PERSONALISED LEARNING:

PERCEPTIONS OF CURRICULUM LEADERS AND MATHEMATICS TEACHERS IN A SECONDARY SCHOOL CLASSROOM

Written by

Raeesa Dada

A thesis submitted in partial fulfilment of the requirements for the degree of Master of Educational Management and Leadership

Unitec Institute of Technology

2015
DECLARATION

Name of candidate: Raeesa Dada

This Thesis entitled: “Personalised learning: Perceptions of curriculum leaders and mathematics teachers in a secondary school classroom” is submitted in partial fulfillment for the requirements for the degree of Master of Educational Leadership and Management at Unitec Institute of Technology.

I confirm that:

• This thesis represents my own work;
• The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
• Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: 2015-1031

Candidate Signature:

Date: 25 November 2015

Student number: 1375026
ABSTRACT

The personalised learning and teaching approach is an ideal vehicle to impact and explore the needs and abilities of students, so that they can achieve to the best of their ability.

This study is focused on the curriculum area of mathematics in three Auckland secondary schools in New Zealand and will explore the perceptions of curriculum leaders and mathematics teachers regarding personalised learning in a mathematics secondary school classroom.

The two research methods, semi-structured interviews and focus groups were used to obtain the perspectives of selected mathematics teachers and mathematics curriculum leaders around four main questions; firstly, what is the curriculum leader and teacher's perception and understanding of personalised learning in a mathematics secondary school classroom? Secondly, what do curriculum leaders and teachers perceive as the barriers and challenges in implementing personalised learning in a secondary school mathematics classroom? Thirdly, what do curriculum leaders and teachers view as successful personalised learning strategies/experiences in a secondary school mathematics classroom? Finally, how are opportunities created and challenges addressed by teachers and curriculum leaders in relation to personalised learning in their mathematics classrooms?

The findings suggest that despite the fact that all participants acknowledged the need and importance of personalised learning in a secondary school mathematics classroom, this approach to teaching and learning was seldom practised.

The findings revealed three major themes; personalised learning, curriculum leadership and relationships. This research suggests that the concept of personalised learning needs to be reinforced to ensure that everyone is on the same page with
regard to teaching mathematics in a secondary school classroom. Secondly, leadership, in this case the role of the mathematics curriculum leader, needs to be clarified with regards to providing support, team work and expectations for mathematics teachers in a secondary school. Finally there is a need to establish open relationships of trust, so that a shared vision can be created to ensure that personalised opportunities are created for our students so that they can achieve positive outcomes in mathematics.
ACKNOWLEDGEMENTS

My sincere thanks to all who have supported me in my endeavours to complete my thesis.

I would like to acknowledge the principals, mathematics curriculum leaders and mathematics teachers at the three schools who participated in the interviews and focus groups. I am sincerely grateful for their willingness to share their time and for the honest accounts of their experiences.

My thanks to all the lecturers and staff in the Department of Educational Leadership and Management and the Te Puno Ako Learning Centre for the extra workshops provided.

I am grateful to the Ministry of Education for providing me with a study award which has allowed me to complete my Master of Educational Leadership and Management and my own school and Board of Trustees for supporting my application.

Special thanks to my husband Omar and my sons Nabeel, Yusuf and Nazeer for their love and support throughout my studies.

Finally, I would like to acknowledge and thank my principal supervisor, Dr. Josephine Howse and my associate supervisor, Jacoba Matapo, for making time to give me the support, guidance and constructive feedback. Their patience and encouragement has been invaluable to me.
Table of Contents

DECLARATION .................................................................................................................. 2
ABSTRACT .......................................................................................................................... 3
ACKNOWLEDGEMENTS .................................................................................................. 4
LIST OF TABLES ............................................................................................................... 7
LIST OF ABBREVIATIONS ............................................................................................. 8
CHAPTER ONE: ............................................................................................................... 1
  Research Aims and Questions...................................................................................... 4
    Research aims ............................................................................................................ 4
    Research questions .................................................................................................. 4
  Thesis Structure ......................................................................................................... 5
CHAPTER TWO: .............................................................................................................. 7
  Literature Review ....................................................................................................... 7
    Introduction ............................................................................................................... 7
    Personalised learning ............................................................................................... 7
  Curriculum Leadership .............................................................................................. 13
  Relationship Building ................................................................................................. 17
  Summary ..................................................................................................................... 20
CHAPTER THREE: .......................................................................................................... 22
  Research Methodology ............................................................................................... 22
    Introduction ............................................................................................................... 22
    Methodology ............................................................................................................. 22
    Rationale for Qualitative Approach ....................................................................... 24
  Sample selection ......................................................................................................... 26
  Research Methods ...................................................................................................... 27
  Semi-structured interview ......................................................................................... 28
  Focus group interview: .............................................................................................. 29
  Data Analysis ............................................................................................................. 30
  Validity and Reliability .............................................................................................. 31
Ethical Considerations ................................................................................................. 33
  Informed consent ........................................................................................................ 33
  Anonymity and confidentiality ................................................................................... 34
  Cultural issues ............................................................................................................ 34
  Summary ..................................................................................................................... 35
CHAPTER FOUR: .................................................................36
Findings ........................................................................36
   Introduction ..................................................................36
CHAPTER FIVE: .............................................................55
Discussion, Conclusion And Recommendations ...............55
   Introduction ..................................................................55
REFERENCES ...................................................................70
APPENDIX A ..................................................................74
APPENDIX B ..................................................................75
APPENDIX C ..................................................................76
APPENDIX D ..................................................................77
APPENDIX E ..................................................................78
APPENDIX F ..................................................................79
APPENDIX G ..................................................................80

LIST OF TABLES

List of Tables

Table 1: School Profile.................................................................28
Table 2: Understanding personalised learning ..................................38
Table 3: Personalised learning development in school .......................41
Table 4: Personalised learning impact on achievement .....................43
Table 5: Strengths of personalised learning in mathematics classes ..........44
Table 6: Impact of examinations on personalised learning in mathematics classes ..47
Table 7: Practices used to ensure personalised learning in mathematics classes ....49
Table 8: Challenges or barriers for personalised learning in mathematics classes ....50
Table 9: Curriculum leaders’ understanding of their job description ..............55
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>ERO</td>
<td>Education Review Office</td>
</tr>
<tr>
<td>CL</td>
<td>Curriculum Leader</td>
</tr>
<tr>
<td>MT</td>
<td>Mathematics Teacher</td>
</tr>
<tr>
<td>FG</td>
<td>Focus Group</td>
</tr>
</tbody>
</table>
CHAPTER ONE:

BACKGROUND

In a very multi-cultured New Zealand, known for its rainbow nation, it is vital to remember that whether we are on the sports field or in the classroom, whether it's rugby gear for the school team or doing a reading lesson with the students in your class, the notion of a “one-size fits all” model simply does not work.

The Minister of Education, the Honourable Hekia Parata stated that she wanted to ensure that New Zealand's education system is a world-leading system that “equips all our young people with the knowledge, skills and values to be successful in a world that is increasingly complex, fluid and uncertain. A good education gives our young people opportunities and choices” (Bolstad & Gilbert, 2012, p. 3).

Demski (2012) has a similar notion, he describes personalised learning as “a student-centred teaching and learning model that acknowledges and accommodates the range of abilities, prior experiences, needs, and interests of each student, with the goal of moving every student to a higher standard of achievement” (p. 1). Such an approach to teaching and learning requires us as educators to frame both our curriculum and education system so that it encompasses the student, contrary to the student having to fit the system.

The Ministry of Education Statement of Intent for 2008-2013, recognised that schools needed to work towards “improving flexibility, responsiveness and choice, and exploring alternative models for teaching and learning, [which] will help build an education system that can adapt to change in the 21st-century.” (Ministry of Education, 2008, p.15). Anthony Mackay, Co-Director of the Global Education Leaders’ Programme, is of a similar opinion, stating that “21st century learning needs to be the game everywhere for everyone, so that all young people will thrive” (as cited in Bolstad
In 2013, the Ministry of Education (MOE) launched a pilot initiative called 'Achievement 2013-2017', to raise student achievement in schools. It was evident, from the outcomes of this project, that personalised learning is an important aspect of student achievement. According to the Education Review Office, their reviewers found that personalising learning for students encouraged them to take more responsibility for their own learning by helping them gain a better understanding of what they needed to do to achieve success (MOE, 2013).

RATIONALE

As far back as 1999, Littky and Allen discussed the fact that one size does not fit all. According to them, it is important for schools to develop structures and relationships that develop and find the strengths and passions of individual students. Try as schools might, a one-size-fits-all approach to education will always be hit or miss. While there is a lot of research available on personalised learning in general, I found that my topic of personalised learning, specifically in the area of mathematics in a secondary school classroom, was a relatively under-researched topic.

In my role as an assistant principal and as a member of the senior leadership team in an Auckland secondary school, I have had concerns about student learning outcomes with regard to student achievement in mathematics. I have also been intrigued by comments made by colleagues from other schools with regard to personalised learning in mathematics. Are we guilty of this one-size-fits-all approach? This has triggered a query about whether there is a personalised learning approach when teaching students in a secondary school mathematics classroom?

It is evident that the learning styles of students have changed in our 21st century learning environment. This change could inadvertently impact on student achievement.
The advantage of having a 21st century learning environment is that students can use the content and be the experts with their teacher. Educators across most curriculum areas, including mathematics, have also looked to technology for personalised learning programmes, that can support students through the curriculum. Personalised learning allows students to take control of their own learning. Students are individuals and have their own style of learning.

According to Bolstad and Gilbert (2012):

Learning has to be a personalised - not a standardised - experience. Learners have to feel in charge of their own learning. They need to feel that they know what they are doing, and that they can control the pace of their learning. They need to “get into it” enough to get a sense of flow and progress; they need the right amount of challenge, not so much that it is beyond them, but not so little that it is boring; and they need feedback along the way, not just at the end of the course. (p. 32)

According to a Ministry of Education report (O’Riley, 2014) and his 21st century learning reference group, the resources available in our 21st century learning environment change the way students learn, the way teachers teach, and where and when learning takes place. A key finding of the report was that innovative teaching practices flourish when firstly, teacher collaboration focuses on supporting peers and sharing teaching practices, secondly, professional development involves the active and direct engagement of teachers, particularly in practising and researching new teaching methods, and finally the school culture offers a common vision of innovation, as well as consistent support that encourages new types of teaching.

Student learning is driven by the individual's learning needs, interests and capabilities. In a personalised learning environment the learning objectives, content, method, and pace may all vary. According to Bray and McClaskey (2013), personalised learning is
student driven, as opposed to individualisation or differentiation which is teacher driven. Personalising learning challenges teachers and leaders of learning to think about what new resources may be needed to support learning, and how learners can access these. It gives students the opportunities to work independently, at times, so that they can work at their own pace.

Leadbeater (2005) states that personalised learning “requires schools to radically rethink how they operate” (p. 7). It requires teachers and school leaders to manoeuvre from traditional teaching to a more personalised approach to teaching and learning.

The purpose of this research is to explore the perceptions of curriculum leaders and mathematics teachers regarding personalised learning in a mathematics secondary school classroom. I am hoping that my research will contribute new information that will impact on future teaching and learning of mathematics in a secondary school context.

My research adopted a qualitative study approach that utilises two research methods, semi-structured interviews with three mathematics curriculum leaders and a focus group discussion with nine mathematics teachers. There were a total of 12 participants.

The three secondary schools were randomly selected from the Auckland area in New Zealand. The three schools ranged in decile ratings (8, 5 and 2). They also ranged in size from 467 students to 1820 students. Two of the schools were co-educational and one was a single sex school.

**Research Aims and Questions**

The research aimed to examine the concept of personalised learning from a curriculum
leader's and a mathematics teacher's perspective, the role of the curriculum leader with regard to personalised learning and the impact of relationships on this type of teaching approach.

**Research aims**

- To engage in a discussion with teachers and curriculum leaders about their experiences and perceptions with regard to personalised learning in a secondary school mathematics classroom.

- To investigate what teachers and curriculum leaders perceive are the barriers and challenges in implementing personalised learning in a secondary school mathematics classroom.

- To investigate what teachers and curriculum leaders view as successful personalised learning strategies/experiences in a secondary school mathematics classroom.

**Research questions**

1) What is the perception of the curriculum leader and mathematics teachers with regard to personalised learning in a mathematics secondary school classroom?

2) What do curriculum leaders and teachers perceive as the barriers and
challenges in implementing personalised learning in a secondary school mathematics classroom?

3) What do curriculum leaders and teachers view as successful personalised learning strategies/ experiences in a secondary school mathematics classroom?

4) How are opportunities created and challenges addressed by teachers and curriculum leaders in relation to personalised learning in their mathematics classrooms?

**Thesis Structure**

The thesis is set out in five chapters as follows:

Chapter One briefly outlines the research study. It presents an overview of this research project, a rationale that justifies the study and an outline of the research aims and questions. This chapter also gives an outline of the thesis structure.

Chapter Two provides a literature review that examines key themes identified in the literature relevant to the study. The literature examines the concept of personalised learning from different perspectives, the role of leadership, in this case the curriculum leader as a middle manager, and the impact of relationships on the personalised learning approach to teaching.

Chapter Three examines the research methodology and design. It begins with a methodology overview. It presents a justification and a rationale for adopting a qualitative interpretive approach to methodology. An explanation of sampling decisions is also provided, together with descriptions of the two data collection methods, semi-
structured interviews and focus group discussions. Finally the procedure of inductive analysis that was used to manage the data and issues regarding validity, reliability, and ethics related to the study are explained. It also details the ethical considerations. Chapter Four reports on and analyses the findings of the research. This chapter analyses the findings from the interviews and focus groups question by question.

Chapter Five contains a discussion of the findings with support from relevant literature. Conclusions, limitations of study and recommendations for future practice and for future research are discussed.
CHAPTER TWO:

Literature Review

Introduction

This chapter provides a review of the literature related to personalised learning in the secondary school sector. The paucity of literature available in the New Zealand context has triggered the researcher to consider other international context.

Personalised learning

A former British Prime Minister, Tony Blair supported the concept of 'personalised learning' at the Labour Party conference (2003). This paved the way, in 2004, for the Department of Education and Skills: *Five Year Strategy for Children and Learners* that focussed on personalised learning to be adopted by all school in the United Kingdom.

While Charles Clark, the then Secretary of State for Education and Skills stated “a fundamental recasting of industry, employment, technology and society has transformed the requirement for education and training – not only driving the education system, but introducing new ideas about lifelong learning, personalised education, and self directed learning” (2004, p. 4). An important aspect of the strategic plan was personalisation and choice in the secondary years with the goal “that every young person is achieving their full potential” (Leadbeater, 2004, p. 58).

In order to spur this above goal into action, every student in Britain was given a choice of an excellent secondary school that they wished to attend which was personalised to their individual needs. A huge amount of work went into ensuring that the five year
strategy plan produced positive outcomes in numeracy for secondary school students.

Important steps were taken to raise student achievement in mathematics by ensuring that teachers teaching in the early secondary school years were supported and received training based on numeracy strategies. These key areas played a critical role in ensuring personalised learning, with specific reference to mathematics, so that the learning could be directed at positive student outcomes. However in a very multi-cultural world, how do we support the diversity and needs of individual students? In July, the following key areas were focussed on how to accelerate the process (Leadbeater, 2004):

- Moving from primary to secondary school.
- A new secondary school strategy for teaching and learning.
- ICT supporting personalised learning.
- Effective subject teaching.
- A richer secondary school curriculum.

Whereas, in New Zealand in July 2006, the then Minister of Education, Steve Maharey presented a speech to the New Zealand Principals Federation Conference on Personalised learning: 'Students at the Heart of Education.' During his speech, he reflected on the fact that in the past politics had impacted on education, but the tables had now changed and the focus in education has primarily become focussed on what the evidence shows, and that is “to be most effective a teacher must engage in personalised learning” (Ministry of Education, 2006). He believed that this idea captured everything we were trying to do in education back then. As a result of learning at their own pace, students became excited, reflective learners. He identified eight areas that he believed required action in order to establish personalised learning in every school:

- Effective teaching strategies.
• Resourcing.
• Strong professional leadership.
• Parents, family and whanau fully engaged.
• A focus on teaching and learning in secondary schools.
• Foundation knowledge.
• Setting boundaries.
• Focus on staying at school.

This message was reiterated when he reminded his audience, that he would be ensuring that personalised learning was at the heart of the Labour-led government's vision for education. Generally referred to as student-centred learning approach, a much more flexible, tailored approach to education has been inherent in Tomorrow's Schools (Ministry of Education, 2006).

According to the current New Zealand Minister of Education, the Honourable Hekia Parata, “Our investment in 21st century technologies must be matched by new thinking that reflects the best teaching approaches.” She went on to express her excitement about the opportunities that could be created by transforming our education system, recognising that “a transformation enacted by teachers, education leaders and communities will enable all learners from all backgrounds to achieve success and shape the world of the future. (Parata as cited in Bolstad & Gilbert, 2012, p. 3).

This view is echoed by Hess and Meeks (2010) who define the term “unbundling” in two dimensions. The first is “structural unbundling,” to examine a teaching system whereby we move away from traditional teaching styles and traditional ideas about “teacher,” “school,” or “school system” and explore how to deliver schooling in new and effective ways” (p. 41). The second is “content unbundling” where we as educators reflect on the curriculum requirements for our students and explore new authentic and relevant opportunities for innovative, personalised learning which is constantly evolving.
According to Robinson, Hohepa and Lloyd (2009), “Mathematics and problem-solving proficiencies of 15-year-olds put New Zealand in the second-highest-performing group of countries in the Programme for International Student Assessment surveys, reflecting the cumulative impact of schooling.” However, they clearly state that “the outcome for mathematics should be interpreted in the light of a less favourable outcome in the Trends in International Mathematics and Science Study survey, which included more countries” (p. 35). So what are our options to improve student achievement in mathematics? Even though the amount of literature specifically related to personalised learning in mathematics is limited, there is a huge amount of information about personalised learning in general that can be applied to mathematics.

While Mackay, (as cited in Bolstad & Gilbert, 2012, p. 5) concedes that “a commitment to personalised learning, embracing diversity, rethinking learners’ and teachers’ roles, forging new partnerships — all fuelled by disciplined innovation and new technologies — are identified as the key dimensions of a redesigned, connected and coherent learning system”.

Similarly Timperley, Kaser and Halbert (2014) commented on the difficulty of ensuring that students were achieving well in core subjects like mathematics, while still ensuring that students were applying themselves by using their imagination and maintaining their creativity in this subject. They commented on the fact that context was an important aspect of mathematics. They also shared their thoughts regarding personalising the teaching and learning programme in mathematics, indicating that they believed that personalising learning in mathematics would help to ensure that students are achieving to the best of their ability.

This leads to the next point of how the emotional well-being of a student impacts on personalised learning. Nair (2015), compared the difference between learning today and yesterday's learning and commented on the fact that in today's educational environment children are able to think for themselves which requires teachers to change the way they think.
Whereas Dumont, Istance and Benavides (2010) verified that “emotions are the primary gatekeeper to learning” (p. 4). Positive emotions strengthen long-term recall while negative emotions can affect the learning process in the brain, which is capable of impacting on student achievement by leaving very little, if any recall after a lesson. This will have compelling ramifications for both teaching and learning. They go on to stress that in order to provide our students with optimum skills and knowledge that they are able to comprehend, we need to ensure that they are positively motivated towards their learning activities, as evidence shows that this will result in students attaining a much deeper learning experience.

Developing a relationship of openness and trust through the personalised approach, will create opportunities for teachers to guide and support students so that students begin to realise how their intrinsic motivation impacts on their learning and guides them to achieve to the best of their ability. According to Clark (as cited in Robinson et al.2009), in practice, the five year strategy plan in the United Kingdom means:

Personalisation of teaching and learning. A good secondary school has effective teaching at its core. Teaching is tailored to the needs of individual pupils, with progress regularly assessed. The National Curriculum is not regarded as a constraint or a straitjacket—it is the foundation for a wide range of curriculum options and for a variety of learning experiences and styles. (p. 59)

According to Bolstad and Gilbert (2012), “personalised learning challenges us to think about how to deploy the resources for learning (teachers, time, spaces, technology) more flexibly to meet learners’ needs” (p. 3). However, the challenge, is about finding a neutral point where we can compose a system that utilises the strengths and expertise of both the teacher and the student to ensure the best learning outcome for the student.
Timperley et al. (2014) referred to the fact that “artificial separations” between areas of learning can at times be created as opposed to being strengthened when combined. They referred to an example, that indicated that there was evidence suggesting that learners disliked mathematics and also achieved low results. The staff asked themselves, ‘Should we focus on deepening understanding of mathematics or should we focus on students’ attitudes to mathematics?’ Based on the learning principles outlined by Dumont et al.(2010), it was evident that “emotion is integral to learning, so attending to attitudes while deepening understanding was the way to go” (p. 10). This would ensure both positive student outcomes and a personalised learning approach to teaching and learning.

However, the Education Review Office (2012) concluded that “teachers and leaders were stronger at identifying which students need help, than they were at planning how to respond to them and evaluating how well programmes impact on learners” (p. 1). Robinson et al. (2015), stated that it was evident that “mathematics homework also finds a positive relationship with achievement when homework (a) directly relates to the curriculum, (b) promotes purposeful interactions between parents and children, and (c) provides materials and resources to help parents support their children’s learning” (p. 156). Furthermore, Dumont et al. (2010) refer to the eight basics of motivation that impact on students learning outcomes. Students are more motivated to engage in learning when:

1. They identify links between actions and achievement
2. They feel competent to do what is expected of them
3. They value the subject and have a clear sense of purpose
4. They perceive the environment as favourable for learning, and
5. They experience positive emotions towards learning activities.
6. Students direct their attention away from learning when they experience negative emotions.
7. Students are more persistent in learning when they can manage their resources and deal with obstacles efficiently.
8. Students free up cognitive resources when they are able to influence the
intensity, duration and expression of their emotions. (p.5)

As part of the personalised learning approach, once teachers are able to identify the students “motivational beliefs” they will be able to use this information to efficiently manage the learning process to target positive student learning outcomes.

A great way for teachers to gain first hand experience with regard to being in a diverse environment, as discussed by Robinson, Hohepa and Lloyd (2015), was created by a principal who gave his mathematics teachers opportunities to work in diverse groups so that “they were able to experience for themselves their potential benefits” (p. 230). As the teachers conducted this experiment by exploring “the complexities of a seemingly simple mathematics problem” (p. 230), the mathematics teachers were able to see that despite the fact that they each produced different strategies, each of their strategies were equally valid solution strategies. They were able to internalise the fact that students in their classroom develop at their own pace and were capable of interpreting mathematics problems differently with equally valid solution strategies.

As mathematics teachers, this little experiment made them more aware and they “could see the importance of moving beyond the obvious (‘some students work faster’) to considering how learning actually occurs (‘children have different ways of understanding mathematical ideas’)” (p. 230). This little experiment helped to establish open discussion for the leader so that he was able to support his teachers to develop the skills they needed to support diverse learners in their own classrooms and to ensure that both their teaching and learning is personalised.

Assessment for learning, talking to students and collating evidence about their learning journey provides teachers with an in-depth knowledge of the needs of a student which is vital for personalised learning (MOE, 2006). It was stimulating to see that a report by the Education Review Office (2012) revealed that success was evident when “teachers looked deeply into student achievement results to determine the impacts of changes
in teaching practice and to decide what aspects of their teaching they needed to improve” (p. 1). Educators have known for some time now that a one-size-fits-all approach to learning does not lead to the level of student engagement and academic success that schools strive to achieve (Demski, 2012). It’s about finding what students are interested in and tailoring their learning experience to match (MOE).

Similarly, Robinson et al. (2009) stresses that this relationship goes beyond the classroom, it is also about understanding and maintaining school–home relationships that are effective and the ability to maintain this connection when differences are identified between the education culture of home and school.

Dumont et al. (2010) have identified seven principles of learning that have analysed learning through the “perspectives of cognition, emotion and biology” (p. 6). The following learning principles aim to establish crucial characteristics of learning environments which will ensure the best possible learning outcomes for individual student achievement:

1. Learners at the centre.
2. The social nature of learning.
3. Emotions are integral to learning.
4. Recognising individual differences.
5. Stretching all students.
7. Building horizontal connections.

These learning principles are an essential part of the personalised learning approach, supporting the teacher to ensure that students are achieving to the best of their ability. As is evident from the research, personalised learning is beneficial to student outcomes, with a wide range of approaches and principles available to support personalised learning, so that students are achieving well and performing to the best
of their ability, specifically in mathematics. The issue, however, is what measures are taken to ensure that teachers are taking a personalised approach to teaching and learning during their mathematics lessons. Leadership is a vital component in ensuring that our students are getting the best teaching and learning opportunities available for them.

As pointed out by Dewey (as cited in Nair, 2015), “If we teach our children as we did yesterday, we rob them of the future.”

**Curriculum Leadership**

The role of leadership is integral in ensuring that personalised learning is a success. Timperley (2005) stated that in order for teachers to significantly change their practice, a wide range of opportunities need to be created for them, in a safe, trusting environment. These opportunities need to challenge our teachers and encourage them to learn new information and understand how it implicates on practice. Good leadership is a critical part in maintaining the culture of a school.

Leadership that is focused on learning has an immense affect on the outcomes and achievement levels of students in the school. As is evident from the research below, there is a strong overlap between the role of leadership and relationships with regard to establishing a personalised teaching and learning approach in mathematics. West-Burnham (2010) views leadership for personalising learning “as having three specific components: developing a strategic approach, managing the operational issues and creating a culture that reinforces the personalised approach” (p. 6).

There are several definitions of “leadership” to be found in the literature. For example, Robinson et al. (2009), provides the following description:
Leadership involves influencing people to think and act differently, either directly (through face-to-face encounters) or indirectly (by creating the relevant conditions). In addition to challenging others to change particular practices, a leader may need to challenge them to reconsider their views about what does and does not need changing. (p. 68)

Seashore Louis, Leithwood, Wahlstrom and Anderson (2010) synthesise their definition of leadership by highlighting the following points, “it is about direction and influence. Stability is the goal of what is often called management. Improvement is the goal of leadership. But both are very important” (p. 10). On a similar note, Robinson et al. (2009) stress that “leadership can facilitate the achievement of important academic and social goals by creating an environment that is conducive to success. An orderly environment makes it possible for teachers to focus on teaching and students to focus on learning” (p. 42).

Trust can be built by initiating respect by “displaying personal regard for staff and demonstrating competence and integrity through modelling.” It is important for leaders to lead by example, “following through expectations, ‘walking the talk’, “and challenging dysfunctional attitudes and behaviours” (p. 47).

When discussing the term “leader”, I am referring specifically to a curriculum leader in mathematics, which is a middle leader’s role, with the responsibility of leading the department or faculty team in mathematics. For leaders to be effective and to maintain a sustainable relationship of trust, they need to have an in-depth knowledge of the core business of teaching and learning, as discovered in the research conducted by Robinson et al. (2015). For example they defined leadership content knowledge as “that knowledge of teaching and learning that shapes management practices” (p. 227). Evidence from their research showed that the leadership content knowledge that shaped an approach to student grouping included:
• knowledge of the discipline of mathematics;
• knowledge of how to promote teacher learning about the teaching of mathematics;
• knowledge of diverse learners and how diversity can promote learning in mathematics classes.

Having this knowledge enabled the curriculum leader for mathematics to better understand the issues around grouping in mathematics. (p. 227)

However, as indicated by Timperley et al. (2014), “It is important to get started even if everyone is not on board right at the beginning” (p. 6). While establishing effective ways to improve teaching and learning practices, it is important as a leader, to ensure that teachers take ownership of the professional learning experience and that they are part of the discovery and change process.

Timperley et al. (2014), discussed the spiral of inquiry approach whereby teachers use the “curiosity mindset” to discover what their students are experiencing and use their intuition to predict what is leading to current learning issues for individual students before making a decision about how to resolve the issue. This creates the opportunity for teachers to “work out what is working well so you can build on it, and what is not working so well so you can make changes” (p. 6).

Similarly, Bolstad and Gilbert (2012) pointed out that “teachers may resist adapting current approaches if they don’t see the need for change, or if they aren’t convinced that adapting current approaches is possible, let alone likely to lead to better student outcomes” (p. 5). As teachers we are intuitively aware of how engaging with individual students and supporting them with their learning needs can impact on them. This is supported by West-Burnham (2010) who stated that “personalising learning is a unique opportunity to combine policy and professional imperatives. At the same time, it provides a focus on alternative strategies to raise attainment, secure performance and sustain school improvement” (p.4). He went on to describe personalising learning as:
A strategy focusing all of a school’s resources to ensure that the potential of each learner is realised by ensuring that the learning experience is appropriate to them personally and that they are able, with support, to decide what they learn, how they learn, when they learn and who they learn with. (p.11)

Timperley et al. (2014) stated that secondary schools are often highly departmentalised and a challenge can be to find a focus to which everyone can commit.

However, as pointed out by Robinson et al. (2009), ‘leading teacher learning and development’ is twice as powerful as any other factor in affecting student outcomes; and that leaders affect student learning indirectly (through teachers), but nonetheless explicitly” (p. 4). It is important that teachers are able to access professional development to support their students in a personalised learning environment, so that students can achieve results which are indicative of their best ability and that all students are exposed to the best features of New Zealand education (Bolstad & Gilbert, 2012).

As mentioned earlier, the strategic approach as discussed by West-Burnham (2010), would require two fundamental leadership actions. He stresses the importance of firstly ensuring that all staff and stakeholders feel confident and well equipped with this approach to teaching, to develop scenarios and role play examples that pertain to your school and the appropriate curriculum areas, such as mathematics and to use relevant documentation and resources to build a foundation for this approach to teaching. Secondly, it will be the responsibility of the school leaders, middle managers or curriculum leaders to ensure that the long-term planning and the school improvement strategies are implemented and linked to the various components of personalising learning. He went on to explain that the operational issues involved the individual school targets and organisational plans with regard to implementing the structural framework of personalising learning into roles, structures, policies and strategies.
West-Burnham concurs that change of existing culture in some schools will be the most demanding aspect to ensure both compliancy and the establishment of a consistent, high standard of personalised learning for all students.

Through their shared vision and intervention to support and impact on this new approach to teaching, there is compelling evidence that school leaders have the greatest influence on school culture. As indicated by West-Burnham, “leaders who focus on vision and values are most likely to bring about a fundamental change in culture and working practices” (p. 6).

The Education Review Office (2014) released evidence that showed “shared responsibility for student outcomes ensures collaboration is purposeful. Staff demonstrate a genuine commitment to make a difference for all students. Collegiality inspires individuals and teams to aim higher” (p. 13). Similarly, the more involved educational leaders get in the teaching and learning, the more likely they are to have a positive impact on students (Robinson et al., 2009).

According to the Education Review Office (2014), a difference was evident in improved teaching and student learning outcomes when “conversations about teacher practice included frank and open discussions about the impact on learning and achievement of all students” (p. 12). However, in order to ensure improved teaching and student learning outcomes, the curriculum leader needs to establish sound relationships with teachers and needs to promote sound student teacher relationships.

**Relationship Building**

Research conducted by Bryk and Schneider, (2002) as far back as the 1990’s in elementary schools in Chicago, indicated that the relationship skills of leaders positively impacted on students with improved outcomes evident, both socially and
academically. Similarly, Cardno (2012), Robinson et al. (2009), West-Burnham (2010) and Timperley et al. (2014) indicate that any person who is involved in the teaching and learning process will need to relate to and communicate with others. Cardno (2012) has noted that managing interpersonal relationships between the educators who are responsible for student achievement and learning outcomes is a common concept that is evident in the readings on educational leadership.

While Bolman and Deal (2008) have emphasised that there is a connection between how effective a person performs and how well they relate to the people that they work with.

Robinson et al. (2009) identified qualities and behaviours that generate trust. Based on their research they concluded that “respect for others, personal regard for others, competence in the role, and personal integrity are all factors. These impact strongly on establishing positive relationships between teachers and leaders, which in turn impact on student achievement and outcomes. This view is echoed by Bryk and Schneider, 2003, using the words “mutual vulnerability” to describe the dependency of stakeholders on one another, to ensure a teaching and learning environment with positive learning outcomes for the school.

Whereas West-Burnham (2010) argues that “personalising learning is on the one hand what most teachers would recognise as the most effective way of supporting the learning of any learner – quite irrespective of age or ability,” (p. 4). However, contrary to this belief it epitomizes “a challenge to many long established beliefs, structures, relationships and practices” (p. 4). The role of the middle manager, in this study, the mathematics curriculum leader, is important in ensuring that teachers feel supported and informed about what is expected of them. Evidence shows that establishing positive relationships with staff plays a crucial part in nurturing job satisfaction and commitment. Once established, the key to maintaining positive relationships is trust.
Robinson et al.( 2009) reiterate the importance of trust, emphasising the fact that:

Effective leaders develop trust relationships by establishing norms of respect; showing personal regard for staff, parents, and students; demonstrating competence and integrity by modelling appropriate behaviour; following through when expectations are not met; acting in ways that are consistent with their talk; and challenging dysfunctional attitudes and behaviours. (p. 47)

A setback in staff relationships, according to Dimmock and Walker (2002), can have a negative impact on student outcomes and achievement and could be the onset of leadership dilemmas. They therefore propose that leaders are attentive in resolving any issues that may emerge. Similarly, Robinson et al. (2009) pointed out that “the more leaders focus on their influence, their learning, and their relationships with teachers on the core business of teaching and learning, the greater their influence on student outcomes” (p. 42).

Research conducted by Southworth (2004) revealed that the key to efficient relationships between leaders and teachers was trust, open communication and a shared goal. This ensured that both teachers and leaders where able to have more productive outcomes which impacted positively on students' achievements. The ability for leaders to have an open, honest and trusting relationship with their teachers formed the basis for effective leadership according to Southworth’s (2004) study in selected primary schools in Britain.
Similarly, educational research by Bryk and Schneider (2002) indicated that as the relationship of trust between the staff and leaders developed and became stronger, staff developed a willingness to take the opportunities provided to learn and to embrace positive change. Staff collaborated, became more resilient and were willing to get involved in professional development and professional dialogues which were outside their comfort zone, which led to an improvement in both teaching and learning strategies.

It is also evident from the literature reviewed that leaders have the most influence on the quality of teaching and learning when a non threatening relationship of trust and openness is established. Robinson et al. (2015) provide evidence that explicitly shows that “an orderly and supportive environment is also one in which staff conflict is quickly and effectively addressed” (p. 104). They went on to justify their findings by reporting that in one of their studies, “the principal’s ability to identify and resolve conflict, rather than allow it to fester, was strongly associated with student achievement in mathematics (p. 104).”

Contrary to this, it is important to remember that no matter how exceptional a leader is, improvement in teaching and learning is confined when there is a breakdown in the relationship (Robinson et al.,2015). This is emphasised below, through a brief explanation of the relational perspective that is endorsed by the dimensions from both indirect and direct evidence, that provide a guide to the types of efficient leadership practice that impact positively on student outcomes:

1. Establishing goals and expectations.
2. Resourcing strategically.
4. Promoting and participating in teacher learning and development.
5. Ensuring an orderly and supportive environment.
6. Creating educationally powerful connections.
7. Engaging in constructive problem talk.
8. Selecting, developing, and using smart tools. (p. 40).

These dimensions will provide essential support for our school leaders "as they address our shared challenge of preparing all our children for the future (Robinson et al., 2015, p. 4)."

According to Cardno (2012), “when it is necessary for leaders and teachers to engage in conversations that are difficult, then the relationship between the parties is tested and may be part of the difficulty involved in attempting to resolve a problem of practice” (p. 35). Cardno emphasises the fact that leaders are accountable for resolving such problems and therefore do not have a choice when faced with these challenges. She goes on to state that when a leadership problem “poses a threat to maintaining a sound or positive collegial relationship, yet also has an imperative to be dealt with because of a negative impact on student learning, then it may well be a leadership dilemma”.

Fullan (2003) stated that in order to establish positive relationships, it is imperative that leaders create an atmosphere that is positive and inspires staff to work harmoniously in an environment that encourages open discussion, trust, loyalty, honesty, care and respect for each other with minimal negative energy. This is supported by Hargreaves and Fullan (as cited in Hipkins, 2015), who recognised that: “while the values and experiences of individual teachers have an impact on their pedagogical thinking, it is important to acknowledge the large body of research that demonstrates the importance of the overall school ethos” (p. 43). This is important to ensure positive outcomes for both students and teachers.

The literature reviewed has shown that there is a strong connection between positive
student learning outcomes and relational trust (Bryk & Schneider, 2002; Cardno, 2012; Robinson et al., 2009).

Summary

This chapter has reviewed the literature relevant to mathematics teachers and mathematics curriculum leaders with regards to personalised learning in a mathematics classroom. As already explained, despite the fact that their was not a huge amount of research available with regard to personalised learning in a mathematics classroom, some of the literature available on personalised learning can be applied to the mathematics classroom.

The following chapter will discuss the methodology adopted in an investigation on personalised learning in three different New Zealand secondary schools.
CHAPTER THREE:

Research Methodology

Introduction

The purpose of this research is to explore the perceptions of curriculum leaders and mathematics teachers regarding personalised learning in a mathematics secondary school classroom. This chapter begins with a methodology overview. It presents a justification and a rationale for adopting a qualitative interpretive approach to the methodology. An explanation of sampling decisions is also provided, together with descriptions of the two data collection methods, semi-structured interviews and focus group discussions. Finally the procedure of inductive analysis that was used to manage the data and issues regarding validity, reliability, and ethics related to the study is explained.

Methodology

Methodology overview

Ontology deals with questions about what things exist in the "real" world (Davidson & Tolich, 2003). Epistemology is the philosophical theory of how knowledge is constructed (Davidson & Tolich, 2003; Willig, 2001). It involves dealing with questions about how we know certain things, what counts as legitimate. Bryman (2008) asserts that "an epistemological issue concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline" (p.13).

All research makes some kind of assumption about issues such as what things there are in the world, how we can know certain things, and what counts as legitimate
knowledge (Davidson & Tolich, 2003, p. 25).

This is central to research and it determines that different cultures often make very different assumptions about knowledge (Davidson & Tolich, 2003; Morrison, 2012). According to Davidson and Tolich (2003), paradigms are used to describe an entire way of looking at the world. There are two classical research paradigms in education. A positivist, normative, quantitatively-orientated paradigm is used to explain how the world works through very scientific and objective methods as compared to a post-positivist, humanistic, interpretive (and critical), qualitatively-oriented paradigm which works within an epistemological framework that acknowledges the role that society and its individuals have in helping to shape the world that they live in (Bryman, 2008; Cohen, Manion, & Morrison, 2007).

The methodology adopted favoured the subjectivist (or anti-positivist) approach. Qualitative researchers acknowledge the value of the data collection and analysis tools that originated from the scientific tradition, but apply them within a different philosophical framework. Epistemology is a theory about the construction or creation of knowledge. It refers to the branch of philosophy that deals with how we know what we know. (Davidson & Tolich, 2003). According to Creswell (2002), an interpretive approach allows the information to emerge from the participants whereas the positivist approach looks at the specific type of information to be collected in advance of the study. A subjectivist epistemological position is founded on the belief that the social world is personal and humanly created and is principally concerned with an understanding of the way in which the individual creates and interprets the world (Cohen et al., 2007).

Using an interpretive approach in this study was appropriate, as I sought to explore individuals' experiences of personalised learning in mathematics classrooms in their respective secondary schools. The interpretive paradigm assumes that there are multiple realities, enabling individual perspectives to be expressed and understood (Cohen et al., 2007; Denzin & Lincoln, 2005).
Davidson and Tolich (2003) describe the interpretive approach as the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds (p. 26). When implementing this approach it is important that the researcher sees the participants as subjects and to explore the meanings of events from their perspective.

The research sought to understand the subjective world of human experience. It was most appropriate to position this research problem in the interpretive paradigm, as my research is also concerned with understanding the perceptions of secondary school mathematics curriculum leaders and mathematics teachers. According to Cohen et al. (2007), this approach involved viewing the social world as “being of a much softer, personal and humanly created kind”(p. 8).

By doing so, it was possible to allow the perceptions and experiences of the mathematics teachers and curriculum leaders to be studied in-depth. By using the interpretive paradigm it was possible to “understand, explain and demystify social reality through the eye of different participants” (p.19). When conducting research, Creswell (2002) stresses the importance of having the correct approach for a specific research problem. As my research problem is based on individuals’ perceptions and personal accounts, an interpretive approach is in line with this. The interpretive approach enables systematic analysis of social action and is further defined by concern for the individual, in order to understand and interpret how people create and maintain their social worlds (Bryman, 2004; Cohen et al., 2011; Davidson & Tolich, 2003).

According to Cohen et al. (2007), the interpretive approach requires researchers to become involved with their subjects and to see knowledge as personal, subjective and unique (p. 7), enabling the researcher to study complex human behaviour and the intangible quality of social phenomena. As my research involved interviews with teachers discussing their experiences and relationships in the classroom, where they were likely to share their own opinions and interpretations about these experiences,
the methodology that I have selected is most appropriate.

**Rationale for Qualitative Approach**

As stated above, the research involves exploring the perceptions of curriculum leaders regarding the implementing of personalised learning in three secondary school mathematics classrooms. The research adopted a qualitative methodology as it is compatible with the interpretive approach in allowing for understanding to be gathered from the participants' perspectives.

Qualitative researchers are concerned with the meaning that people attribute to their experiences, Davidson and Tolich (2003) argue that “this meaning cannot be measured in the way that quantitative research demands” (p. 29). This is further reiterated by Cohen et al. (2007), when they argue that qualitative research is about somebody portraying their world, in their own language and is therefore essentially subjective “rather than an absolutist, external reality” (p. 8).

A subjectivist impression of reality aims to discover how individuals translate the world in which they live and what meaning they place upon their actions (Bryman, 2012; Cohen et al., 2007). The researcher's aim was to get participants to talk about processes and their experiences within their world of mathematics, regarding the implementation, effectiveness, successes and challenges of personalised learning in a mathematics secondary school classroom (Willig, 2001). Another reason for selecting a qualitative approach is because it is the best fit for a relatively under-researched topic, as is evident by Creswell (2002), “if a concept or phenomenon needs to be understood because little research has been done on it, then it merits a qualitative approach” (p. 22).

As I was collecting perceptions and opinions in a social, humanistic and interpretive way, the qualitative approach has enabled the study to take place from within the
school context where an inductive research strategy has been employed (Merriam, 1998). This approach was most convenient as I was dealing with people and relationships, where people were likely to have individual experiences and assign their own multiple meanings to these experiences. This is a relevant research methodology for the mathematics curriculum leaders and mathematics teachers, with the potential to capture their challenges, dilemmas and conflicts associated with their experiences. It is a research methodology that captures their personal experiences and their perceptions, allowing for rich qualitative data, relating to the research aims and questions, to be collected.

Understanding the subjective world of human lived experience, to enhance understanding of particular phenomena, is the main aim, in the context of qualitative research. (Cohen et al., 2007; Denzin & Lincoln, 2005; Galletta, 2013). The use of qualitative research when dealing with people's different views of social reality is also recommended by Bryman (2004), rather than quantitative research, which is based on natural science models and data gathering from afar. According to Bell (2010), qualitative researchers are more fixated on understanding the perceptions of the world from the perspective of the individual. Similarly, Denzin and Lincoln (2005) state that “qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them” (p. 3). This directly links to my four research questions for this study which are:

**Research Questions**

1. What is the curriculum leader and teacher’s perception and understanding of what personalised learning means in a mathematics secondary school classroom?
2. What do curriculum leaders and teachers perceive as the barriers and challenges in implementing personalised learning in a secondary school mathematics classroom?
3. What do curriculum leaders and teachers view as successful personalised learning strategies/ experiences in a secondary school mathematics classroom?
4. How are opportunities created and challenges addressed by teachers and curriculum leaders in relation to personalised learning in their mathematics classrooms?

Punch (2005) suggests that qualitative research starts with a more general approach to the questions and becomes more specific as the study evolves. As is evident above, my research questions adopted for this study followed a structure from the general to the specific. This is an appropriate choice for my research as it is valuable in nature and explores answers to questions about how social experience is created and given meaning. It is concerned with the individual's point of view and provides rich and valuable descriptions of the social world (Bryman, 2004; Cohen et al., 2007).

In order for me to capture the uniqueness of a particular situation, person or programme (Cohen et al., 2011, p. 414), it was important for me to establish a relationship of openness and trust with the participants so that I could share an understanding of their human experience and gain in-depth data which defined the participants thoughts, perceptions, challenges and experiences.

**Sample selection**

The research design is important for any study. Research design is referred to by Bryman (2012) as a “framework for the collection and analysis of data” (p. 715). There were many considerations including: the approach to sampling and selection of participants; the methods used to collect the data; and lastly the analysis of the data. This research focussed on secondary schools as I am currently employed in this sector. The first factor to consider was the selection of schools. As all schools in New Zealand teach mathematics, this research could have been conducted in any school, however, some criteria for selection was needed to ensure that the study was manageable. The schools were randomly chosen using the following criteria, firstly the locality had to be in the Auckland area, which was accessible to the researcher and secondly the
school had to have an appointed mathematics curriculum leader or mathematics head of department. It is important to have a clear sampling approach and sampling size, which would lead to unbiased results that could potentially be considered by mathematics curriculum leaders and mathematics teachers to enhance teaching and learning.

Six schools were randomly selected and invited to participate in this research project. From the six schools, three schools expressed their interest in participating. All three schools were from the Auckland area in New Zealand. The three schools ranged in decile ratings. They also ranged in size from 467 students to 1820 students. Two of the schools were co-educational and one was a single sex school.

Table 3.1: School profile

<table>
<thead>
<tr>
<th>School Characteristics</th>
<th>School A</th>
<th>School B</th>
<th>School C</th>
</tr>
</thead>
<tbody>
<tr>
<td>School type</td>
<td>Co-educational school</td>
<td>Single sex school</td>
<td>Co-educational school</td>
</tr>
<tr>
<td>School roll</td>
<td>1820</td>
<td>1260</td>
<td>467</td>
</tr>
<tr>
<td>Decile rating</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Research Methods

The next consideration was the selection of research tools to gather the data from the participating schools. Based on literature reviews, it was decided that I would need to select research tools that would enable me to provide an informed picture of the perceptions of curriculum leaders and mathematics teachers in regards to personalised learning in a mathematics secondary school classroom. The two data
gathering research tools associated with a qualitative approach that I selected were semi-structured individual interviews and focus groups. To ensure that the interview questions were clear, concise and unbiased, they were piloted with a small number of individuals at my current school that were not participating in the study.

**Semi-structured interview**

As they generate new knowledge, semi-structured interviews (Appendix F) is consistent with the qualitative interpretivist paradigm. Mutch (2005) suggests that semi-structured interviews lend themselves to more discussion as they have a set of key questions that are followed in a more open-ended manner. Moreover interviews should be used when in-depth information is required (Hinds, 2000). It was appropriate to use semi-structured interviews to provide the data that informed my research as it explored the understanding of the mathematics curriculum leaders. This enabled the researcher to focus on the aims of the research project, at the same time giving participants the flexibility to describe their expertise as mathematics curriculum leaders.

Bell (2010), who concedes that semi-structured interviews provide the interviewer with flexibility as they can query answers for clarification and examine participants’ intentions and beliefs, supports this viewpoint. Based on their experience, these curriculum leaders would have a variety of in-depth views and information to share (Brinkerhoff, 2002; Fontana & Frey, 2005; Hinds, 2000). Vogt, Gardner and Haefele (2012) state that we should not be deceived into believing that an interview is an easy process that requires no special preparation or skill. Because humans are complex, ever changing beings there is a high chance of misconception, which can make interviews a very challenging process to conduct effectively (Fontana & Frey, 2005; Vogt et al., 2012).

Semi-structured interviews gave me the opportunity to gain some rich, in-depth data through clarification and emergent questions (Cohen et al., 2000). Being a small
A focus group interview:

A focus group is a carefully planned and moderated informal discussion where one person's ideas bounce off another's creating a chain reaction of informative dialogue (Anderson & Arsenault, 1998). Similarly, Mutch (2005) defines a focus group as an interview technique that brings together participants to respond to the questions in a group situation. She goes on to state that focus group interviews are generally of the structured type with pre-set questions (Appendix G) but some negotiation of responses, depending on the purpose and the composition of the group. As stated by Krueger (1994), "a focus group is not about just asking questions, it is about asking well-thought-out questions in a focused environment" (p. 65). This is similar to the definition of Bryman (2012) who states that it is a form of group interview in which there are several participants; there is an emphasis in the questioning on a particular fairly tightly defined topic; and the emphasis is upon interaction within the group and the joint construction of meaning. Mutch (2005) states that "a focus group is a useful tool for busy
practitioners because they combine the best of surveys (a broader sample) and interviews (an in-depth response)” (p. 128).

A focus group has been further described as “a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment” (Krueger, 1994, p. 6). When a researcher systematically investigates to find answers to a problem by gaining a more in-depth understanding of the participants experience, when there is a need to clarify the thoughts of participants or participants perceptions are required, then according to Hinds (2000), a focus group should be used. Focus groups were appropriate for this research, as participants had the opportunity to construct joint meanings relating to personalised learning in a mathematics secondary school classroom. This method of data-collection created an opportunity for several participants to engage in discussion in a safe, comfortable environment. It allowed for the probing of thoughts and opinions and the gathering of information about the participants experiences, ideas and perceptions. As Kitzinger (1995) writes, patterns of interaction within focus groups allows the researcher to determine how group participants view the issues with which they are confronted in their own terms (as cited in Bryman, 2012). However, Fontana and Frey (2005) identified three issues that the researcher needs to be aware of and manage effectively if the focus groups are to be successful:

- The interviewer must prevent individual participants or a clique from domineering the group.
- Encourage uncooperative participants to participate.
- Obtain responses from the entire group to ensure in-depth analysis of the topic.

I found that I had to initially probe individual members of the group, to gain their thoughts and opinions, but as time went on the participants started relaxing and becoming more forthcoming with information.
A focus group can be used to assess, explain and evaluate a program and understand reasons for its success or failure (Hennink, 2013, p. 16). This was an ideal vehicle to reflect on personalised learning in the classroom and evaluate and discuss participants perceptions on how this was impacting on student achievement in mathematics.

**Data Analysis**

The process of establishing what the data means is called data analysis. According to Lofland, Snow, Anderson and Lofland (2006) and Bryman (2012), analysing data requires the researcher to immerse themselves in the findings in a very structured fashion so that patterns, categories and themes can be established. My interviews were digitally voice recorded, with the permission of the participants. I also made notes which recorded my observations of gestures, expressions and body language that would be missed via the voice recordings and any other information that I felt would benefit my research. Lofland et al. (2006) suggest the researcher keeps field notes about their processes, experiences, impressions, feelings and interconnecting thoughts as these will provide credibility and assist with the clarification of any underlying assumptions. These notes will also be an asset when writing the research report. Identifying salient themes, recurring ideas or language, and patterns of belief that link people and settings together is the most intellectually challenging phase of data analysis and one that can integrate the entire endeavour. (Marshall & Rossman, 2006, p. 154).

In order to become familiar with the data on the perceptions of curriculum leaders and mathematics teachers with regards to personalised learning in a mathematics secondary classroom, I began the process of data analysis by transcribing and analysing each of my semi-structured interviews and each of my focus group interviews as I completed them to ensure consistency, thoroughness and a methodical work ethic. My first step when transcribing my interviews was to ensure that there was complete anonymity for all participants. After transcribing I read through the material a few times to familiarise myself with the general trends and to make notes of key
concepts and ideas as they emerged. I also added on information from my notes at the appropriate points in the transcript, for example, speaker one nodded in agreement.

I used inductive analysis which is an approach to logic where the categories arise out of the data (Mutch 2005). I identified the common categories and themes using colour coding with a key referencing each colour. I highlighted information and used bold headings to establish emerging patterns, categories and themes, constantly referring to my research question to ensure that the data related to my research aims and to ensure that I stayed on track. This gave me the opportunity to establish emerging themes supported by research and to transform the data into findings.

Validity and Reliability

According to Mutch (2005), validity ensures that a study actually measures what it sets out to measure. Cohen et al. (2007) recognised that “if a piece of research is invalid then it is worthless” (p. 133), for research to be effective it is vital that it is valid. In qualitative research, Cohen et al. (2007) refers to reliability as the “fit between what researchers record as data and what actually occurs in the natural setting that is being researched” (p.149).

As mentioned above, interviews were voice recorded and later accurately transcribed by the researcher to increase reliability. Extra notes were also made to include body language and gestures. Reliability involves the neutrality, credibility, confirmability or dependability of results (Cohen et al., 2007). The importance of precisely transcribing interjections, pauses or body language is further echoed by Creswell (2013). Hinds (2000) describes reliability as “the likelihood of the same results being obtained if the procedures were repeated”(p. 42). Reliability is part of the research design that is often more related with quantitative research methods while validity is more related with qualitative methods, however, it is important to remember that they both play an important role in making sure that the research is considered to have research rigour.
(Bryman, 2008; Davidson & Tolich, 2003). The power and impact of research is incomparably established on the capability of the researcher to exhibit its rigour. This is further iterated by Cohen et al. (2007), when they state that:

Earlier versions of validity were based on the view that it was essentially a demonstration that a particular instrument in fact measures what it purports to measure, for example, in qualitative data validity might be addressed through honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the disinterestedness or objectivity of the researcher. (p.133)

According to Keeves (1997) the aim of methodological triangulation is to “validate the evidence, the conclusions drawn and the theory being developed” (p.284). Davidson and Tolich (2003) view validity as “the extent to which a question or variable accurately reflects the concept the researcher is actually looking for” (p.31). During the interview process it was important to get reliable data about the perceptions of the curriculum leaders and the mathematics teachers regarding personalised learning in a mathematics secondary school classroom. It was also crucial for me to ensure that I remained neutral and played no part in influencing the participants opinions, experiences, ideas or thoughts. I therefore ensured that I kept to my script and set questions which were consistent for all participants.

Reliability can be considered as the amalgamation of what is occurring in the classroom with regards to personalised learning in the mathematics classroom and what the researcher is recording as data, with regards to personalised learning in a mathematics classroom. As pointed out by Cohen et al. (2007), “in qualitative methodologies reliability includes fidelity to real life, context- and situation-specificity, authenticity, comprehensiveness, detail, honesty, depth of response and meaningfulness to the respondents” (p. 149).
Triangulation is a way to establish validity in qualitative research. Cohen et al. (2007) defines triangulation as “the use of two or more methods of data collection in the study of some aspect of human behaviour” (p. 141). By collecting data from the mathematics curriculum leaders through semi-structured interviews and the mathematics teachers through focus groups in three schools, I was able to ensure triangulation. This also enabled me to gain in-depth information about personalised learning in a mathematics classroom from a range of perspectives.

**Ethical Considerations**

A major ethical dilemma as defined by Cohen et al. (2007) is “that which requires researchers to strike a balance between the demands placed on them as professional scientists in pursuit of truth, and their subjects' rights and values potentially threatened by the research” (p. 51). Quite simply put by Wilkinson (2001) the most important aspect in ethics is “how we should treat others” (p. 13). Protecting, caring for our participants and ensuring their anonymity is vital.

The first step before undertaking my research was to gain ethics approval from the ethics committee of Unitec Institute of Technology. Research began once approval was granted.

**Informed consent**

Wilkinson (2001) very clearly explains that “the “informed” bit of informed consent requires that subjects know and understand relevant information about the research project they have been asked to become part of” (p. 16). Simply speaking, informed consent is ensuring that the participants have enough information about the intended research to be able to make an informed decision about whether they would like to be involved in the research or not. As stated by Wilkinson (2001), it is imperative that
participants are well informed and know exactly what their options are.

My first step was therefore to provide all participants with an information sheet, clearly outlining my project and explaining the process. Participants were informed about their right to withdraw from the research project. They were also informed that once interviews were completed, they had the option to withdraw their data up to ten days after they had been informed that the transcripts were ready for verification. No attempt was made to influence or bribe participants to be involved in the project. There was no conflict of interest.

With the permission of my participants, all interviews were voice recorded. To ensure an open form of communication with the participants, I prearranged private, on-site locations at each research site to preserve confidentiality for both the focus groups and interviews (Coleman & Briggs, 2002). At the start of each session all participants signed a consent form (Appendix C & Appendix E) and permission was once again sought to voice record the interviews. All interviews were either held during school hours or after school. The times were negotiated with the schools involved. All participants were given my contact details which could be used at any time to ask questions regarding the research. All participants were invited to review their transcripts to ensure authenticity.

**Anonymity and confidentiality**

Neither the participants or the organisation will be identified in the data, the data analysis or the thesis. All information received from the participants will be completely confidential. Data files will be stored in a secure electronic file and a locked filing cabinet. Electronic data will be password protected. Data will be stored in a secure cabinet for 5 years before being securely disposed of. There will be no ongoing involvement with the groups consulted in the project.
**Cultural issues**

As I was not initially aware of the cultural makeup of the staff that I was interviewing, I arranged to meet and consult with a local kaumatua with experience in education in order to establish an appropriate kaupapa for the research. The Kaiarahi Pouako of the Department of Education, at UNITEC also made herself available to support and advise me as needed.

I also enquired about the ethnic groups of staff before my actual interview with the participants, so that I could ensure that I was meeting the respective cultural protocols.

**Summary**

Personalised learning empowers students to take true ownership of their learning, altering the dynamics between teachers and students. It creates opportunities for teachers to recognise students as individuals with different skills, challenges and talents. Let’s talk about Personalising Learning is a Ministry of Education document strongly supported as far back as 2006, by the Hon. Steve Maharey, the then Minister of Education. He described personalising learning as the means by which the New Zealand education system was responding to the challenges of the 21st Century. According to the Ministry of Education (2006), evidence, that is well documented, on the type of teaching styles that have consistently had positive outcomes on student achievement, tells us that students learn best when:

- Teachers create a supportive learning environment; encourage reflective thought and action; enhance the relevance of new learning; facilitate shared learning; make connections to prior learning and experience; provided sufficient opportunities to learn and inquire into the teaching and learning relationship. (p. 34)

Despite there being a substantial amount of literature on personalised learning in
general, one significant limitation was the lack of available curriculum related literature related specifically to personalised learning in a mathematics secondary school classroom.

This chapter has described the methodology overview. I have presented a justification and a rationale for adopting a qualitative interpretive approach. An explanation of sampling decisions was provided, together with descriptions of the two data collection methods, semi-structured interviews and focus group discussions. Finally, I discussed the procedure of inductive analysis that was used to manage the data and issues regarding validity, reliability, and ethics. In the next chapter I will discuss the findings that this research methodology and data collection methods provided.

In the following chapter four the perceptions of mathematics curriculum leaders and mathematics teachers are presented and analysed.
CHAPTER FOUR:

Findings

Introduction

This chapter summarises the findings of the research data collected on personalised learning in a mathematics classroom context. The perceptions of curriculum leaders in mathematics and mathematics teachers in three secondary schools are presented and analysed.

The data were collected through interviews with three mathematics curriculum leaders and three focus groups comprising of up to four mathematics teachers. There were a total of 12 participants. The interview and focus group questions are included in Appendix F and Appendix G.

The following coding system will be used to identify the three curriculum leaders (CL 1 – 3), the three focus groups (FGA, FGB, FGC), the three schools (School A - C) and the nine mathematics teachers (MT 1- 9).

The interview questions have been used as headings for presenting the data. Tables have been used to indicate the frequency of sub-themes that emerged from the data.

Question One: What is your understanding of personalised learning in a mathematics class?

The participants responses are recorded below in Table 4.1. The six key sub-themes that emerged from the responses to the question were knowing students individually;
differentiate – giving students choice; address needs of students; building relationships with students; students working at their own levels; and students taking ownership of their learning. All 12 participants agreed that personalised learning involved knowing students individually.

Table 4.1: Understanding personalised learning

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FGC</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing students individually</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Differentiate – giving students choice</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Address needs of students</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Building relationships</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Students working at their own levels</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Students taking ownership of their learning</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

It was evident that there was some understanding of personalised learning from all the participants.

*Personalised learning is about knowing the kids. I always believed that if you know the kids then you'll be able to address their needs. Over time I make it a point of exercise time, I go to every single student and see what their strengths are, what their weaknesses are and try my best within that span of time to support them. (CL1)*

*Personalisation is kids being engaged with work and actually doing it at their own terms. It's about catering to the needs of the student. Each kid is going to be working at a different pace.*
Some key points that reflect the three focus groups understanding of personalised learning are indicated below:

FGA:

*Setting work at appropriate levels for different students.* (MT2)

FGB:

*I think the main thing is that the students are actually working at their own level on whatever it might be.* (MT4)

FGC:

*How we respond to the students needs as we go and sometimes we have to sort of push them to keep the pace with rest of the class.* (MT6)

All three curriculum leaders started off by giving me a definition of personalised learning, but then contradicted themselves in a follow up explanation as indicated below:

*Will it be in differentiated instruction? Probably not because there's a lot of traditional way of teaching that I do. And I do not have like 10 different sets of exercises to be given to 10 different students – no. Now the juniors will be different because I am more a dictator when it comes to the juniors. This is what you will be doing this is what you will be accomplishing this is what are my expectations. In the seniors this is our expectations this is how you can lead yourself there and this is what is expected of you- do it.* (CL1)
Personalised learning is driven by assessments so that the teacher knows where they are at also and where they know they're at. (CL2)

You can't personalise it for each individual kid in a massive course like calc where there are so many skills and it's too much of work to do. (CL3)

One mathematics teacher (MT8) commented that the personalised learning approach is only used with the junior classes. The senior students get given extra work. While discussing differentiation, the same teacher commented about doing multi-level learning (teaching) and that the concern was that mathematics teachers at this specific school had not done any training for multi-level learning (teaching) or received any support to teach these multi-level classes. The teacher (MT8) went on to express the view that they needed more leadership input and guidance with regards to how to adapt their teaching styles so that they are able to confidently personalise their teaching and learning approach.

It was evident that the majority of mathematics teachers in FGC felt that they did not cater for their weaker students in their classes and they did not feel equipped to teach the very mixed ability classes that they currently have. Building relationships was not something that came across strongly amongst these participants.

A trend amongst all three schools seems to be the use of online mathematics programmes as a form of personalised learning. This was mostly for their junior classes, where students worked independently at their own level. Some schools use this as part of their mathematics classroom programme where it was monitored as a homework task, while other schools used it as an independent activity for students to use as they see fit.
It was evident that all participants struggled with the fact that despite knowing the benefits of personalised learning, they still weren't using this as an ongoing teaching approach in mathematics. They all commented at some point about the fact that a personalised learning approach was not always possible – and that this was the reality of teaching mathematics.

**Question Two: How has the personalised approach to teaching and learning been developed in your school?**

The participants responses are recorded below in Table 4.2. The four key sub-themes that emerged from the responses to the question were mostly traditional teaching style-not personalised; teachers have autonomy in their classes; focus on assessments; and focus on priority learners.

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FG C</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostly traditional teaching style-not personalised</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Teachers have autonomy in their classes</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Focus on assessments</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Focus on priority learners</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

All 12 participants in the interviews and focus groups agreed that the personalised learning approach to teaching and learning in mathematics was not a focus at their school and could not comment on how the teaching and learning had developed with regards to personalised learning in mathematics. The impression created by the participants was that the majority of them still used a very traditional style of teaching in mathematics, a style that contradicts a personalised learning approach, as indicated by a few selected examples below:
It is still relatively very traditional especially level 2. (MT4)

One of the teachers commented that there has not been much of a development towards a personalised learning approach at their school, commenting on the fact that we still expect all the students from a particular level to sit the same exam paper at the end of the day. (MT5)

When questioned about the development of the personalised teaching and learning approach, almost all the teachers and curriculum leaders associated this with the autonomy that they were given in their classes.

I think that it is probably very individual and how different teachers interpret it as we have a lot of autonomy to do what we like in our classrooms. (MT2)

A curriculum leader (CL2) stated that there has been a natural development towards a more personalised approach to teaching and learning at their school because of the introduction of ipads in the mathematics classrooms and commented that this has probably made it easier and led people to be able to look at a more personalised approach to teaching mathematics.

Getting their students to complete their assessments was a priority for all 12 participants in the study. Most of the participants also commented on priority learners as a point of focus for personalised learning and their accountability with regards to these learners. It was noticeable that teachers were very aware of the priority learners in their classes because, according to them, their curriculum leader was monitoring their teaching approach and the student outcomes of these students specifically.
One curriculum leader (CL3) shared a chart called “Learning Guide Design Principles” displayed in all the mathematics classrooms and working spaces and stated: “this was a step towards ensuring personalised learning in all mathematics classrooms at my school...this chart acts as a reminder for both teachers and students about what is expected to ensure personalised learning in mathematics.”

The principles of the mathematics learning guide are listed below:

- **Learning purpose** is clearly communicated.
- Learning is **student centered**.
- Learning is **differentiated**.
- Learning is **varied**.
- Learning processes are **explicit**.
- Learning is **challenging**.
- Learning is **monitored**.
- Learning **timeframes** are indicated.

(Permission has been granted for the researcher to use this learning guide.)

**Question Three:** Using examples from your teaching, how does the personalised learning approach impact on your students outcomes and individual achievement?

The participants responses are recorded below in Table 4.3. The four key sub-themes that emerged from the responses to the question were to establish relationships of trust-build self esteem; student voice; individual support; and support in the class eg. teacher aides.

Only one participant was able to give the researcher an example from teaching that showed evidence that the personalised learning approach impacted on students' outcomes and individual achievement. However, most of the participants were still able
to express their thoughts about the impact of personalised learning on their students’ outcomes and individual achievement.

Table 4.3 Personalised learning impact on achievement

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FGC</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish relationships of trust-build self-esteem</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Student voice</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Individual support</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Support in the class eg. teacher aides</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>

The majority of the participants commented on the benefits of providing individual support to students as the need arose.

One teacher (MT6) commented on the fact that, from experience, students performed better and confidently asked questions after they had established a relationship with the teacher. It also helped the teacher to personalise their programme and support their learning once a better understanding of their circumstances was gained.

While one teacher (MT1) agreed with this comment, based on similar experiences at school, another teacher (MT4) shared this point of view saying:

*I think that the main thing is that students won't necessarily achieve the standards and reach the level but they will gain a better understanding of the topics they are doing.*

All participants acknowledged the importance of a personalised teaching and learning
approach to improve student achievement and outcomes. However, they also acknowledged that this teaching style was not a priority for them in a secondary school mathematics classroom.

All three curriculum leaders referred to the importance of having extra support in the classroom for those students who required it. A curriculum leader (CL3) mentioned how important it was to have support in the classroom for students with special needs and for students who did not speak English as a first language so that these students could achieve to the best of their ability. According to this leader (CL3), this support impacted on both the way the students developed in their self confidence in mathematics and helped the mathematics teacher to gain a better understanding on how to personalise the work for the students.

Despite the fact that all participants were not able to share examples from their teaching, it was indisputable that all participants were aware of the impact that personalised learning had on their students’ outcomes and individual achievements.

**Question Four: What do you see as the strengths of personalised learning in your mathematics class?**

The participants responses are recorded below in Table 4.4. The four key sub-themes that emerged from the responses to the question were relationships between students and teachers; student takes ownership of their learning; celebrating the good things; and positive attitudes.
Table 4.4 Strengths of personalised learning in mathematics classes

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FGC</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationships between students and teachers</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Student takes ownership of their learning</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Celebrating the good things</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Positive attitudes</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

All 12 participants strongly agreed that one of the strengths of personalised learning in their mathematics classes was the relationship between students and teachers. One curriculum leader (CL1) commented on the fact that it was evident when walking around that there was a positive change in the way the students approached the teachers and the way the students showed their appreciation towards the teachers. There were definitely relationships that had been built between teachers and students.

This leader commented further on how this positive relationship impacted on the teachers having a more positive attitude towards teaching mathematics, creating an energy that impacted on how motivated teachers were and impacting on discussions and relationships between teachers as they shared their day and teaching experiences with each other as part of everyday discussion.

Another curriculum leader (CL3) echoed this point of view that in a 21st century learning environment, relationships between students and teachers; teachers and other mathematics teachers in their department; and relationships between mathematics teachers and their mathematics curriculum leader is paramount to teaching and learning. The curriculum leader (CL3) stressed the importance of a personalised teaching and learning approach in their very multi-cultural school – but in the same breath acknowledged that in reality this approach to teaching and learning was not always possible. This leader also gave an opinion that a teacher should facilitate the learning rather than be the sole source of knowledge.
On the other hand, another leader (CL2) associated personalised learning with streaming in a mathematics class. Having established the streaming process for mathematics at their school, this leader commented on the fact that it was easier to personalise learning in a streamed class as the students were all at similar ability levels. However, there was also a comment made about the fact that classes that were not streamed allowed better interaction between students, with more abled students able to peer tutor the less abled. According to this leader, peer tutoring helped to establish supportive relationships in the classroom, and created more opportunities for the teacher to be available to work one-on-one with other students.

The majority of the teachers who participated in the interviews commented on the fact that even though they acknowledged the importance of personalised learning in their mathematics classes and acknowledged that there were positive outcomes as a result of this teaching approach, there was no directive from the school principal or from the mathematics curriculum leader, so they “did their own thing in class.”

A mathematics teacher (MT3) from FGA said:

One of the strengths of personalised learning in the mathematics class is that you direct, you get the student to work at his best educational level, so that he is going to achieve high...but in a class of however many you have you can't get everyone's personalised learning approach.

While a different teacher (MT1) interjected, saying that the strengths of personalised learning directly related to how motivated the students are in the subject. This teacher went on to say that the student's motivation is linked to the teacher who has a relationship with them, and a positive relationship usually yields positive results. The teacher felt that the students would end up working for teachers because they want to
do well for the teacher and then they end up getting enormous satisfaction from that.

When looking at the strengths of personalised learning in the mathematics class, another teacher (MT4) from FGB said that a strength in class was that students are able to feel that they are in charge of what is happening. He went on to say that for teenagers that is really important. It is also the reason why their students have such a positive attitude towards mathematics. Their students have some choice, they talk about their learning.

One teacher (MT5) agreed with this comment, adding that because their students are in charge of their learning they can feel the sense of success in their own knowledge instead of comparing themselves with the rest of the class.

While a different teacher (MT9) from FGC had a similar view, saying that helping students with their goals and working one-on-one with them helps them to feel that sense of accomplishment.

It was noticeable that all participants could describe or identify strengths of personalised learning in their mathematics class.

**Question Five: How does the secondary school structure of examinations and internal/external assessments impact on personalised learning in your classrooms?**

The participants responses are recorded below in Table 4.5. The five key sub-themes that emerged from the responses to the question were no impact; major impact; time constraints; assessment driven; and predetermined student levels.
It was evident by the responses of the participants that the secondary school structure of examinations and internal/external assessments impacted on personalised learning in the mathematics classrooms.

Table 4.5 Impact of examinations and assessments on personalised learning in mathematics classes

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FGC</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>No impact</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Major impact</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Time constraints</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Assessment driven</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Predetermined student levels</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

There was evidence that all 12 participants had some method to predetermine students levels for a course or an assessment task. Time is a major impact on personalised learning in the mathematics classrooms, according to one Leader (CL2), who went on to say that:

In terms of your time, you're spending a lot of time finding assessments, moderating them, marking them, checking and so teachers often focus on assessments...the senior classes can become quite assessment driven.

This view was reiterated by most of the participants as they believed that they were given a directive through the curriculum leader with regards to due dates and expectations for internal/external assessments which they followed because that was the norm.
As indicated by a teacher (MT2) from FGA:

I think we just accept the kind of assessment structure we have and whether we agree with it or not that's just the system we operate.

The rest of the group nodded in agreement commenting that even though their Curriculum Leader showed flexibility with some due dates, the expectation was that there were deadlines that had to be met – how you met these deadlines was up to individual teachers – but they had to be met.

All three curriculum leaders were able to succinctly express their shared views with regards to how the structure of examinations and internal/external assessments impacted on personalised learning in their classrooms:

This is where personalised learning takes a hit. I actually sit there thinking we waste too much time on this, we should be spending time on activities, on thinking about things and ways that we can actually engage the students and get them interested in this subject. It's so assessment driven we just drive everything on assessments. (CL3)

This Curriculum Leader went on to explain that the students have become so assessment driven that their attitude is if there are no credits for a piece of work, then they don't put as much time and effort in it.

Two Focus Groups (B & C) shared the same view that, the secondary school structure of examinations and internal/external assessments hindered personalised learning. A
teacher (MT2) from FGB went on to explain that the timing for the assessments is also an issue. Teachers are given specific dates for assessments but there are some students that probably won't be ready by that date.

Throughout the interviews the teachers commented that there was minimal influence or impact from the leadership team. Teachers were given expectations and deadlines that had to be met and the teachers were accountable for meeting this deadline – even if it meant sacrificing the personalised learning teaching approach.

**Question Six: What specific practices are used to ensure personalised learning in your classes?**

The participants responses are recorded below in Table 4.6. The four key sub-themes that emerged from the responses to the question were shared best practice; individual student support in the classroom; target groups of similar ability; and peer tutoring.

| Table 4.6 Practices used to ensure personalised learning in mathematics classes |
|-----------------------------------------------|---|---|---|---|---|---|---|
| Key sub-themes that emerged                  | CL1 | CL2 | CL3 | FGA | FGB | FGC | Total/12 |
| Shared best practice                        | 1   | 1   | 1   | -   | 2   | 4   | 9         |
| Individual student support in the classroom  | 1   | 1   | 1   | 1   | 2   | 2   | 8         |
| Target groups of similar ability            | 1   | 1   | -   | 2   | 2   | 1   | 7         |
| Peer tutoring                               | -   | 1   | -   | 1   | 2   | 1   | 5         |

The data received for this question is self explanatory. Other points that were made were helping students one at a time as the need arises and providing the best for each student. The majority of the participants felt that grouping students of similar ability
ensured personalised learning in their classes. According to a teacher (MT1) in Focus Group B, a strength at their school is grouping and collaboration:

*Once a task has been explained and discussed, students who are struggling or need any form of support or further clarification stay behind for a more detailed explanation by the teacher. Once all students are on task with their work the teacher moves between the groups in a facilitator role.*

Two Focus Groups (A & B) mentioned peer tutoring as a practice that both groups felt was an important part of personalised learning in their classes, especially when the teacher was working with other students.

Most of the schools spoke about shared best practice and all of them mentioned the freedom for teachers to try whatever they wanted to in their classes. Teachers tried different styles of personalised learning approaches when the opportunity arose or when they had time— but according to them, their planning for their mathematics lessons did not incorporate a personalised approach to teaching and learning. Most times it was incidental.

**Question Seven: What do you see as the biggest challenges or barriers for personalised learning in your mathematics class?**

The participants responses are recorded below in Table 4.7. The five key sub-themes that emerged from the responses to the question were large class size; time; resources to support student ability levels; homework / practice; and lack of information about students.
Table 4.7 Challenges or barriers for personalised learning in mathematics classes

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FGC</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large class size</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Resources to support student ability levels</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Homework / Practice</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Lack of information about students</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

All 12 participants agreed that time was definitely a barrier for personalised learning in their mathematics classes:

One Curriculum Leader added:

*You put your focus on the senior classes. You have to do the internal assessments, it has to be ready, it is as one says, time driven but as a school we are aware of it and I think that there will be an approach of just reminding people.* (CL2)

Large class sizes, between 30 to 35 students, was an issue for 10 out of the 12 participants:

*We don't seem to have the clientele in a class where you can say okay while the 20 of you go on with this worksheet I will get these people to do this. Because the trend is as soon as you are not dealing with the larger group so many of them will just go off task...But it's the kids on the other end who need the individual help and they don't seem to stay on task quite as well.* (MT9).
A barrier to personalised learning for FGB continued to be homework. One of the teachers (MT5) commented that this impacted on student achievement because students needed the extra time at home to practise what was taught in class. Another teacher (MT4) agreed, saying that they were reliant on students doing the practice at home.

Teachers interviewed from two of the three schools (School A & C) commented on the fact that they didn't feel competent enough to personalise the learning to the level required, stressing that they knew the content that needed to be taught but didn't feel equipped to adapt the work to a lower level.

They commented on the fact that they were not provided with any professional development on how to personalise their teaching and learning and there was no intervention or support from the leaders with regards to personalised learning.

One teacher (MT8) commented that mathematics is a teacher driven learning environment because there are the skills and the knowledge that the mathematics teachers have to pass on to the students. These are not necessarily the skills that the students will pick up naturally themselves. If students were given a textbook or worksheets and asked to work independently or in a small group, they would pick it up much slower than if they were directed as a class, when the teacher does traditional whole class teaching.

Another mathematics teacher (MT6) commented that they are still very traditional, while another teacher (MT9) added that personalised learning is important, but it is tough for a teacher because your content knowledge has to be really good and you also have to be able to explain one thing in many different ways and at different levels. The other participants nodded in agreement also expressing their thoughts about how they felt that their mathematics department could benefit with some guidance and resources with regard to personalised learning in their mathematics classes.
When asked if they had discussed this with their curriculum leader for mathematics, they all shook their heads, indicating that they had not.

Question Eight: How do you think that personalised learning impacts on your students achievement?

The participants responses are recorded below in Table 4.8. The four key sub-themes that emerged from the responses to the question were improved results; teachers more aware of students needs; students more motivated; and students more aware of their own needs.

Table 4.8 Impacts of personalised learning on student achievement

<table>
<thead>
<tr>
<th>Key sub-themes that emerged</th>
<th>CL1</th>
<th>CL2</th>
<th>CL3</th>
<th>FGA</th>
<th>FGB</th>
<th>FGC</th>
<th>Total/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved results</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Teachers more aware of students needs</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Students more motivated</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Students more aware of their own needs</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

It was evident that almost all of the participants felt that student motivation was an impact of personalised learning.

Participants from two of the schools also commented on the fact that their mathematics department shared resources and successful lesson plans which made it easier to target specific students or groups when they used the personalised teaching approach. This impacted on student outcomes and also developed relationships between staff, according to three of the participants who were new to their school.
One curriculum leader (CL3) commented saying that they had more success with personalised learning in 2014 when they gave students the choice of working independently at their own speed. Students achievement and outcomes at the end of that year were more successful than other years, with the role of the teacher as a facilitator instead of a traditional teacher.

He went on to say that moving to a facilitator role was something that mathematics teachers had to learn. They attended workshops and conferences together and shared their successful lessons and resources with each other. The curriculum leader (CL3) felt that this type of approach helped to develop a stronger relationship between the leader and teachers. The teachers showed a very supportive and positive attitude towards teaching and learning in mathematics.

As a new teacher at the school (MT5) observed that when students experienced success their attitude towards the subject changed. Once students developed a more positive attitude and relationship with the teacher it was easier to challenge their students by extending their students ability levels. It was evident from the experience of the teacher that students were more open to challenging themselves once they experienced some form of success.

The teacher (MT5) observed that students felt success, when their learning is personalised and they are moved to the next level when they are ready. According to FGB, school achievement and outcomes showed that by using the personalised learning approach there was a higher chance that the students would experience success rather than failure.

This point of view was echoed by another teacher (MT4) who said that it had a lot to do with the system that they used at their school. This teacher went on to explain that if you had a personalised approach to teaching and learning where students took control of their own learning where they are discovering what they need to do and
working through the work at their own pace, it is really efficient, really effective and students do a lot better.

According to Focus Group C, personalised learning helps to enable students to be more aware of their learning needs. Improved results are evident when working with students one-on-one. Students are more eager to want to learn and complete work.

Question Nine: What role have school leaders played in the implementation of personalised learning in this school? How important is this role? Explain.

There was no clear answer, specifically related to this question, by any of the 3 focus groups.

There was a long pause from 2 of the focus groups (FGA & FGC). The interviewer could sense an almost awkward silence amongst these 2 groups as the participants looked at each other. These two groups commented on the fact that the personalised learning approach in mathematics was not a focus at their school and was not something discussed by their mathematics curriculum leader.

The participants of the third focus group (FGB) commented on the fact that their mathematics curriculum leader encouraged them to share successful teaching strategies with each other on a daily basis. They felt that this constant talking and sharing made them feel more confident and more open to sharing issues that they at times experienced with difficult students.

They felt that because their mathematics curriculum leader was always talking to them and encouraging them they felt more confident to talk openly about things. The new teachers commented that even though they were new they already felt included in the mathematics department and part of the decision making process.
This positive energy, according to one teacher, came through in their classrooms and whenever they used the personalised teaching approach.

**Question Ten: Can you describe your role as curriculum leader for mathematics? How did you get this role?**

The above question is numbered as question 10 and was specifically asked to the three curriculum leaders.

The participants responses are recorded on the next page in Table 4.9.
Table 4.9 Curriculum leaders' understanding of their job description

<table>
<thead>
<tr>
<th>Leader</th>
<th>Leader's response: Role description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL 1</td>
<td>- Administrative role.</td>
</tr>
<tr>
<td></td>
<td>- Influence teachers on most things that affect teaching and learning.</td>
</tr>
<tr>
<td></td>
<td>- Leading the department based on school and personal goal.</td>
</tr>
<tr>
<td></td>
<td>- Don't tell teachers what to do – negotiate with teachers so that teachers take ownership of what they do.</td>
</tr>
<tr>
<td></td>
<td>- Arrange professional development for teachers.</td>
</tr>
<tr>
<td></td>
<td>- Ensure that the teachers work is aligned with the New Zealand curriculum.</td>
</tr>
<tr>
<td></td>
<td>- Appointed due to experience in professional development.</td>
</tr>
<tr>
<td>CL 2</td>
<td>- Monitoring teachers</td>
</tr>
<tr>
<td></td>
<td>- Giving my opinion</td>
</tr>
<tr>
<td></td>
<td>- Job share with another maths curriculum leader- we double up on a lot of things. We both applied for the position and we both got the position.</td>
</tr>
<tr>
<td>CL 3</td>
<td>- Administrative role.</td>
</tr>
<tr>
<td></td>
<td>- I never make decisions without consulting my team.</td>
</tr>
<tr>
<td></td>
<td>- The curriculum leader position was created- there were no curriculum leader when the school first opened. I applied and got the position.</td>
</tr>
</tbody>
</table>
Two of the three curriculum leaders looked at their role as an administrative role. When asked to describe their role all three curriculum leaders seemed to be on a similar track, as indicated below:

*I influence teachers on most things. I don't tell teachers what to do. I negotiate with teachers so that they take ownership of what they do.* (CL1)

*Monitoring and giving my opinion.* (CL2)

*I generally trust my team to be doing the right thing. I never make decisions without consulting my team.* (CL3)

All three curriculum leaders were appointed due to their experience in the curriculum area of mathematics.

**Summary**
The purpose of this research is to explore the perceptions of mathematics curriculum leaders and mathematics teachers regarding personalised learning in a mathematics secondary school classroom. Having completed the three interviews with the mathematics curriculum leaders and the semi-structured interviews with three focus groups (all mathematics teachers), three main themes have emerged, personalised learning, relationship building and curriculum leadership.

The following chapter five covers a discussion of the findings with support from relevant literature. Conclusions, limitations of study and recommendations for future practice and for future research are discussed.
CHAPTER FIVE:

Discussion, Conclusions And Recommendations

Introduction

Chapter five discusses the significant findings from the focus groups and semi-structured interviews presented in chapter four, with support from the literature reviewed in chapter two. The study explored the perceptions of mathematics curriculum leaders and mathematics teachers regarding personalised learning in a secondary mathematics classroom. Conclusions from the study and recommendations for future practice and for future research are also made. Finally, limitations of the research are discussed. The conclusions are now discussed under the three themes identified in the study; personalised learning, curriculum leadership and relationship building.

Personalised Learning

It was interesting to note that there was a long, almost awkward pause from 4 out of the 6 interviews, when asked what their understanding of personalised learning was in a mathematics class. However, the responses by all 12 participants revealed that they all had some form of understanding of the concept of personalised learning in a mathematics secondary school classroom. The six key sub-themes that emerged from the responses to the question were:

- knowing students individually
- differentiate – giving students choice
- address needs of students
- building relationships with students
- students working at their own levels
students taking ownership of their learning.

It was, however, concerning to note that after indicating that they understood the meaning of personalised learning, all three curriculum leaders went on to contradict themselves. One leader (CL1) commented saying: “Will it be in differentiated instruction? Probably not because there's a lot of traditional way of teaching that I do. And I do not have like 10 different sets of exercises to be given to 10 different students – no.”

Similarly, another leader (CL3) said: “You can't personalise it for each individual kid in a massive course like calc where there are so many skills and it's too much of work to do.”

The other leader (CL2) went on to state that: “Personalised learning is driven by assessments so that the teacher knows where they are at and the students also know where they're at.”

It is important for leaders to remember that they need to lead by example, focussing on building relationships that will influence their teachers in a positive way. This is recognised by Robinson et al. (2015) who notes that leaders can greatly impact and influence student outcomes if they focus on developing strong relationships of trust and openness with their teachers. Once this relationship is established leaders are able to impact more easily on the core business of teaching and learning.

Despite teachers being aware of the impact of personalised learning on student achievement and outcomes, participants chose not to use the personalised approach, on a regular basis, in their mathematics classes.

Whereas, Nair (2015) advocates a personalised approach when he comments that our students need to be prepared to work collaboratively by teaching them how to work in
groups, understand the skills required for problem solving, develop as critical thinkers and encourage our students to think out of the box. Our students are living in a very competitive, collaborative world and will be constantly competing for both careers and employment. We need to prepare our students so that they have the skills to walk out into the world and navigate the 21st century.

Even though Focus Group C clearly understood the concept of the personalised approach to teaching and learning, and clearly understood the impacts on student achievement and outcomes, they strongly indicated that they did not feel equipped to use the personalised learning approach with their mathematics students and therefore did not feel the need to use this teaching approach.

As indicated by the mathematics teacher (MT8), the mathematics teachers at their school did not feel equipped to teach the very mixed ability classes that they currently have. This teacher went on to explain that the mathematics teachers at his school have not had any training or support on how to teach the multi-level classes that they have at their school. The other teachers nodded in agreement. It was unmistakable, from the evidence provided in the interviews that there was no expectations or monitoring of their classroom practice from any of the curriculum leaders. The gestures and facial expressions from two of the focus groups gave the researcher the impression that they did not have a relationship of openness with their mathematics curriculum leader, where they could openly discuss their concerns or what they indicated was a lack of support in their classes.

Based on the participants in my research, it was evident that most of the participants had a preconceived idea about the teaching style for mathematics and that, in their opinion, it was not as flexible as other subjects with regards to using a personalised teaching approach. As most of the participants at some point of the interview commented that the reality of mathematics was that the personalised learning approach was not always possible. The study showed that two of the curriculum leaders failed to provide the required leadership to develop a personalised learning
approach within the mathematics classrooms that they overviewed. However, it should be noted that the Education Review Office (2012) commented that both teachers and leaders needed to ensure that they are drawing on a wide range of effective research and practice when they designed curriculum and interventions for students. They also stressed the importance of better use of evidence provided, when evaluating the outcomes of programmes and initiatives.

This view is supported by Schleicher (2012) who indicated that our teachers must constantly up skill themselves and actively involve themselves in professional development so that they are able to meet the needs of all students in our very diverse and multi-cultural schools.

It was concerning to note that all 12 participants in the study commented on the fact that the personalised approach to teaching and learning was not a focus in their schools and that the priority for them, as secondary school mathematics teachers, was to focus on the assessment requirements, to ensure that their students met the due dates and that they (the mathematics teachers), had covered all areas of the mathematics curriculum that was required for the external examinations.

As part of the interview questions, both the mathematics teachers and the curriculum leaders were asked how the personalised approach to teaching and learning has developed in their school? The four key sub-themes that emerged from the responses to the question were:

- mostly traditional teaching style
- not personalised
- teachers have autonomy in their classes
- focus on assessments
- focus on priority learners
It was a significant concern that none of the participants were able to comment on how the teaching and learning has developed with regards to personalised learning in mathematics. The impression created by the participants was that the majority of them still used a very traditional style of teaching in mathematics, a style that contradicts a personalised learning approach.

It was evident that most of the participants related the autonomy that they had in their classes with personalised learning as clearly indicated by a mathematics teacher (MT2) from FGA; when the teacher said, *I think that it is probably very individual and how different teachers interpret it, as we have a lot of autonomy to do what we like in our classrooms* (MT2). However, none of them could give an example of a lesson where the personalised approach to teaching mathematics was used in the classroom (MT2).

The impression given to the researcher was that the majority of the participants believed that because they gave specific attention to their priority learners, these include many Maori and Pacific learners. In this particular context, they believed that they were using a personalised teaching and learning approach in mathematics.

While a curriculum leader (CL3), discussed how their school used the “Mathematics Learning Guide Design Principles” that the curriculum leader developed. This Leader further commented that using the Learning Guide was a step in the right direction to ensuring the personalised learning and teaching approach in all mathematics classrooms in their school. The purpose of the Learning Guide was to act as a reminder for both teachers and students about the expectations in the mathematics department, to ensure personalised learning in mathematics. The chart includes some important reminders for both students and teachers. However, a concern identified is that there needs to be some form of monitoring process in place to ensure that the contents of the guide is actually being applied and practised in the mathematics classes, instead of functioning merely as a displayed reminder.
During the interviews, the four key sub-themes that emerged when participants were asked to use examples from their teaching to explain how the personalised learning approach impacted on their students outcomes and individual achievement were:

- establish relationships of trust-build self esteem
- student voice
- individual support
- and support in the class eg. teacher aides

Despite the fact that only one participant was able to show evidence from his teaching that the personalised learning approach impacted on his students outcomes and individual achievement, most of the participants were still able to express their thoughts about the impact of personalised learning on their students outcomes and individual achievement. One mathematics teacher (MT6) immediately identified the importance of establishing a personalised relationship of trust and openness with students, which extended outside the mathematics class. Another teacher (MT1) said: “If the students sense that you know them and care then they are motivated to try.” Mathematics Teacher (4) shared similar thoughts saying:

I think the big thing is the individual attention for a lot of them...another issue is attitude. I think it's the attitude for us that is the important thing in maths. If they have established a relationship of trust and are successful they are willing to work. If they are not successful they give up and then they stop there.

Hargreaves and Fullan (1998) predicted earlier that compared to other countries, education in New Zealand may be subject to a change in priorities in education as a result of a shift in government, which then impedes the development of educational changes. Evidence in both the literature and on the Ministry of Education website show
that with the change of government in New Zealand from the Labour Party to the National Party in 2008, there was a clear directional change in education with regards to personalised learning in education. Anne Tolley, a former National Minister of Education, signalled that personalised learning would continue to be a priority in education, “What works for learners is recognition of their language, culture and identity, personalised teaching and learning, with the concept of teacher as learner. An effective teacher embodies this approach ” (Tolley, 2009, p. 1). This sentiment was further echoed by the Ministry of Education’s 2014-2018 Statement of Intent, where it was proposed that the government will provide “flexibility for where learning can take place and can be personalised according to each individual’s strengths, abilities, languages and cultures” (p. 22). This has been identified as a fundamental enabler for improved student engagement, participation, and achievement (Ministry of Education, 2014).

Curriculum Leadership

According to the findings in this study, it is evident that curriculum leadership is crucial to ensuring both personalised learning in secondary school mathematics classrooms and positive outcomes and achievement. It was concerning to note that all 12 participants acknowledged that the personalised learning approach to teaching and learning in mathematics was not a focus in their school and that none of the participants could comment on how the teaching and learning had developed, with regards to personalised learning in mathematics. The impression created by the participants was that the majority of them still used a very traditional style of teaching in mathematics, a style that contradicts a personalised learning approach.

When interviewing the curriculum leaders, two of the three curriculum leaders looked at their role as highly administrative. When asked to describe their role all three curriculum leaders seemed to be on a similar track, as indicated below:

“I influence teachers on most things. I don’t tell teachers what to do – I negotiate with teachers so that they take ownership of what they do” (CL1).
Another curriculum leader described the job description as: “Monitoring and giving my opinion” (CL2).

Cardno (2012), notes that only those in leadership roles can influence the learning-teaching environment, in order to lead individual and collective organisational learning and change. This point of view is supported by Hargreaves and Fullan (as cited in Hipkins, 2015, p. 43) who stated that “strongly led schools can help otherwise average teachers to lift their performance, but even very talented teachers can struggle in a dysfunctional school climate.” It is therefore important that strong, positive relationships and values are established so that all energies can be directed to positive outcomes and to students performing and achieving to the best of their ability.

None of the mathematics curriculum leaders were able to confidently discuss what learning was occurring in their teachers' classrooms. Dialogue is about the leaders creating opportunities for teachers to talk with their colleagues about learning and teaching. The kinds of dialogues which influence what happens in classrooms are focused on learning and teaching. It is imperative that leaders create the circumstances to meet with colleagues and discuss pedagogy and student learning.

**Relationship building**

The impression created from the interviews was that the teachers and curriculum leaders all functioned in their own little compartment within their respective mathematics departments. They all did what they felt they needed to do, and that was, based on the interviews, to teach mathematics so that their students could pass their assessments and examinations. Different teachers were assigned the responsibility of taking care of the different levels in mathematics. It was the responsibility of the appointed teacher to arrange specific level meetings with other teachers and to discuss assessments and curriculum coverage with the teachers of that specific mathematics level. There did not seem to be an established relationship with their respective curriculum leader. They were not given the opportunity to engage in open discussions
about learning styles or learning approaches in relation to positive student learning outcomes.

The concern that was raised by all of the participants in this study was that they were assessment driven. The findings showed that the emphasis or focus on assessment practice hindered the building of critical relationships to develop personalised learning in the mathematics classrooms. A sound relationship between the curriculum leader and the teacher and between the teacher and students was essential to achieve successful student learning outcomes.

When asked how does the secondary school structure of examinations and internal/external assessments impact on personalised learning in their classrooms, the five key sub-themes that emerged from the responses to the question were:

- no impact
- major impact
- time constraints
- assessment driven
- predetermined student levels

Robinson et al. (2015) echoed the view that building relational trust is fundamental is establishing relationships. If there is an absence of trust, relationships will be jeopardised, no matter how sound a leader’s pedagogical knowledge and problem solving ability may be.

Effective leaders develop trust relationships by establishing norms of respect; showing personal regard for staff, parents, and students; demonstrating competence and integrity by modelling appropriate behaviour; following through when expectations are not met; acting in ways that are consistent with their talk; and
It was evident by the responses of the participants that the secondary school structure of examinations and internal/external assessments impacted on personalised learning in the mathematics classrooms. When asked what they saw as the biggest challenges or barriers for personalised learning in their mathematics class, the five key sub-themes that emerged from the responses to the question were:

- large class size
- time
- resources to support student ability levels
- homework / practice
- lack of information about students

Yet, based on the interviews it was evident that the majority of the participants did not feel comfortable to discuss these issues with the mathematics curriculum leaders. Hence, the importance of establishing strong relationships as a leader is extremely important.

Timperley et al. (2014) commented on a group of teachers in a secondary school who also had concerns about students who were not doing their homework. Evidence showed that one of the main contributing factors to a very offhand attitude to homework was that students found much of the assigned work was monotonous and boring. With strong leadership in place and well established relationships of trust, quality assurance of homework would not be an issue.

A teacher (MT8) from Focus Group C commented about doing multi-level learning (teaching) and expressed concern that the mathematics teachers at their school have not had any training to support that style of teaching or received any support to teach
their multi-level classes. When asked if this was discussed with the curriculum leader the Mathematics Teacher (MT8), indicated that this had not been discussed, while the body language from two of the participants, created the impression that there was a lack of communication between the curriculum leader and the mathematics teachers.

Mathematics Teacher (MT8) continued to express the opinion that they needed more leadership input and guidance with regards to how to adapt their teaching styles so that they are able to confidently personalise their teaching and learning approach. This finding is supported by McKinsey (2015) who identified that the four types of behaviour that account for effective leadership are:

- be supportive
- operate with strong results orientation
- seek different perspectives
- solve problems effectively

It is important to establish supportive learning and teaching environments so that our teachers do not hesitate to communicate with us and so that we as leaders are always available to support as needed so that our students are achieving the best that they can achieve.

All 12 participants agreed that time was definitely a barrier for personalised learning in their mathematics classes. Two curriculum leaders commented:

You prepare, you mark, you think about the kids, you tend to their behavioural issues, you tend to their personal issues - so it is all about time...so what we are doing now is we are trying our best. I believe that we are trying our best to address the needs of individual students. (CL1)
You put your focus on the senior classes. You have to do the internal assessments, it has to be ready, it is as one says, time driven but as a school we are aware of it and I think that there will be an approach of just reminding people. (CL2)

When asked what the curriculum leaders and teachers view as successful personalised learning strategies/ experiences in a secondary school mathematics classroom, it was indisputable that all participants were aware of the impact that personalised learning had on their students' outcomes and individual achievements. This was further iterated when asked what they saw as the strengths of personalised learning in their mathematics class. The four key sub-themes that emerged from the responses to the question were:

- relationships between students and teachers
- student takes ownership of their learning
- celebrating the good things;
- positive attitudes.

This is echoed by Timperley (2008) who went on to explain that an environment of trust and challenge must be established before learning opportunities are created. As a curriculum leader, it is important to remember that “change is as much about the emotions as it is about knowledge and skills” (p. 15).

Many teachers feel threatened by the prospect of change. It is important not to ignore emotional issues as this may lead to teachers becoming defensive. While Timperley (2008) went on to state that: “At the opposite extreme, if professional vulnerabilities are allowed to dictate the learning agenda, then outcomes for students are unlikely to improve” (p. 16).
When asked what role school leaders played in the implementation of personalised learning in their school, there was no clear answer, specifically related to this question, by any of the 3 focus groups. There was a long pause from two of the focus groups. The interviewer could sense an almost awkward silence amongst these two groups as the participants looked at each other. These two groups commented on the fact that the personalised learning approach was not a focus at their school and was not something either discussed by their mathematics curriculum leader or implemented by the leaders of their school.

The participants of the third group commented on the fact that their mathematics curriculum leader encouraged them to share successful teaching strategies with each other on a daily basis. They felt that this constant talking and sharing made them feel more confident and more open to sharing issues that they at times experienced with difficult students or with adapting the curriculum to fit the needs of specific students. They felt that because their mathematics curriculum leader was always talking to them and encouraging them they felt more confident to talk openly about things. The new teachers commented that even though they were new they already felt included in the mathematics department and part of the decision making process.

Recommendations

The findings of this study have led to recommendations for the Ministry of Education; Board of Trustees, Secondary School Principals, Secondary School Mathematics Curriculum Leaders and Secondary School Mathematics Teachers.

Recommendation One

Recommendations to the Ministry of Education

It is imperative that there is accountability and support through ongoing professional development, provided by the MOE, with regard to teaching mathematics using the
personalised learning approach. This could be clarified further in the form of a policy or as part of a requirement from the MOE which could be included in the appraisal cycle. Evidence needs to be provided to ensure that we are providing our students with the best education so that they can achieve to the best of their ability. This, however, can only become a reality if we can ensure that our teachers are being supported so that they feel confident and equipped to provide personalised, engaging and authentic learning. Our mathematics teachers need to be challenged, to rethink current assessment and examination practices so that mathematics in a secondary school is not assessment driven but rather based on the personalised learning style.

Recommendation Two

Secondary School Principals and Mathematics Curriculum Leaders:

At the end of each term every teacher should be required to complete a self-reflection sheet indicating level of confidences, what support they are requiring, how they are coping and any issues that may be hindering student achievement. These reflections sheets can form a basis for providing support in the mathematics classrooms. The curriculum leaders need to take a more active role in monitoring and supporting teachers in the classroom. This is part of the middle leadership role and should not be negotiated.

Finally, as part of the appraisal cycle for the curriculum leaders, teachers should complete a reflection sheet showing evidence of the support that the curriculum leaders are providing and any gaps that the teachers are still finding, that are having an adverse effect on student achievement and outcomes. There needs to be leadership accountability to ensure that we are providing our students with the best education by personalising their education.

School policies and strategies will need to be developed in order to both emphasise and embed the personalised learning across the mathematics curriculum.
Recommendation Three

Recommendations to Secondary School Mathematics Curriculum Leaders and Secondary School Mathematics Teachers:

It is crucial that leaders of departments or curriculum leaders are well informed about students' progress, results, learning needs and individual outcomes. This will easily lead to open conversations and discussions about how assessments, examinations and learning can go hand in hand with a personalised approach to teaching, so that we do not become schools that are assessment driven.

It is crucial for the teachers to clearly understand the job description of the curriculum leaders and for the teachers to ensure that they get the support required so that we can support our teachers to be the best that they can be. This could either involve the curriculum leader role modelling the personalised learning teaching approach and the mathematics teacher observing and vice versa. It is important that this support has a focus on personalised learning with a specific focus on mathematics.

Developing relationships of honesty, openness, trust and transparency with the curriculum leaders will help to ensure that the mathematics teachers are given the support that they require which will in turn help to improve the achievement and learning outcomes of our students.

Professional development needs to be made available to both the mathematics curriculum leaders and mathematics teachers, to support the teachers individual needs. It is imperative that teachers are then given opportunities to trial any professional development sessions that they have attended to support personalised learning in their mathematics classes, with unscheduled observations, so that we can ensure that this approach to teaching and learning is happening in the class.
Limitations of the Research

The researcher struggled to find relevant literature, specifically related to personalised learning in mathematics, in a secondary school setting. However this was a clear signal that the research conducted will make a contribution to new knowledge in the secondary school mathematics classroom.

It is important to note that the small sample of schools and small number of participants involved in this study cannot be generalised into all NZ secondary schools.

Future Research:

- The impact of assessments and examinations on personalised learning.
- To conduct a digital survey monkey with the members of the Auckland Mathematical Association about personalised learning in a mathematics secondary school classroom.
- There is opportunity for my topic on personalised learning to be extended to the other curriculum areas in the secondary school.
- In line with the 21\textsuperscript{st} century teaching and learning style, which includes the integration of technology, there is quite an element of personalised learning developing with this new approach to teaching; enhancing the need for personalised learning as a result of the new online teaching style.

Conclusion

This study has explored the perceptions of mathematics curriculum leaders and mathematics teachers with regard to personalised learning in a mathematics secondary school classroom. The findings and recommendations may be of interest to secondary schools who have noticed a decline in students' achievement in mathematics. The findings may also guide school leaders who are setting up new schools, so that they can establish policies that incorporate constant monitoring of
student achievement and outcomes and accountability as part of the appraisal process.

As quoted by Dewey, an American Philosopher and educator, “If we teach our children as we did yesterday, we rob them of the future.”
REFERENCES


Davidson, C., & Tolich, M. (2003). *Competing traditions*. In C. Davidson & M. Tolich (Eds.), Social science research in New Zealand: Many paths to understanding


Keeves, J. P. (1997). Methods and processes in educational research. In J. P. Keeves (Ed.), Educational research, methodology, and measurement; An


APPENDIX A

Organisation consent form and site access request letter
Researcher: Raeesa Dada
The Principal
School X
As previously discussed, I am currently enrolled in the Master of Educational Leadership and Management programme in the Department of Education at Unitec, Institute of Technology.
I am on study leave from my role as Assistant Principal at Mission Heights Junior College to complete my thesis research on: **Personalised learning: Perceptions of curriculum leaders and mathematics teachers in a secondary school classroom.**
I am writing to request site access to your school to enable me to meet with the teachers and curriculum leader in mathematics please. It would be greatly appreciated if you could please allocate us a room that can be used privately for our interviews and focus group meetings.
Neither you nor your organisation will be identified in the Thesis. All information received from the participants will be completely confidential. The interviews will be voice recorded, with the participants permission, transcribed and then securely stored away. I will provide a transcript for participants to validate before data analysis is undertaken. If the participants wish to withdraw their participation from the project, they will have the opportunity to do so at any point up to ten working days after receiving the transcript to validate the transcriptions. Can you please confirm that you have had the research project explained to you and that you have had an opportunity to have any questions answered.
Please also acknowledge that you understand that everything said as part of this study is confidential and none of the information provided will identify you, the staff or your organisation. The researcher will be audio recording and transcribing the participants contribution and will provide a transcript (or summary of findings if appropriate) to the individual participants to check before data analysis is undertaken.
I agree for the organisation to take part in this project.
Signed: ........................................... Principal
Name: ............................................. Date: ...........................................

UREC REGISTRATION NUMBER: (2015-1031)
This study has been approved by the UNITEC Research Ethics Committee from (26.06.2015) to (31.12.2015). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Information Letter

Research method: Individual interview

Thesis Title: Personalised learning: Perceptions of curriculum leaders and mathematics teachers in a secondary school classroom.

My name is Raeesa Dada. I am an Assistant Principal at Mission Heights Junior College in Flat Bush, Auckland. I am currently enrolled in the Master of Educational Leadership and Management programme in the Department of Education at Unitec, Institute of Technology.

I am requesting your help in the collection of data as part of a thesis course which forms part of this Masters programme. The aim of my research project is to explore the perceptions of curriculum leaders and teachers regarding personalised learning in a mathematics high school classroom.

I will be collecting data using an interview schedule and would appreciate being able to interview you at a time that is mutually suitable, for about 45 minutes to an hour, about personalised learning in a secondary school mathematics classroom. This will involve sharing your thoughts and opinions about what you perceive are the barriers and challenges in implementing personalised learning in a secondary school mathematics classroom and what you perceive as successful personalised learning strategies or experiences in a secondary school mathematics classroom. I will also be asking you to sign a consent form regarding this event.

Neither you nor your organisation will be identified in the thesis. The researcher will be audio recording and transcribing your contribution and will provide a transcript (or summary of findings if appropriate) for you to check before data analysis is undertaken.

If you wish to withdraw your participation from the project, you will have the opportunity to do so at any point up to ten working days after receiving your transcript to validate the transcriptions.

If you have any queries about the project, you may contact my supervisor at Unitec Institute of Technology. My supervisor is: Dr Josephine Howse phone: 815-4321 ext. 8348 or email: jhowse@unitec.ac.nz.

UREC REGISTRATION NUMBER: (2015-1031)
This study has been approved by the UNITEC Research Ethics Committee from (26.06.2015) to (31.12.2015). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
APPENDIX C

Consent form

Research method: Individual interview

Researcher: Raeesa Dada

Programme: Master of Educational Leadership and Management

Thesis Title: Personalised learning: Perceptions of curriculum leaders and mathematics teachers in a secondary school classroom.

I have had the research project explained to me and I have had an opportunity to have my questions answered. I understand that everything said as part of this study is confidential and none of the information provided will identify me, the staff or the organisation.

I also understand that the researcher will be audio recording and transcribing my contribution and will provide a transcript (or summary of findings if appropriate) for me to check before data analysis is undertaken.

I am aware that I have the right to withdraw myself or any information that I provided for this research up to ten working days after receiving my transcript to validate.

I agree to take part in this project.

Signed: ...........................................

Individual interview participant

Name: ............................................

Date: ............................................

UREC REGISTRATION NUMBER: (2015-1031)

This study has been approved by the UNITEC Research Ethics Committee from (26.06.2015) to (31.12.2015). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Information Letter

Research method: **Focus group**

**Thesis Title:** Personalised learning: Perceptions of curriculum leaders and mathematics teachers in a secondary school classroom.

My name is Raeesa Dada. I am an Assistant Principal at Mission Heights Junior College in Flat Bush, Auckland. I am currently enrolled in the Master of Educational Leadership and Management programme in the Department of Education at Unitec, Institute of Technology.

I am requesting your help in the collection of data as part of a thesis course which forms part of this Masters programme. The aim of my research project is to explore the perceptions of curriculum leaders and teachers regarding personalised learning in a mathematics high school classroom.

I will be conducting focus group interviews for about an hour to an hour and a half to discuss your experiences and perceptions with regards to personalised learning in a secondary school mathematics classroom. This will involve sharing your thoughts and opinions about what you perceive are the barriers and challenges in implementing personalised learning in a secondary school mathematics classroom and what you perceive as successful personalised learning strategies or experiences in a secondary school mathematics classroom, and would appreciate your contribution as a member of the group. I will also be asking you to sign a consent form regarding this event.

Neither you nor your organisation will be identified in the thesis. The researcher will be audio recording and transcribing your contribution and will provide a transcript (or summary of findings if appropriate) for you to check before data analysis is undertaken.

If you wish to withdraw your participation from the project, you will have the opportunity to do so at any point up to ten working days after receiving your transcript to validate the transcriptions.

If you have any queries about the project, you may contact my supervisor at Unitec Institute of Technology. My supervisor is: Dr Josephine Howse phone: 815-4321 ext. 8348 or email: jhowse@unitec.ac.nz

**UREC REGISTRATION NUMBER:** (2015-1031)
This study has been approved by the UNITEC Research Ethics Committee from (26.06.2015) to (31.12.2015). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
APPENDIX E

Consent form

Research Method: **Focus group**

**Researcher:** Raeesa Dada

**Programme:** Master of Educational Leadership and Management

**Thesis Title:** Personalised learning: Perceptions of curriculum leaders and mathematics teachers in a secondary school classroom.

I have had the research project explained to me and I have had an opportunity to have my questions answered. I understand that everything said as part of this study is confidential and none of the information provided will identify me, the staff or the organisation.

I also understand that the researcher will be audio recording and transcribing my contribution and will provide a transcript (or summary of findings if appropriate) for me to check before data analysis is undertaken.

I understand that if I wish to withdraw myself from the project, I will have the opportunity to do so at any point up to ten working days after I have received the transcripts to validate.

I agree to take part in this project.

Signed: ...........................................

Focus group participant:

Name: ............................................. Email address: ...................................................

Date: .............................................

**UREC REGISTRATION NUMBER:** (2015-1031)

This study has been approved by the UNITEC Research Ethics Committee from (26.06.2015) to (31.12.2015). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
APPENDIX F

- **Outline of questions for the semi-structured interviews:**
  All questions asked are related specifically to the curriculum area of mathematics.

  1. Can you describe your role as the Curriculum Leader for mathematics?
  2. Can you explain how you got into this role?
  3. What is your understanding of “personalised learning” in a mathematics classroom?
  4. What are your thoughts about how “personalised learning” should look in a mathematics class at your school?
  5. How has the “personalised learning” approach to teaching and learning developed in your school?
  6. What is your role in the implementation of personalised learning in this school? How important is this role? Explain.
  7. Using examples, how does the “personalised learning” approach impact on your students outcomes and individual achievement?
  8. As a leader, what do you see as the strengths of “personalised learning” in the mathematics classes at your school?
  9. How does the secondary school structure of examinations, internal/external assessments impact on personalised learning in the classrooms?
 10. What specific practices are used to ensure personalised learning in the classes?
 11. As a leader, what do you see as the biggest challenges or barriers of “personalised learning” in the mathematics classes at your school?
 12. How do you think that personalised learning impacts on your overall school’s achievement in mathematics?
 13. Is there anything else that you would like to add that I have not specifically asked you about?

Thank you for making time to meet with me today and contributing to this research.
APPENDIX G

• Outline of questions for the focus group:

  All questions asked are related specifically to the curriculum area of mathematics.

• 1. What is your understanding of “personalised learning” in your mathematics class?
• 2. How has the “personalised learning” approach to teaching and learning developed in your school?
• 3. Using examples from your teaching, how does the “personalised learning” approach impact on your students outcomes and individual achievement?
• 4. What do you see as the strengths of “personalised learning” in your mathematics class?
• 5. How does the secondary school structure of examinations, internal/external assessments impact on personalised learning in your classrooms?
• 6. What specific practices are used to ensure personalised learning in your classes?
• 7. What do you see as the biggest challenges or barriers of “personalised learning” in your mathematics class?
• 8. How do you think that personalised learning impacts on your student achievement?
• 9. What role have school leaders played in the implementation of personalised learning in this school? How important is this role? Explain.
• 10. Is there anything else that you would like to add that I have not specifically asked you about?

Thank you for making time to meet with me today and contributing to this research.