' prior knowledge allowed them to access. Miriam ascertained this by enacting the first

lesson from the curriculum plan to gauge students' knowledge and then pitched the curriculum content, including mathematical language, to be taught according to the number of students who demonstrated understanding of the concept.

While Miriam's journey from the intended curriculum (IC) to the planned curriculum (PC$_2$) was influenced by a school-based decision to use the C2C materials (PC$_1$) as the basis of curriculum plans for the school, Miriam did not necessarily follow the planned curriculum as stated. Miriam instead evaluated students' understanding and then adapted the plan accordingly. If the majority of students in her class understood the topic, Miriam would proceed with the unit as written in the curriculum plan (PC$_2$). If, however, the majority of students did not understand the topic, Miriam devised alternate curriculum plans (PC$_n$) that revisited and revised topics until her students had an adequate level of knowledge to proceed with the curriculum plan.

Further influences of time, access to digital technology and textbooks and other resources determined how much of the curriculum plans (PC$_1$ and PC$_2$) were enacted in the classroom (EC$_1$ and EC$_2$), the activities that were used in the classroom and how much time was spent on each topic. The influence of textbooks also assisted to provide the conceptual definitions and potential alternate activities for enactment in the classroom. The influence of the formal assessment for the unit influenced the ultimate direction of the unit and the concepts that were deemed important to be covered, if the time allocated for the unit had elapsed.

5.8   TEACHER 5 - ABIGAIL

Abigail has been a teacher for nearly 15 years. She has taught maths daily in primary classrooms across Years One to Seven. At the time of the study Abigail had been at Joanlee State School for over fifteen years, having had a relationship with the school prior to joining the teaching staff there. She was teaching a combined Year Six/Seven class, which meant that she had students from the Year Six cohort and the Year Seven cohort in her classroom during lessons for all learning areas. According to the school mathematics plan provided by the Head of Curriculum, in this unit Miriam was teaching her students content from the following Australian Curriculum strands and sub-strands:

- Number and algebra: fractions and decimals; number and place value; real numbers

- Measurement and geometry: units of measurement

- Statistics and probability: data representation and interpretation; chance.

Abigail finished the term a week early to go on leave; consequently her journal entries for the unit also ceased at that time. Abigail completed 20 lessons of the unit with her students and has provided 20 entries in her journal.

5.8.1 Abigail's process of curriculum interpretation

At the pre-unit interview, Abigail articulated that she had interacted with the C2C materials and school curriculum plan in preparation for teaching Unit 4. Abigail admitted that in preparation for the unit, she had interacted with these curriculum resource materials only. The C2C materials have been developed by the Department of Education and Training (DET) from year plans directly referencing the Australian Curriculum content descriptions and achievement standards (the intended curriculum). Abigail used the C2C materials as the curriculum plan for her classroom as described in Figure 5.15, which summarises Abigail's curriculum interaction.
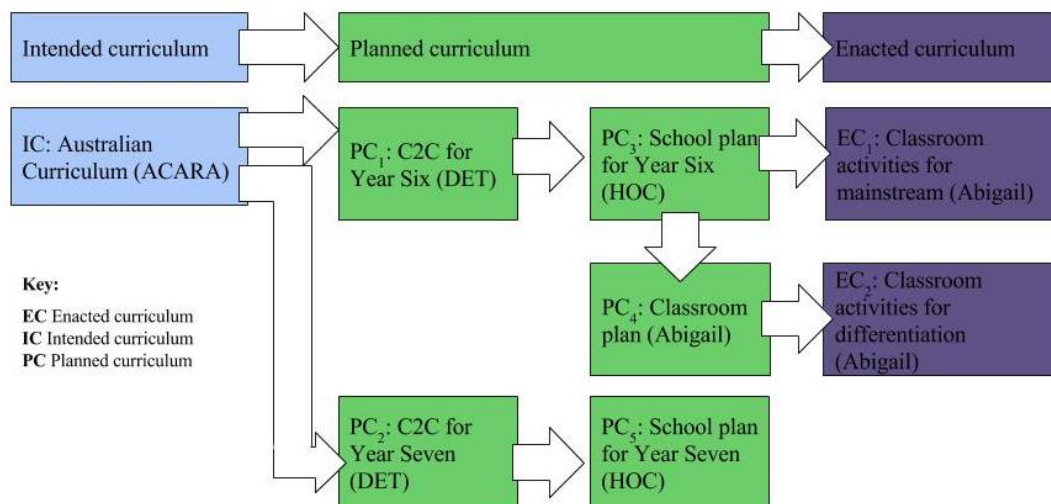
Figure 5.15. Abigail's process of curriculum interpretation

To prepare herself for teaching the unit, Abigail read through the C2C materials (PC_1 for Year Six and PC_2 for Year Seven) and school curriculum plan (PC_3 for Year Six and PC_5 for Year Seven) including the unit overview. In the pre-unit interview, Abigail explained her initial interaction with the unit as follows: "*So the first [thing] I did was obviously look at our C2C unit … Go over it; check the*

assessment tasks that are linked to the unit, so [I knew] what we're required to do based on that" (Pre-unit interview: Abigail).

Abigail commenced her preparation for the unit by reading through the C2C assessment tasks that accompanied the unit. Abigail felt that looking at the assessment tasks for the unit would provide her with an understanding of the destination for her students at the conclusion of the unit, and assist her to know where she was heading with her students across the course of the unit. After reading the C2C materials, Abigail determined that further differentiation would be required to meet the diverse needs of the students in her classroom.

> *... I'm finding I'm probably aiming a lot of my stuff at - just the Year Six level for the Sevens as well. I'm trying to push them a little bit further but it can be just so difficult for them that we have to bring it back ...*
>
> (Pre-unit interview: Abigail)

While the students in Abigail's class would be traditionally placed in Year Six and Year Seven classrooms according to their age, Abigail has found that the curriculum content of the school's curriculum plan (PC$_3$ for Year Six and PC$_5$ for Year Seven) is often too challenging for her class to access, particularly her Year Seven students. Instead, Abigail has found that while planning learning experiences for all the students in her class, she has primarily drawn these from the Year Six curriculum plan (PC$_3$) alone. Abigail developed an alternate plan (PC$_4$) which differentiated appropriate activities for those students in the class that she felt would require extra support, using the Year Six curriculum plan as the base (PC$_3$). This plan was enacted concurrently with the school's curriculum plan for Year Six.

In her pre-unit interview, Abigail believed that the intended curriculum for the unit was pitched too high and some students would find the content far too challenging. As a consequence, she felt that it would be best to aim her classroom plan for all students at the Year Six level. Abigail described that she has had to alter the curriculum plan (PC$_3$) to meet the needs of her students. *"I've had to change and alter [the C2C materials], because [the content] is more difficult on the whole, if you compare it to last year's [school curriculum plans] ... and there's a lot more [content to be covered]"* (Pre-unit interview: Abigail).

Abigail has expressed that she feels the content of the Australian Curriculum that she sees through the school curriculum plan (PC$_3$) and C2C materials (PC$_1$) is

more advanced than the curriculum content that she was teaching to her students during the previous year. In the previous year, the school was teaching mathematics using school-devised curriculum plans based on the New South Wales curriculum. These plans were developed by the school as an interim measure to assist students to meet the increased curriculum demands of the coming Australian Curriculum. Abigail feels that the C2C materials (PC_1 for Year Six and PC_2 for Year Seven) are more advanced than the interim plan the school had devised. She has said that she feels there is an increase in the complexity of the content as well as an increase in the amount of content she is required to cover during the year.

Abigail engaged with the school mathematics curriculum plan and initially determined that the curriculum plan (PC_5) for Year Seven was pitched beyond her students' current level of understanding for that content area. She, therefore, decided to pitch the unit entirely at the Year Six level (PC_3). *"… it's [the content of the unit] really extending them and I'm finding I'm probably aiming a lot of my stuff [classroom instruction and resources] at - just the Year Six level for the Sevens as well"* (Pre-unit interview: Abigail). Abigail stated that the students in her class were finding the nature of the content challenging and, as a consequence, she had been using the Year Six curriculum plan (PC_3) alone to develop her classroom plan for all students including those students in the Year Seven age group. From the Year Six curriculum plan (PC_3) Abigail developed a classroom plan to assist those students whom she felt would not be adequately covered by the activities and content described in the Year Six school plan. This plan is represented as PC_4. Abigail described the process of its development during her post-unit interview:

> *I mean we deviated a little bit … at the beginning because the students' prior knowledge affected what we could or couldn't get through … and we went back to sort of a few more basic ideas and lessons to give them the foundation of development first before moving on to what was required here in that unit.*

> (Post-unit interview: Abigail).

At the commencement of the unit, Abigail recognised that it was necessary for her to deviate from the curriculum plan (PC_3) as her students' prior knowledge of the topic was not sufficient to support additional concepts. Abigail felt that additional

teaching of the conceptual foundations was required to support furthering students' understanding of the concept.

The boxes labelled EC_1 and EC_2 (in Figure 5.15) represent the enacted curriculum, or that which occurred in the classroom. Abigail enacted two plans simultaneously to support the diverse needs of the learners in her classroom. These plans are represented as EC_1 for the mainstream group and EC_2 for the students requiring additional support.

5.8.2 Influences on Abigail's curriculum interpretation

The previous section described Abigail's process of curriculum interpretation, including the decisions that she had made in terms of how to enact the multiple curriculum plans she was using for her class. Her interpretation of curriculum was influenced by factors that will be discussed in the sections that follow.

Content/pitch of the curriculum

Abigail perceived the need to use the Year Six curriculum plan (PC_3) to pitch the content for the unit. From the Year Six curriculum plan (PC_3) Abigail was able to develop alternate activities using modified content to support students requiring additional support. *"... it's [the content of the unit] really extending them and I'm finding I'm probably aiming a lot of my stuff [classroom instruction and resources] at - just the Year Six level for the Sevens as well"* (Pre-unit interview: Abigail). Abigail deemed the content and activities to be too advanced for some students in her classroom. Hence, she devised an alternate planned curriculum PC_4, which incorporated activities pitched at a more appropriate level to accommodate learning needs for those students. As Abigail has stated, this involved using the curriculum plan (PC_3) targeted at the Year Six curriculum content for the teaching of all of her class, even though her class comprised students from both Year Six and Year Seven. Abigail described that using the curriculum plans (PC_3) as written, she has had to make adjustments to meet the needs of her students:

> *... it was sort of like [pitching the activities at] Year Five and ... because being a multi-level I had that Year Six stuff to do with the Year Sevens ... A little bit tricky but I guess when you mix it all together it works and you sort of just take what you can from what you know and where to get it and use that in your work [unit] and hopefully they'll get it.*
>
> (Post-unit interview: Abigail).

Using the Year Six curriculum plan (PC$_3$) as the basis of the activities, Abigail describes that she needed to address underpinning mathematical concepts for her students to be able to build a strong foundation for new knowledge. Abigail attributes this foundation knowledge as being akin to where she imagines the Year Five curriculum content must be pitched. Using these ideas, she has devised an alternative curriculum plan (PC$_4$), which addresses foundation concepts for the students who are not ready to access the curriculum content contained in the Year Six curriculum plan (PC$_3$). Abigail enacted the two plans (PC$_3$ and PC$_4$), simultaneously leading to the inclusion of two enacted curricula (EC$_1$ and EC$_2$) in Figure 5.15.

Time

Time was a key influence on the development of concepts in Abigail's teaching. However, it was referred to in a number of key ways. Abigail identified the need for additional time in planning especially to enable her to develop or source appropriate activities and lesson sequencing for differentiation. She also identified that often, the lessons were "too full" or contained activities (e.g., learning objects - interactive online learning activities) that were "too time-consuming". Abigail stated that in these circumstances she would often need to *"stop completing some aspects, or skip aspects to make sure (the class were) where (we) needed to be"* (Post-unit interview: Abigail). For example, Abigail made reference to learning objects included as part of the C2C curriculum materials, as activities that were quite time-consuming: *"... there's a lot of learning objects and things that can take up half a lesson to watch on the team board and then your [time] actual[ly] getting in there and doing [practice examples of the process] is almost non-existent"* (Post-unit interview: Abigail).

Abigail felt that some of the learning objects were too time-consuming to be used. She expressed that the learning objects could monopolise the time that she would have otherwise used to assist students to practise the concept or skill that they were learning. In this situation, Abigail could see the benefit in the learning object or activity, but would often feel the need just to teach the concept herself rather than using the resources in the curriculum plan (PC$_3$) or allow the students to explore the topic using the learning object. She felt that this was a better use of the time dedicated to mathematics learning. *"So sometimes you've got to leave that [the learning object] out and just get straight into the actual learning of it [the topic] with just the kids and yourself rather than using the outside resource sometimes"* (Post-

unit interview: Abigail). In this way, Abigail felt that she could teach the concept more quickly by explaining the concept and directly teaching, rather than by using the learning object (or another resource external to the teaching of the concept). She felt that her approach would allow more class time for the students to practise and reinforce the concept or skill that she was trying to teach. This approach was key to enabling Abigail's class to work through the entire unit. Often, aspects of the curriculum plan (PC$_3$) needed to be skipped or left out entirely in order to complete teaching of the curriculum content of the lesson. *"… choosing the most important parts to teach and having to sort of let go of a few other bits that might not have been as worthy or that were too time-consuming"* (Post-unit interview: Abigail).

Abigail conceded that while all of the activities and resources in the curriculum plan (PC$_3$) have merit, there are times when she will need to prioritise them to ensure that she has spent adequate time on the aspects that she deems are most important for the students. Abigail prioritises those resources that support the development of students' knowledge of the concept but are not too time-consuming, so as to allow time for students to practise the concept, as the most important for her to use in the classroom. However, at other times, Abigail has invested her time ensuring that students have an adequate grasp of the necessary content prior to administering the assessment: "What changes would you consider making to the lesson if you were to teach it again in the future? More time allocated on teaching the concepts – delay assessment" (Journal entry 4: Abigail). The focus of this particular lesson was the completion of an assessment task by Abigail's class. She has stated that in the future if teaching this unit again, she would prefer to increase the allocated time for developing students' understanding of the concepts and delay administering the assessment so as to support this conceptual development.

Digital technology

Digital technology was an influence on the activities that Abigail was able to do with her students each day. A large component of the C2C materials provides links to online resources. Abigail reported that she found that significant preparation time was required to download and check each online resource for relevance to the pitch of the content, age-appropriateness of the student age group and the literacy demand of the resource. Abigail described that the C2C materials had been developed assuming a minimum access to computers, which she has said was not always

possible with restricted access to computers. Classes at the school have timetabled access to the school computer laboratory, rather than on-demand access available in their classrooms. Abigail felt that the minimum access to computers expected in the C2C materials assumed more regular access to computers than students at Joanlee State School had available. Further, Abigail described that often, online resources may not be working on the day that they wanted to use them, or require too long to download using the school server.

> *... one of the other uncertainties was actually accessing the resources from our unit because the Internet sometimes doesn't work ... But there are some awesome resources and I'll go into those to prepare myself but sometimes they're not available, they're not working, the computer can't upload it, whatever it is.*

<div align="right">(Pre-unit interview: Abigail).</div>

Abigail describes that one of the uncertainties that she faced in using digital resources was whether the Internet connection would be available when she wanted to use the resource. She explains that to prepare for a lesson she will preview the resource at other times (in non-teaching time or at home) and select relevant digital resources that she would like to use, but when returning to the classroom she has found that the resource may not be able to be used. At times this difficulty was due to Internet connection, sometimes it was the school/Queensland Department of Education and Training firewall and sometimes it was the hardware of the computer. Abigail found that she was required to have additional activities as a backup just in case the digital technology failed: *"Then I've got to go and find something different. So I'll do that in preparation before the unit starts but we can't always be 100 percent that it's going to be there for us"* (Pre-unit interview: Abigail).

On those occasions that the digital technology would not allow for her to use the resources that she had chosen for the lesson, Abigail expressed that it was often necessary to have researched an alternative website or resource. She explained that she would try to do this in non-teaching time, so as not to waste class time if she is using the Interactive White Board, or so that the limited computer time that had been granted was not wasted if it was a scheduled computer laboratory lesson.

Mathematical language

Abigail expressed two issues in relation to mathematical language, (1) the introduction of new mathematical language in the new curriculum, and (2) the English literacy demand of the assessment tasks.

Introduction of new mathematical terminology

Related to the influence of content/pitch of the curriculum were the references Abigail made to the new mathematical terminology she felt was required in the Australian Curriculum. Abigail felt that the Australian Curriculum used more technical mathematics terminology for concepts she had previously taught with other curricula.

> *I guess the [mathematical] language used in here [the curriculum plan] isn't what we've always used previously so there's no, there's usually no real explanation in that lesson [plan] to say this is what [the definition] is. Like there's no definition as such.*
>
> (Post-unit interview: Abigail).

Abigail felt that the planning documents (PC_3 and PC_5) used mathematical language that is unfamiliar to her and the students. She felt that the curriculum plan (PC_3 and PC_5) did not adequately define or illustrate terminology that is new to teachers, and this meant that often she was spending time researching the terms to ensure what she was using and how she was using it was developing a correct understanding for her students. Abigail explained that this research was often driven by searches on Google.

> *So they might be talking about something that I know all about but they're using a different language and then I go well what does that mean? ... the language of the maths that they're using now [in the curriculum plan] is different to some of the language that we may have used previously and not having an explanation beside it was confusing and time-consuming for me because you'd have to really go and try and find out what it meant before.*
>
> (Post-unit interview: Abigail).

Abigail described that while the concepts of the curriculum content in the curriculum plan (PC_3 and PC_5) were familiar to her from teaching previous years, some of the terminology used in the curriculum plans was not. She expressed that there were terms that she had encountered for the first time. She voiced that this

added to her work to prepare for teaching her students, as often she would have to spend time finding the correct definitions of these terms to teach them to her students. Subsequently, she felt that she would have to provide much scaffolding to the students in order to support them to understand this mathematical terminology, for example the use of unfamiliar terminology such as, *"area of compound shapes, the square root of numbers, there's a few like the square and triangular numbers"* (Post-unit interview: Abigail).

English literacy demand of assessment tasks

Abigail felt that the English literacy demand of the assessment task was too advanced for her class; the instructions that accompanied the assessment task were not written in language at an appropriate literacy level for her students.

> *More advanced, ... and it [the assessment] was pages and pages long and so ... it took us a few sessions to do it and the questioning was ... far more advanced or more tricky than what they'd actually told us to do ... they struggled with a fair bit of it which was a bit terrible because you want to help them and explain it but ... we didn't sort of realise it was going to be that hard.*

<div align="right">(Post-unit interview: Abigail).</div>

Abigail stated that the final assessment task was not written at an appropriate literacy level for her students to access, which led to difficulties for her students attempting the assessment task. She stated that the level of questioning was far more complex than what the students had encountered during the course of the unit. Additionally, the assessment task was very long. These two factors meant that the assessment task had to be completed across several lessons. Consequently, a number of students struggled with the assessment task.

Textbooks or other resources

In researching mathematical language and supporting differentiation in the classroom (through the development of an alternative planned curriculum – PC$_4$) Abigail identified a number of resources that she had used to assist her throughout the unit. The majority of these resources were textbooks, which were purchased by the school to support learning with the previous school curriculum plan. Abigail explained her approach to using additional texts:

I've looked at OneSchool. I have been on the Learning Place to do that. Sometimes ... if I feel – ... it's missing something, I'll actually go to other books and things that I have, like a Signpost Maths or the iMaths or whatever books I've got ... So I'll tend to try and use other things outside of it [the C2C materials] as well to try to complement it and make sure that the students are receiving a full overall approach.

(Pre-unit interview: Abigail)

Abigail has said that she has visited a number of Queensland Department of Education and Training (DET) digital resources; this included OneSchool (http://education.qld.gov.au/smartclassrooms/working-digitally/oneschool.html) and the Learning Place (http://education.qld.gov.au/learningplace/). Abigail describes that she will use these resources when she feels that the curriculum plan (PC$_3$) is not sufficient to explain the concept or the activities are not adequate to support the development of her students' understanding.

Abigail explained that she will also use other textbooks that she is familiar with from teaching at the school in previous years as her first point of call. Abigail described that she attempts to draw from resources that are not listed in the C2C materials to ensure that her students are getting a comprehensive access to a wide range of resources. Abigail also outlined her reasoning for selecting the texts that she has used:

I do like the Signpost but only because we have used it for a few years running. I find it's quite comprehensive, sometimes a little too over the top. That's probably the best one for me. The iMaths is good for investigations, so if it's a hands-on type scenario that's a good one as well but it is a matter of being a Year Six book; this is all quite different now to what we've done.

(Pre-unit interview: Abigail).

Abigail acknowledged that the texts she had been using did not specifically address the new Australian Curriculum as these books had been published prior to the release of the Australian Curriculum. She felt, however, that these textbooks provided her with additional resources for the content areas/topics that she taught to her students, in the form of useful illustrations and supplementary activities for further practice of processes. She believed that isolated activities and explanations from the texts could be used as additional resources or alternative resources to some of the activities included in the planned curriculum (PC$_3$).

5.8.3 Summary

Section 5.8 has provided a summary of the data collected from Abigail, a teacher at Joanlee State School, who teaches a combined Year Six and Year Seven class. Abigail has described the process that she has undertaken to prepare and teach Unit 4 to her students; this has been depicted in Section 5.8.1. Her process of curriculum interpretation has been distilled from the data and is provided as a diagrammatic representation in Figure 5.15.

Abigail (see Figure 5.15) had a combined Year Six and Year Seven class; in preparing for the unit she used the school curriculum plan and C2C materials for Year Six only. Abigail also used the school curriculum plan and Year Six C2C materials as the basis to develop a classroom plan for students who needed additional support.

Building on Abigail's process of curriculum interpretation, Figure 5.16 includes the influences upon her process of curriculum interpretation. Figure 5.16 is a reproduction of the diagram included at Figure 5.15. The process of Abigail's curriculum interpretation has been included unchanged. The addition in Figure 5.16 of the annotations on the arrows denotes the influences that have impacted upon the process of Abigail's curriculum interpretation.
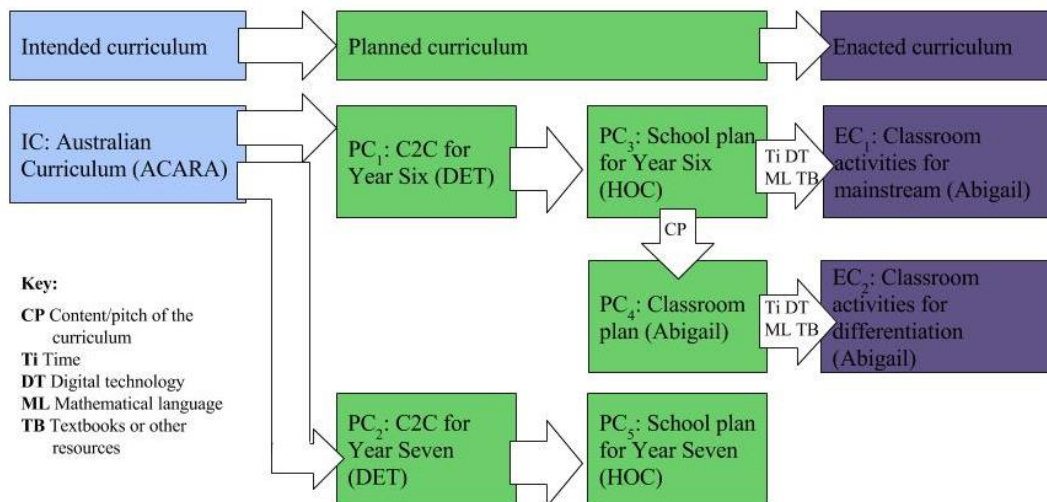

Figure 5.16. Influences on Abigail's curriculum interaction.

Abigail's process of curriculum interpretation was shaped by the need to provide differentiated experiences for the diversity of learners in her class. Initially, this was the decision to utilise the school curriculum plan for Year Six as the basis of

her classroom plan, which she altered (PC_4) to ensure that she provided opportunities to cater for all students.

Further influences of time, access to digital technology, and mathematical language determined how much of the curriculum plans (PC_3 and PC_5) were enacted in the classroom (EC_1 and EC_2). Finally, the influence of textbooks helped to provide the conceptual definitions and potential alternate activities for enactment in the classroom.

5.9   CHAPTER SUMMARY

This chapter presented and analysed the data gathered from five teacher participants from Joanlee State School, as they implemented the Australian Curriculum in their classrooms. Sections 5.4-5.8 presented the data for the five teacher participants, derived from pre- and post-unit interviews of five teachers and the journals they maintained during the unit. The data from each of the teachers was presented in terms of: (a) how they interpreted and enacted the curriculum and (b) the factors that influenced the process of interpretation and enactment.

The curriculum context of the school was presented. The curriculum context gave insight into the decisions that had been made at the school to support teachers during the period of transition to the Australian Curriculum. These decisions were made by the administrative team: the Principal, the Deputy Principal, and the Head of Curriculum. To support teachers during the transition, the administrative team made the decision to adopt and adapt the C2C materials produced by the Department of Education and Training. These materials were used as the basis for curriculum planning at the school. Further, the administrative team outlined the professional support that had been provided to teachers, including planning days, and professional development.

Sections 5.4-5.8 provided a detailed analysis of the process of curriculum interpretation used by each of the teacher participants. The analyses considered the process that each teacher had undertaken, including the curricula and/or resources that they consulted, and the pathways to enactment with which they engaged. Further, each of the analyses studied the influences that had impacted upon the teacher's process of curriculum interpretation. The influences were described for the

effect that they had on the teacher's decision-making in relation to curriculum interpretation.

This chapter has presented an analysis of the data in the present study. The thematic analysis of the data collected during this study has identified a series of key themes; each of these themes has been determined uniquely to the participant in the study; however, there have been several that have run in parallel across the data sets. This discussion has collated the recurring themes from the data and articulated the subthemes that comprise these themes. The data attributed to these themes and subthemes has been used to explore the process of curriculum interpretation employed by five teachers at Joanlee State School, and to seek clarification of the influences that impact upon the process.

Chapter 6 provided a discussion of the results in relation to the research referenced throughout the present study. The chapter discussed the findings of the present study, considering processes of the conceptual model of the study. It explored the processes of planning and enacting the curriculum. Subsequently, it considered the process of reflection as observed in the present study. Chapter 6 also presented examination of the influences on the process of curriculum interpretation. The influences will be examined for those that have a major impact on curriculum planning, and those that have only a minor impact.

Chapter 6: Discussion

6.1 INTRODUCTION

The purpose of this study was to explore and analyse the process of curriculum interpretation, which teachers use to enact the curriculum for their students. It was proposed that the teachers would undertake a process of curriculum planning in order to interpret the intended curriculum for appropriate instruction for their individual classes. The present study sought to explore the process of curriculum interpretation undertaken by teachers engaging with curriculum through the study of five mathematics teachers in a Queensland school. It aimed to identify the process undertaken during curriculum interpretation and ascertain the influences that have impacted upon this process.

This chapter centred on a comparison of the curriculum interpretation processes employed by the teachers, and an analysis of the influences that have impacted upon these processes. The relationship between the processes of curriculum interpretation, the processes of curriculum planning and curriculum enactment, was discussed in relation to the findings and relevant literature. Further, the influences impacting on the processes of curriculum interpretation was discussed. This incorporated analysis of the degree of impact each of the influences has had on curriculum planning and enactment.

In this chapter, Section 6.2 discussed the process of curriculum interpretation in regard to the findings of the present study; this included discussion of the processes in relation to the conceptual model of the study, the relevant literature and the professional context of Joanlee State School. Section 6.3 is dedicated to a discussion of the influences impacting upon curriculum interpretation. Section 6.4 concluded the chapter.

6.2 PROCESS OF CURRICULUM INTERPRETATION

The conceptual model for this work describes three key artifacts in the process of curriculum interpretation. These key artifacts were the

- *intended curriculum*, that is, the curriculum that provides the overarching map for a course of study. It is typically delivered as curriculum policy and developed by the curriculum authority for a jurisdiction

- *planned curriculum*, that is, the first interpretation of the intended curriculum. Typically developed by teachers, the planned curriculum charts the course, which the teacher intends to take to deliver the curriculum in the classroom

- *enacted curriculum*, that is, the interpretation of the curriculum that encompasses the learning experiences and activities in the classroom. The enacted curriculum represents the journey taken by the teacher and the class, regardless of whether the classroom interactions were planned or unplanned.

The model developed aimed to represent the process of curriculum interpretation undertaken by teachers, particularly during a period of curriculum implementation (Figure 6.1).
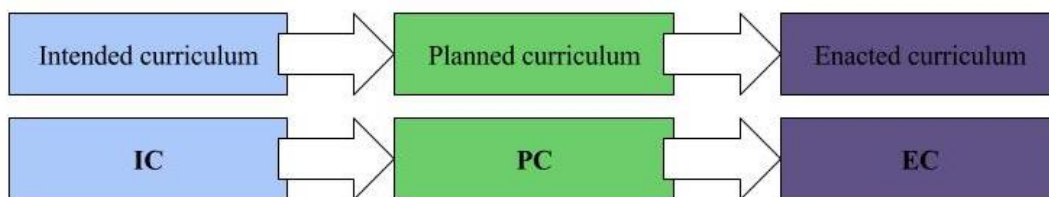
Figure 6.1. The conceptual model.

The model depicts a unidirectional process, with a linear progression from intended to planned to enacted curriculum. This reflects the initial hypothesis that this linearity would adequately describe the process of curriculum interpretation used to engage with the curriculum and to enact in classrooms.

The three sections that follow discuss the findings of the study in relation to the conceptual model. The first section considers curriculum planning (Section 6.2.1), and the second section discusses enacting the curriculum (Section 6.2.2). Curriculum planning and enactment are processes currently described in the conceptual model. The third section, reflecting on the curriculum (Section 6.2.3), relates to a process identified in the findings of the study but not identified in the original literature.

6.2.1 Planning the curriculum

Curriculum planning supports teachers to enliven and make accessible the curriculum content for the students in the classroom. Solomon (2009) described the planned curriculum as the blueprint, which the teacher devises for covering the intended curriculum but not the act of teaching the curriculum in the classroom. Solomon (2009) was emphasising that curriculum planning is an act in the process of curriculum interpretation that a teacher undertakes in preparation for enactment in the classroom, rather than as the act of teaching alone. The planned curriculum expresses the intentions of the teacher for covering the curriculum but may not be the entirety of what is enacted in the classroom. It is an interpretation developed by the teacher to unpack the curriculum and tailor it to meet the needs of the students in their classroom (Kurz et al., 2010; Solomon, 2009).

Each teacher felt it necessary to develop a classroom plan based on the C2C materials and school curriculum plan. C2C was provided to teachers with the message that it would provide them with the time to consider the pedagogical techniques to support their teaching. This did not eventuate, as teachers spent considerable time curriculum planning and spent little time directly considering their pedagogy. Therefore, while the intention of the C2C materials may have been to minimise the curriculum planning time that teachers were required to invest, in practice, the teachers were still devising their curriculum plans in preparation for teaching their units. The C2C materials did not "fast-track" the process of interpretation by removing the requirement to unpack the curriculum. Instead, the teachers simply began the same process from a different starting point. The teachers commenced planning with an interpretion of the intended curriculum, rather than from the intended curriculum itself. Furthermore, during the course of the study, only one of the five teachers made comment about considering their pedagogy in relation to mathematics. Lyn commented about her feelings of uncertainty toward the appropriate pedagogies to implement digital technology in her mathematics classroom as described in the C2C, in particular in regard to embedding learning objects within lessons. Thus, none of the teachers invested in considering pedagogy in the way that the C2C materials were intended to support them to do.

Remillard and Heck's (2014) modelled incorporated the notion of the teacher-intended curriculum, that is, the interpretations and decisions that teachers make in

the process of planning for instruction. Researchers (see, for example, Ellis, 2004; Sherin & Drake, 2009; and Solomon, 2009), have each considered the notion of the planned curriculum in their works. However, none of these authors provided a clear definition of the planned curriculum. Each author has provided the suggestion that teachers engaging with the intended curriculum undertake a process of curriculum interpretation to derive their curriculum plan. However, there is a discrepancy in terms of the positioning of this notion within the process of curriculum enactment. Ellis (2004) and Sherin and Drake (2009) position teacher planning as part of the teachers' intention and therefore situate the planned curriculum as an extension of the intended curriculum. Solomon (2009) argues that the planned curriculum is an aspect of curriculum enactment and therefore locates the planned curriculum within the enacted curriculum.

The conceptual framework of the present study was adopted from Remillard and Heck's (2014) model. They defined the planned curriculum as a separate entity from the intended curriculum and the enacted curriculum. Remillard and Heck (2014) make reference to the teacher-intended curriculum as an interim step between the official curriculum and the enacted curriculum. Within the present study, the teachers' planned curriculum has been positioned as the interim step supporting the preparation processes that teachers undertake when preparing to implement the curriculum.

The conceptual model has provided a means for mapping the process of curriculum interpretation undertaken by teachers in preparing to enact curriculum in their classrooms. The diagrammatic representations created for each of the teachers have been developed for the purpose of comparison. The representations provided a generalised picture of the sequential path that each of the teachers have taken from the intended curriculum to enactment in their classrooms.

Data gathered from the teachers has shown that each teacher engaged in the process of curriculum interpretation similar to that described in the model. They constructed their curriculum plan to interpret the curriculum and resources that they were provided before enacting the curriculum in the classroom. What was not predicted, while conceptualising the present study, was the impact of the Curriculum into the Classroom (C2C) resources that were provided to teachers and schools by the Queensland Department of Education and Training.

The direction the Department of Education and Training undertook by creating and delivering the C2C materials was an implementation strategy unique to Queensland. The delivery of the materials in the term prior to implementation meant that teachers had a relatively short time in which to familiarise themselves with the materials as well as the new curriculum. The administrative team at Joanlee State School made the decision to adopt and adapt the C2C resources with their teachers. The school operationalised this, by using the C2C materials as the basis for the school curriculum plan and then supporting the teachers to adapt it for use with the students in their classroom.

Regardless of the level of C2C adaptation that the teachers employed, they each demonstrated a similar path from the intended to the planned curriculum. That is, they each understood the Australian Curriculum to be the curriculum that they were implementing through the C2C materials, and they all used the C2C materials and school curriculum plan when devising their classroom plans. The Australian Curriculum had been published for nearly a year when the C2C materials were released. The C2C materials were a new approach to curriculum support for the Queensland. There had never before been such a comprehensive suite of resources provided to teachers, nor had there ever been a message to schools compelling them to use a particular suite of resource materials. The pathway from the planned to enacted curriculum generally depended on the strategies the teacher preferred to employ to support students to learn the concepts in the curriculum plan. The general process of curriculum interpretation used by individual teachers appears in Figure 6.2.
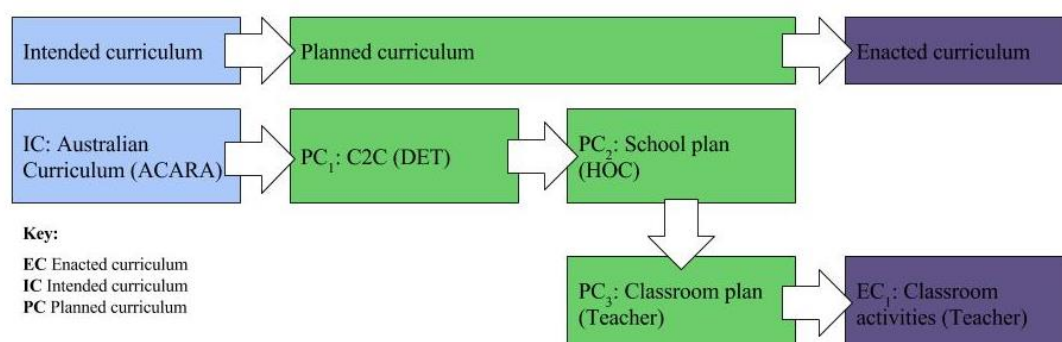

Figure 6.2. The general process of curriculum interpretation used by teachers in the present study.

Figure 6.2 represents a generalisation of the base process that teachers employed to interpret the Australian Curriculum. The intended curriculum was the

Australian Curriculum (IC), and the first layer of curriculum planning was derived from the C2C materials (PC$_1$). This represents the first interpretation of the curriculum, which was undertaken by Department of Education and Training. From the C2C materials, Amy (Head of Curriculum) prepared a version that was uploaded to the school network and the Department of Education and Training's OneSchool portal, which then acted as the Joanlee State School mathematics curriculum plan (PC$_2$). The teachers each prepared their personal classroom plans for their students. The teachers initially developed their plans based upon the school curriculum plan and reflected the relevant curriculum content, teaching strategies, and activities that the teachers intended to use with their students in the classroom (PC$_3$). Finally, the teachers' classroom plans were enacted in the classroom (EC$_1$).

The effect of the C2C materials on teachers

The C2C materials were developed with the intention of supporting the implementation of the Australian Curriculum in Queensland state schools. The materials were conceptualised as Queensland's jurisdictional response and support for the national curriculum development for state schools. The intent was to support a smooth transition during a large-scale curriculum change process. However, according to Department of Education and Training principals, the original direction from the Director General that accompanied the C2C materials, suggested that schools were required to use the materials as their school curriculum plans. The message that teachers were receiving from their Principals and Regional Directors was that they were compelled to enact the C2C materials as written.

A message from the Director-General (Department of Education and Training, 2012) and a communique from the Queensland Teachers' Union (Queensland Teachers' Union, 2012) attempted to remind teachers and schools that the C2C materials were not mandatory, but just resources to support the implementation of the Australian Curriculum. However, newspaper articles at the time reflect the level of confusion that was continuing to be reported by teachers receiving mixed-messages (Chilcott, 2012a; 2012b). The message has been revised over time to support schools *adopting or adapting* (Department of Education and Training, 2015) the materials to suit their context, but the implicit message remained that the C2C materials were the starting point for implementation. The direction to teachers from DET was, and continues to be:

Curriculum into the Classroom (C2C) provides teachers with a comprehensive suite of sample curriculum plans for use in P-10 classrooms … You can adopt or adapt the sample C2C plans to fit your school context and the needs of your students. Use them as a starting point for your curriculum planning and to assess your students' learning. This will allow you to devote more of your non-contact time to evaluating student data and determining 'how' you will teach the curriculum.

(The State of Queensland (Department of Education and Training), 2016b)

While the C2C materials were an interpretation of the intended curriculum, teachers were encouraged to use them as the starting point for curriculum planning. At the time of this study, the C2C resources that were made available to teachers were based on the draft of the Australian curriculum. All of the teachers, with the support of the administrative team of the school, have used the C2C materials (in conjunction with the school mathematics curriculum plan) as the starting point for their curriculum planning. The teachers were, in essence, interpreting an interpretation of the curriculum, as the C2C materials were an interpretation of the Australian Curriculum provided as a resource to schools.

The researcher of the present study hypothesised the intended curriculum, in this case the Australian Curriculum, to be a curriculum touchstone, or reference point, for teachers as they planned curriculum experiences for their students. Through analysis of the processes of curriculum interpretation used by the teachers, it is evident that this has not been maintained as the teachers did not consult the intended curriculum to support their planning. The intended curriculum provides the map for the course of study. However, the advent of the C2C materials and the messaging that accompanied these resources has led to ambiguity in the starting point for curriculum planning.

Using the C2C materials as the starting point for planning creates potential issues for the school's curriculum planning. The C2C materials were created on a timeline, which provided access one term prior to implementation of them (i.e., Term 1 resources were available from the beginning of Term 4 the year prior to implementation, Term 2 resources were available from the beginning of Term 1 in the year of implementation, Term 3 resources were available from the beginning of Term 2 in the year of implementation, and Term 4 resources were available from the

beginning of Term 3 in the year of implementation). Thus, Term 4 of the year prior to implemetnation was the first time that the C2C materials had appeared in schools, an unprecedented curriculum support resources package. The development timeline meant that schools did not have access to the full mathematics curriculum plan for the year until the beginning of Term 3. This schedule of resource release has meant that the teachers were making decisions about the curriculum aspects that may be "left for later" without adequate information about what later units may contain. The curriculum decisions made by the teachers, based on the C2C resource, caused a disconnect from the original intent and curriculum direction of the Australian Curriculum.

The C2C materials were used as the key source for curriculum planning and thus in this case could almost be considered to be a quasi-intended curriculum. The intended curriculum is that which defines the overarching goals for a course of study in a year level and/or learning area; it sets the direction for the teaching, learning and assessment. By using the C2C materials as the initial source for curriculum planning, the teachers were using the directions described in the C2C resource. The C2C materials became the teachers' initial point for the process of curriculum interpretation.

6.2.2 Enacting the curriculum

Solomon (2009) described the enacted curriculum as the planned and unplanned curriculum decisions that occur in the classroom. Porter (2004) defines the enacted curriculum as the content of classroom instruction, that is, he views it as the sum of the curriculum content that the teacher teaches in the classroom through the intended and unintended activities and instructional opportunities presented. Porter (1989) acknowledged that qualitative studies of the enacted curriculum are difficult and costly, as they are difficult to predict and adequately capture. However, Porter also attests that the reward for studying the enacted curriculum is a comprehensive picture of the curriculum in the classroom, including the alignment or misalignment of the content of the enacted curriculum compared to intended curriculum, and a picture of the outside pressures and external distractors that influence classroom practice.

Remillard and Heck (2014) described the difficulties faced when measuring and studying the enacted curriculum. They aligned the enacted curriculum to live performance: the act of enactment requiring responses in the moment to the

questions, issues and challenges that arise from the students' engagement with the curriculum. The teacher engages pedagogical strategies, instructional materials, and other resources using the teacher's intended curriculum as the driver for the general direction of the learning.

A similar phenomenon to that described by Remillard and Heck (2014) was observed in the present study. The teachers had a similar journey from the Intended Curriculum to the Planned Curriculum; the process of curriculum enactment was unique to the teachers. Remillard and Heck (2014) believed that the act of curriculum enactment is responsive to the events and audience that are engaged in the process. The teachers each developed a curriculum plan for the lessons they were to teach, however dependent upon their engagement with the students in the lessons this curriculum intention was not always met. The journal entries kept by the teachers in the present study described a series of curriculum refinements based upon a series of influencing factors, including appropriate pitch of the content for the students in the classroom, time, availability of digital technology, and the language used to teach the curriculum concepts.

The phenomenon of curriculum enactment is a joint construction between the teacher providing a general direction for the learning, and the students engaging in the learning process. The level of engagement with the curriculum provides feedback to the teacher to consider refinement of the process and content. Remillard and Heck (2014) have acknowledged in their model of curriculum, design and enactment system, that the relationship between the teacher-intended curriculum and the enacted curriculum is bidirectional. That is, the nature of the relationship between the teacher-intended curriculum and the enacted curriculum is such that they influence each other. The teacher-intended curriculum sets the direction for the enacted curriculum, while curriculum enactment provides feedback to set the course for the teacher-intended curriculum in the future.

6.2.3 Reflecting on curriculum enactment

Following curriculum enactment, all five teacher participants for this project engaged in a process of reflection and revision to inform the curriculum course for the unit, albeit they all engaged in this process differently. Four of the five teachers, Lyn, Hillary, Miriam and Abigail, each used their reflections on the curriculum content of their lessons to make modifications to their curriculum plans, which ultimately led to

the enactment of dual plans to accommodate the differentiated needs of the students in their classrooms. While Winnie did not engage in an immediate feedback process, her reflections did result in her instituting alterations to curriculum plans in subsequent units.

A process of curriculum revision following enactment was described by all the teacher participants of the present study. The model of curriculum interpretation used as the conceptual frame for the study has not encompassed the reflexive nature of the relationship between the planned curriculum and the enacted curriculum. All teacher participants in the study have used information gleaned from curriculum enactment to alter their curriculum plan. Remillard and Heck (2014) share this assertion and have included a bidirectional arrow to denote the nature of this relationship. The model for the present study used as the conceptual frame should utilise a similar notation to reflect the behaviour observed during the study. Thus, Figure 6.3 includes a revised model of the general process of curriculum interpretation used by teachers in the present study. The revised model is reflective of the nature of the reflexive relationship between the planned curriculum and the enacted curriculum.
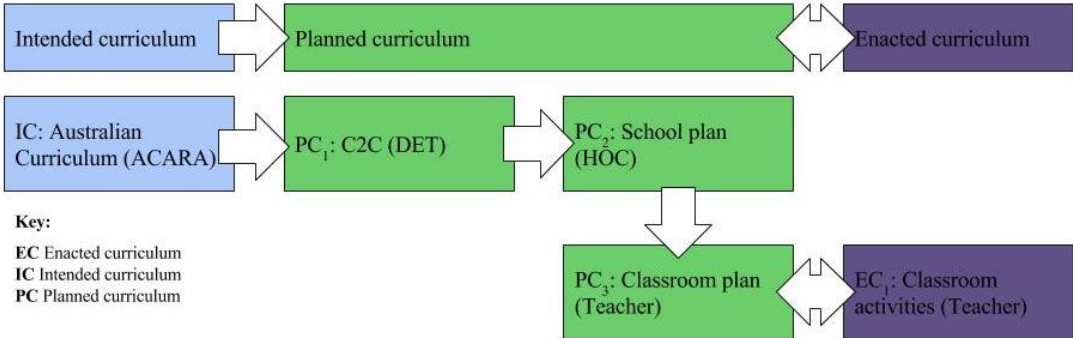
Figure 6.3. Revised model of curriculum interpretation.

Figure 6.3 is a revised version of the general model of curriculum interpretation that has been used by teachers. The inclusion of a double-headed arrow between the teacher's classroom plan and the enacted curriculum reflects the reflexive nature of the relationship between these two aspects of the process. Teachers engaged in reflection about the nature and content of enactment in relation to common influences, which will be discussed in Section 6.3. Using their reflections the teachers, then made adjustments to their classroom plans.

6.3 INFLUENCES ON THE PROCESS OF CURRICULUM INTERPRETATION

Analysis of the five teacher participants identified six influences impacting upon the process of curriculum interpretation. The six influences were: content/pitch of the curriculum, time, assessment, mathematical language, digital technology, and textbooks and other resources. These six influences were represented in the teacher responses during the semi-structured interviews and journal entries when the teachers discussed curriculum planning, enactment and reflection. Table 6.1 represents the processes of curriculum interpretation impacted upon by the six identified influences.

Table 6.1

Impact of the influences on the processes of curriculum interpretation

Influences	Process of curriculum interpretation		
	Planning	Enacting	Reflecting
Content/pitch of the curriculum	✓	✓	✓
Time	✓	✓	✓
Assessment	✓	✓	✓
Mathematical language	✓	✓	
Digital technology	✓	✓	
Textbooks and other resources	✓	✓	

From Table 6.1 it can be determined that all six influences impacted upon the processes of curriculum planning and enactment. However, only three, content/pitch of the curriculum, time, and assessment, influenced the process of reflection.

During the process of curriculum interpretation, curriculum plans developed by the teachers commenced with consideration of the school mathematics curriculum plan, rather than the Australian Curriculum. While all six influences impacted upon the process of curriculum planning, the six did not all impact in the same way. The influences of content/pitch of the curriculum, time, and assessment impacted on the teachers' classroom plan. These three influences led to the development of alternate classroom plans to accommodate issues relating to their influence. For example, consideration of the content/pitch of the curriculum included reflection on the appropriate pitch of the curriculum for the students in the teachers' classes. If the content was deemed inappropriate or inaccessible for the students in the class then the teacher developed an alternate classroom plan pitched at a level appropriate to the

students in the class. Figure 6.4 depicts the general decision path with reference to the influences that altered the development of the classroom plan and their impact on the process of curriculum planning.
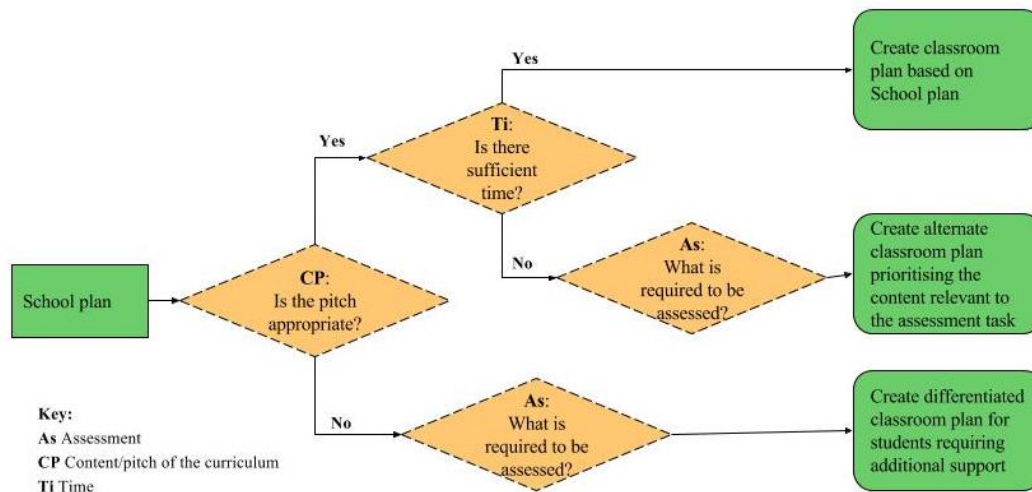

Figure 6.4. Flow chart for the major influences on curriculum planning.

Figure 6.4 represents the general decision path for the teachers as they engaged with curriculum planning. Each of the teachers used the school mathematics curriculum plan as the basis for their curriculum planning. The decisions captured in this image relate to those the teachers considered when curriculum planning.

Figure 6.4 represents that the first influence on the development of the teacher's classroom plan was whether the curriculum content described in the school plan was pitched appropriately. If it was deemed to be appropriate then consideration was given to the amount of available time; enough time meant that the classroom plan would reflect all of the curriculum content described in the school plan. If there was not enough time then the teacher considered the curriculum content that students would need to know in order to engage with the assessment task; from this somewhat narrowed focus the classroom plan would be developed.

However, if the curriculum content was deemed to be pitched inappropriately for the students in the class then the teacher would consult the assessment task. All students were required to be assessed using the formal, end-of-unit assessment task. Thus, the teacher would consult the assessment task in order to determine the curriculum content that the students would need to know in order to engage with the task; from this the teacher would develop a differentiated classroom plan with the

aim of developing students' knowledge to the point that they were able to engage with the assessment task.

By contrast, the influences of mathematical language, digital technology, and textbooks and other resources, led the teacher to considering alternate strategies or activities, but did not lead to the teacher altering the course. These three influences are considerations that the teachers have discussed in relation to their planning. These influences have not led to the requirement for an alternate classroom plan to accommodate them, but rather to the teacher needing to consider alternatives for their replacement. For example, consideration of the digital technology available in the classroom did not lead to the development of a new classroom plan, rather a modification of the teaching strategies to be used in teaching particular concepts.

The impact of influences was not as predictable on the process of curriculum enactment. As described by Remillard and Heck (2014), the nature of curriculum enactment is idiosyncratic. Enactment in the classroom is a dynamic co-development between the teacher and the students. This was observed during the present study. Each of the teachers provided a unique process to curriculum enactment. From the data, it is difficult to determine a general pathway for the effect of the influences on the process of curriculum enactment, similar to that provided for the influences on the process of curriculum planning. Each of the influences has impacted upon the teachers in different ways and in a different order. This may be one of the possible reasons for the variety of processes of curriculum enactment represented in the models presented for each teacher in Chapter Four.

Similar to the influences on the process of curriculum planning, the changes instigated by the influences of content/pitch of the curriculum, time and assessment led to the alteration of the curriculum plan via the reflexive relationship between the planned curriculum and enacted curriculum described in Section 6.2.3. The difference between the influences on curriculum planning and the influences on the revision of the classroom plan is that it is difficult to discern a general approach used by the teachers in the present study. The dynamic nature of curriculum enactment means that while there are three discernible influences, which led to revision of the curriculum plan, the order in which they impacted is unique to the classroom in which the curriculum was being enacted. The sections that follow discuss each of the influences separately.

6.3.1 Content/pitch of the curriculum

Each of the teacher participants commenced their curriculum planning by considering the curriculum content that they were to teach, as defined by the school mathematics curriculum plan. The decisions that the teacher then considered were in relation to whether the curriculum content was appropriate for the students. Miriam and Abigail considered whether the pitch of the curriculum content was appropriate for their students, Hillary considered whether the curriculum content could be combined across the two year levels that she was teaching. Lyn and Winnie each considered the curriculum content in relation to other factors; for Lyn the consideration was whether she had the necessary time to support adequate conceptual development for the students, while Winnie considered whether the curriculum content featured in the formal, end-of-unit assessment task.

The teachers used decisions about their students in relation to curriculum content to guide the curriculum content that they incorporated into their planned curriculum. If the pitch was appropriate for the students in the classroom then, generally, the teachers would then consider the available time for teaching the concepts and engaging with the activities suggested in the school curriculum plan. If the teachers deemed that pitch of the curriculum content in the school curriculum plan was not appropriate for their students, then the teachers considered the curriculum content that students were required to engage with the formal end of unit assessment task. In the pre-unit interviews, the majority of the teachers felt confident with the mathematical content of Unit Four that they were about to commence. Hillary was the only teacher who did not feel confident at the time; she commented that she had not yet read through the school mathematics curriculum plan for Unit Four, but was confident that once she had done the reading she would feel confident in the mathematical content. Each cited their confidence with the content due to their familiarity in teaching the content previously, even though this was their first year of teaching to the Australian Curriculum. While, in general, the content areas were similar to previous curricula from across the different curriculum jurisdictions of Australia, the development of mathematical concepts had been described differently in the Australian Curriculum.

Ball et al., (2008) suggested that one of the sub-domains of pedagogical content knowledge is the *knowledge of content and students (KCS)*, that is, knowing

about the content of the mathematics that is being taught, as well as about the students the teacher is teaching. The teachers knew of the content that had been described in the school curriculum plan and commenced their planning from this aspect. They then considered their knowledge of their students and used this to shape the direction for the curriculum plans they developed. Even and Tirosh (1995) suggested that understanding of the curriculum content and possible areas of difficulty for the students is necessary to pre-empt likely issues with the content.

Frequently the teachers in the present study commented that changes in the planned curriculum during enactment occurred because the students in their classes required additional support to develop the mathematical concepts. Ball et al. (2008) suggested that the teachers should have knowledge of their students. This is not exclusive to knowing about the specific students in the classroom; their description also encompasses knowledge of the conceptions and common misconceptions that are common to students in that developmental group. Ball et al. (2008) posit that knowledge of the students' ways of thinking and self-efficacy is essential for developing students' mathematical learning. Across the five teachers, the two teachers with multiple-years classrooms, Abigail and Hillary, pre-empted the curriculum content that their students would require additional support to engage with, while the remaining three teachers made alterations to the curriculum plan during enactment. Figure 6.5 illustrates the decision made by teachers in relation to the content/pitch of the curriculum.
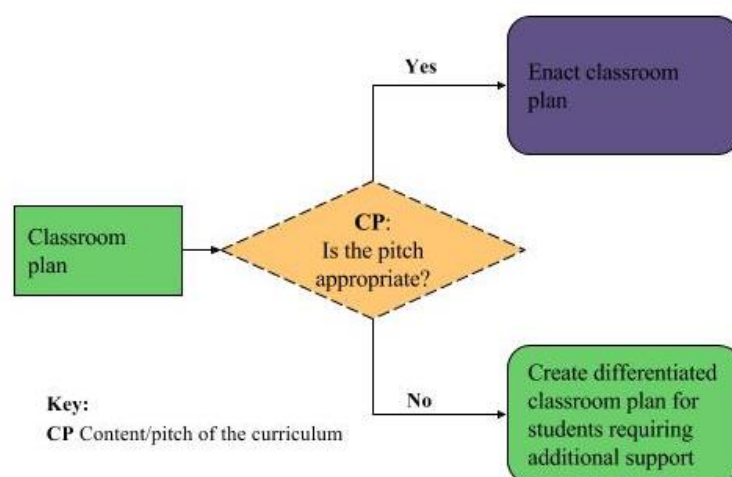

Figure 6.5. Influence of content/pitch of the curriculum during enactment.

Consideration was given to the appropriateness of the pitch of the curriculum content during the course of curriculum enactment. If it was deemed to be appropriate, the classroom plan continued to be enacted. If the curriculum content was deemed to be inappropriate for the students, then the teacher would create an alternate classroom plan to provide additional support for the students. This consideration occurred at different points in the reflection on the enacted curriculum. For Lyn, this process commenced the reflection, as she did not construct a differentiated curriculum plan for the students unable to access the curriculum content until she was enacting the curriculum in the classroom. For other teachers, such as Winnie, this influence was considered following consideration of the final assessment task for the unit.

The influence of content/pitch of the curriculum was most often cited when teachers were reflecting upon the enacted curriculum, and consequently led to the most changes to the classroom plan following enactment. A similar decision to that described during the process of curriculum enactment was considered when the teachers were reflecting upon enactment. The teachers considered whether the content was pitched appropriately for their students. If they considered the content to be appropriately pitched, then no changes were made to the classroom plan. If the curriculum content was deemed to be inappropriate for the students, then the teachers commenced revising the classroom plan to accommodate more appropriate content that assisted the students to build toward the curriculum content described in the school curriculum plan. Even though this process required an adjustment to the curriculum content of the lessons to follow, the teachers did not consult the Australian Curriculum to assist with the process of revision.

6.3.2 Time

All teachers considered time in relation to curriculum planning when contemplating whether they had the necessary time to support students to develop conceptual understanding of the curriculum content that they were to teach. Time was usually considered during planning, once it had been determined that the curriculum content of the unit was pitched appropriately for the students they were to teach.

The teachers used their decisions about time to influence the curriculum plan that they were developing; this led to consideration of other influences on the process of curriculum planning. If teachers considered that they had sufficient time to include

all of the aspects of the curriculum content that they were considering, then the teachers developed their classroom plan to reflect this content. If the teachers considered that they did not have sufficient time to incorporate all of the curriculum content that had been described in the school curriculum plan, then the teachers considered the final assessment task for the unit as a guide for further decision-making.

The decisions and considerations of the teachers align with the findings that Fogelman et al. (2011) have reported about the decisions that teachers have made in relation to time. Fogelman et al. (2011) reported that teachers are continually involved in balancing the coverage of curriculum topics with ensuring students develop conceptual understanding of the concepts that they are taught. They observed that frequently, the tension of coverage of content versus ensuring conceptual understanding, led to teachers opting to forego the perceived time-consuming pedagogical approaches, e.g., inquiry learning, in place of direct teaching methods seen to be less time-consuming.

All five of the teachers made reference to the pressures that they felt in trying to enact the school curriculum plan and C2C units of work. They each discussed their concerns with regard to teaching the curriculum concepts in the classroom within the specified time period. Each teacher considered this influence at difference stages in the reflection on curriculum enactment, however, all employed a similar question and however different teachers constructed different responses. Figure 6.6 illustrates the decision made by teachers in relation to time.
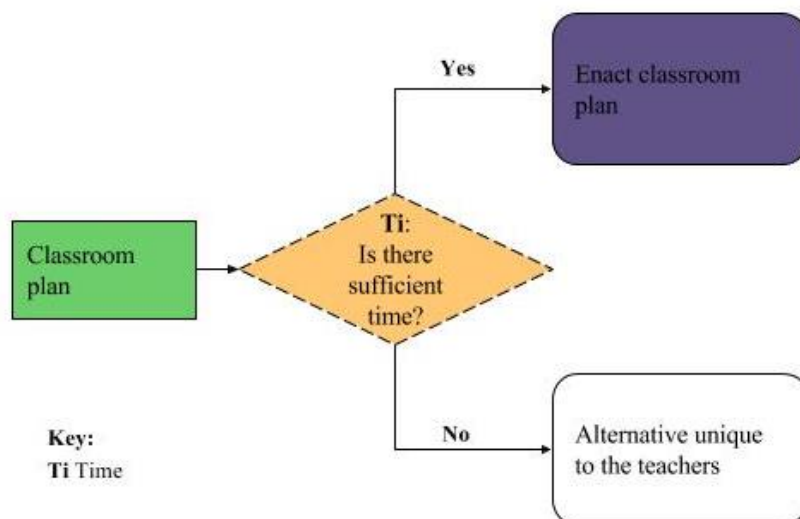
Figure 6.6. Influence of time during enactment.

Each of the teachers reflected on the curriculum content that they were enacting and considered whether there was sufficient time in the unit to continue to teach the content according to their classroom plan. If there was sufficient time, the teacher continued to enact the classroom plan as written. The teachers employed a range of unique strategies if they deemed that there was not sufficient time. For example, if Winnie deemed that she did not have sufficient time to teach the curriculum content in the classroom plan, she considered using the remaining content and activities as homework for the students. Similarly, if there was not sufficient time, Lyn considered using the remaining content for warm-up activities prior to mathematics lessons.

Each teacher could describe time pressures that were affecting their enactment of the curriculum, but how these manifested for each teacher was slightly different. Ultimately the reasoning behind this influence on the process of curriculum interpretation was that each teacher just wanted a little more time to adequately ensure that her students engaged with the mathematical concepts and had time to effectively consolidate their learning.

The notion of ensuring adequate time for consolidation of concepts aligns to that described by Clark and Linn (2003), who found that sustained study of concepts was required for students to develop deep conceptual understanding. The teachers wanted to ensure that their students were developing deep conceptual understanding

of the mathematics that they were teaching; however they described feeling the time pressures of balancing conceptual understanding with coverage of content.

Following curriculum enactment, teachers made adjustments to their classroom plans if the time pressures to cover the prescribed content became too great. During their reflection, teachers considered whether sufficient time was available to provide students with adequate time to develop their conceptual understanding of the curriculum content. Determination of whether there was sufficient time was most often associated with the teacher's determination of the relative importance of the curriculum content. Decisions about the curriculum content were judged according to two criteria: (1) is the curriculum content a fundamental or foundational aspect of mathematics, as determined by the individual teacher's knowledge of mathematics, and (2) is the curriculum content necessary for the students to adequately engage with the assessment task? Answers in the affirmative on one or both of these criteria resulted in the same outcome. The teachers either made no adjustments to the plan, if they felt there was adequate time to teach the curriculum content, or the teachers made adjustments to accommodate the curriculum content in the classroom plan if additional time was required.

6.3.3 Assessment

Assessment was a consideration for three of the teachers, Winnie, Hillary and Miriam. For Winnie, consideration of the content required for students to engage with the assessment task was a key consideration for the content that she included in her curriculum plan. Winnie considered the content that students needed, to engage with the assessment, akin to a minimum requirement for the unit of work; it was the content she would prioritise during the development of her classroom plan. Once Hillary and Miriam had established that they did not have sufficient classroom time to teach all of the concepts in the school plan, they each considered the assessment task. Hillary and Miriam determined that using the assessment task to discern the content required for the students to engage with the assessment task, was a way to focus their classroom plan.

Given that these teachers did not design the assessment tasks that they were administering with their students, the curriculum decisions for the development of the assessment tasks cannot be attributed to the teachers themselves. Gottheiner and Seigel (2012) consider that the learnings that the teacher values can be discerned

from the learnings that are the focus of the assessment task that is provided to the students. In this case, the teachers were utilising this perspective and analysing the curriculum content that was the focus of the assessment task, in order to discern the necessary content that should be taught to the students during the course of the unit. The teachers in the present study used an assessment literacy that Gottheiner and Seigel (2012) consider the students would typically have employed, as they analysed the assessment task to discern the messages about curriculum content contained in the school curriculum plan. The teachers used the information they gleaned from the assessment tasks, in order to prioritise the curriculum content that they needed to ensure they taught to the students, to develop their understanding of the assessed content.

When considering the pressures of curriculum content coverage or time restrictions, the teachers sought to identify the necessary curriculum content that the students would require in order to engage with the formal assessment task at the conclusion of the unit. The teachers used the final assessment task to determine the necessary curriculum content, as they determined that it would narrow the content focus of the unit to the specific curriculum content required for success on the assessment task. The final assessment task for the units did not assess all of the curriculum content taught during the unit. Therefore, the teachers felt that they could justifiably leave out curriculum content that was not the focus of the end of unit assessment task. The influence of assessment has been described in Figure 6.7.

Key:
As Assessment
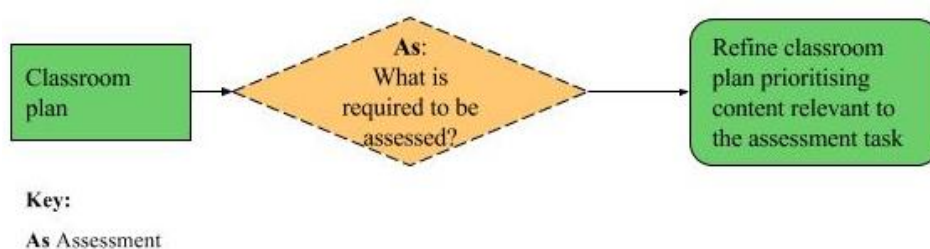
Figure 6.7. Influence of assessment during enactment.

The teachers viewed assessment as a mechanism to streamline the curriculum content that needed to be taught to the students. It provided a quasi-minimum requirement for the curriculum content of the unit, in that it provided sufficient mathematics curriculum content so as to support students engaging with the final assessment task for the unit. Generally, teachers used this influence to refine their curriculum plan following enactment if they considered that: (1) the curriculum

content of the unit was inappropriately pitched, or (2) time was restricting the full coverage of the curriculum content of the unit. Thus, this influence often did not initiate reflection on the classroom plan, rather assessment influenced the process of refinement as a guide for how to refine the classroom plan to best support the final goal of the unit of work.

6.3.4 Mathematical language

All of the teachers made reference to issues relating to mathematical language, however, the concerns they raised demonstrated the diversity of issues the teachers attributed to mathematical language. Discussion from the teachers related to three key aspects of language; they are: (1) mathematical terminology, (2) literacy in English language, and (3) mathematical communication. The teachers have used these three conceptions interchangeably under the guise of mathematical language.

Lyn, Winnie and Abigail made reference to mathematical language in regard to the changes they perceived in mathematical terminology. They believed there to be a noticeable shift in the complexity of the mathematical terminology that they were required to teach and attributed this to an increased demand emanating from the Australian Curriculum. Each felt that students required further support to understand the complex mathematical terminology that they felt they were required to teach.

Abigail, Miriam, Hillary and Lyn made reference to the English literacy demands of the resources and assessments supporting the implementation of the mathematics curriculum. Each felt that students who did not have adequate English literacy levels to engage with aspects of the mathematical terminology would struggle with the conceptual understanding of the mathematics that was being taught.

Finally, Miriam and Hillary discussed the necessity for students to reason and justify their thinking in mathematics, as a perceived change with the advent of the Australian Curriculum. They both felt that past curricula had required students to think mathematically, but that the teacher modelled reasoning without an expectation that the students would mathematically communicate reasoning and justification in their work.

Benjamin (2013) suggests that students should be explicitly taught mathematical language during conceptual development. She states that often, the terminology is as foreign to the students as the concept that they are trying to learn.

Further, she makes the distinction that students should be given support to understand the words that are common to everyday language that have a mathematical connotation when used in mathematical contexts, as well as instruction in the syntax of mathematical examples and problems (Benjamin, 2013).

The Shape of the Australian Curriculum: Mathematics (Commonwealth of Australia, 2009), makes specific reference to the necessity to explicitly teach students the language of mathematics as part of teaching mathematics. Thus, it was intended that the Australian Curriculum: Mathematics, would utilise technical mathematical language throughout the curriculum content in order to support students developing accurate conceptual development. The Australian Curriculum: Mathematics, includes the proficiency strand of Reasoning, which is aimed at developing students to explain their thinking, justify strategies used and conclusions reached. It is indeed an aspect of the curriculum as the teachers surmised. However, this is not a novel concept in Queensland. The Essential Learnings (The State of Queensland (Queensland Studies Authority), 2007) included an aspect of mathematical communication in the Ways of Working (skills) for each juncture of the curriculum. At Year Five, it specifically stated: *Students are able to: communicate and justify thinking and reasoning, using everyday and mathematical language, concrete materials, visual representations and technologies* (The State of Queensland (Queensland Studies Authority), 2007, p.2). Thus, while the teachers perceived there to be difference in the requirement for students to communicate mathematically, a comparison of the curriculum documents would suggest that this should have been an aspect of similarity to the former curriculum requirements.

6.3.5 Digital technology

Four of the five teachers discussed the impact of digital technology on their classroom (Lyn, Hillary, Miriam and Abigail). Each of the teachers who discussed digital technology mentioned their feelings of frustration at the level of access their students had to computers. Each described the challenge of having curriculum plans that feature a minimum level of access to computers through the number of digital resources suggested, while not having sufficient time with the computers to attain this minimum level.

Discussion with the four teachers about the barriers that they described to the use of digital technology centred around Ertmer's (1999) notion of first- order

barriers, defined as those that are external to the teacher and their locus of control. The teachers most often cited the difficulty with gaining access to computers for the full class of students, and often had to consider modifications to the activities and teaching strategies to accommodate the lack of digital technology.

Lyn cited a lack of knowledge of the appropriate pedagogies to use to embed technologies as part of her classroom practice. Ertmer's (1999) notion of second-order barriers incorporates issues and aspects that are internal to the teacher, that is, a lack of confidence, knowledge or belief in the use of digital technology in the classroom. Ertmer describes the second-order barriers as a greater challenge than the first-order, as they are more difficult to overcome. Lyn's description of her hesitation to incorporate technologies in the classroom aligned to Ertmer's (1999) description of second-order barriers, and thus provided a greater challenge to Lyn than the lack of availability of computers.

6.3.6 Textbooks and other resources

Each of the teachers made reference to the resources that they relied upon that were not attributable to the Joanlee State School's mathematics curriculum plan. Abigail, Miriam, Hillary and Lyn each discussed the use of textbooks to support differentiation. They each described using textbooks to source alternate explanations or different classroom activities to support both the learning of students requiring additional support to understand a concept, and the learning for those students who were ready to continue with the learning ahead of the pace of the majority of the students in the class. Miriam and Hillary also discussed the use of textbooks to derive additional practice problems in order to support the consolidation of concepts. They both intimated that they believed the students required further repetition of the concepts than provided in the C2C materials, to ensure students had an adequate understanding of the concept or strategy taught.

To ascertain whether the students had adequately understood the concept that they were teaching, Miriam and Winnie each used textbooks to derive monitoring tasks to check for student understanding. Winnie also used these tasks to check for prior knowledge before commencing a teaching sequence about a particular topic.

Having considered a range of Australian mathematics textbooks, Vincent and Stacey (2008) recommended that teachers consider a range of activities and examples

to engage students in mathematical thinking and learning. Vincent and Stacey (2008) recommended that teachers engage in a wide-variety of practice problems that incorporate simple to complex, routine to non-routine situations in order to develop conceptual understanding. While the teachers in the present study did not make particular mention of the variety of mathematical situations as described by Vincent and Stacey (2008), their references to textbooks and other resources were in relation to the effort of attempting to find alternate strategies and examples to support student learning.

6.3.7 Discussion of influences

Remillard and Heck (2014) overlayed their model of the curriculum policy, design, and enactment system with an indication of the influencing factors impacting on the aspects of the model. Across their model, Remillard and Heck described factors that influenced the five aspects of the system. These are: official curriculum, teacher-intended curriculum, enacted curriculum, instructional materials and student outcomes. These five aspects refer to artefacts of the curriculum policy, design, and enactment system. The influencing factors they cited were those they found to be most commonly cited in American literature as positively or negatively impacting upon the five aspects. Remillard and Heck (2014) stated that they see the curriculum system as occurring in context and that the factors they describe are natural to the context in which the system exists, often influencing in conflicting ways.

Some similarities and differences can be discerned from a comparison of the broad themes identified in the present study to the influencing factors cited by Remillard and Heck (2014). The purpose of the identification of the themes and factors, as well as their definition and respective research base, serve to explain a portion of the differences between them. From the literature that Remillard and Heck (2014) consulted, the factors they quote are purposefully broad, encapsulating a variety of perspectives from across the range of contributors to the system. That is, the factors identified by Remillard and Heck (2014) have been purposefully developed to broadly encapsulate the variety of influences discerned from a large number of research studies with different foci. Consequently, the grain-size used to describe the influencing factors by Remillard and Heck (2014) is different to that used in the present study to describe the themes. Thus, while some alignment can be identified, there is not a direct or obvious comparison. The influencing factors

identified by Remillard and Heck (2014) are factors that affect the artefacts of the system, whereas, the influences identified in the present study are those determined to be the reasons for decision paths occurring during the process of curriculum interpretation, enactment and reflection.

A comparison of the factors on teacher decision-making identified by Remillard and Heck (2014), and the broad themes that have been identified as influences on the process of curriculum interaction in the present study, illustrate the degree of difference between the two. While some degree of alignment between the sets of influences and factors exists, there is a degree of difference emanating from the derivation and grain-size of each. For example, the theme of *content/pitch of the curriculum* is derived from the teachers in the present study describing the curriculum focus for their teaching, and the teachers describing their process for differentiation to meet the learning needs of the students in their classrooms. This theme, therefore, aligns with the notions contained in Remillard and Heck's influencing factors of

- Teacher knowledge of, beliefs about, and practices with mathematics, pedagogy, learning, and curriculum resources (factor influencing teacher-intended curriculum);

- Teachers' understanding of particular students' needs (factor influencing teacher-intended curriculum); and

- Teacher and student knowledge, beliefs and practices (factor influencing enacted curriculum).

The teachers in the present study did not make reference to their beliefs about mathematics in depth, nor did they discuss the selection of appropriate pedagogies for the teaching of mathematical concepts; these are both aspects described in the influencing factors presented by Remillard and Heck (2014). Further, references to curriculum resources made by teachers in the current project were attributed to the theme of *textbooks and other resources*.

The theme of content/pitch of the curriculum demonstrates that the influences of the current project do not encompass the full range of information within the each of the influencing factors. It demonstrates that aspects of the themes identified in the present study align well to describe a similar phenomenon to that observed by

Remillard and Heck (2014) and recorded through the influencing factors in their model of the curriculum, design and enactment system. The comparison also establishes that aspects of the themes and aspects of the factors describe slightly differing observations. This is to be expected, given the nature of the derivation of the two descriptors. However, while direct alignment of the factors to the influences may not be observed, across the broad range of factors described by Remillard and Heck (2014), the themes identified in the present study can be affirmed.

6.4 CHAPTER SUMMARY

The development of the conceptual framework for this study has provided a means by which to map the process of curriculum interpretation of teachers. A general process of curriculum interpretation has been discerned from the teacher participants in the study. Accommodating direction from the administrative team at the school, the teachers have all used the C2C materials and school curriculum plan as the basis for their classroom planning. Thus, the process from the intended curriculum to the teachers' classroom plans was similar for all five teacher participants.

The nature of curriculum enactment in the classroom needs to be responsive to the needs and directions of the teacher participants in the interaction. While the teacher plans for the curriculum focus, teaching strategies and activities in the lesson, responding to the needs of the students may lead to very different pathways. The process of curriculum enactment has been described as idiosyncratic. The teachers in the present study each enacted their classroom plans in their own ways. The similarity between the teachers was that they were all motivated by the desire to be responsive to their students' needs.

The influences impacting on the process of curriculum interpretation and enactment have been able to be categorised into two groups. The influences of content/pitch of the curriculum, time, and assessment each contributed to significant changes to the curriculum plans of the teachers, either during the process of interpretation or as refinements to the plan following curriculum enactment. The influences of mathematical language, digital technology, and textbooks and other resources were found to be considerations for teachers during the process of interpretation and enactment, but did not lead to changes in the teachers' classroom plans.

Chapter 7 addressed the findings of the study in order to address the research questions of the study. The chapter presented recommendations for education systems, schools and teachers based upon the findings of the study. Also outlined in the chapter are the limitations of the study, as well as a discussion of the implications for future research in the area of study. Chapter 7 culminated in an overview of the chapter and provided the conclusion to this study.

Chapter 7: Conclusion and Recommendations

7.1 INTRODUCTION

This chapter presents the conclusion to the present study. The aim of this study has been to explore and analyse the process of curriculum interpretation undertaken by teachers through investigation of the practice of five mathematics teachers in a Queensland Primary school who participated in this study. The study also provides insight into the influences that have impacted upon the teachers' process of curriculum interpretation. In addition, data were gathered from the school administrative team (the Principal, Deputy Principal, and Head of Curriculum) to provide depth to understandings of the school's decision making and curriculum context.

This conclusion is presented in four key sections. Section 7.2 summarised the findings according to the two research questions of the present study. Section 7.3 summarised the limitations of the study. Section 7.4 discussed implications for future research in the area of study. Outlined in Section 7.5 are the recommendations of the research for the profession, and the final section, Section 7.6 provided a summary of the chapter and the thesis.

7.2 MAJOR FINDINGS

7.2.1 What is the process of curriculum interpretation used by individual teachers?

The model developed for the present study aimed to represent the process of curriculum interpretation undertaken by teachers, particularly during a period of curriculum implementation. It was drawn from Porter's (2002) Surveys of Enacted Curriculum and Remillard and Heck's (2014) model of the curriculum policy, design, and enactment system.

Diagrammatic representations of the teachers' process of curriculum interpretation were developed from analysis of the teacher data from pre- and post-unit semi-structured interviews and journals. The process of curriculum interpretation used by the individual teachers can be found in Figures 5.4 (Lyn), 5.6

(Winnie), 5.8 (Hillary), 5.10 (Miriam), and 5.15 (Abigail). There were some similarities and differences between the teachers in terms of their individual processes of curriculum interpretation. Figure 7.1 provides a general summary of the process of curriculum interpretation undertaken by the five teachers who participated in the study.
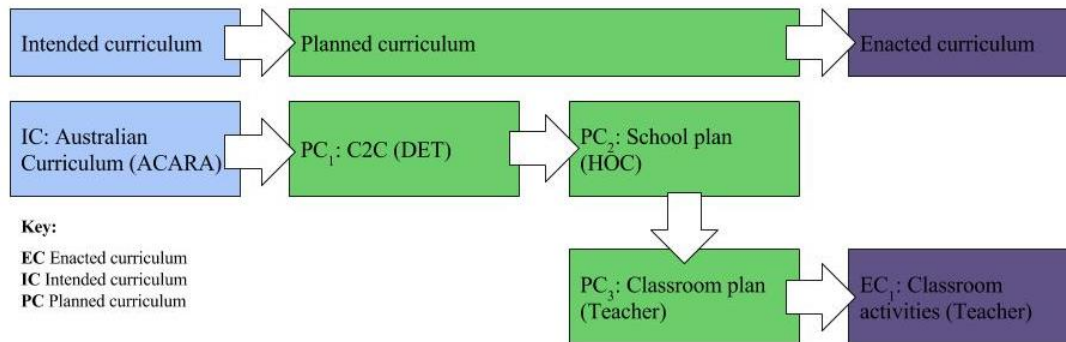

Figure 7.1. The general process of curriculum interpretation used by teachers in the present study.

Figure 7.1 gives an overview of the general process of curriculum interpretation by the teachers in the study. Teachers were directed by the school leadership team to implement the Australian Curriculum. To support this directive, the teachers were provided with the Department of Education and Training's C2C (Curriculum to the Classroom) materials, which were to be used as the basis for curriculum planning. Thus the first interpretation from the Intended Curriculum to the Planned Curriculum (PC_1) was determined for teachers by the Department of Education and Training.

The school administrative team's decision to use C2C as the basis for planning documents at the school resulted in Amy (Head of Curriculum) downloading the C2C materials (PC_1) and adopting them as the school curriculum plan (PC_2). Thus, once the teachers received the materials to support their implementation, they had already gone through two levels of interpretation: first, by the Department of Education and Training, and, second, by the school management team led by Amy.

The teachers received mixed messages about the extent to which they were required to use the C2C materials (PC_1). There was also some confusion about the interplay between C2C resources and the school curriculum plan (PC_2). The teachers were told by the administrative team that these documents were a resource. Yet, the resources were also uploaded into the Department of Education and Training's

OneSchool portal as the official curriculum documents for Joanlee State School. Thus, while teachers were instructed that these were resources to support planning, they had been officially and publically adopted as the school's curriculum plan. This has caused ambiguity about the status of the materials in the minds of the teachers. The implicit message given to the teachers when the C2C materials were rebadged and submitted to the Department of Education and Training as the official curriculum of the school, was that the teachers should be using the school curriculum plan, and therefore the C2C materials, as their curriculum plan. Consequently, the teachers have used these documents as the primary source of information for their curriculum planning, rather than the intended curriculum.

The information given to schools was that the C2C materials would streamline planning and allow teachers more time to consider pedagogy as the curriculum planning had been done for them. Instead, the teachers continued to invest considerable time in curriculum planning. Rather than plan from the Australian Curriculum, the teachers commenced their personal curriculum planning from the interpretation they had been provided. They did not consider the original intended curriculum to support their planning processes. During the course of the study, only one of the five teachers considered pedagogy. Lyn referred to pedagogy in relation to misgivings about her knowledge of appropriate pedagogies to imbed digital technologies in her practice. Therefore, the C2C materials have not offered to teachers the desired support that they were intended to provide. The teachers in the study have needed curriculum planning time to engage with the C2C materials and contextualise them to meet the needs of their students, just as they would have, had they used the Australian Curriculum as the primary source for their curriculum planning.

While their processes of curriculum planning were similar, the teachers' processes of enacting the curriculum distinguished the individual teachers in this study. The process of enactment, according to Remillard and Heck (2014), is reflective of the unique nature of the relationship between the individuals in the class and the teacher. The diagrammatic representations of the process serve to illustrate the processes undertaken by the teachers. These have provided a useful mechanism for determining the processes used as well as analysing the specific influences impacting upon the process. Each teacher had a unique means of enacting their

classroom plan (PC_3) in the classroom with their students (EC_1). The degree of planned and unplanned instruction and activities varied across the course of the unit for each teacher, according to the major influences impacting at the time. This will be further discussed in Section 7.2.2.

The aspect not represented in the general model of curriculum interpretation is the reflexive nature of the relationship between the classroom plan (PC_3) and the enacted curriculum (EC_1). These two elements respond and build upon each other. Feedback discerned from the teacher during the process of curriculum enactment serves to refine the classroom plan that they are using. In the study, it appeared to be dependent upon the teacher how quickly the information gleaned from reflection is adopted and the changes made.

7.2.2 What are the specific influences which impact upon teachers' curriculum interpretation??

A thematic analysis of the data was conducted, using a process adapted from Braun and Clarke (2006), to ascertain the influences that impacted upon the teachers' curriculum planning and enactment. The analysis identified six broad themes: content/pitch of the curriculum; time; digital technology; mathematical language; textbooks and other resources; and assessment. The themes can be categorised into two groups – major influences and minor influences.

Major influences

The themes of content/pitch of the curriculum, time and assessment contribute to significant changes in the curriculum planning and refinement process. That is, these three themes led to the teacher considering and altering their classroom plan to the extent that it may be redeveloped or substantially changed. For example, the teachers used decisions about the appropriateness of the pitch of the curriculum content to develop differentiated classroom plans to suit students' skill and knowledge levels in mathematics. In most cases, this took the form of an alternate classroom plan, which catered for the needs of these students.

Minor influences

The three minor themes of mathematical language, digital technology, and textbooks and other resources, did not lead to the same degree of curriculum change as the three major themes previously identified. Rather, these minor themes of

mathematical language, digital technology, and textbooks and other resources led to the teacher making adaptations to activities or teaching strategies within the classroom plan they had developed. For example, the availability of digital technology affected whether a particular activity (e.g., a learning object) was conducted during a lesson.

The six themes identified are represented in literature. They align with the influencing factors identified by Remillard and Heck (2014). Additionally, Chen and Wei (2015), in their study of pedagogical content knowledge, observed four components that influenced teacher adaptations of the curriculum. The four components were knowledge of students' understanding, knowledge of assessment, knowledge of instructional strategies and knowledge of the curriculum. These aspects align with the present study's two major influences of content/pitch of the curriculum, and assessment. Additionally, the components align to the minor influence of mathematical language through references to knowledge of students' understanding and knowledge of the curriculum. Further, Chen and Wei (2015) determined categories of curriculum alignment discrepancy, which included "time constraints" and "teaching resources" (Chen & Wei, 2015, p.263). These aspects align with the themes of time, digital technology, and textbooks and other resources, identified in the present study.

The themes identified in the present study are described as influencing teachers' classroom practice and therefore, curriculum enactment. This study sought to identify the influences that impact upon teachers' planning and enactment. The influences emerged and reaffirmed factors that have been previously identified in literature as attributable to curriculum enactment. In this study, however, the influences identified have impacted on curriculum interpretation (from intended curriculum to planned curriculum) as well as curriculum enactment (from planned curriculum to enacted curriculum).

7.3   IMPLICATIONS

The purpose of the study has been to explore and analyse teacher engagement with curriculum from the intended curriculum to the curriculum plan developed by the teacher and its influence on the curriculum enacted in the classroom. The analytical framework used in this study provides a new method for mapping of the process of

curriculum interpretation. This mapping process enables the identification of gaps in the process, which will assist to support targeted professional support and learning. This process has implications for how the effectiveness of curriculum interpretation can be mapped and analysed across a variety of situations, including in regard to identifying support for individual teacher processes, through to a broader analysis of processes in order to derive mechanisms for system-wide process for curriculum support.

The model for analysis of curriculum interpretation provides a new way of engaging with the processes that are used to implement curriculum and allows for the alignment of these processes to be mapped. It also provides an opportunity to ascertain the influences on these processes and/or the additional resources that may be shaping the curriculum that is ultimately enacted. In this way, the model assists in targeting issues. The issues highlighted will allow for redirection of the process and ensure a closer alignment of what is taught to what was intended to be taught. Examples of this thinking are included in the recommendations that follow.

7.3.1 Teachers as co-developers?

Connolly and Ben-Peretz (1980) described the possible roles for teachers during curriculum implementation, according to three possible streams for the interaction. The level of flexibility in the curriculum interpretation is dependent upon the level of prescription and implementation readiness of the intended curriculum. The three streams were

- Stream (a) teachers as users of teacher-proof curricula

- Stream (b) teachers as active implementors

- Stream (c) teachers as partners in development

(Connelly & Ben-Peretz, 1980, p.106).

The Australian Curriculum was conceptualised as a curriculum that could be modified by teachers to meet the needs of the students they are to teach. While written in year levels, ACARA intended for the curriculum to be used flexibly, allowing teachers to ascertain where best to commence engagement with the curriculum for the students in their class. The intentions for teacher interactions with

the Australian Curriculum support a "stream (c)" view of the teacher-curriculum interaction (Connelly & Ben-Peretz, 1980, p.106).

For teachers in Queensland state schools, C2C was the major support provided during the implementation of the Australian Curriculum. The C2C materials were accompanied by very little professional development provided by the responsible central agency. A limited amount of additional professional development was offered by the Queensland Studies Authority to assist teachers to understand the curriculum intentions of the Australian Curriculum writers (for example, there were 13 half-day workshops available to specifically support the implementation of the Australian Curriculum: Mathematics; this represents one workshop in each district as defined by the Queensland Studies Authority). The C2C materials could, therefore, be described as supporting a "stream (a)" view of the teacher-curriculum interaction.

The development of the C2C materials was not supportive of the intentions of the Australian Curriculum regarding its flexible design. This position has been observed during the present study. Lyn and Miriam each commented on the prescribed assessment tasks in the C2C materials. They described the pressure they felt to use the assessment in the C2C plans as the sole source of evidence of student learning in the unit. Their concerns emanated from the desire to cater for where their students were in their learning of the mathematical concepts, and their concern that the C2C assessment was too difficult for those students. The intent of the Australian Curriculum was to allow for flexible delivery and to ensure all students were supported in their learning, at the appropriate level of their learning. Mandating an assessment task for all students in the chronological age-group cohort, regardless of their level of development, does not allow the students who are not learning from that year level content (i.e., students learning curriculum content from a year level above or below their chronological age-group) to demonstrate their understanding.

The level of interaction with the intended curriculum undertaken by the teachers was supported by the decisions of the administrative team. Each of the administrative team members expressed that Joanlee State School was 'adopting and adapting' the C2C materials in the initial stages of implementation of the Australian Curriculum. Amy (Head of Curriculum) explained that the school administrative team's position was that the teachers would use the C2C materials during 2012, and in subsequent years the teachers could begin *"scheduling of the units themselves"*

(Interview: Amy, Head of Curriculum). That is, in the future, teachers could commence planning from the Australian Curriculum. However, James (Principal) maintained that the message to the teachers was that they did not have to use all aspects of the C2C product (Interview: James, Principal). It was James's view that the C2C product provided a sequence of learning and appropriate assessment for the teachers to deliver, while the rest of the product was for teachers to choose to use.

The C2C materials are a vastly comprehensive suite of resources for teachers. Due to their considerable size, the Department of Education and Training made the decision not to update the materials as new versions of the Australian Curriculum were published. The digital-only publication of the Australian Curriculum allows ACARA to be responsive to the changing educational landscape through automatic updates similar to a computer programme (Australian Curriculum, Assessment and Reporting Authority, 2010b). As the Head of Curriculum described, by following the C2C materials, the school missed some key revisions to the Australian Curriculum that were not included in the C2C materials (Interview: Amy, Head of Curriculum). The C2C materials used by the teachers during the data collection period were developed by the Department of Education and Training using version 1.2 of the Australian Curriculum (published September 26 2011). At the time of data collection for the study, ACARA had published version 3.0 of the Australian Curriculum (published January 23 2012). Thus, teachers reliant upon the C2C materials to build familiarity with the curriculum were not accessing the most recent version of the curriculum they were trying to unpack.

The C2C materials were a construction for Queensland state schools. This method of supporting implementation of the Australian Curriculum was not adopted by any other state or territory. The development of such a comprehensive suite of materials by a government agency that, in essence, performs the role that is typically performed by the teacher as they interpret the curriculum, is unprecedented. This view of curriculum aligns closer to a 'teacher-proof' curriculum than the original intention of the Australian Curriculum (Connelly & Ben-Peretz, 1980).

Teacher preparation

Amy outlined that the teachers had been presented with professional learning materials based on the Australian Curriculum in preparation for implementation (Interview: Amy, Head of Curriculum). The professional development sessions that

Amy held with the teachers, in October of the preceding year, used the Queensland Studies Authority (QSA) professional development materials to outline the key aspects of the curriculum. The teachers were given a professional development folder that presented aspects of the Australian Curriculum, such as the rationale and aims. However, this was a photocopy from the QSA professional development handbook; the handbook was developed to incorporate all aspects of the curriculum that participants at the workshops may not be able to view without a computer and access to the Australian Curriculum website. The version in the handbook was up-to-date when the handbook was produced. Teachers were not using the curriculum in its original form. This is significant because, between the roll out of the QSA professional development workshops and the provision of the folders by Amy to the teachers, ACARA published a new version of the curriculum. Thus, the materials provided to the teachers were already out of date.

The professional development folder was most certainly provided to teachers to assist with improving their familiarity with the curriculum and to remove any impediments to curriculum implementation through the difficulties with access to computers and therefore the Australian Curriculum. It was also provided with the intent of making the process of developing familiarity with the curriculum as quick and easy as possible for the teachers, by removing the need for the teachers to access the curriculum themselves. While the teachers did not have to engage and interact with the curriculum documents in full, by using this approach they were only provided an opportunity to engage with isolated elements of the Australian Curriculum.

Additionally, the C2C materials presented aspects of the curriculum content and achievement standards from the Australian Curriculum as relevant to the unit of work that is being taught. The C2C materials provided teachers with the year level description, relevant content descriptions, and achievement standards. The materials did not present the totality of the aspects of the Australian Curriculum that are available to assist understanding of the curriculum intent and content. Using aspects of the curriculum in isolation has the implication that the teacher cannot see, from the materials provided, how this curriculum content fits into the broader context of the curriculum for the year level as a whole, and the additional aspects of the curriculum that assist in establishing the underlying importance of the curriculum content.

Griffin (1998) contends that a fundamental factor of full implementation of any curriculum is integration of the underpinning philosophy with the curriculum content. It is Griffin's contention that the curriculum cannot be fully implemented unless understanding of the underpinning philosophy of the curriculum developer is appreciated and considered, as this provides the frame of reference through which to engage with the curriculum content, described in the documentation. Taking into account the materials that were provided to the teachers, it would have been difficult for them to discern an adequate picture of the underpinning philosophy of the Australian Curriculum. The teachers were given a mix of dated professional development materials and the C2C materials, neither of which provided the totality of the curriculum map.

7.4   THE LIMITATIONS OF THE STUDY

There are three limitations that have been identified in relation to this study. In this section, each of the limitations will be described and the ways in which they have been addressed will be explained.

Firstly, the timing of the study to coincide with the initial implementation of the Australian Curriculum was advantageous, because it allowed for the exploration of teacher engagement with a new curriculum. The parallel roll-out of the C2C materials and the decisions made by the administrative team at Joanlee State School has meant that the teachers in the present study were not interpreting the intended curriculum from the curriculum policy documents as published by ACARA. Rather, the teachers in the present study sought to implement an interpretation of the curriculum, that is, C2C. Thus, while it is said that the teachers engaged in a similar general process from intended curriculum to planned curriculum, a substantial component of this process was the result of the development and use of the C2C materials. Future research could explore the process of curriculum interpretation when teachers are supported to use the intended curriculum as the source of curriculum planning.

Secondly, selection of participants from across year levels within a school has given a spread of the experiences of teachers across the school at the focus of the study. The data set did not encompass all the teachers across one year level and thus reflects the diversity of support and experiences across the year levels at one school.

While the data set in the present study is not large enough for transferability of results to all contexts, it does represent a very unique curriculum context. That is, the study reflects one of the first implementations of the first national curriculum for Australia, the first implementation of a national curriculum in the State of Queensland, and the first use of a suite of government-developed curriculum materials of the depth of the C2C materials. While the teachers in the present study reflect a diversity of experiences, it was found that the five teacher participants used a similar general process of curriculum interpretation. However, as this is a case study, the findings cannot be generalised to an entire population. The participants were all from the one school, and thus, it would be advantageous to use the same data collection and analysis methods in different contexts to ensure generalisability of the results.

Thirdly, potential preconceptions and biases of the researcher need to be considered. The researcher's preconceived ideas as to what may be likely from literature or from the context of the researcher's work, can influence the analysis of the data. During the analysis for this study, it was critical that the themes evolved from the interpretation of the data. This study has aimed to identify the themes impacting on the process of curriculum interpretation. The research has been designed to identify the influences from the teachers' data rather than stipulate them upfront and seek to find them in the data. However, the nature of interpretivist research is that the object of the research is interpreted in respect to the reality of the researcher's experience and therefore, meaning is derived from within the paradigm of the researcher's reality (Weber, 2004). As much as possible, the processes used during data analysis, including significant time between engaging with each of the teachers' data sets, have assisted to minimise the effect of potential preconceptions.

7.5   RECOMMENDATIONS FOR PRACTICE AND RESEARCH

The impact of system and administrative decisions on the way in which teachers in this school implemented curriculum, was able to be discerned during the study. The advent of the Curriculum into the Classroom (C2C) materials developed by the Department of Education and Training has meant that the process of curriculum interpretation observed has been affected by the decisions made at the school level. The administrative team at Joanlee State School made decisions about how to implement the Australian Curriculum and, like many other Queensland schools at the

time, used the C2C materials as a method of streamlining the process of curriculum interpretation (Queensland Teachers' Union, 2012).

Analysing the process of curriculum interpretation that the five teachers have employed suggests that the purpose of the C2C materials was not met. The C2C materials were developed with the intention of supporting schools to decrease the time required to familiarise teachers with the curriculum. The decision to use the C2C materials was to decrease the time required for teacher planning. Instead, it was intended that the teachers would be able to invest time on considering the pedagogies they would employ to teach the curriculum. Teachers in the present study, however, still invested considerable time planning to use the curriculum materials. This was both the first year of the Australian Curriculum, as well as the first time the teachers had seen a curriculum resource like C2C.

The difference that C2C engendered was an altered starting point for the development of the planned curriculum. Rather than commence planning with the intended curriculum, in this case the Australian Curriculum, teachers felt compelled to plan from the C2C materials. Thus, the teachers commenced their implementation and interpretation from the materials they knew to be an interpretation of the curriculum they were required to implement. With this in mind, recommendations are made for education systems, schools and teachers.

7.5.1 Recommendations for education systems

Recommendation 1: Recognition of the value of teacher curriculum planning

Teacher curriculum planning is not an aspect of curriculum that is well-described in literature presently. In literature, curriculum planning has been assumed as both an element in the process of engaging with the intended curriculum (Ellis, 2004; Sherin & Drake, 2009) and as a component of curriculum enactment (Solomon, 2009).

The C2C materials developed for Queensland state schools, assumed that a short-cut could be created that bypassed the process of teacher curriculum planning. Teachers were given the materials and told that they need not worry about the curriculum content. However, regardless of the comprehensive nature of the C2C materials, teachers still completed curriculum planning to tailor their curriculum plans. Teacher curriculum planning is not a part of the process of curriculum

interpretation that can be bypassed. Rather, teachers will strive to make the plans they create meaningful for their students, regardless of the intent of the materials they are given to build from.

Recommendation 2: Closer alignment of curriculum resources to teachers' needs

Teachers in the present study each set about a process of curriculum planning using a variety of technologies, textbooks, and other resources. The teachers were provided with a comprehensive suite of resources, incorporating macro-level planning (e.g., year level plans) to micro-level planning (e.g., stipulated activities in lesson plans) through the C2C materials produced by the Department of Education and Training. Other organisations, such as the Queensland Curriculum and Assessment Authority (QCAA), and its predecessor the Queensland Studies Authority (QSA), provided resources to support schools with the implementation of the Australian Curriculum. However these resources were not mentioned by the teachers as resources to be drawn upon, nor as a source of information that they considered for support. Amy (Head of Curriculum) mentioned that she used the QSA resources to support professional learning of the teachers at the school in the professional learning folders. The resources produced by each of the organisations did not fully support the needs of the teachers using them. Teachers found the resources cumbersome and requiring significant additional work if they used them at all. Taking into account the process of curriculum planning that the teachers used to prepare for curriculum enactment, it is not surprising that the format of the resources produced did not support their needs. It was a replication of the work that they intended to do in order to prepare to enact the Australian Curriculum.

Curriculum policy documents are implemented throughout this country, using different models for support. Further, within the state of Queensland, a different method of curriculum support has been used for decades to support the implementation of senior secondary (Years 11 and 12) curriculum that has never been used to support curriculum in Prep to Year 10. The model of support for senior secondary curriculum includes, as a minimum,

- explanatory professional development workshops about the curriculum changes from the previous curriculum and support for curriculum planning

- professional development workshops about the assessment requirements for the new curriculum

- exemplars of the standard of curriculum planning that is required for approval of the school's work program

- exemplars of the assessment instruments and task-specific standards that are required by the curriculum to make judgements on students' work

- state-wide moderation involving trained moderators on district and state panels to support consistency of judgements made by teachers about student work.

The culmination of the senior secondary curriculum is tertiary entrance, and as such, this is the justification for the rigour associated with this level of curriculum support. The foundational eleven years of schooling preceding senior secondary, instead receives inconsistent support for teachers charged with curriculum implementation in Prep to Year 10. Across the last three curriculum initiatives in mathematics in Queensland, the Years 1 to 10 Mathematics Key Learning Area Syllabus (2004), the Mathematics Essential Learnings and Standards (2007), and the Australian Curriculum: Mathematics (2010a), the QSA has provided three substantially different curriculum support packages, none of which have been as comprehensive as the package of support afforded to teachers in senior secondary.

It would seem prudent for the organisations to consider engaging more frequently with the end user of their products (i.e., the teachers) to develop resources that are more aligned to teachers' needs. It is recommended that alternate models for curriculum implementation support should be further explored using the model from this study. The model could assist in analysing the effectiveness of aspects of curriculum support, to aid in determining ideal models for support that develop the necessary understanding of the purpose and importance of curriculum policy documents for teachers.

7.5.2 Recommendations for schools

Six key themes influencing the process of curriculum interpretation were discerned from the data obtained through semi-structured interviews and journals. The six themes could be categorised into two groups based upon their impact on the process of curriculum interpretation. The first group, representing the major influences of

content/pitch of the curriculum, time and assessment, were influences that led to teachers instituting significant changes to their curriculum plans, either during the process of curriculum interpretation (from intended curriculum to planned curriculum) or following curriculum enactment (refinement of the planned curriculum following curriculum enactment). The second group, reflecting minor influences of mathematical language, digital technology, and textbooks and other resources, were influences that led to teachers changing activities during enactment, but did not lead to refinement of the planned curriculum following enactment.

Recommendation 3: Teachers need adequate time to engage with curriculum change

The teachers spent substantial time interpreting the curriculum, interpreting the curriculum materials, interpreting the curriculum requirements of the assessment tasks in the curriculum materials, and refining their curriculum plans following enactment. Each of these processes was necessary for the individual teacher to make relevant the curriculum content for the students in their class. There are two potential mechanisms to streamline the processes of teacher curriculum planning described. The first mechanism relates to the alignment of the resources provided to the needs of teachers. This mechanism has been highlighted in Recommendation 2.

The second mechanism for streamlining the processes of teacher curriculum planning relates to the provision of adequate time. Teachers need adequate time and professional learning with a new curriculum to assist them to understand the curriculum requirements and develop them into a plan for curriculum enactment. The provision of planning resources is not a substitute for the deep understanding of the curriculum and its intent that teachers are able to develop from engagement with the curriculum to develop their curriculum plans. This level of understanding takes time.

Recommendation 4: Consideration of the influences on teacher curriculum planning and enactment should assist to determine investment of teacher curriculum support

The conceptual model used in this study has allowed for the identification of gaps in the process and provision of curriculum support. This level of analysis of teacher processes makes explicit the connections between the curriculum policy documents and the planning processes in use by teachers in the school. Analysis of the process of teachers' curriculum interpretation would assist schools to identify the areas where gaps may exist in the implementation support that has been provided to the teachers,

and therefore allow for targeted professional learning and resources to be sought. While it can be determined that the influences that impact upon teachers' curriculum enactment are similar in the present study, it would be difficult to determine that this is consistent across a wider range of schools and teachers.

Furthermore, the process of critical analysis developed from this study has assisted in identifying the influences on teachers' process of curriculum interpretation. Identification of the influences would support schools in identifying opportunities to support teachers and their work. By identifying the influences on teachers and the issues arising from the influences, a school would be able to target support to assist individual teachers with the challenges they are facing, alternatively to support a team of teachers with the mechanism that would best support building them as an effective team.

7.5.3 Recommendations for teachers

Recommendation 5: Professional learning to support teachers to view the intended curriculum as integral to curriculum planning

In the present study, the method of critical analysis has identified a gap in regards to the way teachers were interacting with the intended curriculum. Once the C2C materials were published, the decision by this school to engage with these materials alone has meant that the teachers have not perceived the intended curriculum, the Australian Curriculum, as an integral resource to their curriculum planning. This altered perception of the intended curriculum is an issue for ensuring that the curriculum is implemented as it is envisioned. Development of the Australian Curriculum anticipated flexibility that would allow for curriculum to be planned for students to learn content appropriate for their stage of development, rather than determined by chronological age alone. Support is necessary for teachers to see the purposes of the curriculum as it is published. The curriculum policy documents provide the map for the teachers to use, to determine their best course for their students, but not using the map means that teachers may not be within the discipline area defined by the curriculum.

Professional development needs to be a requirement of the package of support provided to teachers during the release of a new curriculum initiative. Adopting Ben-Peretz's (1990) notion of teachers as user-developers, teachers need to be provided with the tools to use and develop the curriculum. Teachers cannot be expected to be

able to fully discern the curriculum intent, interpret the curriculum and enact it in the classroom without support. The support provided needs to build teacher understanding and capacity to use the curriculum. Future research could explore the influence of teacher content knowledge and pedagogical-content knowledge on the process of curriculum interpretation.

Connelly and Ben-Peretz (1980) described three possible roles for teachers in the process of curriculum implementation. The requirement on teachers to use the C2C materials, no matter how implicit, aligns with Connelly and Ben-Peretz's (1980) notion of teachers as users of teacher-proof curricula, designed for minimal input from the teacher. This is not the intent of the Australian Curriculum, nor of the C2C materials; however, the implication of using a curriculum resource in this way lessens the role that is desired from the classroom teacher.

The two other roles described by Connelly and Ben-Peretz (1980), of the teacher as an active implementer or the teacher as a partner in development, requires investment in the teacher when the new curriculum is published. In order to adequately support teachers in the process of curriculum implementation, teachers require professional learning. If the teachers are viewed as active implementers of the curriculum, then support is required for teachers to understand and appreciate the curriculum intent, while developing a deeper understanding of the curriculum goals and aspirations for their students. If the teacher is viewed as a partner in development, then the teacher requires professional learning to support the process of co-development, as well as a shared understanding between the teachers, schools and curriculum authority as to how the process of curriculum co-development will lead to curriculum change and the transformation of materials.

Whichever of the three roles proposed by Connelly and Ben-Peretz (1980) is determined to be the path for the teachers in a jurisdiction, consideration should be given to the provision of support. Ultimately, with all three roles described, the curriculum as written is the touchstone for curriculum decisions.

7.6 CHAPTER AND THESIS SUMMARY

The present study aimed to observe and analyse a group of teachers in the midst of curriculum change. In the state of Queensland, curriculum change in the area of Years One to Ten Mathematics has occurred since 2004 through three key and

diversely different curriculum reforms. Since the advent of the Australian Curriculum, the rate of curriculum change has not decreased; while Queensland has been implementing the Australian Curriculum since its publication in 2010, ACARA has updated the curriculum on a regular basis. At the conclusion of this thesis, the Australian Curriculum is currently published as Version 8.3 (Australian Curriculum, Assessment and Reporting Authority, 2016). With each curriculum reform, the teachers dutifully plan to implement the new curriculum in their classrooms with their students, with variable support from schools, systems and the state.

The study found that teachers are working from the resources that they are provided using the guidance they are given from the schools, systems and the state. The teachers in this school did not use the Australian Curriculum as provided by ACARA, as they were given supporting resources that unpacked the curriculum for them into teaching plans and they were directed to use these as the basis for their teaching programs. Teachers still applied the process of curriculum planning to the resources in order to understand the resources for themselves and to gain ownership of the materials before they taught them in their classroom. Regardless of the level of detail provided in the resources, the process of curriculum planning is still required for teachers to make sense of the materials and to plan the course they intend to take across the map of the curriculum.

In analysing the process of curriculum alignment, the study has developed a method for critical analysis of the curriculum pathway. The process of unpacking the intended curriculum, developing a plan for navigating the curriculum and finally enlivening the curriculum in the classroom can be described, using the model for critical analysis developed in this study. This process has enabled each teacher's curriculum journey to be mapped for the purposes of analysis and comparison. Further, this mapping can be used to identify gaps in understanding of the curriculum and/or in the support that has been provided to the teachers attempting to grapple with the curriculum, and their contextualisation of it for their students.

The model for critical analysis has also allowed for the influences on teachers' curriculum decision-making to be identified. These influences have been similar across the group of teachers that were the focus of this study. The influences of Content/pitch of the curriculum, Time, Mathematical language, Textbooks or other resources, Digital technology, and Assessment, were identified in the data of three or

more of the teachers at the focus of this study. These influences were described as both positive and negative influences on the curriculum decisions that were made by the teachers in this study. Further, it is possible that a similar process, using the model for critical analysis in this study, could allow schools to target their resources to support teachers or teams of teachers where issues were identified in their decision-making.

The model for critical analysis could be used in the future to make comparisons of the methods used by curriculum authorities and systems to implement curriculum reform. Through these comparisons, it may be possible to identify optimal methods of support for curriculum reforms. This is not to say that there is a one-size-fits-all model of professional support for curriculum reform, but perhaps rather different types of reform may align best with particular resources for support. Comparison of the methods of support for curriculum reform may allow for this type of analysis to occur, which would provide the benefit of targeting financial support in the development of resources and also in identifying specific resources that actually assist and support teachers, as they work towards developing the hearts and minds of the students they are charged with teaching.

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Appendices

Appendix A

A short summary of the Queensland curriculum documents for mathematics

Since 2004, Queensland teachers have enacted three separate changes in mathematics curriculum alone, each dramatically different from the previous. A succinct Queensland mathematics curriculum history follows.

The Years 1 to 10 Mathematics Key Learning Area Syllabus (QSA, 2004)

The Years 1 to 10 Mathematics Key Learning Area Syllabus (QSA, 2004) was an outcomes based syllabus that outlined content in five strands (Number, Patterns and Algebra, Measurement, Chance and data and Space) described across six developmental levels for Years 1 to 10. Levels were described as articulating to approximately 18 months to two years of student development in mathematics and were to be used to describe the milestones students had reached on their individual learning journey (i.e. not specifically aligned to a year level). This suite of syllabi was written in Queensland for the eight key learning areas described in the Adelaide Declaration (MCEETYA, 1999). The suite was released in Queensland in groups of two from 1999, until the final syllabus release in 2004.

The Queensland Curriculum, Assessment and Reporting Framework Mathematics Essential Learnings and Standards (QSA, 2006)

The Queensland Curriculum, Assessment and Reporting Framework Mathematics Essential Learnings and Standards (QSA, 2006) were developed in response to Queensland Government (2005) policy and embedded the recently developed National Statements of Learning for Mathematics. The Essential Learnings and Standards described the core mathematical concepts, which were deemed necessary for students to develop across two year junctures (described at Years 3, 5, 7 and 9). The Essential Learnings were organised by content - Knowledge and understanding (in five strands of Number, Patterns and Algebra, Measurement, Chance and data and Space) and Skills – Ways of working.

The Australian Curriculum: Mathematics (ACARA, 2010)

The Australian Curriculum: Mathematics (ACARA, 2010), was developed in response to the Melbourne Declaration (MCEETYA, 2008), which paved the way for the nationalisation of curriculum under the authority of one national body. The responsibility for curriculum development was therefore undertaken by a national statutory authority, while all implementation and supporting resource development remained the responsibility of the state-based curriculum authorities. The Australian Curriculum: Mathematics, is described by two sets of strands – three content strands (Number and Algebra, Measurement and Geometry and Statistics and Probability) and four proficiency strands (Understanding, Fluency, Problem Solving and Reasoning). The Australian Curriculum: Mathematics, is written year by year from Preparatory year to Year 10.

Appendix B

Pre-unit interview questions for teachers

1. What have you done in preparation for the unit you are about to teach in Term Two?

2. Which content descriptions from the Australian Curriculum will be the focus of the unit?

3. How confident do you feel with this content?

4. Why do you feel this way with this content?

5. [If the teacher taught this year level last year] Do you feel this is similar content to the unit you taught on this topic last year?

6. Which curriculum documents have you consulted in order to prepare for teaching this unit?

7. Why did you select these documents?

8. In what ways do you feel they help you?

9. Which aspects of your curriculum plan do you feel uncertain about and why? [Uncertainty could be because of the content expectation, the pedagogical technique to be used or the amount of available time.]

10. What further work do you feel you need to do before the unit commences?

Appendix C

Journal questions

Date:_____ / _____ / 2012

Prior to lesson:

1. Details of the lesson (e.g. context, resources to be used):

2. Mathematics concept(s) to be taught:

3. What influenced your planning?

Following the lesson:

4. Were you able to address all the mathematical concepts you planned to address? Why or why not?

5. What changes would you consider making to the lesson if you were to teach it again in the future?

Appendix D

Post-unit interview questions for teachers

1. How closely aligned do you feel your unit was to your plans?

2. Where do you feel it deviated from your plan, if at all?

3. Why do you think it deviated from your plan?

4. How confident did you feel with the content of the unit and why?

5. What resources in addition to your curriculum plan did you consult during the unit?

6. What further work, if any, do you feel the students will require in this content area?

7. When and how do you plan to incorporate this additional learning into your curriculum plans?

8. When and how do you plan to incorporate this additional learning into your curriculum plans?

9. What further work, if any, do you feel you will need to do in preparation for teaching this unit in the future?

10. What changes, if any, would you make to the unit in preparation for teaching this unit in the future?

Appendix E

Interview questions: Head of Curriculum and Deputy Principal

1. Has the school chosen to use C2C as a resource for planning, teaching and/or assessment? Why has the school chosen to use C2C in this way?

2. How is the school using the C2C resource? [Is the school choosing to 'adopt' or 'adapt'C2C?]

3. How much of the school's unit plans are additions from you and/or your staff?

4. What activities have you undertaken with the staff in order to prepare for the implementation of the Australian Curriculum: Mathematics?

5. What resources have you consulted to assist with preparing staff for implementation of the Australian Curriculum: Mathematics? In what ways have these resources been helpful?

6. Which curriculum documents have you consulted in order to assist staff with preparation for the Australian Curriculum: Mathematics or for teaching this unit? Why, and how helpful were they?

7. What preparation have you done with staff for the unit they are about to teach in Term Two? How did you come to decide on this approach?

8. Which content descriptions from the Australian Curriculum will be the focus of the units across Years Three-Seven?

9. How confident do you feel your teachers are with teaching the content in these units (Unit Four)?

10. Which aspects of the curriculum plan do you feel teachers feel the most uncertain about and why? [Uncertainty could be because of the content expectation, the pedagogical technique to be used, or the amount of available time.]

11. What activities and resources have you suggested to them in order to assist with their preparation? How did you select these?

12. What further work do you feel teachers will need to do before the unit commences? How do you know this?

Appendix F

Interview questions: Principal

1. Has the school chosen to use C2C as a resource for planning, teaching and/or assessment? Why has the school chosen to use C2C in this way?

2. How is the school using the C2C resource? Is the school 'adopting' or 'adapting' C2C and why?

3. What has been your role in preparing staff for the implementation of the Australian Curriculum: Mathematics?

4. What activities have you undertaken with the staff in order to prepare for the implementation of the Australian Curriculum: Mathematics?

5. What resources have you consulted to assist with preparing staff for implementation of the Australian Curriculum: Mathematics? Why have you used these resources?

6. Which curriculum documents have you consulted in order to assist staff with preparation for the Australian Curriculum: Mathematics or for teaching this unit? Why, and how helpful were they?

7. What preparation have you done with staff for the unit they are about to teach in Term Two?

8. Which content descriptions from the Australian Curriculum will be the focus of the units across Years Three-Seven?

9. How confident do you feel your teachers are with teaching the content in these units (Unit Four)?

10. Which aspects of the curriculum plan do you feel teachers felt/feel the most uncertain about and why? [Uncertainty could be because of the content expectation, the pedagogical technique to be used or the amount of available time.]

11. What activities and resources have you suggested to them in order to assist with their preparation? How did you select these?

12. What further work do you feel teachers will need to do before the unit commences? How do you know?