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***AN INVESTIGATION INTO THE IMPACT OF HIGH-STAKES TESTING,
THROUGH THE NAPLAN ASSESSMENT, ON THE TEACHING AND LEARNING
OF MATHEMATICS IN ONE PRIMARY SCHOOL***

Submitted by

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Dip. Ed, B.Ed

***THIS THESIS IS PRESENTED IN FULFILMENT OF THE REQUIREMENT FOR
THE DEGREE OF MASTER OF PHILOSOPHY (THESIS)***

AT

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ABSTRACT

In 2008, the implementation of the National Assessment Program – Literacy and Numeracy (NAPLAN) commenced in all schools across Australia. This assessment of mathematical and literacy standards across Australia raised questions about the impact which high-stakes testing has on teaching and learning. This research specifically focused on the effect NAPLAN has had on the teaching and learning of mathematics. The study explored perspectives about NAPLAN from key participants; students, teachers and parents at one Western Australian Primary School. These perspectives included the potential anxiety experienced by students and how this affected their performance in NAPLAN. According to recent research on high-stakes testing, the role of the teacher is instrumental in children’s achievement results. As such, this study also investigated the extent to which instructional pedagogy at one school had been altered by the implementation of NAPLAN and the subsequent publication of results. Moreover, this study investigated the effect NAPLAN had on parents’ understanding of the national testing program and how NAPLAN had affected their relationship with the school. Consistent with a phenomenological perspective, the qualitative data for this investigation were collected through semi-structured interviews and field notes. Moreover, collected data offer insight into how the implementation of NAPLAN has affected stakeholders’ attitudes towards the teaching and learning of mathematics.

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CHAPTER ONE – BACKGROUND AND INTRODUCTION TO THE STUDY

1.1 Introduction

This thesis describes an investigation into how a national standardised test has affected the teaching and learning of mathematics in Years Three and Five in a Catholic metropolitan primary school in Western Australia. This research was motivated by an intention to determine the extent to which the implementation of a specific standardised test, NAPLAN (National Assessment Program - Numeracy and Literacy), has affected the teaching and learning of mathematics from the perspective of the key stakeholders; namely; students, teachers and parents.

Through the annual implementation of NAPLAN, the testing of mathematical standards across the nation invokes many questions about the potential that high-stakes testing has for academic reform. The increased pressure placed on the main stakeholders was also a focus of this investigation. White and Anderson (2012) described how the increased accountability of national standardised testing has led to teachers feeling obliged and pressured to prepare for the test. This assumption underpinned the premise of the investigation; it was an aim of the researcher to investigate if the perceived pressure actually affected the teaching and learning of mathematics.

Another intention of this research was to gather evidence regarding the impact of NAPLAN on the teaching and learning of mathematics from the perspective of students, their parents and classroom teachers. To gather these perspectives from the key stakeholders, the research was naturalistic and qualitative in nature and data were gathered through a number of semi-structured interviews and researcher-generated field notes. This research aims to provide a clearer picture of the effect the implementation of NAPLAN has had on key stakeholders involved in primary school mathematics.

1.2 Background of NAPLAN

In 2007 Kevin Rudd, the opposition leader, presented a paper *The Education Revolution* (2007) in response to Australia's declining performance in international

testing particularly PISA (Programme for International Students Assessment) and TIMSS (Trends in International Mathematics and Science Studies). In *The Education Revolution*, Rudd (2007) stated that the Australian economy required a revolution. Specifically, he recommended that the Australian government increase the investment in education in order to increase productivity; “OECD research shows that if the average level of education of the working-age population was increased by 1 year, the economy would be 3-6 per cent larger, and the growth rate of the economy would be up to 1 per cent higher” (Rudd, 2007, p.10). From the recommendations of this paper the Australian government began implementing this *Education Revolution* (Rudd, 2007). A mandatory standardised test was introduced into all Australian schools, NAPLAN. During this period the government also mandated a new Australian Curriculum and launched a website where the results of this test were published.

In 2008, NAPLAN commenced in Australian schools. Every year, all students in Years 3, 5, 7 and 9 are assessed on the same days using the same tests in the areas of Reading, Writing, Language Conventions (Spelling, Grammar and Punctuation) and Numeracy. Each year, over one million students nationally sit the NAPLAN tests, providing students, parents, teachers, schools and school systems with information about the literacy and numeracy achievements of all students (ACARA, 2008). This investigation is concerned with the effect the numeracy component of NAPLAN has had on the teaching and learning of mathematics.

The NAPLAN test aims to assess broad aspects of numeracy within all curricula in each state and territory. *The National Protocols* (2017) ensure consistency in the administration of the tests by all test administration authorities and schools across Australia. The test administration authority in each state and territory is responsible for the marking. Numeracy tests are marked using optical mark recognition software to score multi-choice items and the results are then reported nationally through the annual *Summary and National Reports* (ACARA, 2008). An individual report is provided to parents and caregivers for each student. These results show a student’s achievements against a national average and the school’s scores are posted and made available via the *My School* website. The aim of the testing is to compare results of each cohort, over a two-year period.

In March 2011, the Federal Minister for Education launched the *My School 2.0* website. This website allows users to locate information about schools in their community and compare them with statistically similar schools across the country. The website also contains information about the performance of 10,000 schools across the country on the NAPLAN tests. Users can search schools by name, town or postcode and compare like schools.

In 2014, the Western Australian government introduced an additional compulsory standardised test, OLN (Online Literacy and Numeracy Assessment) into secondary schools. OLN is an online literacy and numeracy assessment designed to ascertain if students can successfully achieve Band 8 in the NAPLAN test. The assessment requires students to demonstrate skills that are regarded as essential to meet the demands of daily life. Students who have not achieved Band 8 in the Year 9 component of NAPLAN are required to sit the OLN. OLN has increased the high-stakes nature of NAPLAN as students are now under additional pressure to achieve Band 8 in Year 9, to avoid having to sit the OLN (ACARA, 2014).

1.3 Aims of the Research

The aim of this study was to determine the effect NAPLAN is having on its key stakeholders; teachers, parents and students, in relation to the teaching and learning of mathematics. There were additional aims associated with each stakeholder group to investigate their relationship with NAPLAN, namely; how NAPLAN test conditions contributed to the students' performance and perceptions of themselves as mathematicians, the effect on the well-being of students and teachers, pedagogical changes in both teaching and learning, parental perceptions of NAPLAN and the effect NAPLAN has had on the relationship between parents and school. The aims of the research have been divided up among the three key stakeholders; students, teachers and parents, as the aims are pertinent to each group.

1.3.1 Students.

This study aimed to offer a greater understanding of students' perceptions of NAPLAN in numeracy. The main aims in relation to students were;

- (i) to provide an opportunity for students to have a voice in the NAPLAN debate, something which has rarely been investigated (Belcastro & Boon, 2012)
- (ii) to investigate student perceptions of the teaching and learning that occurs during NAPLAN preparation time
- (iii) to examine how NAPLAN has affected the well-being of students.

1.3.2 Teachers.

There were three main aims in relation to teachers;

- (i) to examine how NAPLAN has influenced teachers' perceptions of NAPLAN, and the practical applications of teaching mathematics in Years 3 and 5
- (ii) to explore the extent to which teachers discerned increased pressure due to the publication of the scores on the *My School* website
- (iii) to investigate how the relationships between the teacher and parents, and the teacher and students, had been affected by the implementation of NAPLAN and during the communication of the results.

1.3.3 Parents.

The main aims in relation to parents were;

- (i) to investigate the effect of NAPLAN testing procedures on parents
- (i) to determine parents' understanding of the NAPLAN test and the results
- (ii) to investigate if the relationship between the school and parents had altered as a direct result NAPLAN of implementation and the publication of the results.

1.4 Research Questions

The overarching research question that guided this investigation was:

How does NAPLAN affect the teaching and learning of mathematics for the key stakeholders; students, teachers and parents?

Within this main research question, there was a specific research question pertaining to each of the three stakeholder groups. These specific research questions are listed below.

1. How has NAPLAN affected the student learning of mathematics?
2. How has NAPLAN altered the way teachers teach mathematics?
3. How has NAPLAN affected parental perceptions of the teaching and learning of mathematics?

1.5 Design of the Research

This qualitative research employed a phenomenological approach as the theoretical perspective. The research was based on an intrinsic case study (Stake, 1995), where all data were collected from participants belonging to a triple stream, metropolitan Catholic primary school in Perth, Western Australia. This research design allowed the exploration at a deeper level of the main stakeholders' experiences with NAPLAN. In order to ascertain students', teachers' and parents' perceptions of NAPLAN, semi-structured interviews and researcher-generated field notes were used as data gathering methods. The interviews were digitally recorded and transcribed by the researcher, and subsequently analysed using Miles, Huberman and Saldaña's (2014) method of identifying reoccurring themes. This analytical method consisted of three main components: data reduction, data display and drawing conclusions.

1.6 Significance of the Research

Given that high-stakes testing is used to make critical decisions which affects not only students but also influences families, educators, schools and funding, it is significant that research into such testing is conducted. Information gained by investigating the effects NAPLAN has on the teaching and learning of mathematics, highlights the need for decision-makers to understand the impact high-stakes testing has on the key stakeholders and classroom curriculum delivery.

This research is also significant because it has investigated the effects NAPLAN had on the well-being of both students and teachers. It is important that educators and policymakers are aware of the impact that macro-decision making can have on the pressure placed on the key stakeholders (Chilcott, 2014). The research has further significance in that it has investigated the effect NAPLAN is having on the teaching and learning of mathematics. As government bodies have made considerable financial investments into high-stakes testing, it is important that this funding is producing the desired results; that is, measureable improvements in the teaching and learning of mathematics. It is also imperative to investigate NAPLAN to ensure that students, teachers and parents are supported in their implementation of this mandatory standardised test.

This research is significant in that it addresses a gap in the current literature available, particularly with regards to parental perceptions of how NAPLAN has affected the teaching and learning of mathematics. This study has investigated the effects NAPLAN has had on parents and, in particular, how parents responded when faced with a disparity between results they received from NAPLAN and from their school reports. Given that there is a paucity of literature exploring parental perceptions of NAPLAN, this research has made a modest contribution to the literature base with regards to understanding how parents are affected by NAPLAN.

1.7 Outline of the Thesis

Table 1.1 outlines the structure of the thesis introducing each chapter.

Table 1.1

Overview of the Thesis Structure

Chapter	Title
Chapter One	Introduction
Chapter Two	Review of Literature
Chapter Three	Design of the Research
Chapter Four	Results of the Research
Chapter Five	Discussion
Chapter Six	Implications and Recommendations

1.8 Chapter Outlines

Chapter One: The introduction provides a brief explanation of the motivation for the research, and presents the aims and research questions for each of the key stakeholders. This chapter also outlines the significance of the research and describes how this study fills a gap in the current literature on this topic. Finally, a summary of each of the six chapters of the thesis is offered.

Chapter Two: Review of the Literature. This chapter presents current literature on the effects high-stakes testing, including NAPLAN, on the teaching and learning of mathematics. It is comprised of four themes, specifically: high-stakes testing, negative consequences experienced by the stakeholders, parental perceptions of NAPLAN and, changes to pedagogical practices employed whilst in preparation for NAPLAN.

Chapter Three: Design of the Research. This chapter outlines the methods used for the collection and analysis of the research data. This study was based on qualitative research methods. It delineates the research paradigm and presents how the data were analysed.

Chapter Four: Results. Results collected from the stakeholders are presented. This chapter summarises the responses of the key stakeholders to the research questions posed.

Chapter Five: Discussion of Research Findings. This chapter provides an interpretive analysis of the data presented in Chapter Four, alongside the relevant literature for each stakeholder group as presented in Chapter Two.

Chapter Six: Review and Conclusion. This chapter reviews the findings of the study in relation to the originally stated purpose of the inquiry. This chapter presents answers to the research questions, states the limitations of the research, provides suggestions for research findings, offers specific recommendations and includes a personal statement from the researcher.

CHAPTER TWO – LITERATURE REVIEW

2.1 Introduction

The National Assessment Program in Literacy and Numeracy (NAPLAN) is the first national, high-stakes testing program to occur in Australian primary and secondary education (ACARA, 2008). Since its implementation, NAPLAN testing has had a considerable effect on the teaching and learning of mathematics in Australian schools and on the key stakeholders (Thompson & Harbaugh, 2013). The purpose of this chapter is to review the literature within the context of mathematical teaching and learning using the following four themes: (1) high-stakes testing, (2) negative consequences experienced by the stakeholders, (3) parental perceptions of NAPLAN and (4) changes to pedagogy in preparation for NAPLAN. These themes have been presented as a conceptual framework in Figure 2.1.

NAPLAN is a standardised test developed to address the accountability of key stakeholders. NAPLAN was introduced in response to the Australian Federal Government requiring a quantitative measurement of literacy and numeracy attainment scores in Australia. Dulfer, Polesel and Rice (2012) reported on the reasons why governments implement high-stakes testing procedures, and identified that high-stakes testing is an important mechanism for systems and policymakers to provide evidence concerning a school's performance relative to established achievement benchmarks. However, there are repercussions in the administration of mandated standardised tests. These repercussions include negative consequences for stakeholders, placing pressure on teachers to change pedagogies, and a narrowing of the curriculum (Smith, 2016).

2.2 Conceptual Framework

The four themes outlined in Figure 2.1, namely high-stakes testing, negative consequences experienced by stakeholders, parental perceptions and changes in pedagogy, create an interconnected network which formed the conceptual framework for this study. These themes directly influence the topic central to the research itself. In the first theme, the literature explores the definition of high-stakes testing and the consequences that it can have on the teaching and learning of mathematics. The second theme focusses on the negative consequences experienced by students. This theme

explores whether the students' physical and mental well-being are affected by participating in NAPLAN. The negative consequences experienced by teachers and how these consequences affect the teaching of mathematics are also examined. As this research deals with the effect NAPLAN has on all stakeholders, parental perceptions are examined in the third theme. There is limited literature presented on the effect NAPLAN testing has had on parents. The changes in pedagogy which have resulted in a narrowing of the curriculum is the final theme to be presented in the literature review.

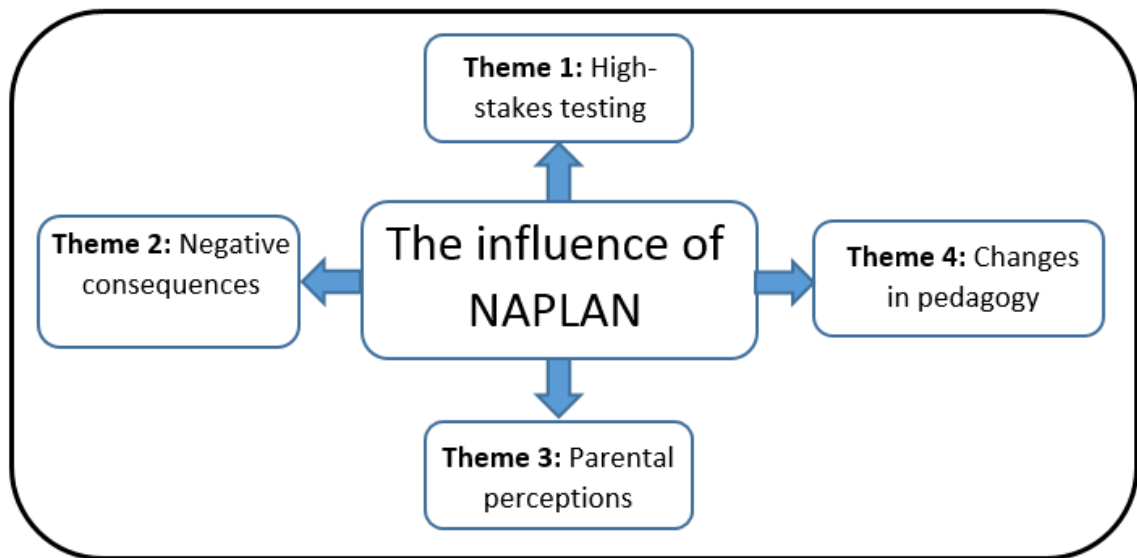


Figure 2.1. Conceptual framework of the literature review.

2.3 The Implementation of NAPLAN in Australia

In order to gain an understanding of how NAPLAN has affected both teaching and learning in Australian schools, it is necessary to know the history of its inception and to understand its administration within schools. In 2008, NAPLAN commenced in Australian schools (ACARA, 2008). Every year, students in Years 3, 5, 7 and 9 are assessed on the same days using tests in Reading, Writing, Language Conventions (Spelling, Grammar and Punctuation) and Numeracy. Nationally, over one million students sit the NAPLAN tests with the aim of providing key stakeholders (i.e. students, parents, teachers, schools, school systems and sectors) with important information about the literacy and numeracy achievements of all students (ACARA, 2008). The NAPLAN

test includes broad aspects of numeracy within all curricula in each Australian state and territory. The NAPLAN results are reported nationally through the Summary and National Reports (ACARA, 2008), and an individual report is provided to parents and caregivers for each student. The main aim of the testing is to compare cohorts of student results over a two-year period, and to provide information to the major stakeholders about the literacy and numeracy achievements of students in Years 3, 5, 7 and 9 in Australian schools.

The phenomenon of national testing and publication of the results in a public forum is relatively new to the mathematics learning area in Australia. In 2008 the Minister for Education launched *My School 2.0*, a website that allows users to locate information about schools in their community and compare them with demographically similar schools across the country. The website contains information about the performance of around 10 000 schools across the country taken from NAPLAN tests. Users can search schools by name, town or postcode and compare like schools with similar socio-economic background and against the national average. McGaw (2008) illustrated how the *My School* website provides information to stakeholders on the students' performances and how this website also allows for comparisons to be made between cohorts and schools. Herein, McGaw (2008) outlined:

[My School 2.0] provides all stakeholders with information about each school including information on staff, resources and students' performances. It also provides the stakeholders with comparisons of their students' performances in the areas of literacy and numeracy. It is also important to note that the site will have data on specific areas of underperformance. (p. 2)

NAPLAN is the only national assessment in Australia which provides comparable data between states and territories, and year cohorts (ACARA, 2008).

2.4 High-stakes testing

NAPLAN has been referred to by Belcastro and Boon (2012) as high-stakes testing. Au (2007) stated that a test is considered 'high-stakes' when its results are used to make important decisions that affect students, teachers, administrators, communities,

schools, and districts. Belcastro and Boon (2012) suggested that a high-stakes test should be accompanied by educational goals and parameters for teaching and learning so teachers do not feel compelled to ‘teach to the test’. From the interpretation of results, these authors have observed that the achievement of educational goals has not occurred in the case of NAPLAN implementation (Belcastro & Boon, 2012). Instead, the results have been used to compare individual students and have become a basis for parents to choose the school their child will attend. Lingard (2009) supported the claim that NAPLAN had become a high-stakes test, and that consequently, such attainment could result in NAPLAN having all the negative effects that high-stakes testing can produce. This author continued to state that the poor results in some Australian states and territories were prompting the review of schools’ mathematics programs, which in turn contributes to the high-stakes nature of the testing. Lingard (2009) further outlined how the high-stakes nature of NAPLAN testing can increase the accountability of all mathematics teachers. Lingard (2009) also deliberated upon the effect such testing can have on the teaching and learning of mathematics. For instance, emphasis can be placed on teachers raising their students’ ability to take tests, rather than on improving teaching and learning strategies (Lingard, 2009).

2.4.1 The effect of high-stakes testing on the teaching and learning of mathematics.

Literature affirms that NAPLAN has had an effect on the teaching and learning of mathematics. (Belcastro & Boon, 2012; Lingard, 2009; Thompson & Harbaugh, 2013). According to these authors, changes to teaching and learning have manifested through a narrowing of the curriculum as teachers implement practice NAPLAN tests, and alter their mathematics lessons by teaching to the test. This impact is evidenced through teachers focusing their pedagogy on the mechanics of taking the test rather than on the learning being attained. Pendergast and Swain (2013) discuss the effect NAPLAN has had on higher order thinking skills. In a recent study they discovered that NAPLAN encouraged low-order thinking across all year levels. According to various scholars, teachers are using large quantities of class time to prepare for high-stakes testing, therefore reducing the time designated to the teaching of social sciences and the

arts in the classroom (Haladyna, Haas & Allison, 1998; Lingard, 2009; Pendergast & Swain, 2013).

2.4.2 Narrowing of the curriculum.

The preparation for NAPLAN tests has resulted in some curricula being narrowed as teachers focus on using classroom lessons to engage students in activities that are solely related to NAPLAN (Smeed, Spiller & Kimber, 2009; Wilson & Hornsby 2014). In particular, Thompson and Harbaugh (2013) found that there was an effect on the National Curriculum as a direct result of the introduction of high-stakes testing in Australian schools. Carter (2017) supported this assertion in stating that teacher's attention and class time was being used to improve results rather than concentrating on teaching the curriculum. According to Thompson and Harbaugh (2013), some teachers had become preoccupied with using class time to prepare their students for the NAPLAN test and there was strong evidence to suggest that some teachers were changing their teaching strategies to teach to the test. Smeed, Spiller and Kimber (2009) further critiqued the effects of high-stakes testing on curriculum development, stating that in order to prepare their students for the NAPLAN test, some teachers were neglecting to teach other subjects that normally encourage creativity and individuality.

Lingard (2009) suggested that because NAPLAN tests are designed and commissioned by government bodies, this involvement directly influences what is actually being tested and consequently improving school results becomes the priority. Governments use these quantitative data to revise policies and designate funding, and there can be a real and perceived danger of losing the authenticity of what is being taught or learnt. The quality of the teaching and student learning is not taken into consideration within collected scores. To counter the influence of government requirements on standardised testing, there should be consultation with teachers to discover what professional support is necessary to improve their classroom practice rather than a 'knee-jerk reaction' from teachers to student scores. Such practices are not necessarily conducive to effective classroom teaching and long-term learning (Lingard, 2009).

Researchers have posited that the lack of consultation with teachers to ascertain the individual needs of students could lead to a loss of higher-order thinking skills, which could result in lower student achievement (Smeed, Spiller & Kimber, 2009). Thompson and Harbaugh (2013) emphasised that a major aim of high-stakes testing should be to make education fairer and more accessible for all students, but this is not always the case. Thompson and Harbaugh (2013) discovered that schools within low socio-economic areas often underperform. These authors reflected that, perhaps this underperformance is due to the content of NAPLAN which is framed by bureaucrats and politicians, who did not take into account the needs of the disadvantaged children from lower socio-economic areas in Australia.

2.4.3 International experiences with high-stakes testing.

In discussing the research on the effects of high-stakes testing on teaching and learning, it is important to acknowledge the results of the implementation of high-stakes testing in other countries such as the United States and England. Lingard (2010) stated that “The Australian approach mirrors the rhetoric of high-stakes testing in the US and UK as mechanism for improving educational equity” (p.15). Lingard (2009) further discussed the effect standardised testing has had internationally, stating that in England the standardised test has resulted in a “de-professionalisation of teachers” (p.17) with reductive effects on schools, which results in it being difficult for them to achieve their goals. Moreover, Lingard (2009) commented that it is worth noting that Finland is achieving very high results in both the Organisation for Economic Co-operation and Development (OECD) and the Programme for International Student Assessment (PISA) testing, yet Finnish schooling continues to emphasise broad learning combined with creativity. Lingard (2009) reported that in Finland, “There is a real valuing of learning for all associated with schooling. Teachers have a considerable degree of professional autonomy. There is no high-stakes test” (p.17).

Several authors are in accord that NAPLAN has influenced the pedagogies employed by classroom teachers as they aim to ensure their students achieve acceptable grades, which are consequently published on the *My School* website (Belcastro & Boon,

2012; Lingard, 2009). As highlighted by Smeed et al. (2009) and Thompson and Harbaugh (2012), it is clear that high-stakes testing has had a major effect on the teaching and learning of mathematics for both teachers and students. These researchers discussed the extent to which NAPLAN has constricted the curriculum. Specifically, they have suggested that the high accountability to produce results above the national benchmark has placed pressure on teachers; consequently this has resulted in them focusing heavily on mathematics and English, creating a narrowed curriculum.

2.5 Negative Consequences Experienced by Stakeholders

NAPLAN has been established as high-stakes testing, and the pressure felt by stakeholders extends to the well-being of parents, teachers and students (Au, 2007). A number of authors have indicated that this testing procedure engenders a level of anxiety amongst the students (Bagnato & Yeh Ho, 2006) teachers (White & Anderson, 2012) and parents (Dulfler et al., 2012).

2.5.1 Negative consequences experienced by students.

High-stakes testing can have negative consequences on the well-being of students, including: a reported increase in anxiety (Huberty, 2010), increased physical and mental health issues (Bagnato & Yeh Ho, 2006), low self-esteem, and poor mathematical affect (Grieve, 2012). Huberty (2010) and Belcastro and Boon (2012) reported on the effects that high-stakes testing had on increasing the anxiety levels of students and Dulfler et al. (2012) presented findings on how this raised anxiety can have a direct effect on students' results. Research by Haladyna, Haas and Allison (1998), Grieve (2012) and Goodwin (1993) outlined that high-stakes testing can lead to enjoyment levels in mathematics and self-esteem being negatively affected. According to these authors, negative outcomes can often occur when children receive the results of the test. Further research by Carter (2012) and Davidson (2009) investigated how time restraints also contribute to the stress placed on students. They determined that children felt pressured to complete the test in the time frame set, this invariably resulted in some children not achieving their best results.

2.5.2 Student anxiety and performance in NAPLAN.

As previously outlined, the existing literature widely reports on the anxiety experienced by students through NAPLAN and how this anxiety affects students' performance (Belcastro & Boon, 2012; Dulfer et al., 2012; Huberty, 2009). Anxiety experienced by students results in; lower achievement levels, effects on physical and mental well-being of students and reduced enjoyment of mathematics classes. The literature highlights the importance of the students' voice being heard (Minarechova, 2012).

Huberty (2010) reported on the effects of high-stakes testing on the anxiety levels of students. He explored the effect these anxiety levels can have on the results students achieve; for instance, some students failing the test or not performing at their best even though they may know the material (Huberty, 2010). Belcastro and Boon (2012) presented reasons for the need for the student voice to be heard in a high-stakes testing environment. These authors argued that the understanding of students' perceptions and feelings for the test allows educators to incorporate effective strategies for students to improve the outcome and results of these tests. Providing students with strategies to complete the test will result in students feeling less anxious towards NAPLAN (Belcastro & Boon, 2012). Dulfer et al. (2012) stated that the dramatic shift towards improving performance in NAPLAN was having an impact on the personal well-being and educational experience of children. These researchers also found that over 90 per cent of teachers interviewed stated that their students showed signs of feeling stressed (Dulfer et al. 2012).

In another study, 1200 respondents commented on avoidance behaviours (for example, absenteeism), physical health issues and negative emotions like fear, and confusion exhibited by students (Dulfer et al. 2012), all indicators of negative affect. However, Dulfer et al. (2012) noted that when examining the impact of NAPLAN, over 40 per cent of children participating in the study did not feel that NAPLAN was a negative experience; they were in fact looking forward to undertaking the test. Prior to Dufler et al.'s (2012) research, O'Keefe (2011) discussed a number of the effects NAPLAN testing had on student mental health and well-being, the resulting argument being that little effort was being made to better understand how students feel about

NAPLAN testing. A search of the contemporary literature does not show that much is still being done in this space.

2.5.3 Anxiety in younger students.

The extant literature offers insight into the formalised testing of seven to eight year old children (Bagnato & Yeh Ho, 2006; Paris & McEvoy, 2000). Such formalised tests (and NAPLAN is no exception) are usually completed in a test-environment of desk rows, which is not typical of primary classrooms, and therefore can cause apprehension and anxiety (Bagnato & Yeh Ho, 2006). These authors commented on the repercussions of the standardised ‘test conditions’ children are placed in, which are not a natural context in an early childhood setting:

High-stakes testing procedures are decontextualised from the typical daily activities and routines of young children in home, center, classroom and community settings. Young children do not display their competencies by sitting quietly at tables, responding on demand. (Bagnato & Yeh Ho, 2006, p. 27).

Literature has noted that when young children are involved in testing, teachers should recognise the impact that high-stakes testing has on the well-being of these children. For instance, research by Paris and McEvoy (2002) (cited in Dulfer et al., 2012) reported that students can ‘freeze’, experience anxiety and suffer physical distress as a result of high-stakes testing. The evidence from a study conducted by Dulfer, Polesel and Rice, (2012) concluded that students reported feeling physically sick, experiencing sleeplessness, and engaging in bouts of crying, as well as psychological responses such as an inability to cope and experiencing feelings of inadequacy.

2.5.4 Anxiety in older students.

High-stakes testing also evokes anxiety in older students. Even though these students may have had more experience sitting a standardised test, they still experience anxiety as they understand the importance of achieving favourable results (Goodwin, 2012; Haladyna et al., 1998; Huberty, 2009). To illustrate, Huberty (2009) reported that up to 30% of students experience anxiety a condition often termed ‘test’ anxiety’ (p.

350). Because of such anxiety, students found it difficult to perform at their best, failing sections of these exams despite knowing the material. In turn, the diminished results of these tests could then lead to low self-esteem and a loss of motivation (Huberty, 2009). At the same time, teachers reported that students felt increasingly frustrated and distressed by sitting high-stakes test, specifically NAPLAN. There were also indications that students were physically sick and not wanting to come to school (Haladyna et al., 1998). Huberty (2009) further discussed the consequences for students completing high-stakes tests, stating that students were likely to experience anxiety when taking such tests and their ability to do their best would be impaired.

Researchers discussed how standardised testing can increase student anxiety about the testing experience, diminish the enjoyment of learning and reduce the value of the testing. Multiple commentators in the field stated that test anxiety is an enduring problem for between 25 – 30% of students sitting high-stakes tests (Grieve, 2012; Haladyna, Haas & Allison 1998; Huberty, 2009). Most of this anxiety is related to pressure to perform well on the test (Huberty, 2010). Grieve (2012) found that high-stakes testing such as NAPLAN can be a threat to both the well-being of children and the quality of their education. Further results in Grieve's (2012) study found that NAPLAN had the capacity to lower self-esteem, self-image and long-term confidence of underperforming students, thus widening the gap between them and their higher achieving peers. Prior to this claim Goodwin (2012) supported the negative effects high-stakes testing can have upon a student's wellbeing and self-esteem, stating that focusing on the results of testing may significantly decrease the motivation and self-esteem of children, and lead to premature labelling of children. This lowered self-esteem can then lead to poor achievement in tests which, in turn, can result in children not being provided with targeted learning opportunities for remediation or extension. Such misrepresentation of children through mismeasurement denies them their rights to beneficial expectations and opportunities (Neisworth & Bagnato, 2004). If students are misrepresented, teachers cannot effectively plan for their individual needs.

2.5.5 Effects of high-stakes testing on lower achieving students and students with special needs.

Researchers (Bagnato & Yeh Ho, 2006; Carter, 2012; Lingard, 2009) have commented on the inequities of high-stakes testing for lower achieving students. These students are disadvantaged as they are required to sit a 'one size fits all' test. The tests are not designed to the specific needs of these children. This generic testing also results in students with special needs not being able to display their true understanding of mathematical concepts which may lead to a lower self-esteem. Bagnato and Yeh Ho (2006) further noted that the items in high-stakes tests are discriminatory to children with some special needs. Specifically the test items have fixed stimulus characteristics and require response modes which cannot be exhibited by many children with sensory, motor, language and social behaviour limitation (Bagnato & Yeh Ho, 2006). Carter (2012) conducted research into the effects of the time restraints placed on children sitting the NAPLAN assessment. This research suggested that the time allocation of these tests has implications for the legitimacy of the NAPLAN results, as there was evidence that some students may not have had sufficient time to show what they could do, an issue which can be even more problematic for special needs, and lower achieving students. The challenging nature of NAPLAN was further explored by Davidson (2009) who posited that special-needs and low achieving students face major problems with NAPLAN as results indicate that this high-stakes test does not always bring out the students' best work.

Lingard (2009) deliberated that high-stakes testing can have a negative effect on the self-esteem of lower achieving students. The results for these students can be misinterpreted and not illustrate their true abilities. Instead of engaging in authentic learning, students are trained to try and improve test results. According to commentators, the outcome can be that schooling is reduced to little more than better test taking (Davidson, 2008; Lingard, 2009). High-stakes testing such as NAPLAN can shift the emphasis in schools to the product of student learning rather than to the process. Thompson and Harbaugh (2013) discussed the move from process to product, and that students from disadvantaged backgrounds achieve poorer results in this kind of environment.

2.5.6 Conclusion: Negative consequences experienced by students.

The anxiety felt by students sitting NAPLAN has been well documented by a range of researchers. Huberty (2010), Belcastro and Boon (2012) and Dulfer et al. (2012) all discussed how the physical well-being of students has been affected by NAPLAN. Haladyna et al. (1998), Grieve (2012), Goodwin (2012), and Lingard (2009) have all stated that this induced anxiety has resulted in a reported low self-worth and reduced enjoyment of the mathematics learning area by students when sitting the test and receiving the results. Carter (2012) and Davidson (2009) referred to the qualitative and design-related flaws of the test. These flaws included high level of literacy involved in the numeracy test, the unclear instructions on how to complete each section of the test and ambiguous nature of the questions. These scholars argued that the test itself does not provide the opportunities for children to effectively display their mathematical knowledge and understanding, but rather it has contributed to the anxiety experienced by students. NAPLAN does not make any allowances for the requirements of students with special needs, and they are expected to sit the test in the same conditions as all children.

2.5.7 Negative consequences experienced by teachers.

The anxiety associated with NAPLAN is not confined to students. Educators have testified that they experience elevated levels of anxiety amongst teachers associated with implementing high-stakes assessments (Minarechova, 2012). Research has highlighted the causes of these anxieties as being; increased workloads, reduced teacher satisfaction and pressure to produce high test scores (Dulfer et al., 2012; Klenowski & Wyatt-Smith, 2012; White & Anderson, 2012). Smith (1991) and Haladyna et al. (1998) reported that educators also feel a sense of guilt and apprehension regarding their ability to successfully prepare students for the test. This anxiety is directly linked to the publication of the test scores and the pressure to reach the benchmarks imposed by governments (Anderson, 2009).

White and Anderson (2012) reported that systems, principals and teachers feel pressured to prepare students for the test and achieve good results, particularly given the published data on the *My School* website. Dulfer et al. (2012), confirmed the feeling of

anxiety in educators stating that educators were making reference to the growing work pressures, higher work load, narrowing pedagogy and diminishing time for quality teaching and learning. This anxiety was due to NAPLAN results being linked with funding and decision making, and improving scores had increased pressure on classroom teachers (Dulfer et al., 2012). Smith (1991) reported on the dialogue occurring amongst teachers required to implement high-stakes testing. Smith (1991) stated that the publication of test scores produced feelings of shame, embarrassment, guilt and anger in teachers, as well as the determination to do what was necessary to avoid such feelings in the future. To illustrate, Smith (1991) recorded how teachers discussed how the publication of these results impacted on their confidence and enjoyment of teaching mathematics.

2.5.8 Anxiety regarding teachers' preparation of students.

It is evident when examining the current literature, that teachers experience anxiety in preparing their students for standardised testing. Such anxiety includes feelings of inadequacy and guilt regarding preparing the students effectively for high-stakes tests (Smith, 1991). Teachers also expressed disappointment in having to alter preferred teaching strategies in order to successfully prepare students successfully (Wilson & Hornsby, 2014). Smith (1991) not only commented on the feelings of guilt and concern from teachers as to whether they had prepared their students sufficiently well for high-stakes tests but also feelings of guilt around the test conditions, and the stresses they were placing on the students. To this end, Smith (1991) stated “teachers displayed concern for the emotional impact of testing on young children which can generate feelings of anxiety and guilt among teachers” (p. 9). Teachers can experience anxiety and frustration in implementing teaching strategies that they are aware are not always the best option for individual students in their class. In adhering to the pressure to achieve high NAPLAN scores, teachers were feeling the pressure to spend more time teaching literacy and numeracy and on focusing on teaching students how to complete the test. Teachers also felt that unfavourable results from high-stakes testing were being used against them (Smith, 1991). Haladyna et al. (1998) observed that teacher anxiety is heightened when the standardised test is the sole gauge of students' learning. When

scores on the standardised tests were lower than expected, teachers were often under pressure from parents to explain their teaching strategies. Such pressure can lead to teachers feeling disillusioned with their own teaching (Haladyna, 2017). Even though teachers know that these scores can be a misrepresentation of students' abilities, they felt ineffective in countering the media attention feeding parental expectations.

Klenowski (2009) reported that one unintended consequence of NAPLAN was the frustration teachers experienced through feeling their professional expertise, knowledge and understanding of each student, along with their teaching methods, were undermined. Further anxiety was caused for teachers in dealing with students from different cultures who were inhibited by their language deficiencies, and teachers felt these students' results were not a true measurement of their ability. Teachers were requesting that the results of these children should not be compared with children who had a strong understanding of the English language and that cultural differences should be taken into account, but this request was unheeded. A study conducted by Haladyna (2017) found that teachers responded to the pressure of ensuring their students perform well on the NAPLAN test in two ways specifically:

Teachers seem to be divided roughly into two camps. Both camps admit that the tests reflect poorly on what they teach and how well they teach. Unfortunately, the first camp may resort to some type of strategy to improve student performance on invalid tests, even to the point of cheating. Members of the second camp merely ignore the test and teach according to their beliefs. The second group, while having to endure criticism for low test scores, may still be more satisfied (p. 270).

The literature indicates that teacher anxiety manifests in many ways; teachers are concerned about their abilities to prepare children for NAPLAN, the alteration of teaching strategies, and the narrowing of the curriculum. This anxiety extends to teachers feeling over-worked and under pressure, which results in teachers responding in two ways. They alter their pedagogies and in effect teach to the test, or ignore the test altogether with no acknowledgement of test scores.

2.5.9 Increased teacher anxiety through accountability.

The increased accountability placed on teachers through mandated high-stakes testing has also resulted in teachers experiencing further anxiety (Huberty, 2010; Minarechova, 2012; Smith, 1991; Wilson & Hornsby, 2014). Teachers have been placed under pressure by governments and school leadership teams to ensure their classes perform above the national average (Anderson, 2009; Carter, 2012; Lingard, 2009; Minarechova, 2012; Smith, 1991). Anderson (2009) supported these sentiments by stating that school systems and teachers are feeling obliged to 'teach to the test' as they become concerned about their students not "measuring up and achieving the minimum standards" (p. 65).

Dulfer et al. (2012) and Smith (1991) both wrote that the pressure and anxiety experienced by teachers had resulted in them changing their pedagogies and trying to fulfil the requirements of the test to achieve high test scores. Haladyna et al. (1998) and Klenowski (2009) suggested that the changes in pedagogy could indicate that teachers are experiencing a crisis of faith in their own teaching abilities, and hence are changing their approaches and the content they teach in mathematics.

2.5.10 Conclusion: Negative consequences experienced by teachers.

Negative consequences experienced by teachers are namely; increased workloads, a lower job satisfaction, a feeling of not preparing students affect for NAPLAN and the increased pressure of scores published. (Dulfer et al., 2012; Smith, 1991; William & Hornsby, 2014). Kenowski (2009) also pointed out that teachers felt that their classroom knowledge and expertise were not being consulted in the implementation and writing of NAPLAN tests.

2.6. Changes in Pedagogy in Preparation for NAPLAN

2.6.1 Narrowing and distortion of the curriculum.

A review of extant literature revealed that the anxiety and pressure educators are facing in implementing high-stakes testing has manifested into teachers altering their pedagogies and narrowing the curriculum to focus mainly on mathematics and English.

Thompson and Harbaugh (2013), Goodwin (2012), and White and Anderson (2012) all reported that teachers were focusing on the teaching and learning of mathematics and English to the exclusion of the social sciences and arts. These researchers also reported that teachers widely use the practice of implementing sample tests in their preparation for NAPLAN.

The notion of a narrowed curriculum is further explored by White and Anderson (2012) in their discussion of how national testing can lead to “shallow teaching and a narrowed curriculum” (p. 60). They posited that the publication of the results on the *My School* website left teachers feeling the pressure to teach to the test in ensuring the students are well prepared and consequently achieve desired results. The awareness of the narrowing curriculum is supported by Dulfer et al. (2012), who claimed that the curriculum was narrowing as teachers were only focusing on subjects that are tested through NAPLAN. Subjects that were not tested in NAPLAN received reduced importance and led to a timetable reduction in schools. (Dulfer et al., 2012). According to those authors it is clear that teachers were (and probably are), paying greater attention to teaching subjects that were nationally tested.

Compulsory testing in Australia has the potential of focussing teachers’ efforts towards preparing students for the test by using past papers for practice, and limiting learning to technical support, such as how to fill in answers (Nisbet, 2004). The research of Wilson and Hornsby (2014) supported this claim, suggesting that teachers of Years 3, 5, 7 and 9 are required to present practice tests to their students for an extended period of time before the test. In addition, these authors make a concerning proposition that children in composite classrooms, (classrooms that consist of multiple year groups), may be left to complete ‘busy work’ while these tests are being administered to students in NAPLAN years. Dulfer et al., (2012) conducted a study into the effects of NAPLAN tests. One of the findings outlined how NAPLAN preparation was taking up a considerable amount of class time and that teachers were focusing on numeracy and literacy at the peril of other curriculum areas which are not tested. Perso (2011) presented a dilemma facing most mathematics teachers:

getting the balance right of preparing students for NAPLAN and not teaching to

the test. There does, of course, need to be some balance in how we do this: spending inordinate amounts of time ‘preparing for the test’ created another set of problems. However, if the preparation is embedded in the mathematics program of the school, where students are taught and required to clarify contexts and situations make choices about the mathematical models, tools and strategies needed, and to critique their own mathematical choices as well as those of others, we will not only be improving their numeracy capability but also their mathematics skills and understandings. (p. 35).

Perso (2011) also highlighted that teachers need to make the right decisions about the pedagogy they implement to ensure students would improve their mathematical skills through self-evaluation. Perso’s (2011) research suggested that the change of pedagogies executed by teachers in the lead up to NAPLAN was not all negative for students. Whilst preparing students for NAPLAN through practice tests, teachers could teach children not only the necessary problem solving skills to successfully complete NAPLAN, but also problem solving strategies which could be more broadly applied.

2.6.2 The impact of test practice and changing pedagogy.

Various researchers have described how classroom pedagogy has been altered by the implementation of practice tests in the preparation for high-stakes testing (Minarechova, 2012; Smith, 1991; Thompson & Harbaugh, 2013). Wilson and Hornsby (2014) discussed that many teachers in Years 3, 5, 7 and 9 were required to give practice tests items to their students for numerous weeks prior to the tests perhaps to the detriment of good pedagogy and the prescribed curriculum. Thompson and Harbaugh (2013) investigated teacher perceptions of the effects of NAPLAN on curriculum and pedagogy and indicated that teachers perceived high-stakes testing impacted curriculum pedagogy in a number of ways. Smith (2016) found some indication that teachers spend excessive time practicing NAPLAN tests at the expense of other curriculum areas.. Smith (2016) further indicated that high-stakes testing had actually widened the gap between high and low achieving schools, students in low education status, and about one-and-a-half to two years behind their higher education status. Thompson and Harbaugh (2013) also found that teachers were narrowing their curriculum and spending

less time on curriculum areas not assessed by NAPLAN and that this was having a flow-on effect to the authenticity of children's learning. These authors stated:

Teachers are reporting that they are either choosing or being instructed to teach to the test, that this results in less time being spent on other curriculum areas and that these effects contribute in a negative way to the class environment and the engagement of students. (Thompson & Harbaugh, 2013, p. 299).

Barrett (2009) summarised the frustration of many teachers involved in a NAPLAN classroom when writing that, many teachers feel that their ability to choose appropriate pedagogy was restricted by their need to address the content for tests rather than individual learning needs. Several researchers have suggested that it is common practice for teachers to employ sample tests in preparation for NAPLAN (Barrett, 2009; Dulfer et al., 2012; Jones & Hargrove, 2003; Nisbet, 2004; Perso, 2011; Ryan & Weinstein, 2009; Wilson & Hornsby, 2014). Dulfer et al. (2012), confirmed that teachers encouraged practicing the tests at least three times a week, with some teachers allowing students to practice more than six times in the final weeks prior to NAPLAN. The report also discovered that practicing tests was more prevalent in primary schools than in secondary schools.

2.6.3 International experience of teachers with high-stakes testing.

Research supports the notion that there is a negative effect in schools where countries have implemented high-stakes testing (Lingard, 2009; Ryan & Weinstein, 2015; Thompson & Harburgh, 2013). Authors concluded that international research suggests that high-stakes testing in schools can have a negative impact on the pedagogy of teachers in countries which use this method of assessment (Thompson & Harbaugh 2012). In countries including the United States of America and England, teachers perceive they are required to change their teaching style and implement uncondusive strategies for early childhood or primary classrooms (Barksdale-Ladd & Thomas 2000; Ryan & Weinstein, 2015; Thompson & Harburgh, 2013).

There is further evidence that teachers in the United States of America England, alter not only the content that they are teaching in preparation for high-stakes testing,

but also the style in which they are presenting the information. Ryan and Weinstein (2009) reported that the Australian experience is supported by studies in the USA, which demonstrated that teachers who feel pressure to produce students 'up to standards' were more likely to use lecturing styles, directing, and praise/criticism teaching techniques.

2.6.4 The positive side of high-stakes testing.

Much of the extant literature predominately focused on the negative aspects of high-stakes testing. However, there is research that reports on the positive effects NAPLAN can have on the teaching and learning of mathematics. Perso (2011) explored some positive possibilities which arise from NAPLAN. She discussed that NAPLAN can be used to balance a curriculum through analysis of the results. Perso (2011) also stated that if the students' preparation for NAPLAN is embedded in the mathematics program of the classroom, the teacher need not change the pedagogies implemented or the content taught. Perso (2011) extended this idea by discussing how the curriculum can in fact be broadened by better use of the results. Perso (2011) stated that if teachers and schools use the results as data to inform their teaching and learning programs, this could inform their curriculum and planning and allow schools to cater further for individual needs "use the results as assessment for learning rather than of learning" (p. 35). Anderson (2009) supported the view that NAPLAN can have a positive effect on the teaching and learning of mathematics through the provision of opportunities to use quality teaching strategies for test preparation. Anderson (2009) suggested that through discussion of the test items, strategies of critical and creative thinking can be taught resulting in increased student confidence and self-esteem, allowing students to feel more in charge of their own learning. Perso (2011) and Anderson (2009) have asserted that the practice of sitting in a high-stakes formalised test can have a positive effect on students as it equips them with the skills to complete standardised tests that they will encounter in secondary and tertiary education. These authors further explored the notion that discussing the content of NAPLAN can encourage critical and creative thinking amongst the students and inform the teacher's planning (Anderson, 2009; Perso, 2011).

2.6.5 Conclusion: Changes in pedagogies in preparation for NAPLAN.

There are a number of effects on the pedagogies of teaching mathematics in year levels where NAPLAN is implemented. Thompson and Harbaugh (2012), and White and Anderson (2012) have all discussed how the implementation of NAPLAN can result in a narrowing of the curriculum. In turn, this narrowing can result in teachers adopting a teacher-centred style causing them to feel restricted in the strategies they can employ when teaching mathematics (Barrett, 2009; Ryan & Weinstein, 2009; Thompson & Harbaugh, 2013). However, Anderson (2009) and Perso (2011) counter such claims with an argument that NAPLAN can have some positive effects on the teaching and learning of mathematics by offering young students the opportunity to experience formalised testing which will prepare them for their future academic lives. Anderson (2009) and Perso (2011) also suggested that there is an opportunity for teachers to encourage critical and creative thinking in students by discussing the content of NAPLAN.

2.7 Parental Perceptions of NAPLAN

Although there appears to be scant literature pertaining to parental perceptions of NAPLAN, the small amount of evidence available concludes that overall, parents favour NAPLAN testing and many parents have found it to be an informative resource in explaining their child's progress in mathematics (Dulfer et al., 2012). Dounay (2000) suggested that parents' perception of NAPLAN may be affected by media reports. Media reports may increase the anxiety felt by parents in relation to NAPLAN, as the importance of NAPLAN is often magnified for the sake of impact. Dounay (2000) surmised that parents can also develop a sense of confusion, due to the difference in school reports and standardised test results. This research also discovered that parents noted children's anxiety regarding the testing which manifested into physical symptoms (Dounay, 2000).

The Whitlam Institute (Dulfer et al., 2012) published a comprehensive report examining the impact that high-stakes testing has on students' schools and families. The report found that a small majority of parents (56%) were in favour of NAPLAN. Approximately 70% of parents found the information provided by NAPLAN useful and

40% of parents found that their children exhibited indicators of stress or anxiety. This stress or anxiety manifested itself through: children having a fear of ‘freezing’ up during the test, students having a fear of parental reaction to the test results and students experiencing sleeplessness, feeling sick and crying (p. 4). Dulfler et al. (2012) also reported that 17% of parents visited the *My School* website in order to compare their school results with other schools in the same area.

Barksdale-Ladd and Thomas (2000) conducted a study based on parental perceptions of high-stakes testing in the United States of America. They reported that parents were affected by the media reports associated with national high-stakes testing stating that negative headlines “...describing and decrying failing test scores must lead parents to questioning their children’s schools” (p. 386). Furthermore, these authors concluded that parents had a limited understanding of the actual test and only knew the major tests by their acronym (Barksdale-Ladd & Thomas, 2000). Most parents had only learnt about the tests from their children’s teachers and some had read about the tests in the newspaper.

When discussing high-stakes testing in the United States of America, Dounay (2000) stated that many parents, as well as the general public, doubted the integrity of the tests when the state assessment scores did not match the grades or achievements measured by other tests. According to this research, parents also communicated their disbelief - when according to local media reports - one in five students failed the state’s mathematics assessment. (Dounay, 2000). This issue of the media being the primary source of information on a state’s achievements was discussed by Freeman, Mathison and Wilcox (2015). These authors commented on how assessment-based accountability is reflected through the test scores, which were used by the state, and circulated through the media, to create images of successful and failing schools and school districts. This arrangement questioned the objectives of accountability systems, which are at the centre of the relationship between parents, teachers and schools. Barksdale-Ladd and Thomas (2000) and Dounay (2000) all suggested that parents were affected by negative media reports and questioned the validity of the tests. These commentators also commented on the confusion parents felt about the results when they did not match the achievements

students were receiving in school reports (Freeman, Mathison & Wilcox, 2006).

2.7.1 Conclusion

Researchers have outlined the influence NAPLAN has on the teaching and learning of mathematics in primary classrooms. The first theme outlined why NAPLAN is considered a high-stakes assessment and how, subsequently, the high-stakes nature increased the accountability for mathematic teachers. The literature also presented evidence that the high-stakes nature of the testing has resulted in a narrowing of the curriculum as teachers spend more classroom time on subjects on which NAPLAN is based. Also highlighted is the perceived negative effect NAPLAN testing has on student achievement.

The second theme focused on the negative experiences experienced by teachers and students due to the administration of NAPLAN. An extensive amount of literature has documented the impact NAPLAN has had on the physical well-being of students. The pressure placed on stakeholders and anxiety induced through the administration of NAPLAN is exacerbated by the publication of results on the *My School 2.0* website. The anxiety felt by teachers translated chiefly to feelings of guilt, concerned that they had not prepared their students sufficiently well for the test.

The third theme explored how adjustments to pedagogical practice have been made by classroom teachers in preparing students for NAPLAN tests. Specifically, these adjustments caused teachers to plan highly structured mathematics lessons, but at the same time reduced the opportunity for students to use higher-order thinking skills. The notion of a narrowing curriculum highlighted class time being spent increasingly on literacy and numeracy and moving away from interdisciplinary subjects and project-based learning. Consequently, teachers reported feeling the need to teach content for the test rather than basing their teaching on the educational needs and interests of children. Literature also pointed towards the potential for NAPLAN to have a positive effect on the teaching and learning of mathematics. According to Anderson (2009) and Perso (2009), if the preparation for the test is embedded into the classroom mathematics program then teachers can extend the strategies they employ to problem solving. These

scholars also suggested that engaging children in practice tests raises both their level of confidence and test results overall.

There is limited literature on the theme of parents' perceptions of NAPLAN. Notably, some researchers discussed the anxiety that parents noticed in their children during NAPLAN testing time. Specifically, evidence pointed to the media having some effect on parents' perceptions of NAPLAN (Freeman, Mathison & Campbell-Wilcox, 2015). Seemingly, the constant media attention reporting on poor standards achieved by schools has confused parents. According to research, (Dounay, 2000; Freeman et al., 2015), some parents have expressed feelings of confusion when comparing the school report results with standardised test results, especially when there are discrepancies between them. Dulfer et al. (2012) revealed that overall, parents were in favour of NAPLAN and found the information presented by ACARA to be useful.

This chapter has framed the current research investigation by drawing on extant literature across the following themes; high-stakes testing, changes in pedagogy, parental perceptions of NAPLAN and negative consequences experience by key stakeholders. Chapter Three will outline the design of the research implemented in this study.

CHAPTER THREE – DESIGN OF THE RESEARCH

3.1 Introduction

The purpose of this study was to investigate how the teaching and learning of mathematics has been affected by the implementation of national high-stakes testing through NAPLAN. The previous chapter examined the literature relevant to the effect NAPLAN has had on the teaching and learning of mathematics from the perspective of the three main stakeholders: students, teachers and parents. This study explores stakeholders’ perspectives of NAPLAN and is qualitative by design. The theoretical framework is explained in Table 3.1.

Table 3.1

Design of the Research

<i>Design of the Research</i>	
Theoretical Framework	Epistemology Qualitative approach
Theoretical Perspective	Phenomenological
Methodology	Intrinsic case study
Research Methods	Semi-structured interviews Researcher-generated field notes
Research Participants	Students teachers and parents from Years 3 & 5
Trustworthiness	Source of participants
Data Analysis	Compartment of data analysis interactive model

3.2 Theoretical Framework

The theoretical framework associated with this research (epistemological approach, theoretical perspective, methodology and methods) is illustrated in Figure 3.1.

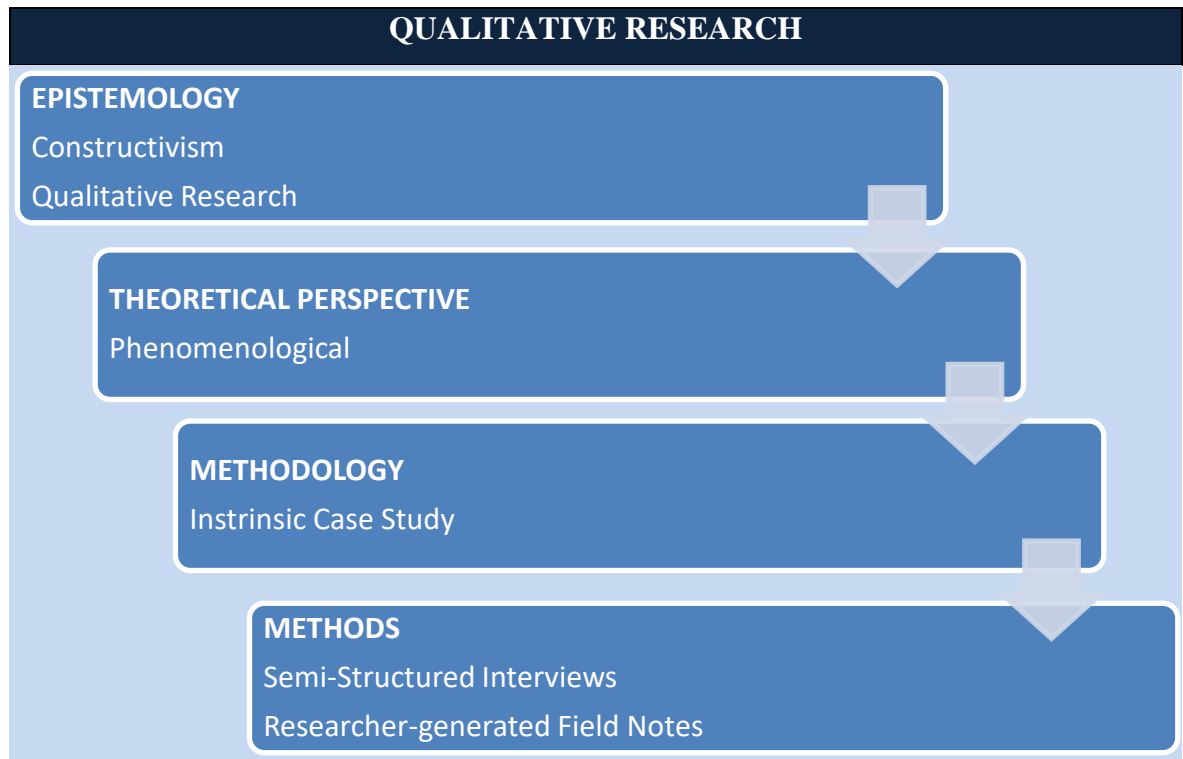


Figure 3.1 *Design of theoretical framework adapted from Crotty (1998)*

3.2.1 Epistemology.

Epistemology is the theory of knowledge embedded in the theoretical perspective and thereby in the methodology. According to Crotty (1998), it is a way of discerning which kinds of knowledge are possible and how we can ensure that knowledge is genuine. Epistemology is also considered the meaning that is constructed when humans interact with the world around them. (Crotty, 1998).

3.2.2 Constructivism.

Williamson (2006) referred to constructivism as ways in which people construct their worlds. Constructivist researchers investigate constructions or meanings about

broad concepts; such investigations can focus on individual, personal and shared meanings that could reflect social constructions. The constructivist approach enables the meanings or perspectives of participants to be studied in-depth, and their particular words to be used to convey their meanings directly to the reader. Ways of thinking about the issues associated with NAPLAN, that the researcher has not previously entertained, can emerge through listening to the perspectives of the different stakeholders. Constructivism describes how humans engage with objects in the community and making sense of them and it suggests that each person's view of making sense of the world is valid and should be respected (Crotty, 1998). NAPLAN has become a social and societal issue that affects individuals. It is hoped that by employing the phenomenological approach, the researcher will place emphasis on people developing meaning for their activities together (Williamson, 2006). Once these roles are determined, NAPLAN may be better implemented for the benefit of all key stakeholders. Constructivism is typically seen as an approach used in qualitative research. (Creswell, 2014).

3.2.3 Qualitative approaches.

As this research dealt with personal experiences and reflective responses of participants involved in NAPLAN testing, it was important to use a qualitative approach that allowed the human elements of the research to be investigated. Specifically, the research dealt with participants' experiences and emotional responses to the NAPLAN testing situation, and reactions upon receiving the results. An advantage of using a qualitative approach is that it allows the researcher to be flexible during an interview and to ask probing questions. This approach allowed the researcher to encourage all participants to expand upon and explain the answers supplied. It also provided an opportunity for the participants to express their own experiences with NAPLAN. The qualitative methods of data collection employed in this study included semi-structured interviews and researcher-generated field notes.

3.3 Theoretical Perspective

3.3.1 Phenomenological approaches.

According to Crotty (1998), the theoretical perspective is the reason for a chosen methodology. A phenomenological approach was chosen for this study as phenomenology requires researchers to engage with phenomena in their world and to question accepted understandings of those phenomena. In line with the phenomenological approach, the researcher attempted to develop a fresh perception of a concept (Crotty, 1998). In this study, participants were required to reflect on, and question the notion of standardised testing as they experienced the phenomenon of NAPLAN testing. Due to NAPLAN being a Federal Government initiative, the participants involved in the case study have little choice but to be involved in this form of high-stakes testing.

Phenomenological research attempts to reveal meaning and to understand how that meaning is connected to a person's life experience (Stringer, 2008). The relationship between NAPLAN and the participants' life experience is paramount in this particular study, as it is the goal of this researcher that the findings will display how NAPLAN effects each of the stakeholders. According to Robinson and Mendelson (2012), phenomenological research has influence when used in multiple-participant research projects, as it allows the potency of one participant's reflection to gain strength if it is repeated throughout many contributors.

A variety of research methods can be employed using a phenomenological approach, including participant observation, action research, focus meeting and analysis of personal practice (Stringer, 2008). This research employed semi-structured interviews, and researcher generated field notes within the interviewing process itself. Due to time constraints and the large volume of data required, it was important that the researcher maintained some structure in the interviews. However, it was equally important to allow the participant to speak freely without being influenced by the pre-determined thoughts of the researcher. Empathy with the participants was critical to obtaining responses which were as honest and forthright as possible. Finally, "phenomenological approaches are good at surfacing deep issues and making voices heard" (Lester, 1999, p. 4). A phenomenological approach was appropriate to this

research. The results may not be in alignment with what policymakers expect or desire, but it is vital that the individual voices of those most affected are heard.

3.4 Methodology

3.4.1 Case study.

Qualitative case studies require researchers to spend considerable amounts of time on site, personally engaging in activities and operations of the case, reflecting, and revising descriptions and meaning or occurrences (Stake, 2007). According to Yin (2009), the case study can be anything that is a perception applied to a real-life context. Additionally, using a case study is appropriate in qualitative research as explanations or interpretations are complex and may be in the form of an unfolding plot or a narrative about particular people or specific events (Neuman, 2006). This research was based on an intrinsic case study. Stake (1995) suggested that intrinsic case studies can be used by researchers who have a genuine interest in the case. It is undertaken not because the case represents other cases, but because the case itself is of interest. This research was conducted in one Catholic primary school in a low socio-economic area as defined by the *My School* website. The school was classed as triple stream; that is, there were three classes of each year level. This school was of particular interest to this researcher as she had held numerous teaching and leadership roles within Catholic Primary schools. Through the exercise of an intrinsic case study, the researcher was able to determine similarities, differences and patterns regarding NAPLAN in the mathematics classroom.

3.5 Research Methods

The research methods applied in this study were qualitative interviews through face-to-face questioning and research-generated field notes.

3.5.1 Qualitative interviewing.

Qualitative interviews were conducted through a semi-structured approach between the researcher and the participants. All participants were interviewed under similar conditions. Each participant was interviewed in a private office on the school grounds. This privacy allowed participants to express their opinions and experiences

freely and in their own language. Each participant was allowed as much time as they required to expand on their answers and share their involvement in NAPLAN.

This research used naturalistic sampling which is defined as the principle that researchers should examine events as they occur in natural, everyday ongoing social settings (Neuman, 2006). The location of the data collection was important to this research, as it was vital that all participants including some very young children, felt comfortable in a non-threatening, familiar environment. The research sought to provide an opportunity for the participants to state their experiences and their perceptions of the challenges associated with being involved in NAPLAN testing.

3.5.2 Semi-structured interviews.

Interviews were the primary method used to collect data. This research was conducted through individual, face-to-face interviews with the key stakeholders; students, teachers and parents. According to Hannan (2011), the aim of interviews is to prompt information about attitudes and opinions. The chosen form of interview for this research was a semi-structured interview. This type of interview requires the researcher to design a set of questions to be raised before the interview takes place. It allows a considerable degree of flexibility to be built into the interview and allows new topics to be incorporated into the interview which may naturally unfold through the ensuing conversation.

Neuman (2006) stated that face-to-face interviews have the highest response rates and permit the longest responses. Face-to-face interviews allow a personal connection with the participants. Such a connection was essential in this research as the children, in particular, had to feel comfortable in order to give clear and honest responses. Before the actual questions were administered the researcher spent a small amount of time allowing the student participants to become familiar and feel safe. Dealing with very young children, at times, required statements such as “Any other reasons?” and “Can you tell me more about that?” Using such statements encouraged the student participants to extend their answers. It was also important for the researcher to develop a strong rapport with the parents and teachers again to ensure honest and detailed responses were attained, without fear of recrimination.

The researcher was also aware of some of the pitfalls associated with face-to-face interviews (Neuman, 2006). The issue of interview bias can be a major issue when conducting face-to-face interviews. The appearance, tone of voice, and wording of questions, of the interviewer may affect the respondent. It was a deliberate decision by the researcher to attempt to present an unbiased view of NAPLAN. The researcher used probing questions during the semi-structured interviews which encouraged participants to expand on their answers (Neuman, 2006).

It was deemed beneficial for the participants to have prior knowledge as to the information being sought by the researcher. Therefore, some participants were given the questions prior to the commencement of interviews. This foreknowledge afforded the participants an opportunity to reflect on their feelings and thoughts about the issues being discussed. In order to obtain accurate information, it was important for the researcher to develop empathy with the interviewees and gain their confidence and to be unobtrusive, so as not to influence the participant. Even though the semi-structured interview approach allows extended discussion, it was important for care to be taken not to lead questions or suggest outcomes (Hannan, 2011).

All interviews were digitally recorded so that the exchanges could be transcribed and analysed. Interviews were recorded using a mobile phone with a recording device, so as not to intimidate the participants. Respondents were made aware before the commencement of each interview that the exchange was being recorded. It was important for the researcher to consider that those being recorded might be reluctant to elicit their true thoughts.

3.5.3 Researcher-generated field notes.

Hannan (2011) suggested that researcher field notes, in conjunction with tape recordings can increase the accuracy of the data collected. To obtain an accurate representation of participants' responses, the researcher took field notes during the interview to record any important aspects discussed so as to facilitate finding them on the digital recording. Babbie (2016) supported the view that field notes can contribute to the accuracy of data collected. He suggested that notes should be reviewed and interpreted as soon as possible after the interview to confirm the accuracy of the data.

Babbie (2016) also reported on how field notes can add trustworthiness to the collected data as they can support the recorded data. The field notes were used by the researcher to expand on the responses of the participants. It was important for the researcher to write immediate responses from the participants to ensure the answers were recorded *verbatim*. On this point, Stringer (2004) warned researchers “to be wary of paraphrasing or abstracting, as this defeats the purpose of interviewing” (p. 73). The researcher in this study re-read the field notes to the participant to ensure the “voice” of the participant was recorded correctly.

3.6 Bracketing

Bracketing is an element of phenomenology that can enrich data collection, findings and analysis. The aim of bracketing is to allow the researcher to maintain self-awareness as part of the ongoing research in a study (Tufford & Newman, 2010). According to Gearing (2004), bracketing comprises three main phases: abstract formulation, research praxis and reintegration. The initial phase, abstract formulation requires researchers to have clarity in their epistemological approach. In this study that position is a phenomenological interpretivist approach (Gearing, 2004). The second phase in bracketing is the research praxis which involves the researcher abandoning any preconceived notions and preconceptions in the study. The researcher should attempt to keep his or her own judgements at bay, and in this study the personal experiences and preconceived ideas of NAPLAN were set aside (Gearing, 2004). Reintegration is the third component of bracketing, and it “focuses on the subsequent reinvestment of the bracketed data into the larger investigation” (Gearing, 2004, p.1434). The reintegration component was implemented into this study as the researcher refrained from allowing personal ideas to fuse with observations as interpretive conclusions were developed. Additionally, the researcher allowed the data to be reported accurately within the findings (Bendall, 2006).

Bendall (2006) raised the challenge that occurs in a phenomenological inquiry, stating that the researcher must allow the voice of the respondents to emerge authentically throughout the data collection and to not be influenced by the researcher’s personal accounts. Within this study, the researcher was cognisant of allowing the

accurate voices of the stakeholders to be heard. Tufford and Newman (2010) referred to keeping memos throughout the data collection as a method of bracketing, allowing the researcher to examine and reflect upon the attainment of the data. During this study, the researcher wrote memos throughout the data collection process to record detailed observational comments. Keeping a record of such comments allowed the researcher to reflect on the methods of data collection and the data itself, ensuring that personal bias was removed.

3.7 Research participants.

There were three groups of research participants for this intrinsic case study, namely: students, teachers and parents. These participants were chosen as they were deemed to be the main stakeholders to be affected by NAPLAN. The parents, children and teachers involved with Year levels 3 and 5 formed the participant group of the research. Of the twelve children selected, six were in Year 3 and six in Year 5. These students were selected based on their academic ability; students achieving results higher than year level, students achieving at the intended target of the year level and students achieving below intended target for that year level. One parent of each child was interviewed and the teachers from Years 3 and 5 were also interviewed. The interviews were conducted on an individual basis within each group of stakeholders. Interview transcripts were allocated a letter and number in order to be de-identified and to ensure anonymity.

3.8 Timing

Children were interviewed one week after completing the NAPLAN test. Interviewing the children at the time NAPLAN had been implemented allowed the researcher to explore the level of anxiety the test induced, and the extent to which the test had affected the children's enjoyment of learning mathematics. The students were interviewed again once the NAPLAN results were released. These interviews were to determine if the results had affected their self-esteem and their belief in themselves as mathematicians.

Teachers in Years 3 and 5 were interviewed at the beginning of school Term 2 to ascertain their feelings about NAPLAN preparation. The research aimed to determine if

the impending NAPLAN test had altered teachers' regular mathematics lessons, and if they felt increased pressure for their students to perform. Interviews were conducted with teachers once the NAPLAN results were released. The researcher determined if the relationship with parents had been affected by the results, and whether the teachers had been under scrutiny from the principal and leadership team. The researcher also aimed to establish via interviews if the teachers felt that the NAPLAN results indicated the true ability of the children in their class.

Parents were interviewed the week after the students had been interviewed. The purpose of this timing was to discover the parents' understanding of the NAPLAN test and if their opinion and relationship with the teacher had been affected by the results. Interviews were also used to resolve if they thought the information on the *My School* website affected their decisions about their child's schooling.

3.9 Trustworthiness

When undertaking qualitative research, trustworthiness needs to be established to ensure the research is not biased and does not in fact reflect the values of the researcher. (Crotty, 1998; Guba & Lincoln, 1994; Stringer, 2008). The trustworthiness of this study was enhanced by including a variety of stakeholders within the participant group. For the data to be considered trustworthy, it was important that the participants felt supported and secure in giving their responses without fear of being identified. The researcher ensured that ethical practices were employed with the participants, particularly as young children were involved in the research (Stringer, 2008). Data were collected through a personal electronic device and were securely stored to ensure the confidentiality of the responses. Guba and Lincoln (1994) outlined that there are four main components to ensuring trustworthiness in a study; namely, credibility, transferability, dependability and confirmability. The trustworthiness of this study will be discussed under these headings.

3.9.1 Credibility.

Credibility refers to the plausibility and integrity of a study (Crotty, 1998). According to Mills (2003), the credibility of a qualitative study refers to the extent to

which the researcher has been able to “take into account all of the complexities that present themselves in a study and to deal with patterns that are not easily explained” (p. 78). Ensuring credibility of research is an essential part of qualitative research. It is imperative to guarantee that the research methods implemented actually serve to answer the intended questions (Shenton, 2004). This study maintained credibility by applying triangulation which involves the use of multiple and different sources (Stringer, 2008). The use of triangulation enabled the inquirer to clarify meaning by identifying ways the phenomenon is being perceived (Stake, 2005). The data were considered credible, as they gave perspectives from the three key stakeholders in NAPLAN namely: students, parents and teachers. These stakeholders gave an insight into multiple and different sources’ viewpoints on their experiences with NAPLAN.

3.9.2 Transferability.

Transferability refers to the extent to which the results of a study can be applied to a wider population (Mills, 2003; Shenton, 2004). Guba and Lincoln (1994) discussed that it is the responsibility of the researcher to ensure enough information about the context of the study is collected to be confident that inferences can be made about the transferability of the data collected. This study was undertaken in one metropolitan Catholic primary school, and it could be assumed that the context of the testing is similar to other schools in the state. The uniformity of the test conditions could be assumed, as the governing body (ACARA) provides clear testing protocols. The data transferability can also be enhanced as all schools in Australia have their results published on the *My School* website. Stringer (2008) pointed out that for a study to have transferability, other audiences must be able to understand the nature of the context and the participants. NAPLAN is implemented throughout Australia in all schools. Therefore, this study may have transferability for educational settings which have a similar system or demographic to that in Australia. As NAPLAN is based on a model of standardised testing implemented in the United States of America, this study has the capacity for international transferability or to any other setting that implements standardised testing.

3.9.3 Dependability.

Dependability requires the research to undergo a review which involves the investigative process and methods for analysing data. It is suggested that these research methods are made available to all participants and other audiences (Stringer, 2004). This research will be made available to the participants of the study, the leadership team of the school and the Catholic Education Office. To enhance the dependability of the study, it is important for the researcher to “show that if the work were repeated, in the same context, with the same methods and with the same participants similar results would be obtained” (Shenton, 2004, p. 71). The parameters of this study were kept uniform throughout. As the data were collected via semi-structured interview questions, it can be inferred that if these same questions were asked to the same participants, similar answers would be given. As the research design has been clearly outlined, another researcher should be able to follow the protocol and receive similar results. The research questions and methods of analysing these questions have been made available to the audience and other researchers.

3.9.4 Confirmability.

Confirmability is achieved through an ‘audit trail’ (Stringer, 2008, p. 59). An audit trail can include raw data such as field notes, questionnaires and annotated notes. It can also include transcriptions of the recording of the interviews. This study was based on the ‘audit trail’ of research questions asked through semi-structured interviews and the researcher’s field notes which entailed observing and recording participant’s responses. Shenton (2008) refers to the importance of the qualitative investigator objectivity in guaranteeing the confirmability of the study. In this study, the researcher was vigilant in ensuring that objectivity was maintained throughout the data collection process.

3.10 Data Analysis

According to Stringer (2008), the ultimate outcome of data analysis is to enable participants to clearly understand the nature of the events that are the focus of the research process. During this data collection, it is the researcher’s task to sift through the

data and decide which elements can clearly represent the aims of the research. Stringer (2008) asserted that such representation can be achieved by:

Starting with events significant from the perspective of the participant perspectives, and building understanding in their terms, we seek not only to give voice to the participants, but to create and insights that resonate with and are consistent with the world as they know and understand it (p. 89).

The data were analysed once the semi-structured interviews were transcribed and the researcher-generated field notes were collated. The analytical process involved applying the interactive framework proposed by Miles, Huberman and Saldaña (2014). This framework consists of four key steps, namely: data collection, data condensation, data display and drawing and verifying conclusions. The four components of this interactive model were applied to analyse the data collected in this study, as presented in Table 3.2.

Table 3.2

Displaying Stages of Data Analysis (Adapted from Miles, Huberman &, Saldaña (2014), Components of DATA Analysis: Interactive Model)

Component	Component Description
Data Collection	Data were collected through semi-structured interviews and researcher field notes. The data were then processed and transcribed.
Data Condensation	The information was then summarised according to each stakeholder group. The data were then analysed for emerging common themes for each set of stakeholders. Each audio recording was listened to whilst reading the transcript. Notes were taken from these recordings and themes were developed. These themes were then cross-referenced between the stakeholders. Each stakeholder group was assigned a letter and

	number. Themes were established in relation to the literature review and results were coded into these themes.
Data Display	The data were displayed through ‘extended text’. The data were categorised into the responses of each stakeholder group, then tabulated to provide an analysis of common themes.
Drawing/Verifying Conclusions	The researcher then sharpened, sourced, focused and discarded the data to allow ‘final’ conclusions to be drawn. Patterns were identified and validity established.

The data were reviewed for significant or key experiences to be identified. Those experiences were unpacked to reveal what was significant in the study. Individual accounts were also considered and then joint accounts were developed to identify any reoccurring themes resulting in a collective account to define common perspectives and experiences.

3.11 Ethical Considerations

Prior to the commencement of data collection, ethical considerations that protect the well-being and interests of research participants must be planned for (Stringer, 2008). This research was conducted in accordance with the ethical approval granted through Curtin University. As the data were gathered within a Catholic primary school in Perth, Western Australia, approvals and ethical clearance were also sought from the Catholic Education Office of Western Australia. Permission and consent forms were distributed to all participants. Permission for the children to participate in the study was sought from each parent. Consent was also obtained from the School Principal. The participants were assured anonymity and the names of the school or participants were never revealed in the research. Participants received information sheets and informed consent was obtained from each individual. All records of the interviews are kept in a securely locked filing cabinet and recordings have been stored on a personal device protected by a security code.

3.12 Chapter Summary

The design of the research for this study was qualitative, operating within the interpretive paradigm. The research implemented the theoretical perspective through a phenomenological lens. This design provided a vehicle for the human element of the NAPLAN story to be investigated which allowed the key stakeholders to voice their experiences with NAPLAN. The research design employed an intrinsic case study in one metropolitan primary school. The participants in this school were questioned using semi-structured interviews and their responses were recorded through audio recordings and supplemented with researcher field notes. The data were then analysed using Miles, Huberman and Saldaña's (2014) interactive model of data analysis. Chapter Four will present the findings of these interviews and Chapter Five will explore these findings in relation to the overarching research question and the review of literature.

CHAPTER FOUR – RESULTS OF THE RESEARCH

4.1 Introduction

The purpose of this chapter is to present the findings from the research on how the teaching and learning of mathematics has been affected by the implementation of the National Assessment Program - Literacy and Numeracy (NAPLAN). Data for this study were collected primarily through semi-structured interviews and researcher generated field notes with three major stakeholder groups; students, teachers and parents. Coding was used to examine the main themes contained within the data through the framework outlined by Miles, Huberman and Saldaña (2014). The themes that emerged from the data are outlined in Table 4.3. The stakeholder groups responded to the research questions outlined in Table 4.1.

Table 4.1

Research Questions Relating to Stakeholder Groups

Students	How do students feel about sitting the NAPLAN test? What is the level of anxiety of students sitting NAPLAN? Are students aware their results are published on the <i>My School</i> website? Has NAPLAN changed students' perceptions of themselves as Mathematicians? Has NAPLAN affected the students' enjoyment of learning mathematics?
Teachers	How are teachers affected by the testing environment? Have teachers' pedagogical approaches been altered since the implementation of NAPLAN? Do teachers feel they are teaching to the test? How has the introduction of NAPLAN affected teachers' confidence levels towards mathematics and the teaching of mathematics?
Parents	What do parents understand about NAPLAN? Have parents experienced anxiety associated with the testing procedure itself or the results? Do parents understand the results? Do parents use the results on the <i>My School</i> website to make decisions about where their children will receive their education? How has the relationship between parents and the school/teachers been affected by NAPLAN?

The research engaged major stakeholder groups (students, teachers and parents) from a metropolitan school in a low socio-economic area in Perth, Western Australia.

This particular school was chosen for a variety of reasons; it had performed under the national average in past NAPLAN tests, it was a triple stream school (three classes of each grade), which allowed the researcher to have access to a greater number of participants, and the school had recently decided to adopt a directed teaching style in mathematics. Six Year 3 children and six Year 5 students across 6 classrooms were interviewed. Students interviewed were from Year 3 and 5 as these are the current years that NAPLAN is implemented in primary schools across Australia. The parents and teachers of these students were also interviewed to gain their perspective of NAPLAN testing. All participants were interviewed away from the classrooms in an office in the administration area.

Table 4.2

Number of Participants in Study

	Students	Parents	Teachers
Year 3	6	6	6
Year 5	6	3	6

4.2 Results of the Study

The results of the study are organised into three categories according to research participant grouping, namely: students, teachers and parents. During the data analysis process sub-themes emerged that connect to the research questions as illustrated in Table 4.3.

Table 4.3

Overview of the Presentation of Findings

Students	<ul style="list-style-type: none"> • Anxiety of sitting the test • Perceptions of themselves as mathematicians • Changes in pedagogy
Teachers	<ul style="list-style-type: none"> • Changes in the approaches to teaching mathematics prior to NAPLAN (teaching to the test) • Pressure of NAPLAN • Relationship with parents
Parents	<ul style="list-style-type: none"> • Understanding of NAPLAN • Anxiety • Relationship with school • Discrepancy in results presented in school report and NAPLAN

4.3 Students

An analysis of collected data revealed three main themes for the Year 3 and Year 5 students sitting the NAPLAN test: the anxiety students experienced when sitting a high-stakes test, student self-perceptions as mathematicians, and the perceived changes in pedagogy in mathematics leading up to NAPLAN. Overall both the Year 3 and Year 5 cohorts presented similar perceptions of NAPLAN and there did not appear to be any distinctions between the cohorts. These themes are presented below.

4.3.1 Anxiety experienced.

The interview questions focused on the anxiety students felt prior to and during the completion of the NAPLAN test. Students were also asked about how they felt when their results were made available. The overall finding from the students interviewed was that they felt some anxiety about sitting the test. Most of this anxiety related to the test conditions, particularly having to sit in isolation and the time restraints placed on students. Student 5A explained his feeling of sitting NAPLAN:

I thought it was a good test, not too hard, not too easy. I was a bit nervous at first, but you know it's not going to affect your results from school, so that is a bit of pressure taken off, your teacher reassures you that it isn't going towards your results.

Student 3B commented that she liked sitting tests and that she felt "a little nervous and happy, I like doing tests". Overall all students interviewed in Years Three and Five stated that they were only moderately concerned about NAPLAN as they felt prepared. Student 3B stated:

We've been practising, but just a little nervous. She [the teacher] tells us not to worry because we're going to be given a bit of help.

The researcher-generated field notes recorded that students experienced a change in their mathematic classes. For instance, one field note was recorded as 'students recalled the classes changing as they stated that one week classes were normal then the next week there was NAPLAN based lessons. These mainly consisted of NAPLAN practice tests'.

Students reported a higher level of anxiety when they discussed the test conditions they were placed under. Most of the anxiety students reported was in relation to the organisation of the classroom, as it was altered to accommodate the specifications set out by ACARA. Students consistently reported feeling anxious when they encountered the different layout in the classroom. Typically, students were required to sit in single file which was not the normal layout for a primary classroom. Overall, student participants described sitting in such an arrangement as a feeling of isolation. For instance, Student 3C stated that he "...felt a bit nervous and insecure because I felt like it was only me getting tested and no one else".

Anxiety was expressed about the time constraints placed on the test. To illustrate, Student 5D recalled that "I get just a little anxious if I go and don't get the question and I skip it and don't get time to go back." Many participants stated that they felt the time pressure under these test conditions, contributed to their feelings of anxiety and apprehension. This restriction of

time felt foreign to the students as they were usually encouraged to go back and check their answers in normal classroom test practice.

4.3.2 Students' perceptions of themselves as mathematicians.

One aim of this study was to provide a voice for student participants and ascertain how the students viewed themselves as mathematicians. Nine out of the twelve student comments revealed a degree of enjoyment towards their classroom lessons and in displaying an understanding of how mathematics is used in the 'real' world. When asked 'Do you like mathematics?' the majority of student responses indicated a positive attitude towards mathematics. A variety of student responses that supported the positive view of mathematics is offered below:

Student 3A: I love it, and I am really enjoying my maths teacher this year. I like maths.

Student 5B: It's fun doing hard sums because I like to give it a go, I keep trying until I think I can get it right.

Student 3B: I like it because I get to learn new times tables and I am really good at them because I know them off by heart.

Student 5E: Maths uses numbers and teaches me new things and helps us with our maths.

Student 3C: My teacher helps me to understand and know what you are doing so you don't get lost.

Student 5D asserted that "It's a big test that Year 3s, 5s, 7s and 9s do, and it goes to the government to see how well you're doing, and if you struggle, they will give you resources to help you". There also seemed to be a common understanding amongst students that NAPLAN was used to group students according to ability. Student 3B stated: "So they know what you do and don't know, and they know what levels to put you in at school". This perception of being grouped according to NAPLAN results affected how the students viewed themselves as mathematicians. If the students' NAPLAN results were under the national average they were placed in a lower level group. Another student commented on the results and how they are used:

It goes on a piece of paper, and it has dots where you're averaged, and where you are placed during the standard, like above or below you know its comparing to the standard in Year Five. I was over the Australian average [and] it felt really good.

The students exhibited a sound understanding of the purpose of NAPLAN and how the findings were interpreted. They were able to state that NAPLAN is an Australian-wide test that compared cohorts from school to school, year to year and state to state.

4.3.3 Students perceived changes in pedagogy.

Students were asked if they thought their mathematics lessons altered prior to NAPLAN. Seven out of the twelve students interviewed stated that there was a change in mathematics lessons preceding NAPLAN. To illustrate, Student 5A stated that lessons did change, responding with:

Yeah, just a little bit. [Teachers] might have changed it into what NAPLAN was doing but we weren't learning. They made us understand the NAPLAN way of writing the test, and that means that we would be able to answer the test questions better. They didn't change hugely, just a slight bit, not a major thing.

Student 5A also acknowledged that mathematics lessons changed to focus chiefly on NAPLAN:

They started teaching more constructed to the NAPLAN things. Our teachers started to put their learning into their lessons more based on NAPLAN, even though they weren't 100% based on NAPLAN.

Most students referred to the main change in pedagogy as the involvement in practicing sample NAPLAN tests. Student 5B commented that "...before NAPLAN we practiced for it and we did a bit harder work. We would do tests that were like, close, so our teacher would give us clues for NAPLAN". Additionally, students noticed that the physical environment altered as did the teaching strategies employed by the teacher. For instance, Student 3A asserted "She explains things better when it's not NAPLAN stuff. Because they don't explain the test before you do it. We spread the desks out, so we

could concentrate on the test”. Another change in pedagogy was that students were not permitted to ask questions during the test. Student 5A noted “It changes because no-one really explains it first, you just do it”. Continuing with this theme, Student 3A commented “I’d rather do [mathematics] the way the teacher normally does it. She explains things better when it’s not NAPLAN because they don’t explain the test before you do it”.

4.3.4 Summary.

The analysis of data revealed three main themes affecting students when sitting NAPLAN. These themes are: student-reported anxiety; how students perceived themselves as mathematicians, and changes in pedagogy. Generally, Year 3 and Year 5 students recalled experiencing little anxiety in sitting the NAPLAN test. Most students recalled feeling well prepared for the test and supported by their teachers. Of the anxiety that was reported by the students, a large degree was caused by the altered physical conditions of the classroom and the time constraints placed during the test. Students experienced anxiety in not being able to ask for assistance throughout the test. Despite these reports of anxiety, the enjoyment of mathematics was not deemed to be affected during the preparation of NAPLAN. Overall, there was a positive feeling about mathematics as a subject. In student responses they indicated a sound understanding of the practical application of mathematics in their everyday life. Students on the whole reported enjoying the lessons leading up to NAPLAN.

4.4 The effect of NAPLAN on teachers

An analysis of collected data from teachers revealed three main themes about implementing NAPLAN. These themes have been presented as: changes in pedagogy prior to NAPLAN; pressures associated with NAPLAN; and the effect of NAPLAN on the teachers’ relationship with parents.

4.4.1 Teachers perceptions of changes in pedagogy.

The six teachers who participated in the study were asked if they thought their lessons altered prior to NAPLAN. Teachers initially indicated that NAPLAN did not change their approach to their mathematics lessons. Teacher A commented that:

Personally, it's not a big deal for me, and I don't like teaching to the test, so I'd never teach something just because they're going to include it. It's not a true indication, I suppose, of the data, if you're teaching to the test whereas if you're just teaching normally. Whatever programs we have at that time for Year Two. We wouldn't do anything special to prepare them.

Teacher C echoed these sentiments by asserting "Our maths teaching hasn't changed at all. I mean we've given them a couple of practice tests just so they've seen them but we haven't altered the Stepping Stones program". After further probing, both Teacher A and Teacher C revised their statements and conceded that they had actually altered their teachings in the lead-up to NAPLAN. As the teachers reflected on their teaching in preparation for NAPLAN and in responding to the interview questions, it became apparent that there was some evidence of changes in pedagogy. This evidence included changes made to the physical classroom setting, and Teacher B stated:

It would definitely be fair to say that it is different from the normal way you teach, and you know the desks, the week before or whatever are moved into their test conditions, we're just sitting our test like this because of classroom conditions.

Teacher D stated that NAPLAN was not something that she consciously thought about when planning her mathematics lesson. After further probing she did concede that she included practice tests in her lessons prior to NAPLAN.

I never really thought about it, but yes I definitely do implement practice tests which I guess has changed the way I teach maths.

Teacher F initially she stated that "[preparation for NAPLAN] always been downplayed, because we don't want to make it a big stressful test. We don't necessarily teach to the test". After further discussion Teacher F admitted that she did alter the classroom

environment and in fact did modify her teaching strategies prior to NAPLAN. Herein, Teacher F commented:

My classroom is set up in rows now just to get them used to the test, just to get them used to it because they have come from a group environment, I think there are a lot of environmental factors that affect the kids on the day of the test, and I think you need to make it as fair as possible. We put the timer on the board, so they get used to working with the clock. We do more practice tests, prior to NAPLAN, we have photocopied practice tests and get them to complete them under timed pressure so they get used to sitting for 40 minutes and working non-stop for 40 minutes.

Teacher E recalled altering her pedagogy after a parent interview in which the parent expressed concerns about the upcoming NAPLAN test.

After that interview I remember thinking, I probably should address the test a little more and included some practice tests in my lessons.

In reviewing the interview transcripts and field notes it became evident that teachers acknowledged they changed their classroom practices in preparation for NAPLAN through the alterations made to the classroom environment and inclusion of practice tests in their mathematic lessons. The researcher's field notes further evidenced that four out of six teachers stated that they did not place a lot of importance in NAPLAN, and that they placed more value on the teacher-designed assessments administered throughout the year.

4.4.2 Perceived pressures associated with NAPLAN for teachers.

The response to participants feeling pressure regarding NAPLAN was varied amongst the teacher participants. Within this theme, various sub-themes emerged. To exemplify, the teacher participants discussed the absence of pressure they felt from the leadership team, but acknowledged the pressure they put on themselves, pressure they felt from other teachers and pressure they felt from parents.

All participants stated they did not feel pressure from the leadership team at the school. This statement was summarised by Teacher C's response "I don't feel any

pressure from administration for the NAPLAN testing”. Teacher A supported this idea “No, not at this school, no we haven’t had any pressure from the school. No, personally I don’t feel any more pressure. I don’t feel like we’ve had that (pressure) applied to us either”. Echoing this view, Teacher D stated:

I never get repercussions from leadership...they have made it very clear that it’s not directed on us, it’s not us as a year group, it’s us as a whole school, because it is testing. What they’ve learnt in previous years we’ve only had them once a term so you can’t do much.

From the results of the interviews it became apparent that the teachers were continually advised that individual teachers would not be held accountable for class and individual student results. A statement from Teacher A indicated that the teachers put pressure on themselves to prepare the students effectively to sit the test. Teacher A:

I think I’ve got to prepare the kids as best I can and more ethically I feel I’ve got a bit more of an ethical obligation to make sure I’ve done the best I can do and that I’ve tried to get them to do the best they can do as well.

It was also evident that teachers felt a responsibility to students to perform well in the test, and to show an improvement from one NAPLAN test to the next as indicated by Teacher C:

This year I would like them to perform well because of the trial we have been doing I do feel like the kids have progressed significantly so I would like it to show up in the NAPLAN test.

This comment from Teacher C may intimate the pressure teachers felt for their students to perform well in NAPLAN to display an improvement in the results from one test to the next from the same cohort.

A large majority of participants consistently stated that they did feel pressure from parents in many aspects of NAPLAN testing. Teacher A summarised the sentiment of all teachers interviewed: “I think there’s a lot of pressure from the parents on students”. This pressure was not confined to teachers of students in the NAPLAN years. Teacher B reported that parents of students in Year Two were already exhibiting anxiety for the upcoming NAPLAN test.

A few parents have asked. In Year Two, I have had parents asking about NAPLAN, what are we doing for the child in Year Three. We just try to calm the parents down so that it's not a big deal. It's only one test. A small percentage of parents in our classroom and in our school that possibly do feel a bit strung about it.

It could be perceived from Teacher B's comments that teachers are required to explain NAPLAN to parents in considerable detail before NAPLAN is implemented, and that teachers are obliged to reassure parents regarding the results.

Teachers repeatedly mentioned that parents exhibited some stress and anxiety associated with NAPLAN for instance, Teacher C asserted:

Parents come in and say my child's anxious, [or] this and that in the classroom. I just say yeah it's a test and it goes off to be marked and you get your scores back. But I try not to down play it but kind of put them at ease like it's just another test and we've done tests before on practice tests so that they're familiar with the style and they do all the standardised test at the beginning of the year which is similar. So I think they get that we're trying to say it's not a big deal.

The emphasis placed on the results of NAPLAN by the parents was another recurring theme evident in the data as evidenced in Teacher D's response:

I still think a lot of parents here put a lot of value on the results, because they've already come to us and told us they are worried about it, they are worried about the results for high school what if they don't perform well that they need the results to get into high school.

Further pressure was placed on teachers as parents indicated that high results from NAPLAN were required as part of the application for secondary schools.

4.4.3 Teachers' relationship with parents.

The third theme that emerged from an analysis of teacher participant data was the change in the relationship with parents. The research question aimed to explore if

NAPLAN, and in particular the results of NAPLAN, affected the relationship teachers had with the parents. The anxiety felt by parents can be collated into three sub-themes; concern for their child's results, anxiety about their child sitting the test and the use of the NAPLAN results as an entry into secondary school. There was evidence of parents showing concern and questioning the results of the NAPLAN test. Teacher B recalled a conversation with a parent once she had received her daughter's result, questioning the types of mistakes her child had made.

She was saying 'do you have any information as to why she would be so below, why that might have happened? Could she have lined up the wrong answers or coloured the wrong bubble, or just not understood these types of questions?

This parent's comment to the teacher may indicate that parents are trying to look for reasons as to why their children are not performing well on NAPLAN and poor results could result in teachers feeling they have to justify what may have occurred during the testing procedure.

Parents in this study experienced anxiety for extended periods of time before their children actually sat NAPLAN. This anxiety affected the relationship between the school and home as Teacher F relayed this reaction from a parent:

Over the holidays, I had parents emailing me that kids were in tears, I've already had three parent meetings – happens every year. It's more the parents than the actual kids (that display anxiety). It wasn't an issue when I first started NAPLAN, but since high schools have been asking for the data in the meetings, that's when I've seen a change in the parents.

Teacher C also mentioned the anxiety that parents displayed right from the commencement of the year. Specifically, she discussed how she attempts to build a good relationship with parents by putting them at ease before the NAPLAN test.

Some of the parents take it on as quite stressful and have a lot of anxiety about it, but at our parent meeting on day one term one, we say, "Yes it's coming, don't stress about it, we prep[are] the kids as best we

can, it's one test on one day," we explain to the parents that it is to track their learning.

Researcher field notes revealed there was a concern raised by parents of Year 5 children. Teachers intimated that they had lengthy discussions with parents regarding NAPLAN as a requirement for secondary school entry. To illustrate, one field note was recorded as: "Some parents are really stressing about it. I had a 45-minute discussion with a parent about NAPLAN. It was mainly about who would see the results and concerned about presenting it to the local secondary school". The researcher's field notes also indicated that children expressed to teachers that Year 5 students were concerned about NAPLAN results in relation to secondary school entry.

In response to parents experiencing concern from the very beginning of the year, teachers reported that they addressed such concerns by explaining the test and its implications in scheduled parent interviews. These parental concerns meant shifting the conversations away from the usual broad business of schools and education, and spending time on issues around one assessment piece.

4.4.4 Summary.

In summary the three main themes emerging from an analysis of teacher interview data were; changes in pedagogy, anxiety towards NAPLAN, and relationships with parents. The teachers initially stated that they did not change their teaching strategies as NAPLAN testing approached but after further probing, these same participants conceded that there were changes in the strategies they employed. Principally, these changes included introducing sample NAPLAN testing, and altering their classroom environments to prepare students for NAPLAN. There was a compelling view that teachers experienced little personal anxiety when implementing the NAPLAN test. This view was primarily due to a majority of participants recalling feeling no pressure being placed on them by the leadership team. The final theme questioned if the relationship with parents had altered through the NAPLAN experience. An analysis of interviews revealed there was some change in this relationship; a majority of teachers communicated how they had attempted to reassure parents that their children were being effectively prepared for NAPLAN. The relationship was also altered as disappointment

was voiced in the parent-teacher interviews when parents stated their concern at the school's poor performance in NAPLAN.

4.5 The effect of NAPLAN on Parents

Parents of the students interviewed from Years 3 and 5 were approached to participate in the study. Six parents agreed to answer questions about their perceptions of NAPLAN. The analysed data revealed several themes regarding parental understanding and views pertaining to NAPLAN, namely: the parents' understanding of NAPLAN; the anxiety associated with NAPLAN for both themselves and their children; and the relationship with the school. These themes will now be outlined.

4.5.1 Understanding of NAPLAN.

The six parents interviewed demonstrated a very sound understanding of the NAPLAN test itself. They displayed a clear comprehension of how the test was implemented and, to a degree, were able to offer an explanation of why the test was employed. Parent A concisely outlined how the test was implemented:

Everyone in Australia does the same test at the same time on the same day, everyone does it. And they give instructions on how to implement it and they keep it as uniform as possible. This is really for the government.

Parent B supported this observation stating:

How I understand it; it is a collation of all statistics to give the government an idea of how students are sitting. It was initiated by the Federal government. Maybe it benefits the school, so they can see which years have done well or not so well and help the students out accordingly.

Through their responses, all the parents conveyed knowledge that the test was a government initiative and understood how the test was implemented. They also displayed an understanding of how the results could be used in a school setting. The researcher field notes collected during the interviews supported this finding. Parents reported that they understood NAPLAN to be a test to gauge a comparison between cohorts and year levels. The field notes and interviews also indicated that parents felt

the school did not put much emphasis on NAPLAN and that the parents were only informed about NAPLAN the week leading up to the actual test itself.

4.5.2 Parent anxiety associated with NAPLAN.

Five of the parents stated that they did not feel any anxiety associated with NAPLAN. This was illustrated by the response offered by Parent C, “I felt not too worried and scared, and I was calm”. Parent A echoed this emotion, “personally I did not feel nervous at all”. Parent D reported that there was little or no stress felt by her child:

She displayed no anxiety, because you would know. She even did it and it meant nothing to her, you know what I mean? She came home and spoke of it briefly, you know. I’m not one to go on about it, just do your best and that’s all. You do a test every day so why is this any different?

The parents interviewed intimated that they did not feel any personal concern regarding the test itself, and did not observe any anxiety in their children before or after they sat NAPLAN.

4.5.3 Relationship with the school.

The parents were asked if they thought their relationship with the school was affected by NAPLAN. Generally, parents communicated that this relationship was not affected by the implementation and the focus the school placed upon NAPLAN. In response to a question about the school’s attitude to NAPLAN, Parent C’s comment summarised the general disposition amongst parents:

Yeah they told me there was no stress, this is what we’re doing and that’s that, so I like that attitude, I think kids do enough testing in school as it is and to put so much more pressure on them. I don’t think it’s very fair to put 8 year-olds through. I understand why we need it but I don’t really agree with it.

This position altered when parents were questioned about their feelings towards the school once the results emerged. Amongst the parents interviewed, parents stated that they were disappointed in the school’s results. The interviewed parents began to

question the school's ability to teach mathematics effectively as is evident by Parent C's response:

I'm a bit disappointed about where the school sits, that's dropped because I've got a boy in Year 10 and I believe the school has dropped considerably to the national average. That worries me. Especially because we've got a new numeracy group now that we are paying for, but the levels have dropped. I don't understand what the school uses these results for.

Parent D raised concern about the lack of emphasis placed on NAPLAN by the school. This participant noted that these results would be used as part of the entry process for private secondary schools.

Well I just thought if NAPLAN doesn't mean anything, why are they doing that? They sorta tell you 'Don't worry about it, it's just for the national placing' but to me I think, I don't want to hand this into the teacher knowing that it's not a true evaluation of my child. If they are telling that the reason she's not place where she should've is because she's stressed out why am I handing it to the teacher? I've got the primary school that doesn't worry about it but then the high school that does. So if the primary school doesn't worry about it, it's not giving my high school a true reading, why bother doing it if it's not going to be acknowledged.

When further probed as to if the school should focus further on NAPLAN, Parent D stated:

Yeah I think so, because I think it would be nice to be proud of this school and to be able to say, "Look at us, we're above the national average". I'm embarrassed to show this to anyone, because we are below the national average.

Parent A exhibited concern over discussing the NAPLAN results with her child's teacher. She was perplexed by the notion that teachers did not receive reports on individual children; hence, the classroom teacher could offer her no explanation for the

results. This parent stated: “I was surprised by my daughter’s results so I went and spoke to her teacher but she said she doesn’t get to see individuals, she only gets to see a year group summary, I felt it was a waste of time”.

There was an expressed level of frustration from most parents interviewed that the results were not used in a more worthwhile manner. It was also evident through the interview data that parents were concerned about the poor results that their child achieved in NAPLAN. Further to this, parents expressed frustration that when they investigated students’ results further the teachers were not able to provide extended information about their individual child’s performance.

4.5.4 Discrepancy in school results compared to NAPLAN.

An interesting finding that emerged from the data was that many parents were very concerned and confused about the discrepancy between NAPLAN results and school reports. Parents displayed confusion and alarm when comparing these two results. Specifically, they were unsure as to which results were accurate and wondered ‘who was telling the truth’. This theme linked to the relationship with the school. Parent E stated:

So what worries me is, is our academic maths class really an academic maths class, when compared with the rest of Australia. Maybe our whole level is not right? Maybe we shouldn’t have an academic’s maths class if we’re not up there with the academics. I don’t want her going to high school thinking she’s an A student, but when she gets there she’s a C. Do you know what I mean? Because it’s hard at high school. Now I’m thinking ‘God I thought my child was academic, maybe I need to keep a closer eye on her’.

Parent B echoed this confusion of the discrepancy between the NAPLAN results and the school’s interpretation of higher achieving mathematics students:

I was just thinking ‘Is she in the right maths class? I was thinking because that’s our school average, and my daughter is in the top maths class, shouldn’t she be somewhere there? Because she’s not. And I know it’s still a great result, but to me it doesn’t reflect where she is at school.

This theme continued throughout the collection of data, with Parent C citing a general feeling of confusion and questioning amongst the parent body:

My daughter didn't perform as well in maths as we thought she would. But I did speak to some other parents about it and they were surprised that their child didn't perform particularly well in maths. But my child sat below the school average, which I thought was very surprising as she is in the top maths group.

Parents expressed that they had faith in the school's ability to report effectively on their child's mathematical abilities, but they were concerned at presenting the NAPLAN results to secondary schools. The researcher field notes supported this, as these notes reported that one parent stated she was apprehensive about including her child's NAPLAN results in the secondary school application. Parent C stated that she had a few concerns, as she did not see the results of a lot of mathematics tests during the term. Consequently, this parent shared feelings that she was surprised by the poor result her child achieved in NAPLAN, particularly as her child was in the academic mathematics class.

4.5.5 Summary.

Three main themes were developed from the data collected from parent interviews. These themes included: Perceptions regarding the NAPLAN test; anxiety associated with NAPLAN for themselves and their children, and; the effect on the relationship with the school due to the discrepancies between the school results and NAPLAN results. Overall, the interviewed parents displayed a sound understanding of the NAPLAN test. They were able to express an understanding of why this test was implemented and that it was initiated by the government. There was no expressed anxiety associated with the implementation of NAPLAN by either the student or parent participant groups. According to the parents, the relationship with the school initially did not seem to be affected by NAPLAN. However, this perception altered when the researcher asked about the NAPLAN results. The parents expressed disappointment with their child's NAPLAN results and began to question the merit of how mathematics was taught at the school. Lastly the data revealed that parents were confused and

concerned about the discrepancies between the NAPLAN results and the grades students were receiving at school.

4.6 Conclusion

In this chapter, the findings of the research were presented for the three major stakeholders; the students, teachers and parents. Students expressed feeling very little anxiety when sitting the NAPLAN test and instead recalled feeling confident and well prepared to sit the test. The students perceived changes in the pedagogy implemented in mathematics classes prior to the test but these changes did not alter their enjoyment of the mathematics lessons or their self-perceptions as mathematicians. NAPLAN had impacted on the teaching of mathematics as the teachers altered the pedagogy they implemented regularly in mathematics lessons, by changing the physical classroom and employing practice testing. Teachers did not feel any pressure from the leadership team at this school, but they reported feeling some pressure from the parents as well as from their own expectations.

Parents displayed a sound understanding of the actual test and its origins. There did not appear to be any anxiety during the implementation of the test but there was some concern and confusion associated with the results of the test. Parents expressed anxiety about the low scores the students achieved on NAPLAN and the discrepancies between the school results and the NAPLAN results. These results will be further explored in the Discussion Chapter alongside relevant literature outlined in the literature review.

CHAPTER FIVE – DISCUSSION OF THE RESEARCH FINDINGS

5.1 Introduction

The introduction of NAPLAN into Australian primary schools has had some effect on the teaching and learning of mathematics and also on the interaction between parents and schools within the mathematics learning area in regards to NAPLAN. To investigate the impact NAPLAN has had on students, teachers and parents, a metropolitan primary school was selected for this study. In undertaking this research, semi-structured interviews and researcher-generated field notes were employed to collect the data. Subsequently, the data were analysed according to a framework (Miles, Huberman & Saldaña, 2014; Stringer, 2004) to develop themes. Tufford and Newman (2010) advised the use of memos assists a researcher in order to suspend bias during data collection. Consequently, memos were also employed to reflect upon the manner in which information was gathered and interpreted, this allowed the researcher to critically exam the potentiality for personal bias (Bendell, 2006).

This chapter will discuss the themes identified in Chapter Four, in light of the literature presented in Chapter Two. Furthermore, through a synthesis of the findings and identified literature, the research questions presented in Chapter One will be answered. These questions were:

1. How has NAPLAN affected the learning of mathematics?
2. How has NAPLAN altered the teaching of mathematics?
3. How has NAPLAN affected the parental perceptions of the teaching and learning of mathematics?

Following the data analysis phase, participant responses to the interview questions were categorised according to themes under each research question. These themes are illustrated in Table 5.1.

Table 5.1 *Themes from Findings in Relation to Research Questions*

How has NAPLAN affected the learning of mathematics?	How has NAPLAN altered the teaching of mathematics?	How has NAPLAN affected parental perceptions of the teaching and learning of mathematics?
<ul style="list-style-type: none"> • Negative consequences experienced by students • Students' self perceptions as mathematicians • Changes in pedagogy for learning 	<ul style="list-style-type: none"> • Negative consequences experienced by teachers • How NAPLAN has affected the relationship between teachers and parents • Changes in pedagogy for teachers 	<ul style="list-style-type: none"> • Understanding of NAPLAN • Anxiety • Relationship with school • Possible variance in results presented in school report and NAPLAN

5.2 How has NAPLAN Affected the Learning of Mathematics?

5.2.1 Theme 1: Negative consequences experienced by students.

The first research question explored the negative consequences experienced by students in relation to NAPLAN, and the extent to which these consequences affected the learning of mathematics. One of the negative consequences that received frequent mention in the literature was the anxiety experienced by participants during NAPLAN and other high-stakes tests. This anxiety included; anxiety related to sitting the test, anxiety associated with achieving high results and anxiety associated with the test conditions. The level of anxiety experienced by students related to sitting the test was identified as low, and generally the interviewed students reported feeling well prepared and not anxious about completing NAPLAN. Such an experience was characterised by the majority of students stating that they felt both nervous and happy. This finding was in opposition to Bagnato and Yeh Ho (2006) who stated that in both very young (seven to eight year olds) and older children, a heightened level of anxiety existed when completing high-stakes testing. Many authors contended that most of this anxiety was related to the pressure to do well on the test (Bagnato & Yeh Ho, 2006; Goodwin, 2012; Haladyna, 2017; Huberty, 2010; Paris & McEvoy, 2000). The lack of anxiety exhibited by students in this study in sitting the test seemed to be engendered by the teachers' reassurance that the results were not important and that they did not relate to their school achievements. To illustrate, Student 6 A clarified that he did not feel pressure as his

teacher had assured him that the test was not going to be part of his school report, "...you know it's not going to affect your results from school that is a bit of pressure taken off, your teacher reassures you that it isn't going towards your results". The lack of anxiety exhibited by these children may also indicate that the students are more concerned about their school results rather than attaining high NAPLAN scores.

Even though students indicated that they were not concerned about the results of NAPLAN, there was some anxiety expressed by participants about the test conditions they were placed under when sitting NAPLAN. Most of this anxiety related to the physical layout of the classroom and the timing restraints of the test. The responses from students indicated that changes in the physical environment caused concern for them and their classmates; amongst the students, they indicated that the alterations in the class setting evoked feelings of uncertainty and nervousness. The notion that the foreign nature of the physical setting of the classroom produced stress in primary aged children is supported by Bagnato and Yeh Ho (2006). These commentators discussed that such test conditions are decontextualised from the usual daily activities as young children typically do not display their best abilities by sitting quietly at tables. This stress was induced in the student participants because their classroom arrangement altered dramatically just prior to sitting NAPLAN. From the results of this study, it is apparent that teachers do alter the mathematics environment and students are aware of these changes. The changes in mathematics environment and the awareness in students of these changes was again confirmed by the researcher field notes which were taken during the semi-structured interviews. One student recalled that she did not like the mathematics lessons pertaining to NAPLAN as they were "boring and I don't like it when we move the desks into rows". This alteration of the environment manifests in students' enjoyment of mathematics lessons being reduced. A discussion point from this finding is that educators need to question the overall test preparation for NAPLAN. If teachers truly believe in the student-directed lessons, which are employed in 'non-NAPLAN' lessons, then they should continue this pedagogy throughout the preparation for NAPLAN. Adhering to usual classroom practices may develop further confidence in students and consequently improve results.

In current literature, authors have commented that the time limitations of the test can also be a source of anxiety for students sitting high-stakes tests. (Carter, 2012; Davidson, 2009). They discovered that the pressure to complete tests in a certain time frame was not conducive to students accomplishing their best results. This finding was reinforced by the participants in this investigation who indicated that they felt concerned if they had to skip a question and come back to it, as they were unsure if they would be able to achieve this within the time constraints of NAPLAN. A common practice during regular mathematics lessons would be to encourage students to revisit questions they did not finish, and to check their answers. Further, it would also be a goal of any teacher writing a test to ensure students could complete the test within the time frame of the lesson, hence limiting the time pressure placed on students.

5.2.2 Theme 2: Students' self-perceptions as mathematicians.

The second theme that emerged from Research Question One was how students viewed themselves as mathematicians and the extent which the students' enjoyment of mathematics was affected by NAPLAN. A majority of students stated that they really enjoyed their mathematics lessons but that they had noticed their lessons altered in the lead up to NAPLAN. These students relayed that they preferred the classes that were not based on NAPLAN preparation. Haladyna et al. (1998) have observed that high-stakes testing can increase the anxiety of the test situation and therefore deter from the enjoyment of learning. Goodwin (1993) stated that a focus on results can significantly decrease the motivation and self-esteem of children. The results of this study did not support Goodwin's (1993) assertions. Students in this investigation indicated that they had a very positive attitude towards mathematics both before and after NAPLAN. It is apparent that the lack of anxiety and positive attitude towards mathematics, even in a NAPLAN year, is related to the affirmative environment the teacher was providing for the students at this school. This lack of anxiety is evidenced by the responses of the students when questioned about their perceptions of their mathematics lessons. Such a positive attitude may be connected to the lack of pressure placed on students by the teachers to achieve high results in NAPLAN. This finding may indicate that if this school can present NAPLAN in an affirmative fashion it is possible for other schools to

follow suit. Alleviating the pressure placed on teachers resulted in students stating that during NAPLAN testing anxiety was not a major issue.

5.2.3 Theme 3: Changes in pedagogy for learning.

The changes in the way students learn mathematics in the lead-up to NAPLAN and regular classroom lessons was evident through this investigation. The major change was demonstrated through regular mathematics lessons being replaced by opportunities to complete practice NAPLAN tests. When asked if mathematics lessons had been altered in the lead-up to NAPLAN, students specified that teachers altered the mathematics lessons to a focus on the content of the NAPLAN test. According to teacher, student and parent testimony, it is apparent that teachers moved away from their usual mathematics lessons to concentrate on NAPLAN practice tests. In analysing field notes pertaining to this research question, the change in pedagogy was confirmed, where one student stated that during NAPLAN preparation lessons the “sums got harder”. Teachers focusing on how to actually complete the test, is a concern raised by Wilson and Hornsby (2014) who outlined that Year 3 and Year 5 teachers are required to provide practice tests for their students for many weeks prior to the tests. It can be concluded then, that the implementation of practice tests would influence the learning of mathematics. If students are engaging in practice tests under test conditions, then this practice is a departure from usual classroom practices in mathematics. Students would not necessarily be concentrating on particular mathematics skills but rather concentrating on understanding how to navigate the actual mechanics of the test. The use of practice tests, could also indicate a withdrawal from child-centred approach and a move to a teacher-centred teaching style where the student voice is reduced. According to Thompson and Harburgh (2013), focussing on sample tests could result in less time spent on higher-order thinking skills, and fewer opportunities for conversation between teachers and students.

Changes in the physical environment have also contributed to changes in pedagogy affecting the learning in mathematics. As previously mentioned, the physical environment of the classroom was altered from small groups to individual desks in rows to meet the requirements set out by ACARA. The changes in the physical environment

had a profound effect on the pedagogies implemented in the weeks prior to NAPLAN. A less collaborative approach to learning was implemented, resulting in a reduced ability to allow students to discuss learning during mathematics lessons, and a classroom environment that was uncondusive to students asking for assistance.

According to the student participants, changes in pedagogy not only affected the learning of mathematics but also contributed to a reduced enjoyment of mathematics lessons in the lead-up to NAPLAN. The students in this investigation generally expressed that they enjoyed mathematics classes, but there was evidence that this enjoyment was reduced during preparation for NAPLAN.

In reviewing the data collected for Research Question One, it was evident that children's perceived anxiety towards NAPLAN was alleviated through the perception that there was little pressure placed on them by their teachers to achieve high NAPLAN results. The little or no pressure experienced by students differs from a review of the literature. The literature overwhelmingly discussed the heightened state of anxiety experienced by students sitting high-stakes testing including physical manifestations and effects on the well-being of students (Bagnato & Yeh Ho, 2006; Haladyna, 2017; Huberty, 2010; Paris & McEvoy, 2000). Findings from this study suggest that if teachers do not place pressure on students, and in fact, do not feel the pressure themselves, then students will not experience anxiety in the lead up to NAPLAN. The only pressure indicated by students was related to the changes in the physical environment and having to complete NAPLAN under time constraints. This finding could provide important questions to be raised in the learning of mathematics in the lead up to NAPLAN. For example, could educators assist in reducing student's perceived feelings of anxiety due to time constraints, by completing mathematics activities under time pressure but not necessarily through NAPLAN practice tests? Further, could teachers possibly prepare students for the concepts presented to students in NAPLAN through regular classroom practices that are child-centred and collaborative rather than engaging in practice tests?

5.2.4 Conclusion.

In Research Question One the notion of how NAPLAN has affected the teaching and learning of mathematics was explored and three themes emerged. These themes included: negative consequences experienced by students and how these have affected their learning in mathematics; students' perceptions of themselves as mathematicians, and; how learning was affected by any changes in pedagogy. In this particular study, it was evident that children's perceived anxiety towards sitting NAPLAN was reduced as there was little pressure placed on the students to achieve high results. However, students did report experiencing anxiety due to the isolation of the physical environment and the time restraints placed on them to complete NAPLAN tests.

In relation to theme two, NAPLAN had minimal effect on the students with regards to their perception of themselves as mathematicians. However, NAPLAN did have some effect on their enjoyment of mathematics, as students indicated that they preferred their mathematics lesson when it was not NAPLAN based. The third theme explored if there were changes in pedagogy in preparation for NAPLAN, and if these changes affected the learning of mathematics. It is evident that there were pedagogical changes due to the implementation of practice tests in preparation for NAPLAN. These changes were mainly manifested through the alteration of the environment which resulted in a shift to teacher-centred lessons and the content of the lessons being replaced by practice NAPLAN tests.

These findings have led the researcher to the following conclusions regarding the negative consequences experienced by students in association with NAPLAN. Firstly, schools do alter their classroom environments in the lead-up to NAPLAN and students are aware of these changes. This alteration of the classroom environment reduces students' enjoyment of mathematics and does contribute to the level of anxiety these students experienced. Secondly, if teachers are not put under extensive pressure and continue to provide a supportive and affirmative environment for students then it is possible for students involved in NAPLAN to not be anxious about this high-stakes test. The final assertion is that the overall preparation for NAPLAN should be questioned as it moves the learning and teaching of mathematics from student-centred lessons to teacher-directed, or even more concerning, test-directed, lessons. The move from

collaborative strategies to a teacher-centred approach is more prevalent with younger students.

5.3 How has NAPLAN changed classroom practices?

5.3.1 Theme 1: Negative consequences experienced by teachers.

In reviewing the findings of this research question three, sub-themes emerged. These sub-themes are: The pressure teachers felt from the leadership team, the pressure the teachers placed on themselves and, the pressure felt from parents.

White and Anderson (2012) stated that teachers can feel a pressure to produce high test scores. The findings from this investigation did not support this statement. The teachers interviewed felt little or no pressure from the school leadership team to produce high scores from their students. A suggested reason as to why the teachers felt no pressure may be, that at the school where the investigation was conducted, the teachers had been explicitly instructed not to place an emphasis on NAPLAN by the school leadership team. The school had decided to place a priority on other areas including an explicit instruction mathematics program. The individual teachers were reassured that they were not responsible for the results of their class and that the results were viewed as a whole school approach. These assertions regarding no pressure exerted from the leadership team were supported by the field notes collected. One teacher stated that “she trusted her leadership team to make the right decisions pertaining to NAPLAN”. However, while teachers did not feel pressure from the leadership team, they did place pressure on themselves. Teacher participants discussed their feelings of guilt and obligation to ensure students performed well, not for the sake of school results, but for the individual results. They expressed concern about how NAPLAN could affect their students’ self-esteem if NAPLAN results were below the National average.

The sentiments expressed by the teachers in the study align with the research found within the literature. Smith (1991) and Haladyna et al. (1998) both reported that teachers feel a sense of guilt and apprehension in their ability to prepare students for high-stakes tests. The pressure that these teachers felt to ensure that their students achieved results above the national average may be linked the publication of these results on platforms such as the *My School* website. Such a platform places the school’s

results in the wider community, allowing external judgements of the school to be made. Teachers reported their aspirations to ensure students improved on their results from one NAPLAN test to the next, and they also expressed their desire for students' positive classroom results to be reflected in the NAPLAN results. These findings support Haladyna et al.'s (1998) statement on how teachers are aware that the results achieved in high-stakes tests are often not a true representation of how students are performing in mathematics classes, and how teachers can often feel ineffective in countering the media attention and parental expectations.

The third sub-theme explored the pressure teachers felt from parents. Teachers asserted that they felt pressure from parents in regards to NAPLAN. Remarkably, the pressure was placed not only on teachers who were teaching in a year when NAPLAN is administered, but pressure was also placed on teachers in the previous year to NAPLAN. There was also pressure placed on teachers by parents as they became concerned about the results their children received due to the high-stakes nature of NAPLAN. The parents indicated that the results formed part of the entry requirements for secondary schools. Teacher C commented on this unease indicated by parents: "They've already come to us and told us they are worried about it, they're worried about the results for high school. What if they don't perform well that they need these results to get into high school". This pressure placed on teachers by parents is linked to the next major theme of how the relationship with parents is affected by NAPLAN.

It could be asserted that even if pressure is not placed on teachers at a school level, teachers ultimately still perceive pressure from parents and other external sources. The publication of the test scores and the comparison of cohorts places pressure on teachers to perform. This pressure could be dramatically reduced by the test scores not being published on the *My School* website.

5.3.2 Theme 2: How has NAPLAN affected the relationship between teachers and parents?

In exploring how NAPLAN has changed classroom practices, the theme of relationships between parents and teachers emerged. It became apparent through the

literature and responses from the participants that teacher-parent relationships were affecting classroom practices. This change in relationship mainly manifested in the anxiety parents felt towards NAPLAN, which in turn put pressure on the relationship between teacher and parent. Teachers further reported that parents were displaying increased anxiety towards NAPLAN results when these results became used as an entry into the local secondary school. Teachers indicated that there was an increase in the request for parent-teacher interviews, as parents were seeking to be reassured about NAPLAN results. It can be asserted that as NAPLAN has become an increasingly high-stakes assessment, parents have become more anxious, in turn placing more indirect and perhaps unintended pressure on teachers and negatively affecting the parent-teacher relationship.

The literature supports this finding as Haladyna et al. (1998) stated that teachers are under pressure to explain the students' results when they are lower than expected. This pressure placed on teachers by parents can result in teachers altering their pedagogies in an attempt to increase results. Klenowski (2009) discussed that these changes in pedagogies may indicate that teachers are experiencing a crisis of faith in their own teaching abilities, and hence are changing their pedagogy, and the content they teach in mathematics lessons. This change in classroom practices was evident in the teacher participants who at first were hesitant to admit to altering their mathematics lessons in the preparation of NAPLAN, but eventually conceded to doing so. Such a concession confirms Haladyna et al.'s (1998) belief that teachers were doubting their own teaching abilities, and changed their teaching strategies to attempt to raise NAPLAN scores. Even though teachers know that the results from high-stakes tests can be a misrepresentation of students' abilities, they often feel ineffective in countering the media attention feeding parental expectations. It is evident that the perceived pressure placed on teachers from contact with parents has not only affected the relationship between the parents and school, but has also led to a change in the pedagogies used by teachers. There are two apparent reasons for the change pedagogy; firstly in part to placate parents, and secondly to try to improve NAPLAN scores. The further effects on the changes in pedagogy will be explored in the final theme for Research Question Two.

5.3.3 Theme 3: Changes in pedagogy for teaching.

Through the semi-structured interviews used to collect data in this investigation, the teacher participants were asked if they employed different teaching strategies in the lead-up to the NAPLAN test. An initial denial of changes in pedagogy was gathered from all teacher participants. There appeared to be a great reluctance for teachers to admit that their mathematics lessons had been altered in the preparation for NAPLAN. After further investigation, it became apparent that a change in pedagogies had actually occurred. The changes in pedagogies manifested in two major ways; firstly, through the implementation of practice tests and secondly, through the physical arrangement of the classroom.

Teachers expressed feelings of being compelled to provide students with opportunities to complete practice tests to prepare them for the uncommon format of the NAPLAN test. Wilson and Hornsby (2014) supported this notion, reporting that teachers in Years 3, 5, 7 and 9 were required to give practice tests. In administering the practice test, teachers were moving away from child-centred strategies and moving towards a teacher-centred style. Thompson and Harbaugh (2013) also supported this view, finding that using practice tests promoted a less inclusive classroom where students had less voice, less time to spend on higher order thinking skills, and that there was less conversation between teachers and students. Teacher participants eventually conceded that, in the lead up to NAPLAN, they did replace usual mathematics lessons with practice tests, thus altering the child-centred pedagogies that would normally be implemented.

Within this research question, a second element that contributed to the changes in pedagogy emerged. It became apparent that teachers altered their teaching strategies in mathematics lessons through changing the classroom environment. Initially, teachers did not view this as varying their pedagogies, but after further discussion they acknowledged that altering the configuration of the classroom did adjust the way students were learning mathematics. Teachers confirmed that teaching strategies were altered by adjusting the physical classroom setting to adhere to guidelines set out by ACARA. As students were required to sit in rows, teachers indicated that they perceived the classroom environment was no longer not conducive to the usual child-centred

strategies that would be employed in their lessons. The change in classroom environment resulted in the teachers implementing a more teacher-directed style of instruction.

This sentiment was echoed by the student participants. Many of the students referred to their mathematics lessons changing in the lead up to NAPLAN and a key feature in these variations was the physical environment. They also indicated that mathematics concepts were more difficult to understand due to the physical arrangement of the classroom. In mathematics lessons that were not NAPLAN based, students were provided with an opportunity to work collaboratively and ask the teachers questions at the point of need. These opportunities were removed in the lead-up to NAPLAN as students were required to sit in rows, providing an environment that was un conducive to discussion and peer collaboration. The literature to-date does not speak directly to the alterations in the physical classroom environment having an effect on changing of pedagogies. However, researchers do discuss that changes in pedagogy are evident due to the preparation of NAPLAN. Barrett (2009) and Ryan and Weinstein (2009) wrote that many teachers feel that their ability to choose appropriate pedagogy is restricted by their need to teach the content of the test, rather than the individual needs of their students.

The time spent on practice tests affected not only the pedagogies employed in teaching mathematics but has extended to a reduction in time spent on other learning areas. The literature states that a narrowing of the curriculum has been observed since the inception of NAPLAN. Notably, Carter (2017) found that some teachers have become preoccupied with using class time to prepare their students for NAPLAN. This finding is also supported by Smeed, Spiller and Kimber (2009) who stated that in order to prepare students for NAPLAN, teachers were neglecting to teach other subjects that normally encouraged creativity and individuality. Within the data collection of this investigation, teachers stated that they were spending large amounts of time preparing students for NAPLAN. Teachers indicated that mathematics lessons were used to give students practice tests to ensure that students could finish the test within the time parameters of NAPLAN. It could be assumed that if these teachers were spending large amounts of time preparing students for the type of standardised test that they may not

normally be accustomed to, they may not be leaving enough time to adequately teach all of the other curriculum areas. When reviewing the literature for this investigation it became apparent that as teachers were not only spending extra class time on practice tests, but that they were becoming so preoccupied with preparing students for NAPLAN they were neglecting to teach other subjects that normally encourage creativity and individuality (Smeed, Spilller & Kimber, 2009).

When a review of the researcher field notes was employed, it became apparent that teachers felt that receiving the results of the NAPLAN tests earlier would inform their pedagogies more positively. One teacher summed up the perceived outlook of all teachers as she stated “it would be helpful if the data came back quicker, as a school it is useful but as an individual teacher the results are no use to me”. This notion of results being returned to teachers in a quicker and timely manner is an important element of the NAPLAN process that needs to be considered. If teachers received the results shortly after overseeing the test they could use the results in a formative manner. Currently, the teachers receive the results in October when the test is administered in May.

In reviewing Research Question Two, how has NAPLAN changed classroom practices three subthemes emerged, teachers in this study did not feel pressure from their leadership team but did experience anxiety from the self-induced pressure and the pressure placed on them by parents. The pressure placed on themselves mainly manifested through concern and guilt toward not preparing the students adequately. The pressure felt from parents was related to the expectation of high scores achieved by students to assist in the enrolment of private secondary schools. The teacher-parent relationship was affected by the anxiety parents felt towards NAPLAN. Teachers were increasingly under pressure to explain results when they were lower than parental expectations. Consequently, teachers changed their pedagogies in an attempt to increase these scores. The change in classroom practices included changing normal mathematics lessons by the implementation of practice tests and the altering of the physical environment to prepare students for NAPLAN test conditions. Finally, it is worth noting that there is evidence to support the claim that the curriculum was narrowed due to large amounts of time spent on practice NAPLAN tests in two ways; preparation for the content of the test, and the preparation for the design of the test.

This last finding suggests that NAPLAN can affect the developmental attainment of mathematical skills in the short term, and it may also have a compound effect on future skills as teachers narrow the mathematical curriculum. If teachers are unable to effectively teach the skills in any given year, particularly a NAPLAN year, students may struggle to keep up with the cumulative nature of the mathematics curriculum.

5.4 Research Question Three: What are the Parental Perceptions of NAPLAN?

5.4.1 Theme 1: Parents' understanding of NAPLAN.

The first theme that emerged when investigating parental perceptions of NAPLAN was the understanding parents exhibited about NAPLAN. The parents interviewed in this investigation displayed a very sound understanding of the test itself and the implications of the test. The comprehensive understanding shown by parents in this study is in the contrast with the literature. Barksdale-Ladd and Thomas' (2000) study indicated that parents had a limited understanding of the actual test stating that parents only knew the test by the acronym.

5.4.2 Theme 2: Anxiety experienced by NAPLAN.

The clear understanding of NAPLAN from the parent participants may have contributed to the finding for theme two. Parents in this study experienced little or no anxiety associated with the administration of NAPLAN. The parent participants were asked about the effect that NAPLAN had on their children. Specifically, they were questioned on the anxiety exhibited by their children in the lead up to NAPLAN or on the test day. The majority of parents stated that their children displayed very little or no stress about NAPLAN. Parent C reflected, "she displayed no anxiety, because you would know. She even did it, and it meant nothing to her, you know what I mean?"

Parents did not report that their children became unduly anxious due to NAPLAN which was contrary to the available literature. According to Dulfer et al. (2012), parents discovered their children exhibited some stress. These anxieties were articulated through children freezing up during the test, experiencing sleeplessness, and feeling sick and crying. The discrepancies between the literature and the parents'

responses in this investigation may be connected to the perceived lack of pressure placed on the students and teachers by the leadership team at this particular school.

5.4.3 Theme 3: Relationship with the school.

When parents in this investigation were questioned about the effect NAPLAN had on their relationship with the school, parents generally stated they were very happy with the school's approach in the implementation of the NAPLAN test itself. The view that parents are supportive of the implementation of NAPLAN is in accordance with the literature. For example, Dulfer et al. (2012), stated that not only was a small majority of parents in favour of NAPLAN, but that 70% of parents found the information provided by NAPLAN useful. Furthermore, those authors found that parents' relationship with the school was not adversely affected by the implementation of NAPLAN.

The notion of a parent-school relationship was further investigated, as the parent participants were asked if their relationship with the school altered once the NAPLAN results were released. Overall, the parents stated that their relationship with the school came into question. Parents expressed concern about the achievements from one cohort to the next; their main concern was due to their children's mathematics results not improving but declining. This discrepancy in mathematics results between what was reported by the school and the results their children achieved in NAPLAN caused parents to question the school's ability to sit within the national average.

When parents were interviewed initially, they universally stated that they were satisfied with how the school handled and presented NAPLAN to the students, supporting the school's decision not to place great importance on NAPLAN. However, this collective stance altered when parents were questioned about how the school handled NAPLAN once the results were published. Parents became less satisfied with the school's approach to NAPLAN. They began to question the casual approach the school embraced in its implementation of NAPLAN. Parents indicated that they thought the school should start to place more importance on NAPLAN and should aim to raise the results of NAPLAN to reach or exceed the National average. Another underlying theme that emerged when exploring the relationship between parents and the school, was the repeated concern from parents that NAPLAN had become a high-stakes test.

For example, 50% of the parents of Year Five children interviewed in this study expressed apprehensions about having to present NAPLAN results to non-government secondary schools. Even though these parents were reassured by teachers that the NAPLAN results were not an indication of their students' mathematical abilities, parents felt that the secondary schools would consider NAPLAN results when reviewing their child's application.

This notion was supported by Teacher B when she was asked if NAPLAN had affected the relationship with parents. She qualified, "...it wasn't an issue when I first started NAPLAN, but since high schools have been asking for the data in the meetings, that's when I've seen a change in parents". The increasingly high-stakes nature of NAPLAN has clearly had some effect on the relationship between parents and schools. The literature may provide a clarification as to why parents feel concerned about NAPLAN results. For instance, Barksdale-Ladd and Thomas (2000) discovered that parents were affected by the media reports associated with high-stakes testing. Media, constantly highlighting schools which are receiving low scores, and reports about the negative effects of NAPLAN could lead parents to question their child's school, and contribute to the anxiety about their child receiving high results in NAPLAN. Freeman, Mathison, and Campbell-Wilcox (2015) highlighted that the relationship between teacher, parent and school can be affected and reshaped by reports in the media.

5.4.4 Theme 4: Discrepancy in results between school and NAPLAN reports.

Within this theme, a significant finding emerged regarding the discrepancy parents perceived between the achievement in mathematics when comparing NAPLAN results and their children's school reports. Dounay (2000) stated that many parents doubt the validity of the standardised tests when they do not correspond to the grades or achievements measured by other tests. Parents interviewed during this investigation displayed great confusion when discussing the discrepancy in results. They were unable to decide as to which results were providing a true representation of their child's mathematical abilities. One of the main concerns came from parents with students who were in 'advanced' mathematics classes in the school. These students did not achieve

NAPLAN results that were above the school or national average. The inability of these students to achieve results at, or above, the national standard caused parents to question if these students had been assessed correctly by the school, and if their child was actually working at an above average level. Such concerns also reflected the parents discontent about how the school had performed in NAPLAN overall. The perception of a discrepancy in the results remained constant throughout the data collection, with parents consistently questioning how their child was performing in mathematics.

Consequently, teachers faced increasing perceived pressure from parents when they were asked to clarify the discrepancy between the NAPLAN results and the school results. Teachers stated that parents were asking specific questions about their child's performances in NAPLAN. Parents questioned if it was possible that their child had completed the actual mechanics of the test incorrectly, rather than the result being a true indication of their child's abilities. Parents required clarification when the results between the school and NAPLAN were so different.

The conclusions in this study echo the findings of Dounay (2000), in her investigation of the dissimilarity between school results and standardised testing in schools in the United States of America. Dounay's results acknowledged the confusion parents experienced when comparing results from schools and national benchmarks. Dounay (2000) also deliberated how parents and students conclude that their individual school results may have been inflated or marvel if the national standards are unreasonably high. There is no other literature published within Australia outlining the concern parents' experience, regarding the discrepancy in results they receive between school reports and NAPLAN scores.

It may be concluded from the results of this investigation that the discrepancies parents have experienced within the results of school reports and NAPLAN results have resulted in parents losing confidence in the school's ability to effectively assess their children's mathematical abilities. It was also evident that the relationship between the school and parents was affected by the poor results this school achieved in NAPLAN and the discrepancy in reported abilities. Consequently, the alteration of the parent-school relationship could have an effect on the education of the child, as parents lose confidence in the instructional abilities of the teachers.

There is a risk that if schools succumb to the pressure parents place on them to improve NAPLAN results, that this may result in the school placing more focus on NAPLAN, and result in further narrowing of the curriculum. This perceived parental pressure may result in teachers teaching to the test with the corollary of increasing anxiety in the children. Anecdotally from the teachers at this school, it was evident that a concern arose from the fact that NAPLAN is administered in May the teachers' collective perception is that they did not have enough time to prepare students for NAPLAN. In essence the school report, which is based on teacher-made assessments, is a more accurate record of the child's actual achievement as it is based on the concepts taught at that point of time. Another reason for the discrepancies may be the nature of the test itself. NAPLAN is very different to teacher-designed testing that is more formative and anecdotal in its nature, and linked to contemporary pedagogies.

5.5 Conclusion

The purpose of this chapter was to discuss the results of this research by aligning them to the Research Questions and current literature. The first research question explored the effect NAPLAN has had on the teaching and learning of mathematics. Through the exploration three themes emerged, namely; negative consequences experienced by students, students' perceptions of themselves as mathematicians and how students' learning was affected by changes in pedagogy. It was evident in this investigation the only negative consequences felt by students were the feelings of isolation due to the change in physical environment and the time restraints placed on students. Students' self-perceptions were not affected by NAPLAN, but the enjoyment of mathematics classes was. The final theme, in Research Question One, uncovered that students were mainly affected by the change in pedagogy by the increased involvement in NAPLAN practice tests. These findings could inform teachers that changes in the physical environment are having a detrimental effect on students' enjoyment and therefore perhaps their overall performance in NAPLAN. The anxiety of children completing NAPLAN could be significantly reduced by not changing the physical environment in lessons preparing students for NAPLAN. If the aim of NAPLAN is to gain a true indication of students' mathematical abilities, then it is evident that it should

not be a requirement for students sitting NAPLAN to have to be in rows. The ACARA requirement of student sitting in rows is particularly detrimental for younger children.

Research Question Two questioned how NAPLAN had changed classroom practices. Research Question Two uncovered the themes of: The negative consequences felt by teachers, how NAPLAN had affected the relationship between teachers and parents and the changes in pedagogy for teaching. It is apparent that the negative consequences experienced by teachers was the pressure they placed on themselves in attempting to achieve high NAPLAN results, as well as the pressure placed on them by parents who also expected students to achieve results at or above the national average. The perceived pressure felt by teachers in relation to NAPLAN was that NAPLAN results were being used as an entry point for some secondary schools. If those secondary schools placed more emphasis on school reports and less on NAPLAN scores, the pressure placed on primary school teachers would be significantly reduced. It could also be assumed that relationships with parents would also improve as a result of certain secondary schools downplaying the importance NAPLAN scores have on the admission process.

Research Question Three considered what the parental perceptions of NAPLAN were. What became apparent was that parents had a sound understanding of NAPLAN and its purpose and implementation. Parents recalled feeling no anxiety about their children sitting the standardised test; the only anxiety relating to NAPLAN was evident when the results were published. The lack of anxiety felt by parents had a direct link to the final theme which concerned the discrepancies parents discovered between school reports and NAPLAN results. From the findings in this study, it is evident that schools must address the discrepancies of school mathematics results with NAPLAN. The school needs to arrive at a decision about how to explain the discrepancies in scores to the parents. As the school in this study was performing below the national average, they may need to review their mathematical programs, (including how assessments are administered in mathematics), to ensure they are providing parents with a correct synopsis of their child's mathematical abilities.

The following chapter will explore the contribution of this study to the existing literature base and the recommendations for future research. It will also discuss the limitations of the study and identify the gaps in the current literature.

CHAPTER SIX – REVIEW AND CONCLUSION

6.1 Purpose of the Research

The purpose of this research was to investigate the effects NAPLAN has had on the teaching and learning of mathematics. In particular, this research focused on the perceptions of students, teachers and parents in Years 3 and 5 at a metropolitan primary school. The case study explored the anxiety felt by those key stakeholders, the effect NAPLAN had on the relationships between the stakeholders, the changes in pedagogies due to the implementation of NAPLAN and how NAPLAN affected the teaching and learning of mathematics. This research was a necessary undertaking to explore the repercussions of the mandatory implementation of NAPLAN on the teaching and learning of mathematics in a primary school setting.

6.2 Design of the Research

The design of this study was located in the interpretive paradigm of qualitative research. The stated goal of this research was to highlight the human perceptions of NAPLAN within a primary school. This intrinsic case study was located in the interpretive paradigm of qualitative research, it was situated within the epistemology of interpretivism, and the chosen theoretical perspective was phenomenology (Stake, 1995). This approach allowed for a deeper gathering of the data (Lester, 1999). The data were collected principally through two methods: Semi-structured interviews and the researcher's field notes. The data were then analysed and significant emerging themes were identified through the framework espoused by Miles, Huberman and Saldaña (2014). To ascertain the experiences of parents, teachers and students with NAPLAN, a major overarching research question was posed: How does NAPLAN affect the teaching and learning of mathematics for students, teachers and parents? Three specific research questions stemmed from this overarching question and these will be addressed in this chapter.

1. How has NAPLAN affected the learning of mathematics?
2. How has NAPLAN altered the teaching of mathematics?
3. How has NAPLAN affected parental perceptions of the teaching and learning of mathematics?

The findings of these research questions have been presented and discussed in relation to current literature in previous chapters. The following sections of this chapter present summarised responses to the questions posed in this research.

6.3 Research Questions Addressed

The investigation was defined by three major research questions and subsequent sub-questions were posed to the participants.

6.3.1 Research question 1: How has NAPLAN affected the learning of Mathematics?

The students reported that they did not initially feel anxious about sitting NAPLAN due to the consistent reassurance from their classroom teachers that the results would not affect their school reports. However, the students recalled experiencing anxiety during the test, due mainly to time limitations and the physical arrangement of the classroom. Although not measured in this study, it would be reasonable to assume that this anxiety may have had an effect on the NAPLAN results these students achieved.

To directly answer Research Question One, it is necessary to focus on the third sub-theme which investigated the changes students experienced in their mathematics lessons in the lead-up to NAPLAN. Through the participant reports, it is apparent that the learning of mathematics was affected by the preparation for NAPLAN. These pedagogical changes mainly manifested through an alteration of the physical environment and the inclusion of NAPLAN practice tests in mathematics lessons. Students testified that they preferred the lessons which were not NAPLAN focused. Student responses also indicated that their enjoyment of mathematics lessons decreased as lessons moved from a child-centred approach to a teacher-directed approach.

Teachers also reported on how the teaching and learning of mathematics altered during the preparation for NAPLAN mainly due to the changes in the physical classroom. Teachers stated that during lessons leading up to NAPLAN, children's desks were moved from small groups to rows. Consequently, children were not given the opportunities to learn collaboratively, a pedagogy of best practice which was normally employed.

6.3.2 Research question 2: How has NAPLAN altered the teaching and learning of mathematics?

The teachers in this study expressed that they did not feel pressure from their school leaders during the NAPLAN process. However, they reported feeling pressure from themselves, parents and the school community, due to the publication of results on the *My School* website. This reported pressure invariably resulted in teachers altering their classroom practices. Initially, all teachers refused to acknowledge that they had changed their lessons in preparing students for NAPLAN. After further questioning, the teachers recognised they had altered their pedagogies; these changes manifested through the inclusion of sample tests in their regular mathematics lessons, and the physical changes made to the classroom environment. It has been established that the teaching and learning environment was altered during the implementation of NAPLAN, and that pedagogical approaches changed due to the inclusion of practice tests in mathematics lessons. It may then be assumed that attention to other elements of the curriculum must have been either postponed or abandoned prior to NAPLAN testing, due to class time being used to prepare students to sit the test.

Students supported this observation that classroom practices altered, stating that they noticed that their mathematics lessons changed in the lead up to NAPLAN. They reported that their physical classroom had been altered and that the teaching style changed. Students also reported that they preferred lessons not based on NAPLAN.

6.3.3 Research question 3: How has NAPLAN affected parental perceptions of the teaching and learning of mathematics?

Parent participants interviewed for this study displayed a very sound understanding of NAPLAN including its purpose and design. Parents understood how NAPLAN was administered and that the results were published on the *My School* website. Initially, parents stated that they did not experience any anxiety when their children sat NAPLAN and recalled that they did not notice any anxiety in their children on NAPLAN days. At the implementation stage of NAPLAN, the relationship between

the school and parents was very positive. Parents commented that they were supportive of the understated manner in which the school implemented NAPLAN.

However, when parents were asked to discuss the school's NAPLAN achievement results, they displayed a mild degree of discontent. This school performed under the National average in mathematics, which resulted in parents questioning the importance placed on NAPLAN. Parents of Year 5 students expressed the most unease as the NAPLAN result was being used as an entry criterion into the local secondary school which used NAPLAN data in selecting students for their intake. Parents voiced their apprehensions about submitting their child's NAPLAN results when their child had not achieved above the National average.

The major concern and confusion displayed by parents in regards to NAPLAN was the discrepancy in results between the school reports and NAPLAN results. Generally, the school results achieved by students were much higher than those achieved and reported in NAPLAN. The discrepancy in results gave cause for parents to question which results were a true indication of their child's mathematical abilities.

6.4 Implications for the profession

The findings for this study have implications for teachers, parents, policymakers and most importantly, for students. These findings may heighten an awareness within teachers of the ways in which they are altering their pedagogies when preparing their students for NAPLAN. Teachers should be cognisant that seemingly subtle changes in their mathematics lessons can have an effect on the way they are teaching mathematics. From this study, teachers may come to understand that in aiming to improve NAPLAN results they are altering the way students learn mathematics.

For parents, the implications rest in the decisions they make regarding the emphasis they place on the results of NAPLAN, compared with school reports on mathematical attainment. The relationship with the school and predominately the teachers can also be affected by these results, as parents question the trust they placed in the teacher's ability to effectively report on their child's progress. The sensationalism the media places around NAPLAN can also have far-reaching implications for parents as they can become influenced by many available media reports.

Governments and policymakers may discover the results in this study useful in acknowledging that the implementation of mandatory testing has had an effect on the classroom practices in the teaching and learning of mathematics. It is apparent from the findings presented in this investigation and the literature review conducted, that teachers feel pressure to ensure their students are well prepared for NAPLAN and that they achieve high results. Policymakers and governments may come to realise the publication of NAPLAN scores on the *My School* website has resulted in teachers questioning their own abilities to teach mathematics, and consequently altering the way they teach mathematics in the lead-up to NAPLAN. Teachers changing their classroom environments in order to observe the guidelines set out by ACARA, has been a major contributor to why pedagogical approaches have altered. This research has found that teaching strategies have moved from a student-centred approach to a teacher-centred approach during NAPLAN preparation.

There are a variety of implications for the children's learning that have emerged from this research. Firstly, due to the change in pedagogical approaches, children may miss out on a wide range of collaborative learning strategies in the lead-up to NAPLAN, as teachers alter their approaches to prepare the students for the test. This period of preparation may also lead to areas of the curriculum not being covered in Years 3 and 5 (NAPLAN years) as teachers spend time implementing NAPLAN practice tests. This narrowing of the curriculum may also extend to the curriculum in other learning areas being neglected. It is evident through the existing literature, and the findings of this study, that students do experience anxiety when they are involved in NAPLAN. Throughout the interviews, students indicated that they loved their regular mathematics classes; however, they also suggested that this enjoyment of mathematics was reduced during classes in the lead-up to NAPLAN.

The final implication for students is the exposure to standardised testing at a very young age, which varies for the two cohorts involved in this study. Year 3 students reported being affected by the unnatural test conditions they were placed under. However, the implications for Year 5 students, could be construed in a positive light as they gain experience of formal test situations preparing them for secondary school.

6.5 Recommendations

The recommendations that emerge from this study are directed towards the main stakeholders, namely: teachers, students and parents, with some further recommendations for schools and policymakers.

6.5.1 Teachers.

Firstly, it is recommended that teachers acknowledge the pressure placed on them when teaching a NAPLAN class, to exercise their professional integrity when questioned about their students' NAPLAN results. Teachers should feel confident in the technical and pedagogical soundness of their own teaching abilities and should not feel the necessity to alter their lessons in the preparation for NAPLAN. In particular, it is recommended that teachers should avoid teaching to the test. To ensure they can reassure parents that the school results are a true indication of their child's mathematical abilities, teachers should implement a wide variety of diagnostic mathematics assessments to provide a more comprehensive view of the students' mathematical abilities throughout the year. While NAPLAN results will give teachers one insight into students' mathematical ability, these results should not be the major nor the solitary source of assessment.

6.5.2 Students.

Students in this study indicated that they thoroughly enjoyed mathematics lessons and displayed positive self-esteem about their own mathematical abilities. However, these same students admitted that their enjoyment of mathematics was reduced once lessons were altered in preparation for NAPLAN. This finding should act as a salutary lesson to teachers. A further recommendation for students is that they are involved in discussions so as to understand that NAPLAN is only one indication of their mathematical abilities. As a consequence of these discussions, students should be aware that the reporting of their mathematical achievements is taken over a whole year through a variety of diagnostic, formative and summative assessments. Students should be encouraged to approach NAPLAN without anxiety.

6.5.3 Parents.

It is recommended that parents carefully track the scholastic trajectory of their child to make informed decisions about their child's mathematical abilities. In doing this, parents will be more aware of their child's mathematical abilities aside from NAPLAN, allowing them to make comparisons with the results achieved in assessments across the school year. Viewing all mathematics assessments provided by the school will provide a more comprehensive and robust insight into their child's abilities. Additionally, parents need to understand that NAPLAN is one test, on one day, and that there are many factors which could influence their child's performance on that day. Parents should assist in reducing the anxiety students experience by reassuring and explaining to their children that the test would only be viewed as a single indication of their overall abilities in mathematics. School systems could assist parents in their understanding of NAPLAN by providing parent information nights at the beginning of the school year, which would provide teachers with an opportunity to disseminate government and school-based philosophies about NAPLAN. Teachers could explain the test, its implementation protocol and the reporting process and reiterate its place in the overall assessment schedule of the school. Such a refined approach may reduce anxiety and confusion that parents have experienced with NAPLAN.

6.5.4 Schools and policymakers.

Schools could assist parents and students in their understanding of NAPLAN by better disseminating information about NAPLAN; its place in the curriculum, the process and how the results are used to inform pedagogy and policy. Policymakers should review how NAPLAN is implemented and rethink the guidelines to which very young children are asked to follow. It is recommended the policymakers acknowledge the emotional development of young children, be aware of how young children learn and allow them to sit the test in a developmentally appropriate manner. Such a manner is allowing them to sit in small groups which is not as isolating as rows. Allowing young students to complete the test while still sitting in their usual classroom environment would support the developmental phase experienced by Year 3 students. Policymakers

should also acknowledge the high-stakes nature of the test and offer teachers and students further support during the implementation of NAPLAN.

The process regarding the dissemination of NAPLAN results should be reviewed by policymakers. The additional pressure placed on school systems and teachers by publicly publishing the results on the *My School* website should be acknowledged. Policymakers should be aware that teachers are feeling considerable pressure from the publication of the results and that they are changing their classroom practices by ultimately teaching to the test. Policymakers should reduce the stress placed on children by advising secondary schools not to solely use primary school NAPLAN results as an entry document and that students in secondary schools should not be expected to pass Band Eight as a condition of graduation. Instead, secondary school staff should consider school reports and teacher assessments collected over the full academic year rather than the results of one test sat on one day. It should be made clear to students by policymakers that NAPLAN is a single test, and that it is not the sole mathematics assessment administered during a school year. Policymakers must ensure that students understand that this assessment does not define students as mathematicians, nor does it provide a holistic view of their mathematical abilities. The pressure on students to succeed should be reduced and to this end, widespread publication of the results should cease. Children in Year 3 should not be expected to adhere to the test conditions set out by ACARA as these conditions are not developmentally appropriate, and are not conducive to students displaying their understanding mathematical concepts. Thus, the restrictive mode of delivery to the youngest participants needs to be redesigned by policymakers. However, from data collected and existing literature on the subject of test conditions, it is apparent that the test conditions outlined by ACARA are not as detrimental for students in Year 5 as they are for younger children, and, in fact, there could be some benefit for students to sit formalised testing in preparation for secondary schools. This information could be used by policymakers as a ‘selling point’ to parents and upper primary students. It could be perceived that Year 5 students are less concerned about the test conditions than the Year 3 students.

6.6 Limitations of the Research

There were three main limitations for this study. The first limitation was that the study was conducted in only one metropolitan school in Perth, Western Australia, which restricts the transferability of any claims to be representative of all primary schools. However, a mitigating feature was that the institution chosen was a triple-stream school, which allowed a larger selection of students, parents and teachers to participate in the study.

The second limitation was that some of the student participants were of a very young age. Consequently, the students could have felt intimidated by the interview situation and there was a risk that these children did not fully understand the questions. The researcher addressed this potential risk by beginning the interview with a few ‘get to know you’ questions to put the participants at ease. Also, the students were assured that the answers they gave as participants were purely for the researcher’s study purpose. Children who did not feel comfortable speaking to the researcher alone were accompanied by the classroom teacher. One child required the reassurance of her teacher. On this occasion the teacher asked if she could attend the interview as the child felt a little apprehensive. Another limitation with Year Three students was that they were reluctant to expand on their answers. Although Year Three student responses were limited, Year Five student responses were comparatively eloquent and detailed.

Another limitation of this research was that the vast majority of extant literature discusses the negative consequences of NAPLAN. This literature base made it difficult for a balanced view of high-stakes testing to be presented. Norris (1997) explored the difficulty that research can sometimes present, “research whether quantitative or qualitative, experimental or naturalistic, is a human activity subject to the same kinds of failings as other human activities”. (p. 173). All efforts have been made to demonstrate a balanced view point.

6.7 Conclusion

The premise for conducting this study was to investigate the effect NAPLAN was having on the teaching and learning of mathematics for the main stakeholders, namely: students, teachers and parents. This study has given voice to these stakeholders

who are directly affected by the decisions made by policymakers and governments. It has contributed to research that investigates how NAPLAN affects the teaching and learning of mathematics and offered some recommendations built around contemporary literature and the results of this study, for teachers, students, parents, schools and policymakers. In conclusion, this study has determined that NAPLAN has had a significant effect on the teaching and learning of mathematics at one Catholic primary school. In particular, the findings indicated that teachers have altered their pedagogies due to the test requirements set out by ACARA when implementing NAPLAN. Teachers have also experienced pressure and anxiety from parents as a result of the NAPLAN scores being published on the *My School* website. In this study, and at this school, students' enjoyment of mathematics was reduced due to the change of strategies in the lead up to NAPLAN. Low levels of anxiety were also experienced by the students in this study, as a result of the time restraints placed on students when completing NAPLAN. Anxiety in students was heightened by the feelings of isolation during the actual test. Parents were affected by the results they received about their children's performance in NAPLAN. Parents expressed feeling confused by the discrepancy between the results presented in school reports and the results achieved in NAPLAN. This discrepancy gave the parents cause to question the school's ability to accurately assess their children's mathematical achievement.

6.8 Personal Impact

In 2008 when NAPLAN was implemented in Australia, I was working as a primary school teacher. After viewing the effect NAPLAN was having on my colleagues, my students, my own children, and myself, I was inspired to conduct this research. My principal aim was to provide a voice for the key stakeholders of NAPLAN, who were those most affected by the Australian government's decision to implement mandatory, nationwide, standardised testing into primary and secondary schools. As a primary school teacher, university lecturer and mother, I have seen the effects NAPLAN has had on the teaching and learning of mathematics. I have witnessed and experienced the anxiety of delivering and taking high-stakes tests, and I have listened to and witnessed the expressions of professional dilemma. Despite these

experiences, I wanted to approach this research with an open mind hoping to discover evidence which could be viewed to support stakeholders as they undertook NAPLAN testing and provide justification for the implementation of NAPLAN. It became apparent that the vast majority of existing literature discussed the negative aspects of high-stakes and standardised testing. Throughout the course of writing this thesis, I have had the opportunity to formally present my research nationally and internationally. The ensuing passionate conversations and emotive discussions that the topic of high-stakes testing elicits in educational professionals, parents and young people have convinced me that this has been a worthwhile and necessary study to conduct. The findings have given a voice to the main stakeholders in Australian high-stakes testing; however, I do believe that further research into the effects of NAPLAN is warranted.

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APPENDICES

APPENDIX 1

Interview Questions (Students)

Initial welcome/greeting

1. What is your favourite subject in school? What about mathematics?
2. Do you enjoy doing Mathematics? Mathematics classes? Why? Why not?
3. What do you think Maths is important? What kind of things does the teacher stress in class?
4. What do you know about the NAPLAN test? Why do you think it is important?
5. What happens with the results? Have you ever seen them?
6. What did your teacher tell you about NAPLAN?
7. What did your parents tell you about NAPLAN?
8. How did you enjoy the preparation for the test?
9. How do you feel about sitting the NAPLAN test? (Smiley faces may be used here to assist children).
10. Do you like Maths close to the NAPLAN test?
11. Do you think the type of Maths you do closer to NAPLAN changes?
12. How are the lessons different?

Thank you statement

APPENDIX 2

Interview Questions (Teachers)

Initial welcome/greeting

1. How many years have you been teaching?
2. How long have you been at the school?
3. Which classes have you taught?
4. What is your general philosophy on teaching Maths?
5. Is Maths a subject you usually enjoy teaching?
6. How important is NAPLAN in this school?
7. How has it been communicated to you?
8. How important is NAPLAN to you?
9. How do you tell students about the test?
10. How are you affected by the testing environment?
11. How do you prepare students for the test?
12. Have your teaching approaches altered since the implementation of NAPLAN?
13. How has the introduction of NAPLAN affected your confidence towards Maths and the teaching of maths?
14. Has NAPLAN affected your enjoyment of teaching Maths? How?

15. How do you feel about the publication of marks on 'My School' website?

APPENDIX 3

Interview Questions (Parents)

Initial welcome/ greeting

1. What do you understand about NAPLAN?
2. Have you experienced anxiety associated with the testing procedure itself or the results?
3. What do you understand about the results?
4. Do you use the results on the 'My School' website to make decisions about where your children will receive their education?
5. How has your relationship with the school/teachers been affected by NAPLAN?

APPENDIX 4 PARENT AND STUDENT INFORMATION SHEET



Dear Parent and Student,

The Principal and year 3 and 5 class teachers at your child's school have agreed to participate in my study investigating **How NAPLAN has affected the teaching and learning of Mathematics**. I am conducting this study as part of my Master Thesis at Curtin University of Technology. The project will initially require the teachers and students to participate in structured interviews stating their feelings about their participation in NAPLAN testing.

The benefits of your child's participation in this project are that; the researcher may learn how your child is affected by NAPLAN and to ascertain how we can make the mandated testing effective in teaching your child Mathematics. It will also allow the researcher to investigate the impact NAPLAN is having on their own self concept and enjoyment in participating in Maths lessons.

Your child would be involved in a structured interview. The duration of the interview would be approximately 30 minutes at the school. In this interview your child would be asked questions based on the following.

How do students feel about sitting the NAPLAN test?

What is the level of anxiety?

Are they aware their results are published on the My School website?

Has NAPLAN changed their perceptions of themselves as Mathematicians?

Has NAPLAN interfered with their enjoyment of the subject area?

How have their Maths lessons changed as result of the implementation of NAPLAN?

When the project is completed, all response sheets will be stored in a locked filing cabinet in an office at Curtin University of Technology. The complete set of information will be analysed and published in educational journals for teachers but individual student names and school names will never be included in this work.

If you are happy for your child to participate, please complete the form below.

If you have any questions about this project, please telephone me on 0414838540 or email me on linda.cranley@nd.edu.au and I will be happy to provide further information. My supervisor can be contacted on b.atweh@curtin.edu.au or 9277 7073. This project has been approved by the Curtin University Ethics' Committee (Reference No. SMEC-). Thank you for your consideration.

Yours sincerely

Linda Cranley

_____ Please return this form if you wish your child's information to be included in the project.

I have read and understand the Information Sheet that has been provided to me by Mrs Linda Cranley

I have been given an opportunity to ask questions.

I understand that as a voluntary participant in this research I am free to withdraw the school's involvement in this study at any time without any penalty or prejudice.

I understand that any information which might potentially identify me or the school will not be used in published material.

I agree to participate in the study as outlined to me.

Child's Name: _____

Child Signature: _____

Parent's Name: _____

Parent's Signature: _____

Date: _____



APPENDIX 5

INFORMATION SHEET FOR SCHOOL TEACHERS

Study Title: *An investigation into the impact of high stakes testing, through the NAPLAN assessment, on the teaching and learning of Mathematics in primary schools.*

Investigator: Linda Cranley
Linda.cranley@nd.edu.au
94330155
0414838540

I am writing to ask you to consider participating in a research study entitled - ***An investigation into the impact of high stakes testing, through the NAPLAN assessment, on the teaching and learning of Mathematics in primary schools.***

I am conducting this research as part of my Thesis at Curtin University

Your school has been identified as located in a lower socio economic area on the My School website. In my research I would like to investigate the effects NAPLAN is having on a school in this Socio economic environment.

The purpose of this research is to gather evidence regarding the impact high stakes assessment has on the teaching and learning of mathematics for students, their parents and classroom teachers. To gather these perspectives from the key stake holders, the research will be naturalistic and qualitative in nature and will be gathered through a number of interviews.

The research requires semi structured interviews to be conducted with the main stake holders in NAPLAN. They have been identified as the principal and the deputy in charge of Maths curriculum, teachers of years three and five, three children from each year three and five class and a focus group of parents for each year level.

This research would require the support and participation of the Year three and five teachers who will be administering the NAPLAN test and preparing the students for the test.

The requirements of participation in the project for Year three and year five teachers:

1. Participating in semi-structured interviews prior to NAPLAN to discuss the teacher's general feelings about NAPLAN and how the impending test affects their maths lessons. The researcher would also inquire as to the preparation strategies they use to prepare students for NAPLAN.
3. Participating in semi-structured interview once the NAPLAN results have been dispersed.

The requirements of participation in the project for students:

1. Participating in semi-structure interviews to ascertain how or if NAPLAN has influenced the self- esteem of children involved in these year levels. This research aims to give the students a voice to state their feelings about the pre-testing stage including; their involvement in completing many sample tests, the testing situation itself and the effect their results have on their own perceptions of themselves as Mathematicians. The students will not be identifiable in the research.

The requirements in the project for parents:

1. Participating in semi-structured interviews to determine the effect the results and indeed the testing procedure has on parents of children in the nominated year levels. It will aim to determine their understanding of what the test is testing and what do these results indicate about their children's development in mathematics. It will also endeavour to ascertain how the relationship between the home and school has been affected by the implementation of NAPLAN and the publishing of the school's results.

With your permission, I will contact you and make arrangements to conduct the research activities by appointment at a time convenient to you.

As the researcher I encourage you to take part in the study, however, continual participation in the study will depend on each individual participant and I would like to make it explicit to you that any of the participants are free to withdraw from the research at any time without any penalty or prejudice. If you decide you would like to take part in the study and then change your mind you can withdraw at any time.

It is important for you to understand that the data for students, teachers and schools remains confidential. To make sure data and any other personal information, such

as your name and school, is safe, all of the participants will be identified by a code known only to me and everything will be kept in a locked cabinet in an office at the University. All data will be kept for at least 5 years after the completion of the study and written work or public presentations about the research will refer only to grouped results.

If you have any concerns or questions about the study please do not hesitate to discuss them with me by telephoning 94330155 or by emailing me at linda.cranley@nd.edu.au or my supervisor, Associate Professor Bill Atweh B.Atweh@curtin.edu.au.

I would like to arrange a time to meet with you to explain the study and show you the paperwork that is required and I am available at a time convenient to you. Please contact me on the number above to arrange a suitable time to meet with you.

This study has been approved by the Curtin University Human Research Ethics Committee (Reference No. SMEC- . If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 08 9266 2784.

This information sheet is for you to keep. I will also give you a copy of the signed consent form, if you wish to participate in the study.

Thank you for your consideration.

Yours sincerely

Linda Cranley

APPENDIX 6

CONSENT FORM Teachers

Study Title: *An investigation into the impact of high stakes testing, through the NAPLAN assessment, on the teaching and learning of Mathematics in primary schools.*

Investigator: Linda Cranley
Linda.cranley@nd.edu.au
94330155
0414838540

I have read and understand the Information Sheet that has been provided to me by Mrs Linda Cranley.

I have been given an opportunity to ask questions.

I understand that as a voluntary participant in this research I am free to withdraw my involvement in this study at any time without any penalty or prejudice.

I understand that any information which might potentially identify me or the school will not be used in published material.

I agree to participate in the study as outlined to me.

NAME OF TEACHER: _____ (Please print)

SIGNATURE OF TEACHER: _____ Date: __

NAME OF SCHOOL: _____

ADDRESS: _____

PREFERRED CONTACT TELEPHONE

PREFERRED EMAIL _____