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Acceleration in Mathematics: Students' Perspectives.

A thesis presented in partial fulfilment
of the requirements for the degree of
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Abstract

This study examines accelerate programmes in mathematics within New Zealand secondary schools from the participant students point of view. Focus group interviews and questionnaires were used to gather information from students about their acceleration experiences in four state secondary schools.

An analysis of the data gathered reveals that for many students, the opportunity to study one or more Bursary subjects earlier than their age cohort is seen as a motivational factor for participation in acceleration programmes. This opportunity allows them to either broaden their subject base at the Bursary level, or to repeat a subject and try and improve on their marks, perhaps securing a Scholarship. Not all students have long-term goals, however and many students appreciate the immediate challenge of working one year ahead of their normal age cohort.

Contrary to fears identified by educational practitioners, this research does not support the commonly held belief that students who are accelerated will suffer from undue stress that may hinder their social and emotional development. Participants perceive that inclusion in the acceleration programme has not affected their friendship base and they report being comfortable being in classes with older students. Students perceive that they have a normal adolescent social and emotional development.

Coupled with these findings is the fact that, almost without exception, participants felt that participation in an acceleration programme had been beneficial to their learning needs. No significant problems with compacting the curriculum or gaps in knowledge were identified by the majority of students in the research sample.

Overall, this study demonstrates students' endorsement of acceleration programmes. Acceleration is perceived as a viable and valuable tool for meeting the educational needs of gifted and talented students within New Zealand secondary schools. It should be remembered, however, that acceleration is not the only tool available and schools are urged to develop individual, cohesive and flexible programmes to meet the needs of this very varied group.

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Chapter 1: Introduction.

Enabling our gifted and talented students to reach their full potential will make an important contribution to the Ministry of Education's mission of raising achievement and reducing disparity. The revised National Administrative Guidelines provide boards of trustees and school leaders with the responsibility and authority to meet the learning needs of this group of students. (Fancy, cited in Ministry of Education, 2000, p.5)

1.1 Introduction.

The latter part of the 20th century has seen a resurgence in interest for specialised programmes for gifted and talented students within New Zealand (Townsend, 1996). *There is a growing awareness of the special needs of gifted and talented students and of the importance of providing them with an educational environment that offers maximum opportunities to develop their special abilities* (Ministry of Education, 2000, p.6).

Since the Thomas report of the 1940's, the New Zealand education system has provided schools with the discretion to develop programmes and courses that are appropriate to the learning needs of all students (Ministry of Education, 1993). The Education Reviews of the 1980's culminated in the production of *The New Zealand Curriculum Framework* in 1993. This policy document is underpinned by broad parameters recognising the learning needs of all students with different abilities including the gifted and talented. *The school curriculum will recognise, respect, and respond to the educational needs...of all students [including] students with different abilities* (Ministry of Education, 1993, p.7).

The National Education Goals provides school board of trustees with a clear direction for education within New Zealand. They charge schools with the task of providing: *The highest standards of achievement, through programmes which enable all students to realise their full potential as individuals, and to develop the values needed to become full members of New Zealand's society* (National Education Goal 1). Schools should also provide an *...equality of educational opportunity for all New Zealanders,*

by identifying and removing barriers to achievement (National Education Goal 2). But 'equality of educational opportunities' is often understood to be 'the same for all' or a general homogeneous view of both students' needs and the means by which they can be addressed (McAlpine & Reid, 1987). In contrast to this view, McAlpine and Reid argue that we would be better to view equality of educational opportunities as the student's right to receive a level of education that will assist them to achieve to their highest potential.

The Education Review office, as recently as 1998, had reported that: *Most documents outlining requirements on schools do not make any specific mention of students with special abilities* (Education Review Office, 1998, p.6). Recent reviews of the National Administrative Guidelines have addressed this problem and there is now a requirement that schools will make adaptations for gifted and talented students.

The National Administrative Guidelines 1 (iii, c) and 1 (iv) state that Boards of Trustees must: ... *identify students and groups of students who have special needs...* and... *develop and implement teaching and learning strategies to address the needs of [these] students*. These guidelines imply that schools should provide differentiated services that are custom designed to meet the individual needs of students. Further examples of the need to consider gifted and talented students when developing educational programmes can be found in almost every curriculum document (Riley, 2000). Despite these legal requirements for schools to provide educational provisions, there is still no national policy for the education of gifted and talented.

Traditionally, the New Zealand education system has been characterised by a strong egalitarian view. Some have questioned the need for specialist provisions for gifted and talented students, arguing that they can 'make it on their own' or that they are already well served by the education system (Education Review Office, 1998; McAlpine & Reid, 1987). In practice, individual provisions were made for all groups of students except gifted and talented students (McAlpine & Reid, 1987). In recent times, however, these views have become moderated. *Teachers are becoming more aware of the consequences of not attending to the needs of the gifted and talented. The research in this area is conclusive and irrefutable: failure to recognise and meet the needs of the gifted and talented can result in their boredom, frustration,*

mediocrity and even hostility (Ministry of Education, 2000, p.6). Allied to this there is an increased acknowledgement that our gifted and talented students *represent one of our country's greatest natural resources and that failure to support them appropriately in their schooling may see this potential go unrealised* (Ministry of Education, 2000 p.6).

This renewed interest in providing educational programmes for gifted and talented students has resulted in two general approaches; acceleration and enrichment. Since the relaxation of the School Certificate entry rules by the Ministry of Education in the mid 1980's some secondary schools have developed academic acceleration programmes. The nature of these vary greatly, ranging from schools that allow students to take a subject a year earlier than normal right up to schools that have students sitting five Bursary subjects from the sixth form. Other developments have also occurred. In the mid 1990's new Ministerial curriculum statements encouraging 'development band' enrichment material at each curriculum level were produced (Ministry of Education, 1996). More recently the Ministry of Education has formed an Advisory Group on Gifted Education and also produced a new handbook designed to help New Zealand schools meet the needs of their gifted and talented students (Gifted and Talented Students: Meeting their Needs in New Zealand School; Ministry of Education, 2000).

1.2 Acceleration versus Enrichment.

Within the context of secondary school mathematics education, acceleration is one of the more controversial means of providing for the educational needs of our gifted and talented students. In recent years there has been a greater emphasis on any potential harm to students recommended for acceleration (Southern & Jones, 1991). Research within New Zealand indicates that many educational practitioners and parents are concerned that students in acceleration programmes are at an unacceptably high risk of suffering social and emotional maladjustment (Townsend, 1996; Townsend & Patrick, 1993).

Is the concept of acceleration at fault, or do schools need to look more closely at the type and calibre of student who are selected for their existing acceleration programmes? If we contrast the overwhelmingly positive research evidence of the effects of acceleration programmes with educational practitioners' reluctance to use it, it appears that the issue of whether acceleration is effective is overshadowed by whether it is acceptable (Southern, Jones & Fiscus, 1989).

The design of current accelerate options seems to be based on three general assumptions. Firstly, gifted students differ from their peers primarily in the rate rather than the way they acquire knowledge. Secondly, adapting the pace of instruction or advancing grade placement will answer many of the needs of gifted students. Lastly, that the content of the curriculum is generally appropriate and challenging for gifted students (Southern, Jones & Stanley, 1993). However critics have voiced concerns over the validity of these basic assumptions.

Critics of grade skipping acceleration in New Zealand secondary schools have argued that this programme design does not allow students to work at their own level and pace. An accelerated student may work on material that is a year or more ahead of their age peers but the level, speed and sophistication of pedagogical delivery may not be significantly different from the class they left behind (Holton & Daniel, 1996).

Accordingly, there are serious question marks about whether such a programme develops gifted and talented students to their fullest potential as required by the New Zealand Curriculum Framework. Any programme that does not have a high degree of flexibility is in danger of becoming merely a set of activities that are supposed to be equally attractive and profitable to all. This denies the uniqueness of talent (Worcester, 1979).

In recent years more New Zealand schools have been looking at alternatives to acceleration to meet the needs of their gifted and talented mathematicians. As a result, in-class enrichment is now one of the most preferred means of catering for their educational needs (Moltzen, 1995; Townsend, 1996). Moltzen argues that it is a 'safe option' easily defended both philosophically and pedagogically and that it allows students to progress with their age cohort, offering solutions to a number of problems

raised by acceleration. Offering enrichment can simplify the issue of identification of gifted students by assuming a more inclusive notion of gifted and talented students in line with broader definitions based on multiple intelligence criteria (Ramos-Ford & Gardner, 1997; Renzulli, 1986; Sternberg, 1997). Depending on particular programme designs, enrichment can help to overcome some of the problems of being labelled 'gifted and talented' such as being singled out by peers or being withdrawn from class. It can also avoid problems of underachievement and intellectual frustration that some gifted students feel when they are faced with a curriculum that is delivered too slowly, with a directive and transmission based pedagogical style (Townsend, 1996).

Despite the advantages of catering for individual needs whilst retaining students within their age cohort, enrichment also attracted a number of criticisms. There is a problem with the definition of enrichment. Often it seems that everything teachers do outside the normal curriculum is labelled enrichment. Townsend (1996) reports that the extent, type and strategies for providing enrichment are so varied, that he has yet to meet a teacher who does not claim to be providing some enrichment within their classroom. Critics of enrichment claim that it is frequently little more than 'busy work,' offered to students who have finished the set work, or a 'one-off' filler that provides contrast to the regular classroom routine, often lacking clear goals, adequate substance or a clearly planned teaching strategy (Townsend, 1996).

It has been argued that enrichment is appropriate for all students and as a result may not offer a specific solution to meeting the needs of gifted and talented students (Davis & Rimm, 1994). In spite of the lack of agreement on the term enrichment, there is some research indicating that enrichment is an effective strategy in meeting the academic needs of our gifted and talented students. Kulik (1992) has reported that enriched classes outperform control students from conventional classes by four to five months.

The debate about the use of acceleration or enrichment to meet the needs of gifted and talented students has been in progress for at least the last 30 years and it is certain to continue into the new millennium. The research evidence on acceleration is extensive and although some of it appears contradictory, the balance of it supports acceleration.

as a viable option for meeting the needs of our gifted and talented students. Acceleration appears to have positive effects on the academic ability of students with few negative side effects. Although research evidence for enrichment is limited, it also points to positive effects both in academic and non-academic areas.

Kulik and Kulik (1992) suggest that acceleration has an edge over enrichment programmes from a purely academic point of view, but there appear to be no good studies that reliably compare the merits of the various methods across both academic and non-academic measures. Studies on acceleration and enrichment show successful results in every measurable respect and it is very difficult to know whether one group would have been more successful had it had the other's experiences (Worcester, 1979). Due to the lack of comparative research it is difficult to determine which is the most effective approach, under what circumstances and with which gifted and talented students (Van Tassel-Baska, 1994).

Townsend (1996) cautions us that it is important to remember that the two approaches, namely acceleration and enrichment, are not mutually exclusive and argues that it is essential to adopt an integrated approach to meeting the needs of our gifted and talented students. Gifted learners have different learning needs compared with typical learners. Therefore curriculum must be adapted to allow for accelerated and advanced learning as well as enriched and extended experiences (Van Tassel-Baska, 1993). The challenge is not to determine which of these two strategies to employ in schools but rather to provide an integrated programme that gives flexibility in meeting the learning needs of a highly varied population (Townsend, 1996). An integrated approach will utilise the strengths of both techniques. Acceleration encourages the use of strategies appropriate to solving well-structured problems. Enrichment develops strategies useful for solving ill-defined problems. Acceleration and enrichment may be regarded as legs that support the same chair, the development of educational potential for our gifted and talented students (Southern, Jones & Stanley, 1993).

In practice, schools could be looking towards implementing programmes based on models such as the School Wide Enrichment Model (Renzulli & Reis, 1986), coupled with individual subject acceleration in areas of strength for individual students. Many

secondary schools are now using a combination of acceleration and enrichment activities to cater for the differing needs of their gifted and talented students (Winsley, 2000). The level of flexibility offered by such a programme would be in line with the New Zealand Curriculum Framework's strong commitment to individualising learning opportunities for the needs of all students including the gifted and talented (Ministry of Education, 1993).

To provide such an integrated programme requires a detailed examination of the strengths of various programme designs currently used in New Zealand secondary schools. There is currently a lack of research on the effectiveness of such provisions from a New Zealand point of view. Reservations expressed by New Zealand's educational practitioners, coupled with Moltzen's (1995) suggestion that enrichment is replacing acceleration as the most preferred option for meeting the needs of gifted and talented students, highlights the need to conduct research on existing acceleration programmes. The work of Winsley (2000) has expanded our understanding of the provisions for gifted and talented mathematics students currently available in New Zealand secondary schools, but more work needs to be done.

Specifically, this research will examine the effects of acceleration programmes from a mathematics student's point of view. Borland (1991) reminds us that: *Pushing children unnaturally is wrong, just as forcing a child to mark time in a lockstep that is educationally frustrating is wrong. In both cases, the mistake is the result of allowing adult needs instead of the process of natural development to guide the unfolding of children's lives* (p. vii). Too often we assume that we know what is best for our students. We also, as adults, think that we know what our students are thinking and feeling without asking them.

This research will add a new perspective to the debate, namely the students' voice. The students within acceleration programmes have a unique perspective on provisions that are, after all, designed to meet their educational needs. If we are to effectively and efficiently provide educational strategies to meet their needs then we must conduct research on participant students' experiences and perceptions of existing programmes.

1.3 Research questions.

The purpose of this study is to examine accelerated programmes in mathematics within New Zealand secondary schools, from the participant students' point of view. The study intends to gather information from students about their acceleration experiences:

- What reasons do students state as primary motivators for participation in accelerate programmes?
- What do they perceive as the outcome of their participation?
- What do students see as the social/affective issues of being involved in acceleration programmes?
- Do students view their participation in a positive light?

Although there has been some research conducted in this area in the United States, there is a limited amount of research of students' perceptions of their experiences in acceleration programmes within New Zealand. It is intended that this study will provide an insight into the effects of existing accelerate programmes on participant students and that schools might use the findings of this study to help them develop appropriate programmes to meet the needs of their gifted and talented students.

1.4 Definition of terms.

It is important when conducting research on acceleration programmes that the term 'acceleration' is clearly defined. In its purest form the term refers to situations where students are exposed to new curriculum based material at an earlier age and/or at a faster pace than their age cohorts (Townsend, 1996). The most common type of mathematics acceleration programme in secondary schools in New Zealand is often referred to as 'grade skipping' (Winsley, 2000). Students miss out or 'skip' a particular year level in one or more subjects often achieved by compacting or compressing two years into one. In Mathematics, two of the most common ways of achieving this curriculum compacting are: 1. Teaching both the year nine and ten curricula during a student's year nine and then progressing to the year eleven School Certificate curriculum in the student's year ten, or 2. Teaching both the year ten and

year eleven School Certificate course in the student's year ten. Both systems result in students taking the School Certificate examinations one year earlier than their age cohort. Accelerated students usually complete the rest of their secondary schooling at the same pace but one year earlier than non-accelerated students.

A term that is often closely associated with acceleration is 'enrichment.' This refers to a process in which students are exposed to a wider range of content, often from outside the core curriculum, and examine this content in greater depth according to their individual abilities and needs (Townsend, 1996). Enrichment may be designed to develop students' higher mental processes, present a particular content area in more depth, or to emphasise the product or result of instruction rather than the content or processes involved (Schiever & Maker, 1997). In New Zealand, enrichment activities are sometimes called extension activities.

With specific reference to this research project, any programme that results in student placement in a higher year level, or the ability to sit School Certificate, Sixth Form Certificate and Bursary assessments earlier than their age cohort can be thought of as acceleration. Strategies that supplement or go beyond standard grade level work, but do not result in placement in a higher year level or the ability to sit higher-level qualifications early can be thought of as enrichment (Davis & Rimm, 1994).

The specific nature of the participant schools' acceleration programmes and practices will be discussed at the start of each of the respondent school's results chapter.

1.5 The nature of gifted and talented.

Since acceleration is a provision designed to meet the educational needs of gifted and talented students it is appropriate to look briefly at the nature of the term 'gifted and talented' and how these views have changed over time. Even amongst the leaders in gifted and talented education there is little consensus as to what constitutes 'gifted and talented' (Downs, Matthew & McKinney, 1994). However, one widely accepted definition is that proposed by Renzulli (1986). Renzulli describes gifted and talented behaviour as the interaction of above average intellectual ability, high task motivation

and high levels of creativity. This view encompasses the general move away from the restrictive definitions of superior intelligence that dominated the earlier part of this century towards one that embraces both non-academic and humanistic traits.

Traditionally, the concept of gifted and talented was viewed as being relatively one-dimensional (Ramos-Ford & Gardner, 1997). Students were selected for gifted and talented programmes based on their performance in intelligence tests or exams measuring achievement (Subotnik & Arnold, 1993). These tests assumed that a single test score could encapsulate an individual's intellectual ability. It was simply a matter of arriving at a critical value beyond which a person is considered 'gifted and talented'. This could result in a person who scores 130 being admitted to a programme but a person scoring 129 being denied. There has been much criticism of this practice in the latter half of this century: *It is naïve to assume that intellectual giftedness can be captured by a single number* (Sternberg, 1997, p.49). Despite arguments by Osborn as early as 1983 that the assessment of general mathematical ability by a single grade from a maths exam was inadequate, Ramos-Ford and Gardner (1997) report that this is still the most common method of identification used in the U.S.A.

To counter this traditional view of intelligence, Sternberg (1997) proposed his 'Triarchic Theory of Intelligence' that rejects the notion of intelligence as a single continuum. It acknowledges that different people demonstrate different strengths and choose different approaches to suit the situation. A similar view is Howard Gardner's (1993) Multiple Intelligence theory. Gardner hypothesised that individuals possess eight intelligences: linguistic, logical-mathematical, spatial, bodily-kinaesthetic, musical, interpersonal and intrapersonal. Gardner argued that no intelligence exists by itself and that they are always interacting with each other in complex ways. (Ramos-Ford & Gardner, 1997). These views of the nature of intelligence are important because they help us to realise the complexity of giftedness and that gifted and talented individuals are not a homogenous group.

It is questionable whether multi-categorical concepts of intelligence make the task of identifying gifted and talented students easier or not. In one way they provide a tool for viewing students in a whole new light, allowing the identification of a whole new

group of potentially gifted students. In another way they make the task of identifying those students more difficult, because schools cannot simply apply a single test to assess and quantify an individual's intelligence. One thing is clear - the use of broader definitions of giftedness based on multi-categorical criteria has implications for both the number of students identified and the programmes developed to cater for their needs (Downs, et al., 1994).

One of the dangers in building a case for special provisions for gifted and talented students is to overemphasise the homogeneity of the group of potential students (Moltzen, 1995). Programmes are often assumed to have the same purpose and end result for all students. They may all be presented with the same material, with little attention paid to individual needs (Townsend, 1996). It is wrong to think that all gifted students display the same traits, or have the same strengths or interest areas. Some will have a preference for certain types of activities and may appear to be more gifted in certain areas because of this. Individuals' giftedness may vary from one year to the next. This makes catering for gifted and talented students more complex than merely identifying students to fit within existing inflexible programmes.

In addition to changes over time, conceptualisations of gifted and talented vary between cultures (McAlpine and Reid, 1987). This is because a culture's perception of what constitutes gifted and talented *is shaped by its beliefs, customs, needs, values, concepts and attitudes* (Bevan-Brown, 1996, p.91).

Within a New Zealand context, Bevan-Brown (1996) has conducted research into both traditional and contemporary Maori concepts of gifted and talented students. Although she cautions us that her findings should not be thought of as 'the' Maori concept, her work has provided us with an insight into the differing conceptualisations of gifted and talented within New Zealand. Her findings indicate that many different abilities and qualities are valued within Maoridom, including spiritual, cognitive, affective, artistic, musical, social, intuitive, creative, leadership and cultural aspects. She suggests that such broad and wide-ranging concepts are consistent with multi-category concepts of the nature of gifted and talented students (e.g., Gardner, 1993; Sternberg, 1997). One noticeable feature of her research is the great importance placed by Maori on intangible qualities mainly in the affective, interpersonal and

intrapersonal domains. She argues that this is noticeably different than the Department of Education's official definition of gifted and talented students.

The work of Bevan-Brown (1996) is important because it highlights the difficulty of applying a single, all-encompassing concept of gifted and talented students within the New Zealand education system. It adds weight to Moltzen's (1995) observation that gifted and talented are not a homogenous group. Accordingly, we must be cognisant of the variety of different conceptualisations of gifted and talented students, both from within and between cultures.

With the development of multi-categorical concepts of intelligence and broader definitions of gifted students, new identification techniques need to be developed. Studies generally support the continued use of testing, with the proviso that the instrumentation be appropriate for the programme goals. There is also evidence that teachers have a role to play in the selection of students for gifted and talented programmes. Trost (1993) found that teacher ratings of students turned out to be a fairly good predictor of later achievement in schools. Each identification method has its own strengths and weaknesses and so reliance should never be placed on a single strategy (McAlpine & Reid, 1997). It is also important that multiple sources of data should compliment each other, rather than merely confirm each other (Ramos-Ford & Gardner, 1997). Research indicates that a range of predictors should be used when selecting students for specialist programmes, with evidence gathered from teachers, peers and the students themselves (Ramos-Ford & Gardner, 1997; Renzulli, Reis & Smith, 1981). The purpose of these procedures should be to identify the needs of our gifted and talented students in order to develop programmes rather than to identify students to fit within existing programmes. We must actively seek to identify their abilities, not for the purpose of a label, but for the creation of an appropriate education (Riley, 2000).

It is important that schools develop their own definitions of gifted and talented after due consultation with their student body, parents and wider school community. Through this process the school's definition will reflect the values and ideals of those it serves (McAlpine & Reid, 1987). Schools could expect to identify 10 to 15 percent of their student population as gifted and talented and as many as 25 percent of

students should expect to be exposed to material designed for students with special abilities (Ministry of Education, 1996).

It is beyond the scope of this study to examine the effectiveness or accuracy of the participant schools' policies and practices for identifying and selecting gifted and talented students. For the purpose of this study the sample consists of students who have been selected to take part in the acceleration programmes for each of the four participant schools. The selection procedures used by each school are summarised at the start of the school's results chapter.

1.6 Overview.

Chapter 2 reviews the literature from both an international and a New Zealand perspective and provides a theoretical background from which this research can be viewed. It specifically summarises relevant research findings on the use of acceleration programmes to meet the needs of our gifted and talented students.

Chapter 3 describes the research methodology used for this research. Data collection instruments are presented and justifications for the use of these instruments are made.

Chapters 4 to 7 discuss the four schools in the research sample. Each chapter starts with a brief overview of the school, including the details of their acceleration programme and practices. The results of the focus group interviews are then discussed within the context of each school and conclusions are drawn.

The final chapter, chapter 8, looks at common themes and conclusions and discusses these within the context of the New Zealand education community. Implications for teaching practice are presented as well as suggestions for further research.

Chapter 2: Review of the literature.

Borland (1991) claims that academic acceleration is an issue about which educator and layperson alike appear to have strong opinions. Indeed few educational practices have been scrutinised by researchers and reviewers for such a prolonged period of time (Kulik & Kulik, 1992). This review will briefly outline some of the major findings in the research literature, both from overseas as well as a New Zealand perspective, and will show that although there is a wealth of international research into the effects of acceleration programmes on participants, there remains a significant shortage of New Zealand based research. It also highlights that the generalisation of overseas results to a New Zealand educational setting are limited by significant differences between acceleration programme designs. Accordingly, there is a lot of scope for research examining the effect of acceleration on participants as a means of meeting the needs of gifted and talented mathematicians in New Zealand.

2.1 An overview of the research.

Overseas research evidence generally supports the claim that acceleration has a positive effect on the academic development of participants (Benbow, 1991; Benbow, Lubinski & Suchy, 1996; Feldhusen, 1991; Kulik & Kulik, 1984; Kulik & Kulik, 1992; Richardson & Benbow, 1990; Rogers & Span, 1993; Swiatek & Benbow, 1991b). However, many educational practitioners and parents fear that the acceleration process may be too stressful for young adolescents and therefore detrimental to healthy social and emotional development (Brody & Benbow, 1987; Curran, Holton, Marshall, & Haur, 1993; Daurio, 1979; Southern et al., 1989).

Southern and Jones (1991) have reported that according to many who adopt a conservative attitude towards acceleration: *students who are pushed to learn faster sacrifice their childhood on the altar of academic precocity* (p. 13). When removed from their peer group they miss out on important age-appropriate social activities such as time to explore peer relations. Students may simply regret these lost opportunities or it may lead to social maladjustment as an adult due to lack of friends, increased

academic pressures and reduced outlets for expression outside of schoolwork (Holton & Daniel, 1996).

Southern and Jones (1991) suggest that students involved in acceleration programmes may have reduced extracurricular opportunities. Many extracurricular activities are age related and as such may exclude younger classmates. Older students are less likely to give as much attention or respect to much younger classmates, and therefore accelerate students may have less opportunity to develop leadership skills.

Advocates of acceleration point out the absence of research support for such claims (Gallagher, 1996; Kulik, 1992; Richardson & Benbow, 1990; Swiatek & Benbow, 1991b). Townsend (1996) reports that fears that accelerate students would run the risk of rejection by other class mates, social isolation, lowered self-esteem, loneliness and emotional instability have failed to be confirmed by existing studies. On the contrary, research evidence suggests that children who are gifted but not accelerated exhibit more behaviour problems, feel less comfortable and have poorer attitudes towards school (Feldhusen, 1992). *In our attempt to safeguard against the assumed harmful effects of burnout we have been incognisant of the malignant effects of rustout* (Townsend, 1996, p.363).

The apparently contradictory claims about potential harm or benefit from acceleration may be partly explained by the confusion that results from ignoring important variations between different types of acceleration programmes (Southern et al., 1993). The following sections explore these concerns in relation to mathematics education.

2.2 *Inferior understanding of the curriculum.*

Some opposition to acceleration in mathematics has centred on the belief that it will result in an inferior understanding of the curriculum. Students may miss out on some of the fundamental areas of mathematics or at least have a shallower understanding of them (Holton & Daniel, 1996; Southern et al., 1993; Townsend, 1996). The Ministry of Education (1992) has also expressed concerns about the depth of coverage of mathematical topics for accelerate students. They claim that the suggested learning

experiences in the mathematics curriculum are only a subset of the mathematics students could possibly learn and that for many talented students, vertical acceleration ... *may itself limit the extent of their learning* (p.19). Despite these concerns, no overseas studies have yielded evidence that students who have been accelerated exhibit deficits in knowledge or achievement (Kolitch & Brody, 1992).

Kulik and Kulik's (1992) analysis concluded that gifted students are able to handle the academic challenges that acceleration programmes provide. They cite two major findings from American studies to support this claim. Firstly, students who were accelerated into higher grades (i.e. grade skipped) performed as well as gifted older students already in those grades. Secondly, the achievement of these gifted students was significantly higher, with accelerate students outperforming same-age non-accelerates by up to one full year.

The actual level of academic advancement appears to be a product of the level of curriculum adjustment. In other words, acceleration options with the most curriculum adjustment have the largest effect on student learning. Other studies also report that the academic evidence in favour of all modes of acceleration and grouping of gifted and talented students is positive (e.g., Allan, 1991; Benbow, 1991; Feldhusen, 1991; Kulik, 1992; Kulik & Kulik, 1984). However, these positive effects are generally documented for academic concerns rather than emotional and social concerns and for the most part research results do not speak to the long-range effects of accelerate programmes.

2.3 Overseas programmes: SMPY.

Julian Stanley's Study for Mathematically Precocious Youth (SMPY) is one of the most studied acceleration programmes in recent times. Stanley is a strong advocate for acceleration and his work has resulted in acceleration being accepted by the research community as the most effective way to provide appropriate educational opportunity to our most able students (Benbow, Lubinski & Suchy, 1996). This view is not shared by all educational practitioners and, even in the United States,

acceleration is not widely implemented in schools (Benbow, Lubinski & Suchy, 1996).

The scope and level of intervention of SMPY is significantly higher than the acceleration programmes studied in this current research project but, in essence, SMPY promotes competence rather than age as the main criteria used to determine students' progress through academic levels. The criteria for entry into the programme varied from year to year: selected students represented the top 1% to 5% ability group of American students their age. The programme dramatically shortened the amount of time required to complete the four and a half years of pre-calculus at high school, emphasising subject matter acceleration more than grade skipping (Stanley, 1996).

Benbow and her colleagues (1996) undertook a longitudinal study of students who had been involved in SMPY. Their study looked at the impact of SMPY on students from the point of view of their subjective impressions of their participation and its influence on their development. A number of different cohorts were identified and surveyed at ages 18 and 23.

Although the interventions provided by SMPY were purely educationally based, participants saw their involvement as beneficial from both an educational as well as a social point of view. Students, especially females, felt that the programme helped emotionally, with the greatest benefit being the acknowledgement of their abilities and increased self-confidence. The authors suggested that the realisation that there are other students like themselves had a soothing influence and reduced the sense of isolation that some gifted and talented students report. They also argue that the provision of an appropriate and challenging educational environment may increase the chances that social environment becomes more suitable for the participants as well.

Students also reported that participation in SMPY increased their awareness of educational opportunities and was instrumental in helping them to achieve academically. Without it they felt that they would not have achieved nearly as much. Many felt that it had enhanced their academic success in lasting and meaningful ways (Benbow et al., 1996). Further evidence of the positive effects of SMPY on students' academic ability, has been documented by Swiatek and Benbow (1991a, 1991b).

In another study by Brody and Benbow (1987), four groups of students involved in SMPY were surveyed: those who had skipped one or more grades and entered college early; those who took Advanced Placement, special classes or an acceleration course in high school; those who had received some subject matter acceleration, special classes or tutoring but received no credit for it and those who had no acceleration experience. Those students who had received the most curriculum adjustment and acceleration performed at the highest level academically. A special effort made to assess the social and emotional characteristics of the students concluded that no differences were found between the groups and no harmful social and emotional effects of acceleration were demonstrated.

Brody and Benbow (1987) also looked at the differences in involvement in extracurricular activities between accelerate and non-accelerate students. They found that students who took Advanced Placement, special classes or an acceleration course in high school were the most involved in extracurricular activities. Students who received a small amount of acceleration with no credit or no acceleration, were the next most involved group and students who had skipped one or more of their high school years had a lower involvement in extracurricular activities than the other groups. The authors reason that perhaps students who enjoy activities choose not to accelerate by grade skipping one or more years of high school.

2.4 Long term effects of social and emotional adjustment.

Two studies that examine the long-term effects of acceleration, were conducted by Camilla Benbow and her colleagues at Iowa State University (Richardson & Benbow, 1990; Swiatek & Benbow, 1991b). They surveyed 1247 high ability students who either chose not to be accelerated or were accelerated by different amounts and in different ways. The students were surveyed both during and near the end of their formal education (at age 18 and 23). The authors claimed that their study provided a more global or holistic view than that offered by most studies in this area by investigating the effects that the amount and type of acceleration had on academic

ability, self-esteem, locus of control, self-acceptance and social interaction. The findings were compared and contrasted to non-accelerate students.

Both groups of students recorded impressive academic achievements, although accelerate students as a group performed slightly higher than non-accelerate students. Most accelerated students reported high self-esteem and locus of control. They reported being satisfied with their educational experience and felt they were psychosocially well adjusted. Accelerated students reported no overall detrimental effects from their acceleration, and felt that their social and emotional adjustment had been positively affected.

Once enrolled in university, the accelerated students performed at least as successfully as the non-accelerated students despite the fact that they were one year younger. Any reported problems were relatively short-lived and were generally overcome by the time the participants were 23. There appeared to be no relationship between greater amounts of acceleration and increased social and emotional problems. These findings contradict the commonly held belief that gaps in knowledge and poor retention will result if students are accelerated. At age 23, the students who had been accelerated prior to beginning their undergraduate studies were still advanced. They had not slowed their university education or taken time off before pursuing university studies. There was also no difference between the two groups in the level of education the students aspired to. These findings are inconsistent with the belief that accelerated students are more likely than non-accelerated students to suffer 'burnout'. If accelerated students do suffer from burnout then they are unlikely to match their non-accelerated peers in either university attendance, success or educational aspirations (Swiatek & Benbow, 1991b).

An interesting finding of the projects was that there appeared to be a slightly negative effect on self esteem for those students who had been involved in segregated programmes for the gifted and talented, such as grade skipping acceleration. The authors argue that this negative relationship between acceleration and self-esteem may not be due to the acceleration per se, but may reflect the changes in the social comparisons being made between the accelerants. Being placed with other gifted students, or in a higher grade with older students, may result in gifted students

comparing themselves less favourably with their new social group, a phenomenon predicted by Festinger (1954). Negative effects for social interactions were rarely reported countering the claim that students' social interactions suffer due to acceleration practices. In general, this study provided more support for the argument that acceleration does not result in social and emotional harm; rather acceleration may even enhance social and emotional adjustment (Richardson & Benbow, 1990).

In a study examining the grouping of students into academically homogenous classes, Page and Keith (1996) found that ability grouping had a positive effect on achievement of gifted students without negatively impacting on low ability students. They also claimed that ability grouping had no consistently negative effects on educational aspirations, self-concept, locus of control for any of the groups, both high and low ability, that they studied. They noted particularly positive effects for gifted minority youth.

In contrast to other studies, a recent study of students in the University of Minnesota's Talented Youth Mathematics Programme, found that students showed a decidedly negative change in attitudes towards mathematics over the first two years of the programme (Tewwilliger & Titus, 1995). They argued that burnout due to time demands, generally diminished enthusiasm as the novelty of inclusion in the programme wore off and the development of other interests which compete for students' limited time all take their toll on student attitudes.

However, in general, research findings suggest that acceleration appears to have little or no negative effect on students' attitudes towards school, participation in school activities, popularity or adjustment (Kulik & Kulik, 1984; Kulik & Kulik, 1992). Ability grouping for the gifted produces a moderate improvement in attitude towards the subject for which students are grouped (Kulik & Kulik, 1997; Rogers & Span, 1993).

2.5 *Early entrance to university programmes.*

One way of assessing the dependence of social and emotional development on socialisation with same-age peers, is to examine the adjustment of students who enter university early to see if there is any residual social and emotional effect exhibited by students who have been accelerated. Janos et al. (1988) explored the issue of social adjustment by following sixty-three students who had entered college at age 14 or earlier. The researchers explored their pattern of friendships and whether their unique age situation caused any particular social and emotional problems. They concluded that the challenges faced by these students are no different from those faced by high school students and that the pace of social demands is not overwhelming. They found that early entrance students initially made friends with each other or with students of a similar chronological age but after two years they had broadened their base of friends; any problems in social adaptation tended to be relatively minor. The large majority of early entrant students reported a vital social life, with both intimate and larger circles of close friends. They did notice however that females were better than males at establishing a wider circle of friends, but no major instances of social isolation were discovered in this study. Measures of personality of the early college entrants were indistinguishable from equally able non-accelerated age-mates: *Both could be characterised as mature and socially effective* (Janos et al., 1988, p210).

Olszewski-Kubilius (1998) also looked at the experiences of students who entered college early. Her findings generally agreed with Janos et al. (1988). Early entrance students initially formed friendships with other early entrance students, but then later with more typically aged college students. Many of the students were highly skilled socially, effectively managing the social environment and culture despite their young age. They were all risk takers and several became very involved in campus activities. They were clearly ready to enter the world of adults. The primary motivation for attending college early was to find a community of support, acceptance and intellectual challenge. Students did report that they had experienced some problems with adjusting to the higher academic demands of college life, but these did not appear any different from typically aged college students. Few students had any regrets and most felt that being in an intellectually and emotionally supportive environment was an advantage at that time of their life. They reported no loss of

social activity but felt that they had taken on more academic responsibility. Many students had been told that by missing high school they would be missing out on the best years of their life, but they generally did not agree with this sentiment. Many students faced criticism from friends and peers, but perhaps the most disappointing criticisms came from teachers and counsellors who strongly questioned students' competence, both academically and socially, to attend college, questions, they felt, no student who is chronologically old enough to go to college must endure (Olszewski-Kubilius, 1998).

Robinson (1996) reported similarly favourable findings in a study of early entrance programme students at the University of Washington. In social and emotional adjustment there were practically no differences between the early entrant students and the comparison group of similar age who had not been accelerated. The early entrance students generally expressed satisfaction with their choice to be accelerated and described themselves as a little more restrained, introverted and serious than those students who elected not to be accelerated. Males tended to have slightly more adjustment problems and erratic scholastic records, while the females tended to have more salient social agendas and, in general, steadily rising grades. Males reported that being involved in the early entrance programme facilitated their interest in mathematics and science more than females who, in turn, saw acceleration as having had a more favourable effect on their social lives than did males.

Cornell, Callahan and Loyd (1991a) looked at changes in the personality adjustment of early college entrants in their first year in a residential acceleration programme for gifted young women. They administered the California Psychological Inventory at the beginning and end of their first year in the programme. A group of students of comparable age and intellectual ability, enrolled in more traditional high school programmes, was used to control for simple maturation effects. Accelerated students evidenced consistent patterns of healthy personality growth and increased maturity over the course of the year. This is in contrast to the non-accelerate students who made relatively few changes.

For extremely long-term evidence of the impact of acceleration processes on individuals we must turn to the work of Lewis Terman. Terman began a large-scale

search of information on able young people in 1921 and added to this standardised data throughout his lifetime. This work continues today, making Terman's files a unique resource for investigating the long-term effects of acceleration options. Terman and Oden concluded that, on average, the effects of acceleration were consistently positive, although they did concede that acceleration, not surprisingly, did seem to work out badly for some students (Terman & Oden, 1947; cited in Cronbach, 1996). In a follow up research study Cronbach (1996) analysed responses from 1922 to 1977. He compared able students who finished high school at about 15 or 16 with those who graduated nearer 18. He found that in most aspects of their adult life, the group of students who had been accelerated did not differ as a group from the roughly equated control group. Any non-trivial difference that did appear showed that those who had been accelerated had been advantaged. Cronbach expected the initial differences between the accelerated and control groups would be washed out over the years and was surprised to find that they still existed forty or fifty years after graduation. He is non-committal as to whether these differences were due to the positive effects of acceleration, or perhaps due to the personal qualities of the gifted individuals that identified them as prime candidates for acceleration in the first place. One thing does appear clear: as a group they have certainly suffered no serious long-term effects after their accelerated experience.

Holahan and Sears (1995) performed a follow up study looking at the lives of the Terman group from ages in their early 60's through to their mid 70's. They reported that in general the Terman group expressed considerable satisfaction with their lives and the choices they had made during them. They had reached their later years with strong financial resources that they felt helped to mitigate some of the negative effects of ageing. Most reported that they were in good health and while the group seemed prone to the same type of physical decline in ageing as the general population, their self-appraisals were significantly more positive, suggesting less severe impairment.

A noticeable feature of the psychological well being in aging of the Terman group, was an easy-going disposition, happiness of temperament and being. The authors note that it appears that achievement attained in the presence of positive personality characteristics brings with it special rewards in terms of psychological outcomes in later years. They also point out that these gifted individuals have lived multifaceted

lives, not limited to intellectual pursuits and accomplishments. This was in stark contrast to the prevailing myths and stereotypes at the time of the subjects' youth.

It was commonly believed, in 1921, that, apart from intellectual superiority, the gifted individuals would be lacking in other positive characteristics such as physical and mental health, social adjustment and breadth of interest. Throughout their lifetime participants tended to be more politically conservative, but more inclined to vote, less religious, more likely to make contributions to general society, more likely to belong to professional organizations, educational, cultural and community health organizations than the general population (Holahan and Sears, 1995).

In particular, they note that personality characteristics, such as self-esteem, achievement motivation, purposiveness and integration towards goals, played an important role in the ultimate achievement of group members, underscoring the importance of these personality traits (Holahan & Sears, 1995). This evidence agrees with Southern et al.'s (1993) claim that gifted and talented individuals are psychosocially mature, with strong personal resources, and are unlikely to be negatively affected by accelerated programmes.

2.6 Concerns about research design.

Cornell, Callahan, Bassin, and Ramsey (1991b) have argued that the failure to find evidence of psychosocial maladjustment is not persuasive, if studies fail to employ rigorous scientific methods of personality assessment and appropriate research designs. They claim that although the literature on socio-emotional adjustment is positive, the assertion of no harm has not been proven. This is mainly due to: a lack of adequately designed studies; a failure to examine dropouts and those who do not succeed in acceleration programmes; frequent reliance on case study methods and self reported data and a predominance to use questionnaires with unknown reliability and validity (Cornell et al., 1991b). Likewise, Gallagher (1996) contends that many research studies have not done a careful enough analysis of the social and emotional adjustment of accelerated students.

Kulik and Kulik (1984) in their meta-analysis, reported that only a small number of studies have investigated either psychosocial outcomes, or non-cognitive traits of acceleration and these studies either looked at different traits making it difficult to compare results with one another, or the findings were not entirely consistent from study to study. They identified a number of factors associated with the assessment of social and emotional development. The vast array of different techniques and measuring tools that have been used to assess social and emotional or other non-cognitive traits, combined with variables that have been defined so broadly and diversely, have made it hard to make consistent generalisations (Kulik & Kulik, 1984; Cornell et al., 1991b). The recent work of Swiatek and Dorr (1998) in revising the Social Coping Questionnaire is a positive step in helping to define and measure social and emotional development.

Southern et al. (1993) highlighted a common problem related to the discussion of results. With most studies investigating social and emotional outcomes, the null hypothesis is that there is no social and emotional harm from accelerate programmes. In order to reject this null hypothesis and accept the alternate hypothesis, ie. that social and emotional harm exists, the researcher must observe relationships above a given level of probability. If a relationship cannot be observed above a given level of probability, then we fail to reject the null hypothesis. The null hypothesis cannot, however, be proven to be true. All that can be said is that there is no evidence to support that social and emotional harm exists. Such studies cannot prove that acceleration does not cause psychosocial harm, and thus it seems that this burden of proof still lies with the advocates of acceleration.

While the bulk of research fails to statistically demonstrate that there is no psychosocial harm with acceleration, critics equally fail to provide any form of clear evidence that demonstrates any type of psychosocial harm exists (Southern et al., 1993). It might be that no psychosocial harm exists, or it may be that assessment instruments are either too narrow in scope or are not sensitive to the kinds of difficulties faced by accelerated students and therefore are not gathering any evidence that does exist. Unless we develop reliable and valid tools to gather such evidence, one cannot say whether such evidence exists or not (Cornell et al., 1991b).

Further confusion abounds when findings from different types of acceleration are considered together. In general, researchers fail to clearly distinguish between different types of acceleration and there is a tendency to over-generalise research findings. Slight differences in programme emphasis that may not have affected academic outcomes may have influenced attitudinal and social outcomes (Kulik & Kulik, 1984).

2.7 Practitioners' objections.

Despite the large pool of evidence supporting acceleration, it is a relatively unused option in educating gifted and talented students (Southern et al., 1989). Much of the reluctance to use acceleration seems to be centred on reservations about socio-emotional development rather than academic merit. There is a common concern that students will be subject to undue stress, or may develop social problems (Kulik & Kulik, 1984; Southern et al., 1989; Swiatek & Benbow, 1991b; Townsend, 1996).

Galagher (1996) contends that either practitioners are not aware of the positive nature of research findings, or feel that researchers may not have taken into account the social and emotional problems that might have been experienced by accelerated students. Southern, et al. (1989) surveyed the views of 500 educational practitioners, including teachers, principals, school psychologists and co-ordinators of gifted programmes in the United States. These groups consistently expressed conservative attitudes about the value of acceleration as an appropriate intervention for gifted students. Despite the fact that nearly all those surveyed felt that gifted students would have little trouble meeting the academic demands of working at a higher grade, they were concerned about the potential risk to social and emotional development. Even the gifted co-ordinators, the group with the most positive attitudes towards acceleration, conceded that acceleration could be potentially hazardous to psychosocial development. The authors argue that practitioners' concerns about social and emotional development seem to be based on common sense notions that are difficult to challenge. Teachers are more concerned about the short-term academic and psychosocial adjustment and well being of the student rather than any longer-term

potential gains such as an extra year for their career, reduced time spent in education and hence reduced cost, extra time to start a family etc.

In addition to this teachers see advanced grade placement as reversible if students are failing to cope with the new academic demands, but feel that harm caused by social and emotional maladjustment is more ...*subtle pervasive and less amenable to teacher intervention*" (Southern et al.; 1989, p.34). Assessing and reporting on students' academic achievement is something that teachers have been specifically trained to do and is something they do frequently. In contrast, few teachers are specifically trained to assess psychosocial problems. Accordingly, practitioners may feel that they lack the ability to pick up social and emotional problems early on and, as a result, acceleration may be more of a threat to the social and emotional development of students rather than their academic development.

If we contrast the overwhelmingly positive research evidence with educational practitioners' reluctance to use acceleration, it appears that the issue of whether acceleration is effective is overshadowed by whether it is acceptable (Southern et al., 1989). Stanley (1979) has been quite critical of what he calls such 'ill-founded fears', arguing that most resistance is based on preconceived notions and irrational grounds rather than an examination of the evidence. He adds that when the facts are studied, any social and emotional adjustment problems are generally minimal and short lived. It should be noted, however, that if a student does have a negative reaction to acceleration that such a reaction can be vivid in the eyes of those who observe it (Gallagher, 1996). Perhaps critics of acceleration might be guilty of having a selective memory; students who experience difficulties stand out more in the minds of those who observe such difficulties (Southern, et al., 1989).

Adjustment should be considered in the context of normal adolescent development. It is unlikely that many young people achieve maturity without taking risks and experiencing setbacks. Indeed it would be unrealistic for any group of students to have a smooth transition through adolescence, a time which is characterised by identity searching and a great deal of emotional and social growth. While it is likely that some students in any programme will experience adjustment problems, problems

may or may not be a product of their acceleration experiences (Cornell et al., 1991a; Olszewski-Kubilius, 1998).

Specifically, Cornell et al.'s (1991a) research of a residential acceleration programme found evidence that those students who experienced a high degree of adjustment problems over the course of the year, were those who were less well adjusted at the start of the year. They also point out that it is likely that there will be considerable variability in student adjustment over the course of an academic year. Studies report that variation, in both academic and psychosocial development within research groups, far exceeds variation between research groups and control groups (e.g., Cronbach, 1996).

While evidence suggests that psychosocial adjustment for gifted students is comparable to non-gifted students, students of extreme precocity have exhibited some psychosocial difficulties that have been unfairly attributed on acceleration (Brody & Benbow, 1987). Southern et al. (1989) cite the logic construct, *post hoc, ergo propter hoc* fallacy - after this therefore because of this. The common belief that acceleration will cause psychosocial harm may well be reinforced because those extremely gifted students for whom acceleration is the most appropriate educational intervention, are also those who are most at risk of psychosocial harm (Richardson & Benbow, 1990).

There is also a question of the role that parents and families play in the development of their gifted offspring. Southern et al. (1993) have questioned how effectively the gifted child's parents are facilitating their social, emotional, athletic and cultural development. Brody and Stanley (1991) have challenged parents with the task of working on these areas as much, if not more, than academic development of their child. They argue that each gifted child should strive to develop proficiency in at least one athletic sport and performing or fine art. This would provide the gifted child with several contrasting reference groups to interact with.

2.8 New Zealand perspectives.

Research indicates that, in line with overseas findings, the use of academic acceleration to meet the needs of our gifted and talented students is not widely used in the New Zealand education system (Townsend, 1996). It has been suggested that one reason to explain the reluctance to use acceleration as a programme option, is that the accumulated positive findings in the overseas research literature are not widely known in this country (Moltzen, 1995).

Townsend and Patrick (1993) conducted a study that looked at educational practitioners' attitudes towards acceleration of gifted and talented students in New Zealand. They surveyed 152 experienced primary teachers and 140 teacher trainees and, although no secondary teachers were surveyed, their research is important because it gives us some insight into the attitudes of New Zealand teachers rather than teachers from overseas. Respondents were mildly positive, although relatively conservative, in their views about acceleration. They expressed a greater concern about the social and emotional effects than the academic effects. At least half of the respondents cited concerns that acceleration would cause gifted and talented students: to miss out on important social interactions, to have fewer friends, to be less happy, to have problems of emotional adjustment, to engage in fewer extra-curricular activities, to be less satisfied with their future careers and to suffer more stress and early burnout. In general, the results of Townsend and Patrick's study mirrored those of Southern, et al. (1989) although a significant difference between the studies is that only 9% of the New Zealand study accepted that there might be potential harm in keeping gifted children with their age mates, in stark contrast with the 66% of American practitioners reported by Southern and colleagues.

Acceleration programmes in New Zealand secondary schools are often characterised by compacting year 9,10 and 11 courses into two years and offering students the opportunity to sit School Certificate a year earlier in year 10. From year 11, students participate in the same curriculum at the same pace as students one year older than them. University Bursary is then taken in year 12 and some schools encourage their students to repeat bursary in year 13 to increase their marks, which may be important for students requiring entry into restricted university courses (Macleod, 1996).

This programme design, of limited curriculum compacting followed by grade skipping, is in contrast to most of the programmes commonly reported from overseas. Many accelerate programmes in the United States will start at an earlier age than secondary school and will often involve early placement in secondary school. There is a tendency for students to progress through the standard school curriculum at a faster rate throughout their school years, rather than for just a couple of years. In such cases a significant benefit is the ability of students to enter college and therefore the workforce early. In New Zealand, however, the benefit of reducing time spent in formal education seems to be secondary to securing high marks from a student's Bursary year (Macleod, 1996).

Recent work by Winsley (2000) has added to our understanding of current procedures and practices for gifted and talented mathematics students in New Zealand secondary schools. In her research findings, based on a national survey, she reports that 55% of respondent schools have an acceleration programme that enable students to sit School Certificate mathematics earlier than year 11. Private and boys' schools both had a high rate of acceleration programmes and large schools are more likely to accelerate than smaller schools. Mathematics was clearly the most favoured subject to accelerate in, but other single subject acceleration also occurred. Interestingly, she notes that whole class acceleration is not a common practice. Indeed only 27% of her respondent schools, that currently have an acceleration programme, have large groups of 21 or more students sitting School Certificate mathematics earlier than year 11. In contrast 61% had accelerated less than 10 students at any year group.

Winsley (2000) adds that 74% of her respondent schools had experienced problems with acceleration. These ranged from timetable problems to concerns about achievement of some students in the senior school. Teachers reported that they often perceive parents as having unrealistic expectations of their children. There was also concern expressed by some HOD (Heads of Departments) mathematics that parental pressure may have influenced the senior management team at schools to provide an acceleration programme, regardless of the educational needs of the students. Other concerns expressed by teachers include: lack of maturity, underachievement due to

lack of grounding in mathematics and the conflicting pressures of 6th Form certificate and Bursary.

Her research indicates that only 60% of schools formally identify gifted and talented students. Low decile schools reported a low level of identification and there also appeared to be regional differences. 32% of schools surveyed now have a policy on gifted and talented, up from 20% identified by Moltzen (1996). Despite this increase, Winsley raises concerns about the apparent lack of well-conceived, continuous programmes in mathematics for our gifted and talented students.

Curran et al. (1993) surveyed the views of gifted and talented secondary school students who had been involved in the Mathematics Olympiad camps. These camps select students from throughout the country based on a set of questions that the students must complete within a two-week period and send in to be marked. Although this survey did not look specifically at acceleration they reported that most of the students involved in the camps were also involved in acceleration programmes in their own schools. Indeed some of the students had been rapidly advanced from the third form to the sixth form in one year.

Students reported that they felt that, in general, acceleration was good from an academic perspective but they were often unhappy with any perceived or actual social disadvantages. There were problems with bullying when they were dramatically advanced in grade level, as well as when their successes were read out in assembly. They also reported that it was often difficult to make friends in the advanced classes because they were in a different class each year. These problems appeared to be reduced when there were a number of students accelerated together. A number of students surveyed were in a streamed but non-accelerate class, but felt that they would have found it more stimulating to be in an accelerate programme. Some of the students were such gifted and talented mathematicians that acceleration, taken to its logical conclusion, would have placed them well outside their chronological age group. For this highly selected group of students, acceleration, whether in one or more subjects, seemed to be most successful when it was limited to advancing students by only one or two years and when it was applied to a larger group of students rather than to individuals.

However Curran and his colleagues (1993) caution us that this should not be taken as a vote for acceleration over other programmes for gifted and talented students. Most students reported a desire for changes that would offer greater variety in the way mathematical concepts were presented in the classroom and more opportunity for open-ended discussion but they did not necessarily favour acceleration. Students reported that the success of acceleration programmes was partly due to the fact that increased stimulation was provided by the new course material and partly that a whole group of students of similar ability were accelerated together providing an environment of mutual competitiveness without the fear of failure or the embarrassment of being too smart. Other programme designs might just as easily meet these criteria.

2.9 Learning versus performance orientation.

Since acceleration is primarily concerned with maximising the learning potential of individual students, it is useful, at this stage, to examine the research surrounding students' goal orientation and its affect on achievement and motivation. It has been postulated that student engagement, persistence and course achievement can partly be explained by differences in their goal orientation and the implicit theories students have about intellectual ability (Dweck & Leggett, 1988). Dweck and Leggett proposed a framework to distinguish between 'learning' and 'performance' orientations. In this framework a learning orientation¹ is seen as concern for 'improving' one's competence, whereas a performance orientation is seen as a concern for 'proving' one's competence (Shraw, Horn, Thorndike-Christ & Brunning, 1995). The authors add that learning orientated students can be characterised by a desire to increase their own knowledge and understanding of a topic regardless of performance outcomes. Performance oriented students, on the other hand, can be characterised by a desire to publicly demonstrate their competence and do better than others, but may have little desire to improve their understanding of the material.

¹ Learning orientation has also been referred to as 'mastery' orientation by some authors (e.g., Ames 1992; Ames and Archer 1988).

Central to a learning orientation is a focus on the intrinsic value of learning. Individuals are oriented towards developing new skills, understanding new material and achieving a sense of mastery based on self referenced standards. Central to a performance orientation is a focus on one's ability and self worth as evidenced by doing better than others (Ames, 1992). In other words, learning oriented students receive rewards and a personal sense of worth from within themselves, whereas performance oriented students seek public recognition that they have done better than others.

The concern raised over school systems that are too heavily performance orientated at the expense of a learning orientation is summed up by Covington (1999):

If high marks in school become increasingly important as students grow older, not only for the tangible future benefits they are expected to bestow – being the gateway to prestigious occupations – but also as an indication of one's personal worth, then what becomes of the value of learning? Is caring about learning marginalised. (p.128)

It should be noted, however, that learning and performance goals are independent of one another. This means that a student can be high on both dimensions, low on both, or high in one dimension but low in the other. A study by Schraw et al. (1995) concluded that the strength of a student's learning orientation positively affected achievement, use of learning strategies and meta-cognitive knowledge, independent of their standing on the performance dimension. Research evidence suggests that a learning goal orientation promotes long-term, high-quality involvement in learning (Ames, 1992). Performance orientation, on the other hand, encourages the acquisition of extrinsic rewards and focuses student attention on performance outcomes such as high test scores, not on the process of learning itself. When rewards are no longer offered, or available, then learning is likely to suffer (Covington, 1999).

It has been suggested that the manner in which students are evaluated is one of the most important factors that can affect student motivation and interest (Ames, 1992). It is not simply a question of whether students are evaluated, but rather on students' perceptions of the meaning of the evaluative information. In classrooms where frequent social comparison between students is the norm, students will become focused on their ability and the distribution of ability in the classroom group. This

may also have a negative affect on students' interest and motivation. The fact that social comparison information is available is not the problem. When this information becomes emphasised, however, students may learn that what is not evaluated is not worth learning (Ames, 1992).

According to Covington (1999), such a competitive environment threatens a student's sense of worth. Students come to perceive themselves only as worthy as their ability to achieve competitively and, since only a few can win at this game, the majority of students may be feel incompetent and hence unworthy.

It has been suggested that a strongly performance oriented classroom can be changed to a learning oriented classroom by addressing the assessment systems and practices. One approach is to initiate a standards based assessment policy. Under such a system of clearly defined requirements, any number of students can achieve a given grade as long as they all live up to the standard required by the assessment. This procedure has been shown to discourage negative reasons for learning associated with strongly socially competitive environments and to encourage a learning orientation within students (Covington, 1999). The New Zealand National Qualification Authority is currently proposing a standards based assessment system, the National Certificate of Educational Achievement (NCEA).

2.10 Conclusion.

If we consider only the research on the effects of acceleration then it appears that gifted and talented students benefit academically from acceleration and that acceleration poses no direct risk to their social and emotional development. In general, research studies report positive academic evidence in favour of all modes of acceleration and grouping of gifted and talented students (e.g., Feldhusen, 1991; Kulik & Kulik, 1984; Kulik, 1992; Swiatek & Benbow, 1991a). Research has also amply demonstrated that most gifted and talented children are psychosocially mature, often surpassing average children in this regard and that they are able to accept and be accepted by their peers. Most gifted students have strong personal resources and are unlikely to experience psychosocial harm. There is also evidence that acceleration

appears to have little or no effect on students' attitudes towards school and participation in extra-curricular activities (Kulik & Kulik, 1984; 1992). Evidence suggests that there is a moderate improvement in attitude towards the subject that students are accelerated in (Kulik & Kulik, 1997; Rogers & Span, 1993). Apart from individual instances of poor adjustment, which may or may not have been caused by the acceleration process, there is little evidence to suggest that poor adjustment is a common event. In fact there is considerable evidence to show that the majority of students seem to adapt quite well to acceleration programmes (Gallagher, 1996).

If, however, we use current practice as an indicator of consensus then it appears that the debate about the relative risks and merits of acceleration is not settled (Southern & Jones, 1991). Research indicates that many educational practitioners and parents are concerned that students in acceleration programmes are at an unacceptably high risk of suffering social and emotional maladjustment (Brody & Benbow, 1987; Curran et al., 1993; Daurio, 1979; Southern et al., 1989; Townsend, 1996; Townsend & Patrick, 1993). Despite these objections research suggests that academic gains and social and emotional stability are not mutually exclusive. The contention that gains in the academic sphere are made only at the expense of social and emotional skills is untenable (Janos et al., 1988).

As we have seen, much of the research into the effects of acceleration programmes on gifted and talented students comes from overseas and predominantly from the United States. Although there have been a number of research projects based in New Zealand there is a need for more research into this field, particularly from the students' point of view.

Chapter 3: Methodology

3.1 Introduction.

Qualitative research seeks to explain the world as experienced by those in it. What is being observed are people's constructions of reality and how they understand the world. Merriam (1998) has argued that *one of the assumptions underlying qualitative research is that reality is holistic, multidimensional, and ever-changing; it is not a single fixed objective phenomenon waiting to be discovered, observed and measured as in quantitative research* (p. 202). In light of this view a qualitative research design has been chosen to allow students to relate their perceptions of their experiences in acceleration programmes.

Social research can be enhanced by employing interview techniques (Frey & Fontana, 1993). Interview formats were the preferred instrument of data collection for 71% of studies on acceleration (Heller, 1991). Traditional research interview techniques have tended to centre on 'stimulus/response' questions where participants respond to a researcher's question from a limited range of possible answers. This format made responses easy to code and the quantitative data was easy to analyse using traditional statistical techniques (Mishler, 1986). But Mishler argues that rather than asking narrow, focussed questions, researchers should be encouraging participants to talk around the research issue by asking open ended questions that allow participants to engage in a narrative and relate their experiences to the research questions. He refers to narratives as the most internally consistent understanding and interpretation of past and present experiences. Indeed one of the primary ways that people make sense of their experiences is to cast them in a narrative form. This is an ability that grows with us from an early age without any specific training. Story telling and story comprehension are natural modes of ordering, organising and conveying meaning. Mishler further argues that because we all live out narratives in our own lives and because we understand our own lives in terms of these narratives a narrative form is appropriate for understanding the actions of others.

3.2 *Instrumentation.*

3.2.1 *Focus group interviews.*

A technique that encourages this open discourse is the use of a relatively unstructured interview format that allows participants to control the flow and introduction of topics and to encourage them to extend their responses. Accordingly the interview should be akin to a conversation or discussion between the researcher and the respondents (Anderson, 1990). This view has serious implications for the traditional interviewing technique that unwittingly suppresses stories by restricting participants to a limited set of predetermined responses. If narrative is information rich then traditional interviewing techniques have been missing out on a wealth of information in their drive to obtain data that is easily coded and analysed.

This relatively unstructured stance is incorporated in a focus group interview format that provides a setting where individuals feel comfortable in self-disclosure and the group dynamics can provide a more exhaustive view of the issues or topics (Anderson, 1990). Focus group interviews not only gather the views of individual respondents but also provide ...*a situation where the synergy of the group adds to the depth and insight* (Anderson, 1990, p.241). As such they maximise the advantages of the group dynamics of the situation and provide stimulus for elaboration and expression.

One of the major assumptions of focus group interviews is that by providing an open atmosphere that fosters a range of opinions, a more complete and revealing understanding of participants experiences and feelings on the research topic will be obtained (Frey & Fontana, 1993; Morgan & Krueger, 1993; Vaughn, Shay Schumm & Sinagub, 1996). Vaughn et al. (1996) have identified focus group interviews as being superior to individual interviews for obtaining perceptions, experiences and beliefs because they allow a greater degree of anonymity for participants. The participants have the security of being among others who share many of their feelings and experiences and this gives them a basis for sharing their views and perceptions. Unlike most structured interviews or surveys, focus group interviews provide a

'loosening effect' promoting candour and participation that allows students the opportunity to clarify or extend their point of view and to provide examples to back this view up. In contrast to individual interviews where participants need to respond to each of the researcher's questions, focus group interviews allow individual participants the freedom to choose whether they want to respond to individual questions or not. Focus group interviews, when done well, generate data that ...*would not come out in either the participants' own casual conversation or in response to the researchers preconceived questions* (Morgan, 1988, p.21).

In summary, focus group interviews are compatible with the major assumptions of the qualitative research paradigm as outlined by Vaughn et al. (1996). Firstly, multiple views of reality exist. This is a strength of focus group interviews since individuals' diverse opinions and perspectives are desired and encouraged. Secondly, there is the potential influence of the 'inquirer and respondent relationship'. *The interaction between the moderator and the respondents and the interaction between the respondents themselves are recognised as having the potential to add depth and dimension to the knowledge gained* (Vaughn et al. 1996, p.16). Lastly, the nature of truth statements is such that truth is influenced by perspective and by context.

Truth is explained by describing a particular set of issues or concepts in relationship to a particular context. The goal is not to generalise to larger populations. Rather the goal is to describe findings within a particular situation. Thus, with focus group interviews, the intent is not to elicit principals or tenets that can be extended to a wider population. The goal is to conduct an interactive discussion that can elicit a greater, more in-depth understanding of perceptions, beliefs, attitudes and experiences from multiple points of view and to document the context from which those understandings were derived. (Vaughn et al. 1996, p.16)

3.2.2 Questionnaire.

In order to provide a complementary data-gathering tool, a questionnaire was developed based on the focus group interview questions. This questionnaire (Appendix 1) had several key purposes. It provided participants with the opportunity to comment further on any of the questions or concepts touched upon in the focus

group interview. It allowed participants to write down any views or perceptions that either they:

1. did not feel comfortable expressing in the focus group interview
2. did not express in the focus group interview because the discussion moved away from that point and the opportunity was lost
3. did not think of until after the focus group interview had finished.

Participants were asked to complete the questionnaire and to post it back in the pre-paid envelope supplied. The response rates for the various different schools were as follows: school A, 50%; school B, 38%; school C, 21%; school D, 31%.

Data from such self-selecting tools must always be treated with caution. Accordingly, care was taken when combining the two sources of data to ensure that data collected from the questionnaires did not overshadow the experiences and perceptions gathered from the focus group interviews. Interestingly, the data received from the questionnaires was consistent with the data gathered through the focus group interviews for the corresponding school. This made the task of combining the two sources of data considerably easier.

3.3 Quality criteria: validity and reliability.

In any research study the reader must be convinced that the project has both validity and reliability, but these concepts are more difficult for qualitative than for quantitative research (Merriam, 1998). Merriam reports that the research community is still developing a consensus as to the appropriate criteria for assessing validity and reliability in qualitative research. x

3.3.1 Internal validity.

Internal validity addresses the match between research findings and reality. How closely do the findings capture what is really there (Merriam, 1998)? To answer this question it is important to consider the nature of reality in this context. Since the

research was interested in the 'perceptions' of the participants' experiences, then reality, in this context, are those perceptions. What are being observed are the participants' constructions of reality. These are accessed directly through the interview process and therefore the researcher is closer to reality than if a quantitative data collection instrument had been interjected between the researcher and the participant (Merriam, 1998). Merriam argues that if reality is viewed in this manner then internal validity is a definite strength of qualitative research designs such as focus group interviews.

The second issue to address is whether the researcher's report of the interview is the 'true and correct' representation of the respondent's perceptions. To address this issue we must first consider two presuppositions. Firstly, that there exists a true and unique interpretation of the data collected, and secondly, that this interpretation may be determined by standard universally applicable technical procedures (Mishler, 1986).

Naturally occurring discourse, such as interview narrative, relies on the shared cultural understandings between the researcher and the participant. Meaning and interpretations are contextually and culturally grounded (Mishler, 1986). I have been teaching secondary school mathematics for the last fifteen years and have had an extensive and direct involvement in teaching accelerated students in a number of schools. As a result I have an in-depth appreciation of the culture within accelerated programmes in New Zealand secondary schools. It is this shared cultural knowledge base that allows for the analysis of the interview material by a process that Mishler calls 'expansion'. In this process the researcher brings together all the shared knowledge and information that they have to help in the interpretation of the narrative. To accomplish this expansion of meaning they must use their 'best understanding', make references to other material as well as to the shared knowledge between the participants. They must introduce factual material from other parts of the interview as well as from general knowledge of the situation. Not all statements can be taken at face value and must be judged within the context of the broader discussion.

The accuracy of the interpretation of the data is enhanced by utilising the researcher as the interviewer. In this way the researcher is closer to the research topic through a direct intensive encounter with the participants. This greatly facilitates interpretation and allows focus group interviews to yield valuable insight that might not be available from other sources or using other techniques (Knodel, 1993). However, given the qualitative nature of the data gathered, a considerable amount of subjective interpretation is unavoidable and the unbiased measurement of socially reactive data is unlikely if not impossible (Mishler, 1986).

3.3.2 Reliability.

Reliability is concerned with the replicability of a given research project. In other words, if the study was repeated would we get the same results. This has been identified as a difficult area in social sciences due to the fluid nature of human behaviour and perceptions. Since individuals' experiences will influence interpretations of reality there are no benchmarks to judge reliability in the traditional sense of quantitative research (Merriman, 1998). Lincoln and Guba (1985) suggest that rather than using the term 'reliability' in the traditional sense our purpose would be better served if we think about the 'dependability' or 'consistency' of the results obtained. Rather than requiring that an outside researcher obtain the same results by replicating the study we should instead require that they agree that, given the data collected, the results make sense within the context of the research situation. The critical issue is not the determination of one singular and absolute truth but rather the assessment of the relative plausibility of an interpretation when compared with other potentially plausible alternative interpretations (Mishler, 1986).

3.3.3 External validity.

External validity is the extent to which the findings of a given study can be generalised and applied to other situations. From a communication perspective, focus group methodology has a degree of external validity because focus groups are grounded in the human tendency to discuss issues and ideas in groups. Accordingly,

...personal opinion might be more appropriately described as derived from social rather than personal processes. Opinions about a variety of issues are generally determined not by individual information gathering and deliberation but through communication with others (Albrecht, Johnson & Walther, 1993, p. 54). One of the advantages of opinions gathered through focus groups rather than individual interviews is the degree of isomorphism between group opinions and those of the population at large (Albrecht et al., 1993).

However for the findings of this project to be applied to other settings would require an underlying assumption that the programmes examined in the sample schools are representative of all New Zealand secondary schools' mathematics accelerate programmes. This would be difficult, since Winsley (2000) has shown that there are a large variety of different acceleration programme designs currently utilised in New Zealand. A further underlying assumption is that the cultures of the sample schools are representative of all New Zealand secondary schools. The relatively small sample size may limit the validity of such an assumption and limit the extent to which generalisations of the results can be drawn. Certain findings of this study will certainly strike a chord with educators and students who read them but it is not intended to imply that these views are representative of all students who experience acceleration in mathematics in New Zealand secondary schools. The purpose of this study is to describe findings within a particular setting, in line with the view of Vaughn et al. (1996), stated earlier. Within a snapshot of the acceleration programmes studied, this study aims to provide an overview of the range of possible perceptions of student's accelerated experiences.

3.4 Limitations of the methodology.

Focus group interviews are comparatively easy to conduct because they are cheap and quick (Morgan, 1988) but they are not without their problems and the researcher may have less control over the data that is generated. Anderson (1990) cautions, that for a focus group interview to be effective the researcher needs to be skilled at exercising control over the group without being too obtrusive. The researchers should ensure

that the group continues to move forward through the list of desired topics while still allowing the participants to freely and openly discuss issues of concern to them.

Focus group interviews are often criticized for creating conformity of views (Morgan & Krueger, 1993). Although a collective group culture can produce a wealth of material, individuals' behaviour can be subject to group influence and participants may espouse views that they do not genuinely hold (Morgan, 1988). There are several reasons for this phenomenon. Subtle cues from the interviewer may make students respond in ways they believe are expected by the interviewer. The interviewer may provide, albeit subconsciously, immediate reward for favourable comments made by the participant, for example the nod of a head or verbal suggestions indicating agreement. These cues may encourage the participants to simply 'give the researcher what they want'. At other times a participant may put forward a viewpoint that they hope will carry favour with another member of the group that the respondent admires. (Albrecht, et al., 1993).

Within the current study the following steps were taken to ensure that the data gathered closely modelled the views of the participants. Special effort was made to create an atmosphere in which each person felt free to share their point of view. This was achieved by emphasising the desire for a range of different experiences and feelings to be heard and followed up by asking specifically for other points of view (Morgan & Krueger, 1993). All members of the group were encouraged to participate and that the group was not dominated by one or two strong members (Fontana & Frey, 1994).

3.5 Ethical concerns.

As with all qualitative studies that deal with participants' experiences and perceptions this study must deal with ethical concerns about selection of participants, collection of data and dissemination of results. Accordingly an application was made to the Massey University Human Ethics committee and approval to proceed with the research was granted. Written approval was also secured from the Principals of the four schools involved in the research.

Students in the accelerate programmes were supplied with an information sheet outlining the research project (Appendix 2). Time was allowed for students to consider the implications of participating in the research and then informed consent was gained in writing from all participants (Appendix 3). Students were invited to take part in the focus group interviews at a time that was mutually agreeable and suitable to both the school and students.

The participants were informed that all information given by them would remain confidential to the researcher and any publications resulting from the research project and that no students or school involved in the research would be identified either directly or indirectly in written or verbal form. Although focus groups encourage an open discussion of students' experiences, which may or may not be positive, students' voluntary contributions to the discussion should minimise any discomfort to participants. The original audio tapes and their transcripts remained in the possession of the researcher and were stored in a locked filing cabinet in the researcher's home office. At the completion of the research both the tapes and their transcripts were destroyed.

It was also explained to the participants in the research that they have the right at all times to:

- decline to participate;
- refuse to answer any particular questions;
- withdraw from the study at any time;
- ask any questions about the study at any time during participation.

3.6 Research population and sample.

Morse (1994) argues that the choice of the sample is determined according to the needs of the study rather than external criteria such as a random selection. The group should have homogeneity but with sufficient variation to allow for contrasting opinions (Krueger 1994). The participants in this research were chosen because they were representative of the same experience or knowledge base. They were not

selected because they reflected or represented the general school population. Indeed Mishler (1986) argues that a small group of well-informed acute observers brought together as a discussion group is many times more valuable than any representative sample. These students were chosen because they have all the requirements identified by Morse (1994) necessary for being a good informant: namely that they have the knowledge and experience that the researcher requires, the ability to reflect on and articulate their experiences and the time and willingness to be interviewed.

Four New Zealand schools with acceleration programmes in place were invited to take part in the research. Each school was asked to supply the information sheet to all students involved in their programmes. At three of the schools the information sheet was also given to students who had been accelerated in the junior school but had failed to secure the necessary marks to continue with the programme and had reverted back to a normal year level programme. Students interested in taking part in this research expressed this interest to their maths teacher. The head of the mathematics department co-ordinated a list of all interested students and then selected a random sample of six students from each of the fourth, fifth, sixth and seventh form year levels. If there were less than six students from any given year level then all of the students were selected. Although only four students from each year level took part in the focus group interviews, six students were chosen from each year level to allow for illness and problems arranging suitable times for the interview process. These students were given consent forms which were signed by both the student and their caregivers.

Eight students were involved in each focus group interview. There were two focus group interviews per school, one interview for students from the fourth and fifth form and one for students from the sixth and seventh form. In some instances there were only three students from a given year level and so five students from the partnered year level were chosen. For example, if there were only three fourth form students available to participate in the research then five fifth form students were selected. At two of the schools, students selected to take part in the focus group interviews included students who had been accelerated in the junior school but had reverted back to a normal year level programme in the senior school. In these instances, the schools have been identified in the introduction to their respective results chapters. The

interviews took place at the participant schools in order to provide an environment and atmosphere that was familiar to the students. Such an environment is important because it helps the students to relax in the familiar surroundings and therefore enhances the data gathering process (Vaughn et al., 1996). There were eight interviews in total and all interviews were audio taped. The audio tapes were transcribed and analysed by the researcher.

3.7 Analysis.

Two basic approaches to analysing focus group data are 1) a strictly qualitative or ethnographic summary and 2) a systematic coding and content analysis. The first relies heavily on direct quotation of the group discussion to support summaries while content analysis typically produces numerical descriptions of the data (Morgan, 1988). Mishler (1986) has identified that a qualitative approach, such as narrative analysis, is most appropriate for research projects seeking to examine participant's perceptions of their experiences.

Krueger (1994) has argued that qualitative researchers must be situationally responsive and as such the analyst should not prejudge the type or nature of analysis needed until they have had sufficient exposure to the data. This project analyses the data utilising a framework adapted from the work of Vaughn et al. (1996). This framework consists of four stages.

Stage 1: Identifying the Big Ideas.

During and immediately following the focus group interview, participants' words, views, and intensity of participants' responses as well as nonverbal communications were considered and several 'big ideas' were identified. These provide the initial framework for the development of the major findings although these were refined or altered after further data analysis. During this process the strong significant themes were distinguished from the less significant ones. This process was sophisticated because it required more than simply counting how often an idea or theme is reported. It also required an awareness of the extent of emotion or feeling towards a particular theme and whether it was important to a high proportion of the participants or just a few. At this stage the big ideas were identified as impressions or hypotheses as

opposed to definite results or findings. According to Krueger (1988) *The analysis process is like detective work. One looks for clues, but in this case, the clues are trends and patterns that reappear among various focus groups* (p.109).

Stage 2: Unitising the Data.

Units of information that later formed the basis for defining categories were identified. For a piece of information to be considered a 'unit' it should be aimed at helping the researcher to better understand the research topic. If it does not do this then it is irrelevant, even if it is interesting. A unit should be the smallest amount of information that is informative by itself. A reader should be able to interpret the unit with little more than a broad understanding of the purpose of the research. The size of the units may be as small as a phrase or as large as a sentence or paragraph.

Stage 3: Categorising the Units

The units that were identified in stage 2 were sorted into relevant categories. This process brought together those units that are related to the same content or theme. This provided an organisational structure for summarising the data and writing up the findings.

Stage 4: Identifying Themes.

This last step re-examined the big ideas generated in the first step and considered whether any of these were supported by the categories identified in step 3. The big ideas were then reframed and restated to form 'themes'. Summaries and explanations of these themes were written with supporting units of data (i.e. direct quotes) used to provide the reader with a context for the summaries. The quotes used were not necessarily common to all but rather cover the spectrum of responses.

The four schools are quite different, in not only their programme design, but also the cultures of the respective schools. Once the interviews were conducted and a preliminary review carried out, it became clear that many of the comments made by the participants were specific to the individual research school. Understandably, students were often commenting on aspects of the school's programme design or the particular nature of the school rather than acceleration in general. This is natural because without a frame of reference, students can only comment on their personal

experiences and perceptions based on those experiences. Accordingly, the four research schools are written up separately rather than amalgamating all of the data together. The above procedure was employed to complete this task.

It should be noted that, since the interviews were, by design, semi-structured, the subject of students comments varied from school to school. An interview schedule was used to try and ensure that similar areas were covered in all interviews and I used further questions to try and encourage students to elaborate on points they had made. Despite this, the very nature of the focus group interview structure employed, means that it would be extremely unlikely that all four schools would raise identical issues. For example, when asked if participation in the accelerate programme had affected their involvement in extra curricula activities, some school, despite my attempts to get them to elaborate, simply replied 'no', while other schools responded in a much fuller way. Accordingly the four results chapters differ slightly in their organisational structure.

The analysis framework itemised above was used for a second time to draw common conclusions from the four respondent schools. These common conclusions and the associated discussion are detailed in chapter 8.

Chapter 4: School A.

4.1 Overview of School A.

School A is a large traditional single sex boys' state school, with a stated emphasis on academic success in external examinations. The school has had an accelerate programme since the late 1980's and promotes the programme as a feature of the school. It believes that this programme improves the motivation and learning outcomes of its more able students.

Two top stream classes, each of about 32 students, are selected for the accelerate programme at the start of year 9. This selection is based on the results of Progressive Achievement Tests (PAT's) sat by students at the end of year 8, combined with information about students' abilities from contributing schools. These streamed classes remain together for their core subjects of English, mathematics, science and social studies. After 5 weeks all students at the school are given one-hour tests in each of the four core subjects. In light of these test results and in consultation with the dean, students are moved into, or out of the programme. The number of students entering tends to balance the number of students leaving the programme.

Year 9 maths students complete the year 9 and 10 curriculum and sit the year 10 mid and end of year exams. At the end of year 9 there is further opportunity for students to enter into or leave the accelerate programme. From this point on students cannot enter the programme but are able to leave.

In year 10, accelerate students study the School Certificate mathematics, English and science programmes in addition to 4th form social studies and two 4th form subject options. In year 11 students complete Sixth form Certificate in mathematics and English and also take four School Certificate subjects. Students also sit the Combined Schools Examinations in English and mathematics at a 6th form level. There are no mark or grade boundaries preventing students from continuing with the programme at this level, but the school does counsel students against continuing if they are not achieving to a high standard. Very few students drop out of the programme and

repeat a year level course. The school follows a 7 day timetable and accelerate classes in years 9, 10 and 11 all have 5 periods of Mathematics in 7 days in contrast to non-accelerate classes which have 7 periods of Mathematics in 7 days.

In Year 12 accelerate students take a full Bursary course of five subjects. Most students resit some, or all, of their Bursary subjects in Year 13, although some replace subjects with new ones at the Bursary level or take university papers extramurally. Many Year 13 students attempt to secure Scholarship passes through the New Zealand Qualifications Authority (NZQA) Bursary examinations and also sit the New Zealand Educational Scholarship Trust (NZEST) Scholarship exams. In years 12 and 13 accelerate students are often in standalone accelerate classes but, depending on subject choices, they may be in some mixed classes with non-accelerate students sitting the same course.

From the school's point of view the purpose of the accelerate programme is twofold. It provides: 1) the opportunity to study a particular subject in more depth and therefore increase the chances of securing Scholarship passes from year 13 and 2) the opportunity to study a wider range of subjects at a Bursary level. Although students could leave at the end of year 12, the school actively encourages all students to return for year 13.

4.2 Student perceptions.

4.2.1 Selection procedures and attributes of an accelerate student.

The participants seemed to have a general awareness of the selection procedures used and had no suggestions of how this procedure could be improved. Some of the students in the group had been moved into the accelerate programme at the end of year 9. Participants were also aware that students can elect to be removed from the programme. The perception of participants is that there is no stigma attached to the students who leave the programme and in fact, criticism was directed towards students who should really elect to be removed from the programme, but who chose not to.

- *There are those students who really would be better off not being accelerated but they don't get shifted into a lower class where they can actually keep up with the work. They are actually disadvantaging themselves.*

Most students reported that there was no particular pressure placed on them by their parents to take part in the accelerate programme and generally the decision to be involved was left to the student.

- *My parents weren't expecting anything but they were pretty proud when I got in.*

In general both the junior and senior students agreed that although you need to have above average ability to do well in the accelerate programme, it was also important that you were prepared to put in the work. Students reported that to do well in the programme you have to be determined and prepared to catch up on missed work if you were sick or involved in an extra-curricula activity.

- *Much more important that you work hard. A lot of people, like 3rd and 4th stream, can be brainy at maths but they don't work. That's the thing about accelerate students, they work a lot harder than everybody else.*
- *You've got to be reasonably able. You might be a hard worker but if you can't understand the work then you won't cope.*

The sentiment for accelerate students to be hard workers was echoed in the focus group's advice to students who might be considering entering the accelerate programme. They felt it was necessary for potential accelerate students to be able to cope with the stress and pressure of working at a higher level.

- *If they are willing to put in the work they yeah do it, but they have got to realise that they are taking on a big responsibility and lots of pressure. If you think you can cope with pressure then do it. In the long run it's probably worth it.*

The above views were consistently held by all members of the focus group but there was also a perception that some of the more able students could cope with the academic demands of the work more easily and with less work.

- *Some of the really bright guys hardly do any work and still get top in the tests.*

4.2.2 Purpose of acceleration programme.

A commonly identified purpose from overseas acceleration programmes is the opportunity to reduce the time spent in secondary school. It was interesting to note that only one out of the eight junior students identified this as a prime motivation for taking part in the programme. In contrast, several of the senior students saw the option of leaving after four years as an attractive option. All three of the year 12 students stated that they intended to leave at the end of the year and a number of year 13 students said that they had considered it but had decided to return.

- *That was the idea but at the end of 6th form I didn't know what to do so I came back.*

One of the 7th formers who had thought of leaving, was now questioning why he hadn't. He was finding repeating the same Bursary courses tedious and, since he already had an 'A' Bursary and was not really aiming to get Scholarship, he was considering leaving school to get a job for the rest of the year before attending university next year. He claimed there were a number of his year 13 friends who had thought about leaving part way through the year. There was, however, a general feeling amongst the group that leaving school at the end of Year 12 and going straight to university was an unattractive option.

- *It's not so fun leaving school at the end of the sixth form. I know a lot of people who aren't having such a good time this year, being the youngest one in your class, being the little one. You're not too popular especially when you are doing better than them.*

I asked the seniors what sort of students had left at the end of year 12 and what had happened to them.

- *The really brainy guys left.*
- *Quite a few guys left but the surprising thing was that out of the real top guys only one went to university, another is working for a year and another one went back to his parents' farm.*

The school confirmed that many of the more able students had left at the end of their year 12.

The senior students reported that the school actively encourages them to stay on and complete their year 13 studies. Students felt, however, that the school's motivation was more self-interest, rather than the academic advancement of individual students, arguing that the school uses its high achieving students to raise its profile in the wider school community.

- *From 3rd form up until the 6th form I got the idea that the accelerate programme was so you could leave. When you get to 6th form they are actively encouraging you to stay to try and get some scholarships.*
- *There is also the skite factor for the school because your accelerate students tend to achieve, not the first year they go through but the second year, and the school can then say we did really well in Bursary and Scholarship.*

Some of the 7th formers returned to school to sit Bursary in extra subjects they had not previously taken. One stated that when he had chosen his Bursary subjects for year 12 he was unsure which career area he wanted to go into. During year 12 he had narrowed down his future career areas and found that he needed to take a couple of subjects that he was not currently taking. Another student stated that, although he was also taking several new subjects in year 13, he was doing this more out of interest, since he felt that repeating too many of his subjects would be too boring. The school offers the opportunity for year 13 students to sit extramural papers through Massey University and one of the students was taking advantage of this option.

There was also evidence that senior students appreciated the opportunity to utilise year 13 to broaden their interests in other school and personal activities.

- *Having the opportunity to leave if you want, but being a year ahead of everybody else, you can do what ever you want because you have your Bursary. I'm actually enjoying school this year because I'm*

concentrating on a lot of other stuff like music and my band that I couldn't last year.

The junior students reported that the opportunity to repeat Bursary in Year 13 was a prime motivation for their involvement in the accelerate programme. Seven out of the eight students said that they intended to come back and complete a year 13 course.

4.2.3 Positive work ethic.

There is definitely a feeling that one of the positive outcomes of the accelerate programme is a good work ethic. There was also general agreement amongst the focus group that the challenge of working at a higher level was perceived as a motivational factor for being involved in the acceleration programme.

- *To learn how to work properly. To learn a work ethic so that later on you'll have a bit of an advantage over the others because you have grown up learning how to apply yourself and stuff.*
- *Get to work at a higher level, always working hard keeping you interested with new information.*

Despite the fact that a good work ethic was seen as a positive outcome of the accelerate programme, the amount of work needed to acquire this work ethic was seen as a negative consequence of being in the programme. There appears to be a love-hate relationship with the amount of work students feel they have to do. Students reported that they felt that the workload encroached significantly on their weekends and that you really had to think twice before you took a day off school because of the large amount of work needed to catch up.

- *If you get sick and spend two days sick then you've got to come to school and work really hard to catch up. Even though it was only two days that you missed out it takes two weeks to catch up with the rest of your class.*
- *I never enjoy my weekend because I'm doing stuff from during the week that I need to catch up.*
- *We have to work harder than we should have to. We do a lot more work than most high school students should need to do because all the school is setting you up for the real work coming at university.*

... although it does have its advantages ...you can relax a bit after you've got it. It's unfair that we have to work as hard as we do.

A number of the senior students commented that the pressure to perform in the internal exams at the junior level had a negative effect on their motivation to work in the senior school. They claimed that as seniors they are much more selective about the parts of the course that they work hard for.

- *The bad thing about being drilled so hard is that your teachers tell you that exams are really important and to work really hard and only now do we find out that exams don't really count for anything and so by the time we get to 6th and 7th form we've lost a bit of motivation. That's a bit stupid. I think they should slowly get you into the system in the first couple of years and then start drilling you.*
- *You learn to work hard for things but you also learn what to work hard for.*

When asked what their non-accelerate friends thought about their involvement in the programme, one student offered this:

- *In the first few years they thought we were a bit crazy taking the course but now they realised that we are the lucky ones. They wish they had been taught how to work. All their life they had been in the lower classes and so they haven't been taught how to work properly because nobody in their class wants to work.*

Some saw the programme as an opportunity to have a go at trying to study at a higher level with the added bonus that if you did not cope with the workload then you could always get a second chance the following year, without really being penalised chronologically.

- *There is an option that if you do fall too far behind you can fall back a year but you'll still be at the same level that you would have been anyway. It's sort of like a safety net.*

Although not a prime motivation for taking part in the programme it was interesting to note that some saw the programme as being beneficial to their self-confidence.

- *Self confidence is a big thing as well, getting the feeling that you are the best, not big headed, but its good to know that you can do well.*

4.2.4 *The competitive environment.*

One very clear negative aspect of the acceleration course was the perceived competition between students to succeed. It was generally felt by both groups that irrespective of what mark you scored in a test, the real measure of whether you had achieved was your rank position amongst your fellow classmates. Such a system of social comparison of achievement is characteristic of a performance oriented environment (Dweck & Leggett, 1988). Only one student reported that they liked working in this type of environment.

- *You are always worried afterwards, who is the best guy in the class and who is the worst guy. There is always a guy just behind you that you are trying to just stay ahead.*
- *If you get 60% you are not very happy, but if you find out you are top of the class you are happy. You are competing against the class.*

This performance orientated environment appeared to have an effect on the amount of work that students did.

- *I do push my self more because I'm in the first stream and I think there is a certain standard in the first stream and I want to stay to that, but as long as I'm above that I don't really study.*
- *Once you get into it in the third form there is quite a bit of pressure to make sure that you stay in it. And that you don't get dropped out. I worked hard because I was scared of getting dropped.*

Focus group members described the way students at the bottom of the accelerate class found it difficult to compete with the other students in the class, even if they were coping with the workload and academic demands of the course,

- *It's not much fun being at the bottom of an accelerate class where you can keep up with the work but you can't keep up with the rest of the class.*
- *Some people put in the work but they just can't compete and they are ostracised by not only the accelerate class because they are not doing well, but also by the others because they are accelerated.*

Students also felt that the competitive environment could be negative for students at the top end of the accelerate class as well.

- *The competition is not just negative for the people at the bottom but its also negative for the people at the top who expect to do really well and if they don't then they get really disappointed. Sometimes you look at your marks and you say I'm doing really well but I'm not doing as well as the rest of the class and that shouldn't be making as much impact on me as it is.*

Participants expressed some negative views about the value of the school rewarding its top scholars. Some felt that the practice had a detrimental effect because it encouraged high levels of competition for the top academic prizes and there was a concern about the effect on students who can't compete at the highest level. As identified in the literature, extrinsic rewards risk focusing students' attention on performance outcomes, such as high test scores, not on the process of learning itself.

- *The competition can be quite negative because in the lower levels of the school you lack the maturity to realise that you are not competing with everybody else and the school does nothing to say, well its not so important that you come at the top by rewarding the people who come at the top, especially at the end of the year. ... its negative for those who can't reach the standard.*

The majority of students felt that the school actively recognised its top scholars but one student felt that extra-curricular activities were recognised more than academic achievement.

- *There is heaps of recognition for somebody who got player of the day, but there is only some recognition for those who did really well in exams. I think that while you are at school the most important thing is to learn and yet we are not encouraged to do that. Its all the other activities that a lot of people in the accelerate classes just can't do sometimes that get the recognition.*

A number of students indicated that they personally preferred to adopt a learning orientation. Ames (1992) describes this orientation as one where students are focused on developing new skills, understanding new material and achieving a sense of mastery based on self referenced standards. Participants described how they used a particular mark or grade to assess whether they had achieved such mastery of the material. Despite their personal views, students commented that it was quite hard to remain learning oriented in a strongly performance oriented environment. They felt

that the school created high levels of competition by encouraging social comparison of achievement between students.

- *My parents keep saying that you are in a top stream of a top school so why are you comparing yourself with all these other students. ... if you were at another school then you'd be top of the school. I think it's wrong how this school creates competition for us, although they probably don't realise that they do. They want us to think it's a competition and so we work harder and we bust our gut to do well for us but for the school as well. ... If you get 70% in a test then that might be bad in the context of your class, but its 70% and what is wrong with that.*
- *It's quite a big shock because I never thought I'd get below 75, it's just my mark or level that I never thought I'd get below and then I got a 66 and it was like a big shock and I felt that I had let myself down.*

4.2.5 Life in an accelerate classroom.

I asked both groups to describe what their accelerate mathematics classes were like and whether they felt there were any differences between these classes and their non-accelerate classes. Many students had been in the accelerate programme since the beginning of year 9 and found it difficult to make an accurate comparison. However, some had been in non-accelerate year 9 classes and were able to compare the two classes. The overriding impression gained from the comments made by the two groups was that accelerated classes at the junior level are far too rushed. When I asked whether they thought this happened because their teacher felt they had mastered the material, most felt that it had more to do with needing to keep pace with a set syllabus. From the comments made, it appears that many of the problems centre on the curriculum compacting during years 9 and 10 and the fact that accelerate classes have 29% less class time than non-accelerate classes.

- *Because we had done it so quickly we had skipped aspects of it and then this year I found it hard because my teacher thought we had a higher level of understanding than we did.*
- *I know there are lots of examples of guys in our class who still don't understand anything on one topic and yet we only get one period if we have any problems and that is often quite rushed. There are one or two topics that I'm not too sure about but you can't go back.*
- *At the beginning of the period he goes over the homework but he like rushes that, so you don't really understand how he has done it and only some people get their questions answered, like one problem then he goes on to the notes.*

Some students felt that there should be more explaining of the underlying mathematical principles and their relationships to one another. They felt that, since they were considered able students, then they should be capable of engaging in some of these discussions. Students reported that they often felt that some teachers dismissed their conceptual questions out of hand.

- *One thing I find really annoying is the way often they will teach you something but you don't understand why you are doing it and they say we can't teach you this, we are not allowed to teach you until next year. I feel that since we're in the accelerate class they could tell us a bit more. It's just like 'that's the way it is.'*

Comment, especially from the senior students, indicated that they really appreciated and respected the more experienced teachers who were prepared to discuss the broader mathematical picture, as they felt that this enhanced their learning, making maths more real and fun.

- *There's definitely more discussion in scholarship classes. They don't really concentrate on getting down the notes and stuff, which is good and bad. Good because we get to learn more practically but we don't get as much to study as we did the years before.*

The senior students reported that their teachers have explained that they are trying to get them to think, but some would still prefer more notes. Some indicated that they perceive that learning to think is taught at university. A number indicated that they thought of year 13 as a bit of a transition year between school and university.

- *We are supposed to be, technically, university students.*
- *Teachers are more relaxed and although they give you the work it's up to you whether you do it or not. Treating you more like adults. We came back for our own reasons so if you want to work then do it, if you don't then...*

4.2.6 *The role of the teacher.*

Since the teacher is often the biggest influence on classroom dynamics I asked them to describe the attributes that they felt a teacher taking an accelerate class should have. Many of their comments would be seen as attributes of a good teacher whether they were teaching an accelerate class or not. Students felt that teachers should pace the lesson according to student needs rather than an externally determined schedule. They also felt that teachers of accelerated classes should be more relaxed and less strict, arguing that the more teachers interact on a personal level with their students, the more those students will respect and learn from the teachers. They also felt quite strongly that the teacher should be openly seen to be enjoying teaching able students.

- *The teachers who teach the accelerate classes should know what the answers are for absolutely everything, because if you get a teacher who doesn't know what they are on about they just sort of bore you and you don't want to listen, but there are other teachers that interest you so much that you want to listen and you want to learn the work.*
- *When you are teaching an accelerate class you can guarantee that any questions that can come up, will. So the teachers really have to know everything backwards to be able to handle it because it's not great when you have a class full of smart people coming up with questions and you're just coming up with 'I don't know' or 'you'll do that next year.'*
- *The less strict you are the less the class played up.*
- *Our old teacher wasn't like that at all. We just kinda got along with him, rather than being afraid of him. It also helped us to communicate with him and talk back to him. If someone is not breathing down your neck all the time you can learn better because you are a bit more relaxed.*

4.2.7 Friendships.

Junior students reported that most of their friends were also involved in the acceleration programme. They indicated that this is probably due to the fact that in junior classes accelerated students tend to stay together in discrete class units. There was general agreement that there were no problems making friends and this may have something to do with the large number of students involved in the accelerate programme.

- *It does have a big effect because you are spending most of your day with accelerated people and not others.*
- *Accelerate people tend to hang out in the main with accelerate people.*

By the time accelerate students reach year 12 they are more likely to mix with older non-accelerate students in option classes and many reported forming some friendships with non-accelerated students in their senior years. Participants indicated that at times they perceive that older non-accelerate students feel inferior to accelerate students.

- *At times I think they kind of feel inferior because we are doing the same course as they are yet we are younger than them and often we are doing better than they are.*

Despite this view, participants reported that there is generally a harmonious atmosphere between accelerate and non-accelerate students at all levels. They felt that since the numbers in the accelerate programme were quite large this served as a buffer against any potential problems. They also felt that the school viewed them with pride and gave them special opportunities that reinforced their self worth and helped to ward off any problems.

- *It's good being chosen for out of school things like marking MATHEX (a local inter-school mathematics competition) and taking people around the school on open day. It makes you feel good about yourself.*

The students did note that too much positive attention can have a detrimental effect on some students.

- *It's not good people telling you that you are so good all the time. It might kind of pamper your ego or give you a false impression.*
- *There are a lot of arrogant people in the class but some people are like that anyway. Once they get too big headed nobody wants to talk to them and they eventually fall over and that's when it hurts.*

Students did express some concern about the social pressure they felt around exam time.

- *There is not as much pressure for the non-accelerate classes to perform in the exams. They don't really worry about it. They are out doing other stuff so you get a bit hassled for studying as well not being able to go out.*
- *We miss out a bit socially too when it comes up to exams at the end of the year and people your own age are going out and doing stuff and you have to stay at home and study.*

However, students generally felt that this was a small price to pay for the long-term gains.

4.2.8 Extra-curricula activities.

There were mixed responses when asked about the effects of the accelerate programme on their extra-curricula activities. Most indicated that there was little effect or that they had learned to work around any problems.

- *We work harder to work around it.*
- *One of the really important things that I have learnt just recently is, those who have got more to do, do better. Those who are busier and have more on, still do better than everybody else.*
- *You get your time management from fitting everything around your school-work.*

There were, however, a few who felt that the programme had a negative effect on their sporting and cultural activities.

- *Some sporting activities you can't do because your homework load is quite a bit and because you are trying to keep up with the form above you. They have had three years of going slow and you have had two years of going hard out.*

4.2.9 *Interests and attitudes towards mathematics.*

Students were asked whether being in the accelerate programme had affected their interest in mathematics. The range of responses were interesting and varied, but most students reported that their interest and attitudes towards mathematics had not changed significantly. Other responses included:

- *I'm less interested because of the rushing and the not understanding some parts of it.*
- *Mine has increased a bit because of greater knowledge of harder maths.*
- *Definitely learnt to not have a negative attitude towards maths. For the first couple of years it was like 'maths isn't for me'. But, as you learn, you find out that this is really interesting stuff applying to the real world. When your working with big problems and you finally get it, then there's a satisfaction thing to maths. Like in 6th form calculus, that's when the real maths hit. It was by far the hardest maths we have had to do and the most work but it was also the most satisfying. It was proper maths. The other stuff was just pussyfooting around.*

4.2.10 *Future career goals.*

Many of the students had clearly thought about their future career paths. Two students planned to do architecture, two medicine, two law and science (one with biological science and the other with more of a physics and maths base), one engineering, one arts, one dentistry, one electronic technology and one student planned doing something involving mathematics. When asked, nearly all of the participants were unsure if being involved in the acceleration programme had affected their choice of future career.

4.3 *Discussion and conclusion.*

Students generally were happy and proud to be in the accelerate programme at this school. Focus group participants reported a familiarity with the selection tools and procedures used by the school and had no suggestions on how these could be

improved. Participants felt that students needed to have above average ability as well as being prepared to work hard in order to succeed in the programme.

The design of the current acceleration programme offers students the opportunity to leave at the end of year 12 with a full complement of five Bursary subjects. The students reported that some of the most able students at the end of year 12 had left and the school confirmed that, as a general rule, those students who scored more than about 400 marks in their five subjects did leave. These students tended to work or travel in the following year, with only a small proportion attending university straight away. When asked if participants felt that the opportunity to complete their secondary education in four years was a prime reason for being involved in the programme, the two groups offered very different responses. The majority of junior participants did not see this as a motivation for taking part in the programme. In contrast, most of the year 12 students stated that they intended to leave at the end of the year and a number of year 13 students indicated that they had seriously considered this as an option but, for a variety of reasons, had decided to return. At least one of the year 13 students was now questioning his decision to come back to school.

Junior students stated that that the opportunity to repeat Bursary in year 13 was a prime motivation for their involvement in the programme. Senior students did not state this as a motivational factor, instead arguing that the school actively encouraged them to return and resit some or all of their Bursary subjects and try and secure some Scholarship passes. Although the students appreciated the opportunity to do this they felt that the school's motivation for this practice was one of self-interest rather than for the benefit of individual students. They felt that the school used the number of Scholarships its students obtained to 'sell' the school to the wider community, arguing that with a large number of Scholarship passes it could then claim to be an academic school.

Focus group participants perceived the high workload, especially in years 9,10 and 11, as a negative consequence of involvement in the programme. Interestingly, they also attributed the major positive outcome of a solid work ethic to this high workload. There appears to be a love-hate relationship with the amount of work students feel they had to do to succeed in the programme. The juniors appear to be more

concerned than the seniors about the rushed nature of the classes and the pressure of having to complete three years in two. They felt this led to gaps in student knowledge and an inferior understanding of the curriculum. By the senior school, students generally perceived that the workload is more manageable and they felt they had become more selective about what to work hard for. The seniors appreciated the high workload they had experienced in their junior years and felt that this has given them an ability to work hard, an attribute they showed some pride in.

Junior students regret that their teachers tend not to discuss the broader conceptual aspects of the curriculum. Many felt that since they were considered able students, they should be exposed to some of the wider issues and implications of the mathematics they were learning. Since all students reported a very fast paced learning environment in years 9, 10 and 11, it may be that teachers feel that there is not enough time during the junior classes to enter into these discussions. This may be attributed, in part, to the schools policy of having fewer mathematics periods for accelerate classes than for non-accelerate classes in the junior years. The seniors showed appreciation for experienced teachers who spent more time discussing mathematics in depth. Students perceived that this enhances their learning, arguing that it made the subject more real and fun.

In the junior years, accelerate students tend to make friends within the accelerate classes and reported that they have few friends from outside the programme. By the time they are senior students, many reported that the increased interaction with non-accelerate students in option classes, as well as other school activities, results in a wider and more varied friendship base. Participants reported that, in general, interactions between accelerate and non-accelerate students are positive. Students perceive that the school has great pride in its accelerate students and feel that this, combined with the large numbers of students in the programme, reduces any negative interactions.

Perhaps the most significant criticism raised by the students, is the strongly performance oriented environment that they felt the current accelerate programme encourages. Such an environment is characterised by high levels of competition and the social comparison of achievement between students. When exam and test results

come out students are constantly judging where they are in relation to other students. Many of the participants are very aware that this comparison with their classmates is not a fair one, since they are comparing themselves with other very able students and being at the bottom of this very able group does not make you a failure. It is interesting to note that students perceive that the school encourages this performance orientation and many students reported increased levels of stress that they perceive is directly related to this overt performance environment.

All students in the focus group reported being proud of their involvement in the accelerate programme. Students generally felt that their career paths had not been influenced by their involvement in the programme. For the majority of participants, the programme has had a limited effect on their interests and attitudes towards mathematics, but all felt that they would not have achieved as much if they had not been involved in the schools accelerate programme.

Chapter 5: School B

5.1 Overview of School B.

School B is a co-educational secondary school of 1100 students situated in a satellite suburb of a provincial city. The school attracts a number of students from the nearby city, especially in the senior school, and prides itself on providing a high quality, balanced education, maximising the individual learning potential of students of all ability. Although the school has a well-established acceleration programme it sees this as only one of the services it offers its students. The HOD mathematics reported that the remedial maths programme is given equal emphasis to the accelerate programme.

In line with the school's stated philosophy of breaking down elitism, there are no streamed classes in year 9. The school does, however, offer an extension programme and uses PAT tests and an extension test to select a small number of year 9 students, who are then removed from one of their four regular maths lessons each week. The school claims that this programme has been developed to cater for the needs of year 9 students for whom the regular year 9 curriculum is not challenging enough. This programme is a form of enrichment programme, but to be consistent with comments passed by students, will be referred to as an extension programme. There are two extension classes with between 12 and 15 students in each class. A key point to note is that no year 10 topics are covered in any year 9 extension work.

At the end of year 9, a class of about 32 students is selected for the acceleration programme. Selection is based on students' year 9 assessments and work done in the extension programme. Students who were not involved in the extension programme are also considered for the acceleration programme. The only other subject that offers acceleration is science, but not all students are accelerated in both maths and science.

Year 10 accelerate students complete both the year 10 and year 11 curricula and must secure a School Certificate mark in excess of 75% to be allowed to continue with the programme. The year 10 accelerate students are in a stand-alone maths class and

have the same number of maths periods as non-accelerate students. Students who continue with the programme complete Sixth Form Certificate in their year 11 and must secure a grade 3 or higher to be allowed to progress to the Bursary courses. Students who do not continue with the programme revert back to a normal programme at their appropriate level. The group of students interviewed at this school included a number of students who had been accelerated in the junior school but had failed to secure the necessary marks to continue with the programme.

The school feels it takes two years before students are in a position to make a reasonable attempt at securing a Scholarship in calculus but only one year in statistics. Accordingly all year 12 accelerated students take calculus only. Accelerate students in year 13 may take either statistics, calculus or both, with those taking calculus for a second time in a special Scholarship class. There is an extra timetabled lesson for calculus students at 8 a.m. one morning a week and there are also extra tutorials offered to year 13 statistics and calculus students one afternoon after school and one evening a week. Some of the more able students also sit the NZEST Scholarship exams. Students in years 11 and 12 are in mixed classes with older students, but will usually have other accelerate students at the same age level in their classes. Year 13 accelerate students are with their same age peers.

The school states that its motivation for having an acceleration programme is primarily so that students can increase their chances of securing Scholarship passes from year 13. The school argues that this will increase the chances of students who wish to gain access to restrictive university courses such as medicine. Although it recognises that students may take the opportunity to broaden their subject base in year 13, the school does not view this as a major reason for having an acceleration programme.

5.2 *Student perceptions.*

5.2.1 *Selection procedures and attributes of an accelerate student.*

Students were familiar with the selection procedures for the acceleration programme and in general felt that identification procedures were appropriate and reasonably accurate. They indicated that to succeed in the programme you need to be an able student but you must also be prepared to work.

- *Obviously they need to be a good mathematician but they need to have the motivation to do well and to work hard to achieve. Those who are very intelligent would need to work less, but even they need to work.*
- *The best student would be one that is reasonably able but has to work. ... People who are too gifted usually coast and then when the work gets tough they sometimes back off.*
- *Some accelerate students had dropped out of the programme because they did not secure the marks required to continue. Participants commonly perceived that there is no stigma attached to these students and generally felt that their selection into the acceleration programme in the first place had been appropriate. Participants felt that they deserved a chance to see if they could work at a higher level.*
- *Those people who are doing it again are doing much better. I think in respect to other students they are quite advanced still because they know the work.*
- *Even though some of the people are repeating it there is no bad feeling. It's like oh yeah I didn't get it. I'll try again this year and I'll be able to get a lot better mark.*

5.2.2 *Purpose of acceleration programme.*

I asked the students to explain their motivation for being involved in the programme. Many participants reported that a prime motivation for them was the opportunity to increase their marks in year 13 and perhaps try and secure a Scholarship.

- *You get the chance to do a subject twice and go for a better mark.*
- *That's the only thing really. I wouldn't be in it if I wasn't going to get good marks, because all this is really doing is setting me up for what I want to do in future. I'm not in the class to motivate myself or to challenge myself or work hard. I'm in there to get a Scholarship, get into university. Get to where I want to go.*

Some students also felt that that the programme provided them with the opportunity to widen their subject base in year 13.

- *If you get a high mark the first time then you get a chance to do something else. It might be completely different from something that you have done and so you can relax and have a bit of fun.*

It is interesting to note that several students indicated that being selected for the course and wanting to justify that selection was a significant motivation for taking part in the course.

- *Being put into a programme like this, it makes you think, they think I can do this so I'll show myself that I can do this as well. You work for yourself to show that their faith was justified.*
- *The knowing that you have been selected to do this and you can improve on yourself and almost become better than people your own age.*

I asked the students what they perceive the school's motivation for having an acceleration programme might be. There was a strong feeling that the school's motivation was for the benefit of the students within the programme. This certainly is in line with the school's philosophy of helping the students to achieve to the best of their ability.

- *Because they want to extend people as much as they can. They want people to get good marks.*
- *It's like that saying 'tramp to the pace of the slowest person'. If someone is dragging behind in a normal class then the whole class pretty much does. If you take the top students out then they can go at their own pace and the bottom people can go at their own pace.*

Since no student had mentioned that the school might use its high achieving students to gain a high profile in the community, I asked them whether they thought that the school benefited from having high achieving students. Only then did they concede

that this probably did happen but stressed that was quite normal and accepted practice and, although a useful side effect, was not the main reason the school had an acceleration programme.

- *People who are doing Bursary for the second time should get good results and it makes the school look good because they are getting good scholarship marks.*
- *But every school takes pride in their top students. Its quite competitive between schools and how many scholarships each school got.*
- *I think it's more to give students the benefit of it rather than the school.*

The limited nature of the acceleration programme means that students are not in a position to leave school at the end of year 12 with a full compliment of 5 Bursary passes so I asked them whether they would like the programme expanded so that this was possible. There was almost universal rejection of this suggestion. The students evidently did not see the ability to shorten their time in formal education as an attractive outcome of being involved in the accelerate programme.

- *I think it would be hard socially. You would be a year ahead of yourself academically but you wouldn't really make friends with those of your own age.*
- *I reckon you are selling yourself short by leaving at the end of 6th form, because you could do better.*
- *And what's the point of just getting one year ahead anyway, you could broaden out rather than just going up.*

5.2.3 The challenge of working at a higher level.

Some students indicated that they liked the challenge of working at a higher level. They enjoyed the academic challenge of the more difficult curriculum work and felt that mastering this work gave them not only a sense of achievement but also increased their self confidence. Concerns of being bored if they had stayed with their current age cohort were also raised.

- *Doing the work above your age level is also satisfying because you can do harder problems than most students and you also develop maturity, I guess, by being required to do advanced work and*

advanced thinking. Plus I like the challenge and the satisfaction of getting work right.

Some students reported that they found the higher workload needed to do well in the programme developed a range of skills that benefited their other subjects as well.

- *There is a lot of hard work but that is more of an advantage because it motivates you. If I'm falling behind in something then it's good motivation to work hard and succeed.*
- *It gives you better work habits. If you want to stay on top, you have to work and do homework, which is a good trait that benefits all subjects.*

Students appreciated the fact that, if they didn't succeed in the programme, then they were not disadvantaged chronologically since they could always revert back to their normal year level course.

- *I wasn't really worried because I knew I had the chance to do it again if I couldn't do it.*
- *If you don't pass it then you can just do it again next year anyway and improve your mark.*

A number of the senior students commented that they concentrated on their 6th Form Certificate courses during year 12 and so their Bursary calculus course took a lower priority. Some students expressed concerns about the folly of approaching the first year of calculus in year 12 too lightly knowing that they would be repeating it next year.

- *It's very easy to do first year calculus knowing that you are going to do it again and you just bum around thinking that, oh its all right I've got a second year, but it really doesn't work like that. You've really got to put the hard work in the first year.*

Not all the seniors agreed with this view.

- *I don't believe that's a problem at all. Last year I definitely went to calculus to learn by osmosis and basically bummed around all year to see what mark I could get just for the hell of it. I was doing three 7th form subjects and that allowed me to focus and get really good marks in my 6th form subjects. You still pick up enough to give you a really good base for your final year.*

5.2.4 *Higher expectations.*

I questioned the group about changes in other peoples' expectations of them now that they were involved in the programme. Although it was generally felt there were higher expectations because they were accelerated this did not seem to be a major problem to most.

- *The expectations of others are a great motivator and your expectation of yourself.*
- *We are expected to get really good marks because we are accelerated students.*
- *We are expected to always do well by our peers and especially the school.*

There were a couple of students who did voice concerns about what they saw as unreasonably high expectations from others.

- *Often too much pressure to perform. We are put into the programme because of our abilities and it often seems that we must do well, especially achieve more than those who are not in the programme. For instance those who could easily be accelerated as well.*

Some felt that some of the stress tended to be self-induced because the students themselves wanted to do well. For these students, the pressure seemed to be more internal than external.

- *I think in combination with other things the stress levels can be a bit too high but I think you bring that on yourself.*

5.2.5 *The extension programme.*

There was a general view amongst both seniors and juniors that the year 9 extension programme should be modified to allow students to be in the same class for all of their maths periods. Students reported that one of the problems with the current extension programme was that they only saw their extension teacher once a week and this made it hard to follow up any problems they encountered doing the extension homework sheet. They also felt that it would be beneficial in later years if some of the year 10 curriculum work was undertaken in year 9.

- *I think the selection might have been good but I'm not sure in practice that the extension A and B groups worked all that well. Maybe if they got all the students together in one class.*
- *Perhaps it would have been better if everyone had had a full time extension at third form level instead of just once a week.*

Some students felt that the existing extension programme was not challenging enough and encouraged bad habits. Many students commented that the much of the extension material was not harder or more challenging, just different. A number of the students in the accelerate programme came from an intermediate school in the same satellite suburb that has an active policy of accelerating their students so that they are doing quite a lot of the year 9 curriculum in year 8. This was identified as a problem by the research school.

- *I only regret that I wasn't pushed harder in third form. It was actually easier than form 2.*
- *The only problem is that in the junior school students are taught to laze around because the work is extremely basic and in the senior school the work gets hard and some give up.*

5.2.6 Competitive environment.

Students had mixed opinions about the nature of the competitive environment within the acceleration programme and school in general. Some felt that they were learning oriented, setting their own standards and competing more with themselves than with the group as a whole. Others felt quite strongly that they were more performance oriented, judging their achievements and marks against others. The views of the seniors were strongly expressed and this was the only time during the interview where there was tension within the group. I had to intervene and explain that both views could be supported in this study and it was not necessary to reach a consensus. It was interesting to note that the division of opinion reflected a gender pattern. The males tended to be the more performance oriented while the females were more learning oriented.

- *I reckon everyone pretty much competes with themselves.*
- *I think you have to compare yourself with other students to set goals for yourself. To make them realistic ones.*

- *I don't compete with myself at all because I don't have a benchmark to compete with myself on so I'll compete with everyone else. When I set a goal I don't set a goal on a mark because all marks are relative. I set a goal on how many people I beat.*
- *It's not too competitive. There's no pressure at this school to be really intelligent or to be a hard worker. At some schools it may be like that but this school is pretty good like that.*

The lack of a consensus suggests that the school does not have a strongly performance oriented culture. In other schools within the research sample where students had identified that a performance oriented environment exists, even those who held a predominant learning orientation, could recognise and comment on the overriding culture of the school. This did not happen in school B. Individual students appear to be determining an orientation that best motivates them.

5.2.7 Life in an accelerate classroom.

Junior students stated that they enjoyed being all together in the same class with the same teacher in year 10. They also felt they were treated as though they were year 11 students. Students perceived the accelerate class to be a very collaborative environment where students helped each other with problems and homework. Participants reported that, since they were all of a similar ability, the pace and level of curriculum delivery could easily be adapted to suit the class. A number of students commented that they felt that the accelerate classes get the better teachers. Comments were also made about some year 10 students feeling inferior to the year 11 students and the effect this had on their learning.

- *They treat you as if you are 5th formers even though you are 4th formers. There is like a psychological motivation.*
- *I think that the students actually try harder once they are in the extension. In our class about half the people don't actually think they are as good as 5th formers so they try harder.*

One student commented that they felt that teaching all of the accelerate students together in one class had a positive effect on non-accelerated students.

- *Another good thing is the effect on the students who are not accelerated. They think, 'Oh you are so good, how come I'm not*

that good'. But when you are not around them they don't feel as demeaned.

The juniors expressed a strong view that they would like to continue the practice started in year 10 and keep the year 11 students doing the year 12 course all together in one class. There appeared to be a level of understanding of the problems of keeping students together due to timetable constraints. The seniors were more open about mixed level classes and although some agreed with the juniors' sentiments, support was also expressed for having accelerated students in mixed level classes.

- *That's a good aspect of the system that you do get to know some sixth formers.*
- *I'm neutral about that because there are good aspects and bad aspects about that. When you get your marks you can look across at a 6th former and say well I did better than them and they are a year older than me and it makes you feel good.*

I questioned the group about whether it was hard being in a class with older students.

- *At first they are a bit standoffish, especially when you do better in a test than them, but after you repeatedly do better than them then they give you a bit of respect.*
- *I actually find that some students come up and ask for help. They don't seem ashamed or anything, and even if you can't help them they don't sort of say, 'Well you should know how to do this because you're supposed to be brainy'.*

Students perceived that they do not get more homework than in their non-accelerate subjects and, in some instances, felt that they receive less homework because they pick up the concepts more easily and need less repetition to master the material. Participants experienced few problems associated with compacting the curriculum in year 10 and reported no significant increase in workload.

- *The class is more casual and the teacher can personally teach us rather than lecturing us with no feedback. We perhaps work less and the class often deviates from maths. Also the teacher sometimes sidetracks, proves things or tells us of things that are not covered in the course but help us in our understanding and enjoyment of maths.*
- *I don't believe that we worked any harder than anyone else last year. We are a hell of a lot better at maths than most people so we click on to the ideas easier and so it's a lot easier to pick up on them and*

when I hear how much my friends struggle on the basics. I've got friend who studied hours and hours each weekend, every weekend starting at the beginning of the year and I never did that. I know a lot of people who work a hell of a lot harder than me and don't get so far. So I don't believe I worked any harder than anybody else.

I asked students who were in mixed level classes whether they felt they were treated any differently from non-accelerate students. In general participants felt that they were treated the same and did not get asked to answer more questions than non-accelerated students.

- *I think we're the ones who usually volunteer to answer questions.*

Students also felt that there were no significant problems asking the teacher for help.

- *You shouldn't really care about it because you have skipped a whole year of maths. You shouldn't be embarrassed if you don't know something. It might have been in the year you missed.*
- *You keep thinking I really shouldn't be here. I'm a year ahead and so it's no big crime if I don't know one thing because I know a lot of things that other people my age don't.*

5.2.8 *The role of the teacher.*

I asked participants to describe the things they liked about some of the teachers that had taught them in the accelerate programme.

- *Our teacher says we are doing way better than the rest of the 5th form. I don't know if it's just a motivational thing but it's just the feeling that your teacher thinks that you are better than most of the 5th form is quite good.*
- *He obviously really likes maths and he gets into it and he shows us all the business behind it and how things are derived and where they come from. He gives a lot of background because he expects that now we have got to this level we actually sort of like maths and want to go a little bit deeper into it. So instead of just doing the questions we are learning what's behind it.*
- *They often add in things that they think would be relevant to you but not to an average class.*

When asked whether teachers should explain where maths is used in the real world one student responded:

- *Not so much, especially when it comes to where it is used in the real world and definitely not when it comes to calculus, because it's not really used in the real world.*

Some of the senior students in the year 13 calculus Scholarship class had the same teacher for year 12 calculus. They noted a change in the teaching style between the two years and felt that the teacher had adapted their teaching style to cater for the more advanced abilities that these students brought to the class.

- *Our teacher doesn't go into things in as much depth as he did last year. He'll just skim over it and give us heaps of exercises to work on in class. So he'll spend only half the time explaining it and then we get to work on it.*
- *In the first year you get taught the basics and by the second year you get taught how to answer the more difficult questions. It usually takes the whole year just to learn the basics of calculus.*

The participants reflected on the qualities they would like to see in an accelerate teacher.

- *One who believes that he has a class of students that are capable of picking up things faster than the average student and is motivated to teach them all they can.*
- *One that treats the students as if they are at the level they are teaching at, say a 5th former in a 6th form class. The teacher should treat the 5th formers as 6th formers.*
- *Shouldn't expect us to know everything just because we are accelerated students.*

5.2.9 Friendships.

Some students reported that their circle of friends has changed since they have been in the programme but they felt this was because they had drifted apart rather than because of the programme. Many of the students said their closest friends were also accelerated but felt that friendships in general are not determined by whether or not they are in the accelerate programme.

- *I don't think it has anything to do with it. You are friends with somebody not because they are bright or intelligent but because you like the same things as them. If they judge you because you are intelligent then you shouldn't be friends with them anyway.*
- *I've got a wide range of friends from all levels. It's not affected by my acceleration, but my closest friends are also accelerated students, possibly because we all think alike.*

Some students reported that they sometimes found it hard not being in the same maths class with their friends after year 10. When this happened the accelerated students tended to make friends with other accelerated students in the class rather than the older non-accelerate students.

- *It's just because when you are in 6th form in a 7th form class you have all these 7th formers so you just kind of stick with the 6th formers. So where you normally wouldn't have been as good friends with this person, because this person is the only other 6th former in your class you tend to make friends with them and then the year after that you are possibly in the same class so you have got your relationship from then.*

The female participants were certainly more vocal in their desire to have their friends in their classes.

- *Being away from my friends and peers is a major downfall on my confidence during class.*

A few students did make friends with the older students in their maths classes but some saw these friendships in a different light.

- *Often it gets to the point when you have maths friends and other friends and they're kinda separate.*
- *The friendships in the classes I have with older students form differently in respect to the depth of friendship, for example in class time not out of school time.*

In general accelerated students perceived that they blend in with the other students and don't really get identified as accelerated. There were no reported incidents of being bullied because of inclusion in the programme. Any comments made to accelerate students are generally positive although it was felt that the wider school community does not respond kindly to accelerate students being too arrogant.

- *The only time you get hassled is when you brag about it. That's the only time it's going to get to you is when you bring it upon yourself.*

5.2.10 Extra-curricula activities

The acceleration programme does not seem to have impinged on any of the students extra curricula, sporting or cultural activities. Students reported that they seemed to be able to take on any activity that they chose and no students reported having to give up an activity because of workload pressures due to the programme. The general feeling was that accelerated students tended to be highly active people and worked around any time constraints.

- *I think that generally the people in the accelerate programme are the type of people that are willing to work hard to get what they want.*

5.2.11 Interest and attitudes towards mathematics.

Most participants reported that their level of interest had not changed significantly, with most retaining the same level of interest, though a few reported a slightly increased interest. Most of the increase in interest appears to be due to a reduction of boredom with work that was too easy.

- *Would have just got bored with the class and accomplished less. Fall behind because you just get bored and don't pay any attention to anything.*
- *But it's still like just a subject, it's not like we are really interested in it.*

Some felt that although their view may have changed this could be attributed to an increase in age and maturity rather than being involved in the programme.

- *I think it's just as you get older. As you understand more it makes a lot more sense.*

One student who reported having the same level of interest in mathematics as before acceleration noted that they had only retained their interest because they had taken part in the programme.

- *I think if I hadn't been put in an accelerate class I would passionately hate maths and not try very hard. I work a bit better with pressure.*

Only one student reported that their interest had significantly increased because of the programme.

- *I have always been good at maths but, until intermediate and this acceleration programme, I was not interested in maths. But now I have a strong interest in maths and it is now my favourite school subject.*

5.2.12 Future career goals.

Students were asked if their future career aspirations would involve mathematics in some form and whether these aspirations had changed because of their involvement in the programme. A number of students were still undecided about future careers but noted that being involved in the programme had definitely affected the level of career that they were aiming for.

- *I don't have a clue but I think because of the acceleration programme I'm looking to more advanced things. I know that I can do things that are more advanced and not just a mediocre job.*
- *If anything acceleration in maths gave me the confidence to decide I want to have a top job with higher qualifications and specialising with excelled learning in my career.*

One student, who had emphatically stated that they did not want to have a career that had anything to do with mathematics, also added:

- *Maybe if I get a good calculus grade it's just for employers to see that I have some sort of thinking method and I can work out something and I can apply myself to get a subject that is hard.*

A number of students were looking at going into science-based careers.

- *I intend to do a BSC next year. I will definitely need maths and will at least study a few maths papers at university. The maths taught at school can often be boring but at university and beyond I am sure it will be interesting and I should not be scared off maths from school.*

Other career areas included: medicine, teaching English, chemistry, mechanical engineering, biology, veterinary science, music recording and computer programming.

5.3 Discussion and conclusions.

School B had stated that its main reason for having an accelerate programme is to increase students' chances of securing Scholarships. A number of participants echoed this view, claiming that having two years at a Bursary level in the same subject was a major motivation for being in the programme. Accelerate students also valued the opportunity to broaden their subject base at the Bursary level by taking at least one Bursary subject a year early. Students felt that the prime reason that the school had the acceleration programme was for the academic advancement of individual students rather than for any high profile benefit that the school might obtain from having a larger number of Scholarships.

The current design of the acceleration programme does not allow students to leave at the end of year 12 with a full complement of Bursary passes. In general, students did not feel that this would be an attractive option, stating that students would not be making the most of their opportunities at school if they left without completing a year 13. Students were equally united in their views about the year 9 extension programme. It was generally felt that better use of the time could be made if potential students were put into an extension class for all of their maths periods in year 9 and material from the year 10 curriculum was introduced. A nearby intermediate feeder school has an active policy of accelerating its most able students allowing them to undertake year 9 work in year 8. Consequently many of the able students in the trial school are not finding their regular year 9 classes challenging enough. The one period out of four extension programme is viewed by the students as an addition rather than an integrated part of their learning.

Junior students appreciated being in a class of similar ability students in year 10. They particularly liked the fact that the class was all working at the same level and that the pace and depth of curriculum delivery could be adapted to meet the needs of this special group. They felt that the class was more relaxed and they were able to interact with their teacher more. There appeared to be no significant problems with compacting the curriculum in year 10 and students reported that, rather than having

more work to do than their non-accelerate friends, they felt that, at times, they had less repetitive class work and less homework. They would like to see this 'special accelerate class' concept extended to subsequent years, but conceded that this would be constrained by subject choices of accelerate students in the senior school and by other timetable constraints. Senior students also found the workload manageable and did not feel embarrassed when they needed to ask the teacher for help. They enjoyed the challenge and the good work habits that they felt the programme encouraged.

Participants appreciated that if they did not succeed in the accelerate programme then they were not disadvantaged chronologically and could revert back to a normal maths course at their appropriate age year level. Student perceptions indicate that there appeared to be no stigma or ill feeling towards students who repeat a year because they do not meet the school's criteria for promotion to the next year level. It was generally felt that students who had left the programme still had an advantage over those who had not been involved in it and, therefore, their initial inclusion in the programme was justified. Some students at the senior level reported that, in the first year of studying Bursary calculus in year 12, they had concentrated more on their 6th Form Certificate subjects, claiming that they did not have to secure very high marks in calculus since they would be repeating it in year 13. Accordingly, many did not put much work into their calculus course.

Participants reported that being in a class with older students presented no significant problems. Expectations from teachers, parents and peers were high, but in general, not unreasonably high and often proved to be a motivating factor. Some students identified that they held a learning orientation and were primarily competing with themselves. Others students indicated that they held a performance orientation and were competing with the other students in the class. Despite this mix of learning and performance orientations, there does not appear to be an overly performance oriented and competitive culture within the school. Students seem to create the individual orientation that served to motivate them best. Interestingly, the males tended to be more performance oriented while the females tended to be more learning oriented.

Many of the students reported having both accelerate as well as non-accelerate friends and, although the majority of their closest friends were also involved in the

acceleration programme, many felt that friendships in general are not affected by inclusion in the programme. There were no significant problems being in mixed level classes with older students, although females expressed a greater desire to have similar aged accelerated friends in their mixed level classes, while males were happier than females about mixing with older students.

Students reported no major problems with accelerate students getting bullied or hassled. Comments passed between the two groups were described as being light-hearted in nature. The only exception to this is when the accelerated student was perceived to be acting in an arrogant manner. Students reported having the time to be able to take part in any extra curricular activity that they chose.

For most students their interest in mathematics had either stayed the same or increased slightly. Many felt that their interest was only maintained because of inclusion in the programme arguing that their interest would have been significantly reduced because they would have become very bored.

There appeared to be a wide range of future career interests and it was interesting to note that many of the participants claimed that the acceleration programme had had a positive effect on their career aspirations. Not because they all wanted to follow mathematically based careers, but because their expectations for possible future career had been raised significantly. They felt that their success in the acceleration programme had given them the confidence to believe that they could aim for a high level career requiring top-level qualifications.

Overall the participants in the acceleration programme at school B viewed their experiences in a positive way. They felt that they had all benefited from the programme, even those who had dropped out. Students strongly felt that the school was looking to maximise the learning potential of all students rather than raising the school's profile in the community. Students felt that the school was supportive of all levels of achievement and seemed to really value this broad all encompassing philosophy.

Chapter 6: School C

6.1 Overview of School C.

School C is a medium sized co-educational school in a provincial city. It has a policy of non-streaming and prides itself on providing an equality of education for all. The school's mathematics acceleration programme was well established when the current HOD of mathematics arrived 4 years ago. In recent years the school has downsized its programme from accelerating a whole class of students to only a small number, with between 4 and 8 students entering the programme at the start of year 10.

Because of the small number of students involved, there are no stand-alone accelerated maths classes. Accelerate students are placed in normal mixed ability classes at a higher level. A number of other school subjects offer acceleration to a small number of selected students, but this is generally done on an individual basis according to the students' needs. Most students are accelerated in only one or two subjects, but there are occasions where a student has been placed completely in a level above their normal chronological year level. When this has occurred the student has generally left at the end of year 12, after four years at high school, rather than returning to resit Bursary in year 13.

The school's mathematics acceleration programme starts at the beginning of year 10. Students are screened based on the result of a single year 9 exam and teachers are consulted about the suitability of potential students for the programme. The emphasis is on selecting students with natural ability rather than selecting hard working students with less ability.

Students complete the year 11 School Certificate course during year 10, but because of the timetable structure, they attend only four of the five scheduled mathematics classes in a week. It is the students' responsibility to catch up on missed work. The school sees little point in students repeating School Certificate and so all students generally go on to the 6th Form Certificate course in year 11. There is no grade boundary for students moving on to the Bursary course, but, if students are

experiencing problems working at a higher level, then they are encouraged to repeat the 6th Form Certificate course. Accelerate students take only one Bursary maths course in Year 12. The school actively encourages them to take Bursary statistics in year 12 and Bursary calculus in year 13, and, in general, no students repeat statistics in year 13. In past years some students have taken university papers from year 13 but this has not been a common practice in recent years. In years 11, 12 and 13 accelerate students attend the same number of mathematics classes as non-accelerate students.

The school states that its prime motivation for having an accelerate programme is twofold: 1) to keep able students interested and motivated by providing them with a challenge and 2) to broaden their subject base at the Bursary level. The school states that securing Scholarships is not a major purpose of the programme.

6.2 Student perceptions.

6.2.1 Selection procedures and attributes of an accelerate student.

Students perceived that a single test was used for their selection into the programme and they appeared quite critical of this procedure. In their opinion, the single test did not discriminate between the most able students and those who simply had worked hard and learned the required work. They also felt that there was a cut-off mark below which students were not considered and they were concerned that some potential students were excluded from the programme because of a poor exam mark. They felt that class teachers were in a better position to assess students' natural mathematical abilities and that students should be able to put their names forward for inclusion in the programme.

- *Don't base it on one exam because it doesn't reflect much of our work throughout the year. Class teacher should have a role to play. Should tell whether you are grasping the concepts instead of just the marks*
- *The test was just basic work. They could have tested a series of things at different levels. They could have tested harder things as well.*
- *Automatically ruled out anybody under 85, which is really odd.*

- *Students should have a role to play in their own selection. It's up to the person whether they think they can do it. They may have stuffed up in the exam.*

Participants reported that, to succeed in the acceleration programme, students needed to be reasonably able and determined to succeed.

- *I think you need to be able but hard working as well. When you are a 4th former doing 5th form maths there are other 5th formers who aren't that bright that are still doing it. So you need to be just basically able.*
- *Someone with a higher interest, ability and motivation in maths.*

6.2.2 Purpose of acceleration programme.

It is interesting to note that the school's stated purpose of keeping students interested and motivated was echoed by the students. It seems that for the majority of participants the main purpose of being involved in the programme was to overcome boredom.

- *I get bored in most classes because they have to go over it so many times for some people. It gets really tedious.*
- *Because I was asked to and I was bored in 3rd form.*

Several of the students reported that they appreciated the opportunity to take one of their Bursary subjects a year earlier as this allows them to broaden their subject base at the Bursary level.

- *I thought I might have actually got a year without maths but that's not the way it has worked out.*

Several of the students reported that their motivation for being involved in the programme was more long-term.

- *I like the thought of being in an accelerate class because it would look good on a C.V.*

The opportunity to secure Scholarships from year 13 had not been identified by students as a possible motivation for being involved in the programme. I asked them whether they considered this would be a realistic outcome for them.

- *It looked like a possibility back in the 4th form, if you do the same subject twice, if you do maths one year you get the hang of it, doing it the second time you'll be brilliant at it and get good marks. But when you get to the 7th form...*

Two of the students who were taking all of their subjects one year level higher reported that they had entered the programme so that they could complete their secondary education in four years. They intended to take a year off before going to university and had no intention of coming back for a fifth year to attempt Scholarship. Both of them intended to work for the year so that they could save some money and reduce their overall student debt.

When I asked participants about the school's motives for having a programme the two groups gave quite different responses. Senior students felt the school is more interested in how the programme benefits the school in general, rather than individual students.

- *So the school looks better.*
- *They can show off all the smart students.*
- *So they can teach the rest of the class better if they don't have all these smart people in the class.*
- *If they have got bored students in the class who are finding it really easy then it is just going to disrupt everyone else.*

In contrast the junior students felt that the school's motives are centred more on the advancement of its individual students.

- *Mostly for our benefit. We get more out of it than they do.*

6.2.3 The challenge of working at a higher level.

Participants perceived that studying at a higher level had a number of positive outcomes. Students reported that it provided them with a cognitive challenge that, they thought, helped to reduce the problems of boredom experienced prior to

involvement in the programme. Some students felt that the challenge of working at a higher level motivated them to work hard and justify their inclusion into the programme.

- *Not sitting in a regular class and finish your work in 5 minutes and then sit there for the next half an hour. You are able to work through problems that you have difficulty with. It takes longer to do and you have to think more.*
- *You actually have to work rather than sitting around picking up bad habits. I'm really lazy now because they didn't accelerate me earlier.*
- *It gives you an additional challenge. Being a year ahead motivates me because I feel I have to prove that I can succeed a year ahead of my age level.*

A number of participants felt that sitting a course a year in advance was an advantage because it provides them with an early insight into the higher-level courses.

- *Nice to spread out the exams. Gives you a taste of what it will be like in other subjects. Gives you the habit of sitting exams.*

Several students appreciated the challenge of working at the higher level knowing that they could always revert back to their normal year level course if they found the work too difficult.

- *There is a little less pressure if you do a subject a year ahead. If you fail then you can just do it again.*
- *Because I believe it will extend my mind and if I fail a year then I can re-sit it again without getting a year behind.*

Some students felt that the option of dropping out of the programme and reverting back to their normal year level had some negative consequences as well. Participants thought that students who gave up part way through a course may end up regretting their decision at the end of the year and could find it difficult to re-commit to the same course in the following year.

- *The whole safety net concept can be a bad thing as well, because it gives you an excuse if you don't do so well. You sort of get into a frame of mind where it really doesn't matter and then it's hard to get out of that mindset.*
- *I found because I wasn't really committed to it, it made it harder. It's like halfway through the year you think oh I'll just do it again*

next year and then by the end of the year you think I wish I had stuck at it.

Nearly all the focus group participants indicated that they would like to see either the acceleration programme extended to start at the beginning of year 9, or some form of extension programme introduced into year 9.

- *It would be nice if there were some kind of interesting extension thing in the third form. Everyone is just like 'oh yeh, you'll be doing acceleration next year so it doesn't really matter'.*
- *It would be good to go straight into the 4th form, but for that you would have to have a test before you come to school. Perhaps they could get recommendations from your previous principal or something.*

6.2.4 High expectations.

A number of students reported that teachers, parents and peers all had higher academic expectations of them once they were in the acceleration programme. For many of the participants these expectations helped to motivate them, but also proved to be a source of concern for some.

- *There is a bit of pressure to do well because you have been put up. It's like, you're really smart, so you should do really well.*
- *My mum is pressuring me to do scholarship and it's like, hey, I'm hardly even passing this year.*

The focus group participants stated that the non-accelerate students generally expected the accelerate students to do better than them in tests and exams. Participants added that non-accelerate students were very pleased if they scored a higher mark than accelerate students.

- *I think they expect you to do well because you are accelerated, but they are really, really happy if they beat you though.*

In spite of this comment, students reported that generally there was not a strongly competitive culture within the school. Comments made indicated that the vast majority of accelerate and non-accelerate students adopt a learning orientation rather

than a performance orientation, setting their own internal standards and competing against themselves rather than other students.

Nobody regretted being involved in the programme but some reported that they did find it hard when everyone else was due to go on holiday and they had to study for an external exam. Some students felt that they had not achieved as well as they might have if they had been left in their normal year level.

- *For me it the worst thing is that my marks have gone down a little bit because I haven't been able to cope quite as well as I might have otherwise.*
- *We probably would have done a little better because we would have done a regular 4th form. We might have got bored, but in the third form we still did well even though we were bored.*

It is possible that if students had worked at the same level of motivation and intensity, then the extra year spent mastering the curriculum material may have resulted in a better performance in assessments. But as several students have indicated, being left out of the programme may have negatively impacted on their interest and motivation, and their performance may have suffered as a consequence. Although one student felt that they were able to perform well even if they were bored, it is unclear whether they would be able to maintain this ability in the long term. It may be difficult, therefore, for these students to accurately assess whether their performance has been adversely affected by their involvement in the programme.

6.2.5 *Life in an accelerate classroom.*

Since accelerated students move from being in a normal year 9 class to a normal year 11 class in year 10, they essentially missed out the entire year 10 curriculum. At the end of year 9, students entering the acceleration programme are given some year 10 work which they are required to cover over the Christmas holidays, prior to starting the year 11 course. Most reported that they did not do this set work. The year 10 accelerated students missed out on a class every week so they had 4 classes instead of 5 and students were required to catch up on the notes and work from other students. There seemed to be no significant problems meeting this requirement, although some

students reported an increase in their workload to master the new material. Students reported that they experienced no significant problems with the transition to the higher-level curriculum material. Although some students reported problems with knowledge and skills they had missed out on, these concerns were generally minor and tended to diminish as the student advanced through the school.

- *I work harder especially when I was doing School Certificate. I felt it was more important.*
- *You just sort of click onto things when you go over it in the 5th form.*
- *Say in the 6th form, most people have forgotten what it is so you can go through it from the start anyway. It's not too hard to pick it all up.*

Students reported that the most significant change on entering the accelerate programme was getting used to being in a class with older students.

- *The only little problem was mixing with the older students right at the start.*
- *There is a bit of a social aspect. You feel a bit inferior to the older students. It's not so bad now but in the beginning it felt pretty stink.*
- *You are younger than the other students so you don't tend to ask as many questions as you would have.*
- *I think if you don't understand something it's harder to say, 'No I don't understand, can you explain it again,' because people just say 'Oh it's so easy, go back to the 4th form'.*

Due to the small number of students taking part in the programme, there are no stand alone accelerate classes. All accelerate students are integrated into normal mixed level classes at the higher level. As a result of this, the speed and pedagogy of curriculum delivery is not generally adapted to meet the needs of the accelerated students. This has been identified in the literature as a potential problem with grade skipping students, but only one student felt that the speed of delivery was a problem.

- *Once you get up to doing the same work as everyone else you get stuck with the same problem of people who still don't understand it after the third time that you have gone through it and so you get bored again, especially in stats - that was a bad one for getting bored in.*

Due to subject choices and timetable constraints it is not always possible to place all the accelerated students in the same class in the senior school. In year 10 however, all of the accelerated students are placed in the same class with older non-accelerated students. Participants felt that this helped to create a better learning environment for them.

- *It's a little quieter and the other students want to do well, more than people in other classes.*
- *I don't get as distracted as easily and I enjoy it more than my other classes. I like maths and the teacher is excellent.*

6.2.6 The role of the teacher.

Group members reported that teachers of accelerated students generally treat them the same as non-accelerated students in the class and did not feel that they were required to answer questions more frequently than other non-accelerate students. It was also commonly perceived that the better teachers were allocated to classes with accelerated students in them. I asked the students to describe the attributes of a good teacher of accelerated students.

- *I think the teacher needs to be aware that there may be some bits that we might need to go over.*
- *They have to be willing to keep accelerating you if you find the work easy.*

6.2.7 Friendships.

Participants reported that they had a wide circle of friends including both accelerated and non-accelerated friends. This may be due to the small numbers involved in the programme and the fact that there are no standalone accelerate classes resulting in more opportunity for interaction between accelerate and non-accelerate students. Participants felt that there was generally a good relationship between accelerate and non-accelerate students with any comments passed being light-hearted and good-natured. Students also felt that their friendship base had remained very much the same and in general was not affected by being in the programme.

- *My friends are still the same even though I'm doing this programme, which is good. They don't even tease me but treat me like everybody else is treated.*
- *It hasn't affected other friendships at all. They may give me a hard time but only jokingly.*

The majority of participants reported that most of their friends are at the same chronological level as them. When I asked the group whether they had made any older friends in the higher-level classes, participants expressed a range of responses. Some students reported that they had no problems making friends with older students while others felt that, although they were not completely ostracised, their relationships with older students are of a different nature.

- *It's a little bit easier making friends with people in your own year level because you have known them for longer, but it's not that difficult if you want to make friends with someone out of the higher level class who is not in the accelerate programme.*
- *Although I've got friends in the 6th form they are just classmates. I still hang around with all of my 5th form friends.*
- *I have no problems in the maths class. I have a good friend from my year level but have little contact with the others.*
- *People talk to me but it's not on a friendship level.*

Students perceived that these problems diminished as they got older and spent more time in classes with older students. However, participants always appreciated having other accelerate students in their higher-level classes.

- *When you move up a level you've still got the friends from the year before in your class so it is like a transition.*
- *It's helpful being in a class with an accelerate friend.*

Some of the year 11 students who are in a year 12 class, reported feeling a little uncomfortable because they were still in uniform while the year 12 students were allowed to wear mufti. This generally did not seem to be a significant problem.

Two of the students who had been completely moved up a grade in all their subjects did report having to make some significant changes to their circle of friends because of their involvement in the acceleration programme. These students reported that

although their circle of friends had changed since they had been accelerated, this had more to do with the fact that they no longer had much contact with their old friends and that they had simply drifted apart. They rejected the notion that their old friends didn't want anything to do with them now they were accelerated. This problem has possibly arisen because of the small number of students who are accelerated in all subjects.

- *I had to make a whole new lot of friends because I skipped 4th form completely in all my subjects. We were friends for a while but then we just drifted apart. We had nothing in common really.*
- *I skipped 6th form and decided to do 7th form this year and I don't have classes with my good friends anymore. I don't really see them unless I go at interval and stuff. I'm still friends with some of the 6th form accelerate students who are in my 7th form subjects but it's a bit tough because they kinda resent me. I've made new friends with some of the other 7th formers.*

Interestingly when I mistakenly called these two students '6th formers' they were adamant that they were 7th formers even though they were only year 12 students. They clearly identified with the older students rather than with students of their own age.

6.2.8 *Interest and attitudes towards mathematics.*

The biggest differences in views between the junior and senior students arose in the discussion about their interests and attitudes towards mathematics. The seniors seemed quite negative and reported that they were less interested in mathematics since their involvement in the programme.

- *I'm less interested because it is heaps harder. The reason I liked maths before was because I was good at it.*
- *I'm less interested. When I first started doing the acceleration thing I quite liked it but now I'm getting a bit sick of it.*
- *I thought it would be kinda interesting but it's still maths. The maths isn't cool because it's harder. It would be nice to do some interesting maths. If it's just established, main-stream, normal school qualification type stuff then... I mean if you don't like maths then you are still not going to like maths.*
- *Because I did stats last year and I'm doing calc this year I think I've done too much maths and I'm getting sick of it and my grade is going down because of that.*

A number of students did not enjoy taking the Bursary statistics course in year 12.

- *Doing stats last year made me a bit bored with maths. I was looking forward to doing calculus this year.*
- *My interest has changed. I was more interested in 4th and 5th form because it got a lot harder and a lot more challenging but last year statistics was just not my kind of thing. This year I'm doing calculus and it's more structured. It's more my kind of thing.*

In contrast to the views of the seniors the majority of the juniors appeared to be more positive and more interested in mathematics. Their increase in interest seems to be related to the higher expectations they have of themselves, rather than the new level of mathematics they were being exposed to.

- *I take it more seriously. Now that we are accelerated we have more potential.*
- *More interested to do well because you are at a higher level so more interested to achieve.*
- *More interested because I took it more seriously especially my maths last year because it was for School Certificate.*

These views were held by the majority of the focus group, although two students did indicate that their interest had not changed significantly.

6.2.9 Future career goals.

The junior students generally had no clear ideas about future career paths, although one student thought of going into a chemistry related field. The seniors, on the other hand, had more definite plans, with students indicating that they were going into the arts, fashion design, health science, ornithology, law and environmental science. One student felt that being accelerated in maths could help them avoid doing maths in their university degree.

- *I'm going into architecture so if I get a good mark this year I won't have to do any more maths.*

Only one student indicated that they were definitely interested in doing maths at a university level, planning to complete a maths and science degree. Another student

felt that although their involvement in the acceleration programme had not determined their future career it would certainly prove useful in the long run.

- *I want to be a CEO of a large company or a highly efficient and productive dairy farmer, so being accelerated in maths will probably help.*

Most felt that their career paths have not changed because of being involved in the accelerated programme.

- *I would still do exactly the same career path. I don't think being accelerated has changed that.*

6.3 Discussion and conclusions.

The majority of focus group participants reported that their prime motivation for being involved in the acceleration programme was to reduce the high levels of boredom that many had experienced in their study of mathematics, prior to their involvement in the programme. Nearly all students felt that the current year 9 curriculum was not challenging enough and they had been looking forward to the challenge of working at a higher curriculum level once they entered the programme. Interestingly, students reported that they were not involved in the programme in order to secure Scholarships in year 13. The majority of students do not repeat their year 12 Bursary mathematics course in year 13, preferring instead to take another Bursary course and broaden their academic base. Two students who had been grade skipped in all their subjects were intending to complete their secondary schooling in 4 years, rather than returning to try and secure scholarship passes in year 13. These views and actions are consistent with the goals of the programme as stated by the school.

The students were divided on the issue of the schools motivation for having an acceleration programme. Seniors generally felt that the school found it easier to teach the general classes if the more able students were removed and catered for elsewhere. Senior students also felt that if the accelerated students did well in the external exams, then the school would be seen in a more favourable light by the wider school community. In contrast to this view the juniors felt that the school's motivation for

having a programme was to maximise the learning potential of the individual students.

Students enjoyed working at a higher level and appreciated that they could revert back to their normal year level studies if they found the work level too difficult. They did indicate that there was a danger in approaching a particular course without a high level of commitment. They cautioned that if students abandoned their efforts, vowing to recommit to their studies the following year, then it might be difficult to change this mindset. Students also appreciated the opportunity to take a year level course one year early, which spread out the sitting of external exams and helped them become familiar with the assessment systems of the higher level.

Participants would like the acceleration programme extended to incorporate the year 10 curriculum in year 9. Students were aware that this would require students to be assessed prior to starting secondary school. In conflict with this view, participants were critical of the current selection procedure which they perceive is based solely on the 3rd form exam, stating that potential accelerates as well as teachers have a role to play in the selection procedure and that the assessment should be based on a whole year's work. It is interesting to note that the students' perceptions are consistent with research on the identification of gifted and talented students (e.g. Ramos-Ford & Gardner, 1997; Renzulli, Reis & Smith, 1981; Trost, 1993).

Pressure from parents and teachers to perform were seen as negative consequences of involvement in the programme. One student reported that their marks had gone down since they had been in the programme and several felt that, although they probably would have been more bored, they may ultimately have secured higher marks if they had not been involved in the programme. Despite the concerns, students expressed the view that they were not involved in the programme solely to get the highest possible marks and all participants claimed that the programme had been highly beneficial to their learning.

There appeared to be no significant concerns raised about year 10 students missing out on the year 10 curriculum and also having to cope with reduced curriculum delivery time. Students reported only minor problems with gaps in knowledge and

workload. They were generally comfortable about being in a class with older students but appreciate having other same-age accelerated students in their classes. Despite this relaxed relationship between accelerated and non-accelerated students, participants reported that the majority of their friends were generally in the same chronological year group as them and felt that involvement in the programme had little, if any effect, on their friendship base. The only exceptions to this view were the two students who had been grade skipped in all subjects. These students had made a whole new circle of friends in their new year level claiming that they had had little opportunity to mix with their old friends and had simply grown apart.

Most participants felt that their chosen career path had not been affected by their involvement in the programme. They expressed interest in a wide range of possible career areas with only one student expressing an interest in pursuing mathematics at university.

It is interesting to note that senior students, on the whole, felt that the acceleration programme had a negative impact on their interests and attitudes towards mathematics. These views are in contrast to the generally positive views held by junior students. It appears that the programme has a positive effect during years 10 and 11 and this may be due, in part, to a reduction in boredom as students are provided with a more challenging course. This effect does not seem to flow into years 12 and 13.

Chapter 7: School D

7.1 Overview of School D.

School D is a small co-educational school in a satellite suburb of a provincial city. The school describes itself as providing a supportive environment for all levels of learning epitomised in the school motto 'We Care'. An emphasis on producing well-rounded students with a strong academic base is evidenced by the majority of the top awards in the school being for all round excellence rather than first in a subject. The school prides itself on challenging students to reach their individual potential rather than competing with one another for top honours. This strong learning orientation is characterised by a line of a poem that the school Principal reads out in assembly at the start of each year; "I choose to excel, not compete".

The new HOD mathematics has inherited a well-established acceleration programme that has been in place for the last eight years. Students are pre-tested at the end of year 8 and student information is also obtained from the feeder schools. The pre-testing has recently been reviewed and the school is now using a series of overseas tests to assess students' ability in maths, English and science. The information gathered is used to select a top stream and a bottom stream year 9 class. The other three year 9 classes are non-streamed mixed ability classes. The top stream class remains together for all its' core subjects in year 9 and 10 and are accelerated in mathematics to cover the year 9, 10 and 11 curricula in two years. This class also receives advanced level work in other subjects but mathematics is the only School Certificate exam sat at the end of year 10.

At the end of the first term in year 10, students who teachers perceive are not coping with the programme are removed and placed in another form class. There are, however, a small number of students who complete year 9 and 10 of the acceleration programme but, in consultation with their parents, teacher and dean, do not sit the School Certificate exam. Participants are informed that they must score 75% or greater in the School Certificate exam before they may continue with the acceleration programme. In reality this cut-off point varies from year to year based on teachers' professional judgements of the relative difficulty of the exam. In recent years the

school has been questioning the number of students it allows to take part in the programme. Last year only 7 out of the 28 students sitting School Certificate from year 10 passed the revised cut-off mark of 65%. Accelerated students complete the 6th Form Certificate course in year 11 and must score a grade 5 or better before they can continue. Students who do not continue with the programme repeat the appropriate year level course.

In year 12 students may choose between one of the Bursary statistics and calculus courses with the large majority of the students choosing statistics. In year 13 some students repeat their year 12 Bursary maths course, attempting to increase their mark, although students who have received high marks in year 12 tend not to repeat the subject again. Some students decide to take the alternate Bursary maths course and a few do both maths courses in year 13. Throughout the programme, accelerate maths students have the same number of maths periods as non-accelerated students at the same curriculum level.

The accelerate programme was originally developed to motivate and challenge brighter students. The school does not see securing individual Scholarships as a prime objective of the programme. The Principal indicated that in an effort to provide students with a broader base in the senior school the programme might actually hinder students' attempts to secure Scholarships. This is because many of the able students take an alternative subject in year 13 rather than repeating their year 12 maths course trying to secure a higher mark.

7.2 Student perceptions.

7.2.1 Selection procedures and attributes of an accelerate student.

All focus group participants claimed that they were not asked whether they wanted to take part in the accelerate programme. They reported that if you were in the top streamed year 9 class then you automatically went into the acceleration programme.

- *We got put in that class. We didn't really get a choice.*

- *We weren't asked if we wanted to do School Certificate in the 4th form,*
- *They made me. They put me in the class and I didn't want to leave as my friends were in it.*

I asked the students whether they knew how the top stream class was selected. Most felt that selection was based solely on the pre-test that students had sat at the end of the year 8. There was general criticism of this procedure and it was suggested that other selection tools should also be used. It was also quite strongly recommended that students should be asked if they wanted to take part in the programme.

- *They should assess the whole year because not all people are good at tests.*
- *Should look at their attitudes. Some people are intelligent but they can't be bothered doing it.*
- *The teachers know who the able students are.*

Participants were aware of some students who had dropped out of the programme during year 10, but felt this was the students' choice, rather than intervention from the school. There seemed to be little awareness that the programme had actually started in year 9 and that the school was monitoring students' abilities and attitudes during year 9 and in the start of year 10, removing students as appropriate. Participants perceive that there is no negative feeling towards students who do not complete the programme and, generally felt that the fault lay with the selection procedure rather than the students.

- *Some people shouldn't have been put in the acceleration class because they clearly couldn't cope with the work.*

To succeed in the acceleration programme students felt that they had to be able, motivated and hard working.

- *You have to be pretty bright just to keep up but you have to work hard.*

However students did perceive that some of the more able students had to do less work to maintain a satisfactory achievement level. Participants warned potential students against becoming 'big-headed' just because they had been selected for the

programme and emphasised that motivation and a good work ethic were critical to success.

- *Just because everyone is telling you you're smart, you're not exactly smart. You've still got to work hard.*
- *Some people in our class who were really brainy in the 3rd and 4th form just kinda gave up and now one of them is doing School Cert for the third time.*

7.2.2 Purpose of acceleration programme.

When asked why students were taking part in the acceleration programme, participants said that the decision to be involved was taken out of their hands. They were just put in the top stream class and many of them did not realise the implications of being in this class until year 10. Since students felt they had been left out of the decision making process, many do not seem to have identified an internal motivation for taking part in the programme. This was particularly true of the junior students and many of them looked quite surprised when I asked them why they were taking part. For them the answer seemed obvious. They were taking part because they had been put in the top class.

Students did seem happy to continue with the programme and although they could identify positive outcomes these tended to be consequences of, rather than motivations for, being involved in the programme. Only a small number of the senior students had reflected on their motivation for taking part in the programme.

- *So you can get a second chance at Bursary.*
- *I thought it was a good idea because I can do the 7th form maths over two years instead of one. Sort of spreads it out.*

Aiming to increase their Bursary mark, securing Scholarships or broadening their subject base at the Bursary level were mentioned by only one or two of the senior students as prime motivations for being involved in the programme.

Even though the opportunity to repeat a Bursary subject had only been identified as a prime motivator by one or two students, it certainly was strongly identified by the seniors as being one of the positive outcomes of involvement in the programme.

- *I know I wouldn't have done as well this year in stats if I hadn't done it last year because you know some of the work and you don't need to study quite as hard. You did it but you didn't know why you were doing it. This year you know why.*
- *In the first year you get halfway but in the second year you click better.*

I questioned them, about what the school's motivation for having an acceleration programme in place might be. To enhance students' learning and to prevent students from being held back was a common theme for both the seniors and the juniors.

- *It's probably for the student because it's easier to work when you are surrounded by people that are at your level or close to your level.*
- *So you don't waste a year I suppose.*

The seniors also felt that it was necessary for the school to have an acceleration programme so that they could compete with other schools in the area, both in terms of student numbers and student achievement. Students thought that this was a reasonable justification for the programme and that all schools would think along these lines.

- *It's because all schools do it so they would look pretty bad if they didn't.*
- *So people don't go to another school.*

7.2.3 The challenge of working at a higher level.

The opportunity to attempt to study at a higher level, with the safety net option of reverting back to a normal year level course if they found the work too difficult, was identified by many students as an attractive feature of the programme. For a few of the students they felt this was not just a possibility but a probability. By their own admission, they felt that they were not very able mathematicians and perceive that taking part in the programme might increase their chances of passing a given year level course the second time around.

- *If in the 6th form doing Bursary you do really badly then it doesn't matter you can just do it again.*

- *We get two chances and we don't get embarrassed if we have to sit it again.*

A number of the participants had repeated a year level course because they had not secured the necessary marks to continue and in most cases felt they had benefited from their acceleration experience. A number of the students who were repeating subjects felt that they were bored at times, although other students in similar circumstances did not feel excessive boredom was a major problem.

- *I felt because I did 5th form twice that I understood the maths really well. Other people kept getting left behind.*
- *The second year doing School Certificate maths is like revising everything you learnt last year. Maths is way easier and I don't find it a struggle at all.*

One of the students who was involved in the programme during year 10 but repeated their School Certificate year, felt it was a mistake for them to be involved in the programme.

- *It was a mistake for me to do this programme because I found maths too hard and so I stopped caring.*

Students also perceived the opportunity to work at a higher level a year earlier than normal as a positive feature of the programme, because it gave them a preview of the workload and academic level required for their other subjects in following year at school.

- *Having an exam in 4th form is good practice for 5th form. I think it prepared me really well.*
- *Having done stats in 6th form helped with calculus this year, especially the algebra.*

7.2.4 Higher expectations of accelerated students.

Higher than usual expectations from teachers and parents were seen as a negative outcomes of involvement in the programme. Students perceive that there is quite a lot of pressure for them to perform academically.

- *We were constantly reminded that we were doing two years in one and we needed to work harder.*
- *They always say 'If you've done it before then you should be doing better.'*
- *Or 'you're doing it a year early so you should be doing so much more work to keep up.'*
- *And even if you did pass they went on about it. 'Oh you made these stupid mistakes.'*

At times students felt that a higher standard of behaviour was expected of them than of similarly aged non-accelerate students.

- *People have different expectation of what you should be doing than they do of normal students.*
- *Sometimes they told you off for things that had nothing to do with being accelerated. Like 'You shouldn't be so rowdy because you're in the top maths class.'*

Accelerate students are required to score 75% in the School Certificate exam before they can proceed into the 6th Form Certificate course. Non-accelerate students only require 50%. Students were critical of this difference in the required mark claiming that it was unfair.

- *I don't like it that you have to get 75% or over to go up. I think it should be if you pass then you go up to the 6th form.*
- *There are people who get 51% and they go through and do the 6th form so why not us.*

7.2.5 Competitive environment.

Comments from participants within this study indicated that school D had more of a learning oriented rather than a performance oriented environment. Students are oriented towards achieving a sense of mastery based on self referenced standards and there appeared to be little competition between students at most year levels. The exception to this is at the 6th Form Certificate level where it was clearly recognised by the students that grades are allocated from a rank list.

- *It's more competitive in 6th form because it's ranked. You've only got to get better than everybody else. It doesn't actually matter what your mark is.*

Most of the students were quite critical of this system of allocating 6th form grades, although they did recognise that this is beyond the control of the school. For most of the year 10 students, their primary goal was to get over the 75% boundary that allowed them to advance to the 6th form. At the Bursary level there seemed to be little competition for the top awards in the school. Students perceive that the top awards are heavily influenced by teacher recommendations and that marks during the year are not a significant factor in deciding who receives these awards. Consequently it appears that only a very few of the most able students compete with each other for the top academic award. The majority of students reported that they were primarily concerned with their end of year Bursary mark.

- *People don't care that much about the certificates because the teacher bias comes into it. All that really matters is your Bursary mark at the end of the year.*

There was also criticism of the externally determined scaling system for the Bursary exams. It was felt that you should receive the mark you scored in the exam and that the marks should not be scaled so that a pre-determined number of A Bursaries are given out. This is a further indication of the strong learning orientation of the students

- *I think it's unfair. It doesn't really matter if everyone else in the country gets an A Bursary as long as you get one as well.*

7.2.6 *Life in an accelerate classroom.*

The junior students reported that they needed to increase their workload in year 10. For some of the more able students this posed no significant problems, but some students found the increased workload very hard to cope with. This perception seemed to be quite prevalent amongst students within the group who have repeated their School Certificate year. Some also indicated that they found the speed of curriculum delivery too fast and they felt that their knowledge and skill base had suffered as a result.

- *I haven't picked up some skills from 3rd and 4th form because it was done too fast.*

All junior accelerated students appreciated the enhanced learning environment in their maths class saying that the class was more focused and there were fewer disruptions. They commented on the advantages of being surrounded by students of similar ability. Students also perceived that the purposeful classroom environment has increased their work and study skills as well as their self-confidence. Many felt this had a positive effect on their other subjects.

- *Everyone wants to work in maths. If someone is disruptive then everyone tells them to shut up because we want to learn.*
- *It's really good to have people who are the same level as you so you can bounce ideas off them.*
- *Even in the other subjects that you haven't been put up in, it still helps to be in the upper class because you do higher-level material. You also pick up other things that help you to get through next year as well.*

As with any small school there were some problems with timetable restrictions for multi-level students.

- *The problem I found was subject clashes. You can't do some subjects because your 6th form subject clashes with it.*

Since the year 9 and 10 accelerate students are in standalone maths classes it is not until year 11 that they are in classes with older students. Most indicated that, although it took them a while to feel comfortable in the class, there were no significant barriers to interacting with older students. The only minor problem was the perceived competition between students for 6th Form Certificate grade allocation.

- *It doesn't really bother me in my 6th form class. ... I don't think we see each other as a different level or anything. We are just doing 6th form.*
- *Some of them see us as a bit of a threat because in the 6th form class you are competing with them for grades.*

The senior students initially claimed that there were no significant problems interacting with older students in their classes.

- *You're working ahead so you're always getting along with people older than you anyway.*
- *They don't seem that much older.*

But during the interview participants eluded to the fact that not all interactions are harmonious.

- *I had four other accelerated students in my class and we did really well. The 7th formers who didn't get as high were like 'well you don't have all the other subjects to think about'.*
- *I was the only 6th former in my stats class. Some of my 7th form friends in the class got quite competitive. 'You shouldn't be doing better than us because you're a 6th former.'*

7.2.7 *The role of the teacher.*

The role of the teacher appears to be influential in the students' success in the programme. Students perceive that the school allocates its best teachers to the accelerated classes. Both seniors and juniors spoke of teachers who they felt had been highly supportive of their learning.

- *It was probably because of our teacher. He was the kind of teacher that made you feel that you weren't doing work even though you were.*
- *He didn't make it sound like work. He made it sound like everyday life.*
- *He wanted us to succeed. Wanted us to do well. He was always there for us before school, after school, lunchtime.*

In contrast, participants were quite critical of teachers who they felt were not supportive

- *One teacher we had just used to put notes on the board and then leave for most of the period. I felt pretty restricted by that.*
- *You didn't care because they didn't seem to care.*
- *Some of the teachers need to be a bit more accepting of the younger students. One teacher I had didn't believe there should be 5th formers in 6th form classes. I didn't do very well at 6th form.*

Students felt that the teachers did not ask more questions of the accelerate students than the non-accelerate students. One student thought that they were asked questions less often arguing that:

- *They ask the people who are not likely to know so they can explain it again.*

7.2.8 Friendships.

Students reported that, at times, there appeared to be some tension between accelerate students and non-accelerated students. Many of the comments made to accelerate students were good natured, but some were not. Both senior and junior students reported that negative experiences seem to be more prevalent in the junior years.

- *Labelled a nerd.*
- *We get called the brainy class. The nerd class.*

Most of the juniors reported that their friends tend to be other accelerate students in their class. Many of them have been together in the same class since intermediate school and felt that they share common ideas and have similar goals.

- *I wouldn't say we were arrogant but we did kinda stick together during our 3rd and 4th form years.*
- *You usually pick friends because they have got the same kinda intellect as you. It's hard to have a really intelligent conversation with someone in the bottom class because they are not up to the same level as you.*
- *It's pretty frustrating if you say stuff to them and it goes over their head all the time.*

The senior students reported that by year 12 their circle of friends had usually widened to include both older students and other same age non-accelerated students. At times, these comments seemed to contradict their earlier comments about problems they had experienced interacting with older students. The relatively small size of the school may increase the interaction between senior students and help to facilitate closer bonds between them out of the classroom.

- *If you know them through other things you can talk to them.*

- *There are a lot of activities that you can get involved in with 7th formers, not just sport and stuff.*

7.2.9 *Interest and attitudes towards mathematics.*

I asked the students whether they felt being in the acceleration programme had any effect on their interest or attitudes towards mathematics. One senior student felt that there was a relationship but felt that student interest determined success in the programme.

- *I think it works the other way around. If you are keener on maths then you'll not just get into the acceleration programme, you're going to be good at it.*

For the other senior students there seemed to be a wide range of opinions and attitudes towards mathematics, but, in most instances, students reported that their interest had not changed significantly due to involvement in the programme.

- *Maths was always my favourite subject. I've always been pretty good at it.*
- *Maths was always my worst subject.*
- *I hated it, but I did it anyway. I still hate maths.*

With junior students their interest in mathematics seemed to fluctuate more. One student's interest had increased because they were repeating School Certificate mathematics.

- *Probably increased because last year I failed and this year I want to pass. ... Last year I knew I wouldn't pass so I just stopped caring.*

Another student's interest had waned this year because they did not like the internally assessed structure in the 6th form, although this comment seems to be more concerned with the structure of the national 6th Form Certificate programme rather than the school's acceleration programme. There was an indication that some of the juniors felt that their year 10 course was a little too rushed and this has affected their interest.

- *Less interested because...now it's just really quick because we've only got a year and everyone else has two.*

7.2.10 Future career goals.

Most students felt that being involved in the acceleration programme has not affected their choice of future career. Some did comment, however, that being involved in the programme may make it easier for them to achieve their goal.

- *Being accelerated in maths, your career options are much broader because you can achieve higher marks to get into any university course you want to.*
- *Accelerated maths hasn't changed my decision but I did think that if I got through to the 6th form that I could have enough subject options to do statistics and calculus over two years.*

Although no students indicated that they were going to study maths at university, they thought their chosen fields would certainly benefit from a sound mathematical base. Future career areas include: sciences, ecology, engineering, biological sciences, psychology, physical studies, medicine and accounting. Two students were hoping to study law and another two were intending to become architects.

7.3 Discussion and conclusions.

One of the most significant observations that can be drawn from the experiences related by students, is the impact of not asking them if they wanted to be involved in the acceleration programme. All of the top stream students are automatically placed in the programme without their consultation. It could be suggested that because of this lack of consultation, many students seem to have no clear motivation for taking part in the programme. Of the few who had reflected on their situation, the chance to spread out the Bursary maths courses over two years and the opportunity to repeat a Bursary maths course were identified as motivational factors. The opportunity to work at a higher level without a significant cost to the student in the event of 'failure' was also reported as a motivator by students.

Students appear to be unaware of a number of aspects of the acceleration programme design and monitoring procedures. All of the students reported that the programme started in year 10 when in fact their acceleration had started at the beginning of year

9. Participants also reported that, although they were aware that some students dropped out of the programme early in year 10, they felt that this was solely at the request of the student. They were unaware that the school was constantly monitoring and assessing students' achievement and intervening if they felt a student was unable to cope with the programme.

Although many students had not reflected on their motivation for being involved in the programme, they were able to identify a number of positive outcomes of the programme. Taking a School Certificate subject one year early was seen as a good practice because it allowed you to become familiar with preparing and sitting major external exams earlier than normal. It was felt that this practice was good preparation for students sitting the rest of their School Certificate courses in the following year. This effect continued through the rest of the students' secondary schooling as students sat 6th Form Certificate and Bursary courses earlier than usual.

Although students reported that the relationship between accelerate and non-accelerate students in general seemed harmonious, some interactions between the two groups are perceived by the participants to be negative. This seemed to be more prevalent during a student's junior years and seemed to diminish as students got older. There were, however, comments passed by some of the senior students that indicated that their inclusion in a higher-level class was not always appreciated by older students and teachers. These comments from the senior students were, at times, in conflict with their perception that they had a large number of friends, both accelerate and non-accelerate, from a number of different levels. This is probably due to a small school environment coupled with a large number of out of class activities resulting in a lot of interaction between senior students. Junior students, on the other hand, tended to interact and make friends with other accelerate students from within their own class. It appears that the students' circle of friends widened, as they got older.

One of the significant problems that students identified with the programme was the difference in expectations between accelerated and non-accelerated students. Participants generally felt that the teachers, the school and other students had a different set of expectations for them than for the other students. This difference in expectations was commented on in terms of academic ability, behaviour, work ethic

and effort, but most significantly in the criteria for promotion from School Certificate to 6th Form Certificate maths. It was commonly felt by the students that it was unfair that the school requires accelerated students to get 75% or better to be allowed to continue on with 6th Form Certificate maths, but only requires non-accelerated students to score 50% or better. The school has taken a philosophical position that unless accelerated students perform well at the School Certificate level then they would be doing those students a disservice by allowing them to advance to the next level and may be jeopardising their Bursary marks in the long-term.

Participants appreciated the supportive environment that they felt the stand-alone accelerated class in years 9 and 10 afforded. Students reported that these classes are more focused and less disruptive than their other classes. They also felt that they picked up a number of generic study skills from these classes that helped them in their other subjects. The role of the teacher seems to be critical to the perceived success of accelerated classes. The teacher needs to feel that the students deserve to be advanced a level and must be actively seen to value the students and believe in their ultimate success. It was also commonly perceived that accelerated classes get the better teachers.

The current acceleration programme involves about 20% of students at the year 9 and 10 level. Both the Principal and the HOD maths are questioning the large number of students entering into the programme, especially in light of the low number of students who score more than the entry mark for 6th Form Certificate course. Although most students reported that the programme has not significantly affected their interest and attitudes towards mathematics, one can only speculate whether their educational needs may have been better served if they had not been accelerated in mathematics. In light of recognised concerns and changes within the educational qualification system within New Zealand, the school is looking towards adapting the existing programme to be more responsive to individual student needs.

Chapter 8: Discussion and conclusions

8.1 Introduction.

The major goal of this study was to examine accelerate programmes in mathematics within New Zealand secondary schools, from the participant student's point of view. This study gathered information from students about their acceleration experiences in four state secondary schools. There were four areas of primary focus for this study:

- What reasons do students state as primary motivators for participation in accelerate programmes?
- What do they perceive as the outcomes of their participation?
- What do students see as the social/affective issues of being involved in acceleration programmes?
- Do students view their participation in a positive light?

In this chapter, these four areas of focus are discussed in light of the research findings. Implications of the research and suggestions for future research are outlined and finally, conclusions from this research project are presented.

8.2 Student motivators for participation in the programme.

According to the students who participated in this study, there appears to be no single common motivational factor for students taking part in acceleration programmes. There were, however, a number of common factors cited by students from the four schools in the research sample.

The first of these common motivational factors is the opportunity to sit one or more Bursary subjects early in year 12. Two main reasons for appreciating this feature of acceleration programmes were offered. Firstly, in every school there were a number of students who, having successfully passed one or more Bursary subjects in year 12, were looking to take other Bursary subjects in year 13 and hence broaden their subject base. Secondly, in three out of the four schools, students reported that they were

intending to resit their year 12 Bursary subject(s) in an attempt to improve their mark(s) and work towards securing Scholarships.

The frequency with which students stated that they were striving for Scholarships appears to be related to the school's stated purpose for having an accelerate programme in place. Schools A and B both stated that providing an opportunity for students to secure individual Scholarships was a prime reason for having an acceleration programme. In both schools there were a number of students who either reported they were aiming for Scholarships, or stated that they were resitting subjects in an attempt to increase their mark. The research has not provided conclusive evidence but it can be suggested that some of the students who claim that they want to increase their marks may be reticent about claiming to be trying for Scholarships, for fear of appearing too arrogant.

In contrast, schools C and D both stated that securing Scholarships is not a primary goal for their acceleration programmes. At school D only one or two students reported aiming for Scholarships and although a number of students do repeat their year 12 Bursary mathematics course, the students who arguably are in the best position to secure Scholarship passes, namely the students with high marks from year 12, tend not to repeat their year 12 mathematics course. At school C no students expressed an interest in aiming for Scholarships and the majority of students do not repeat their year 12 mathematics course.

Winsley (2000) has identified concerns from some teachers that many accelerated students are not performing at a Scholarship level. They question whether spending two years in a Bursary course to secure a mark in the 60's could be considered 'successful' acceleration. This research has shown, however, that for many participant students, acceleration is not solely about securing Scholarship passes. It remains to be seen whether other programme designs could equally meet the motivational needs of gifted and talented students.

A commonly reported outcome of acceleration programmes from overseas is that they allow students to reduce the amount of time spent in formal education (Stanley, 1996). Two of the schools in the research sample have programmes that give students

the opportunity to complete their secondary school education in only four years. School A has a programme design that allows all its accelerated students potentially to complete their secondary education at the end of year 12. Both the school and the students reported that, despite strong encouragement from the school to stay, many of the high achieving students do leave at the end of year 12. School C has some students who have been placed in a higher grade in all subjects. These students intend to leave at the end of year 12 rather than returning to resit Bursary in year 13.

Despite the above examples the majority of students are not accelerated to a point where they are able to leave secondary school with a full complement of Bursary passes from year 12. A number of participants indicated they felt students were unwise to leave secondary school early, arguing that they should use year 13 to improve on their secondary school qualifications, or broaden their academic base. Accordingly, this research supports Macleod's (1996) view that reducing time spent in formal education is not the primary focus for accelerated students within New Zealand secondary schools. The question remains, if the aim is not to be truly accelerated and hence reduce the time spent in formal education, then it may well be that other types of programmes could be equally, or possibly more beneficial to the learning needs of our gifted and talented students.

A common perception expressed by participants was that attending university a year early would be difficult from a social point of view. They felt that being younger than other university students would make it difficult to socialise and establish a circle of friends. Participants felt that students intending to leave early would be better to remain at school for year 13 so they could attend university in the same year group as their same age peers. This contrasts with findings from overseas research that indicates that students who enter university early experience no medium to long-term problems establishing a wide circle of friends (e.g. Janos et al., 1988; Olszewski-Kubilius, 1998; Robinson, 1996). The majority of students in this study who were intending to leave, or participants' reports of those who had left, indicated that students often work for a year prior to going to university. Therefore students who leave school early may not necessarily lose touch with their established friendship base. With the advent of increased tertiary fees and student loans, it may well become

more common for students to want to reduce their time spent in secondary education, so that they can work and save some money for their tertiary education.

The opportunity to work at a higher level, safe in the knowledge that they could always revert back to a normal year level, was seen by participants as an attractive feature of participation in the accelerate programmes studied in this project. Some students stated this as a prime motivation while other students found this to be a valuable outcome of participation in the acceleration programme. Although this project did not examine this issue in great depth, it can be suggested that students perceive this 'safety net' option because it reflects a lack of self-belief in their ability. It may also be thought of as a pre-emptive failure avoidance tactic. In other words students identify that, if they 'fail', then it was always a part of their plan to repeat the subject and hence they have not really 'failed.' They may then possibly claim that 'I was only giving it a go to see what happened. I didn't really think I could do it anyway.'

Students' perceptions of the school's motivation for having an acceleration programme varied. Many students perceived that the prime reason that their school has an acceleration programme is to maximise the learning potential of individual students. For some though, they perceive the school's interests to be more self-serving. A number of participants felt it was easier, from the school's point of view, to teach classes where the very able students have been removed. Others felt that the school was using the success of its high achieving accelerate students to raise its profile in the wider school community. Some students argued that although this did happen, they did not agree that it was the prime reason for the school having an acceleration programme.

8.3 Outcomes.

Participants in this study perceive that parents, teachers and peers tend to have higher expectations of accelerate students than non-accelerate students. These expectations include: higher academic achievements, a better work ethic, higher work-output and a better standard of behaviour. Many participants found these perceived higher

expectations to be motivational factors and increased their workload and effort accordingly. In some instances they felt that this was necessary to repay the faith people had placed in them by selecting them for the acceleration programme. For some students, however, these perceived expectations seemed to be unfair and a number of students reported increased levels of anxiety attempting to meet these higher standards. This research did not examine the expectations of parents, teachers and non-accelerated peers, so it remains unclear whether these groups actually do have significantly higher expectations of accelerate students or whether this is just the perception that students in this research hold.

Despite these feelings, participants reported that their teachers do not call on them to answer more questions in class than non-accelerated students. They feel they are not generally identified by the school as being accelerate students. Participants reported that they are not bullied and the vast majority of dealings with non-accelerated students are generally good-natured.

Undoubtedly there are specific cases of differential treatment between accelerate and non-accelerate students. For example, accelerate students in school D are expected to get a significantly higher mark than non-accelerate students in their School Certificate exam, before they can move on to the 6th Form Certificate course. Students at this school viewed this double standard as unfair, but many who were repeating their School Certificate course reported that they understand the material a lot better than last year and now find maths a lot more relaxed.

Schools tend to set their own mark boundaries for entry into 6th form certificate courses. The 6th Form Certificate regulations, however, allow any year 12 student to sit 6th Form Certificate, regardless of their mark. Based on my experience, many teachers would agree that students who get only 50% in School Certificate generally find 6th Form Certificate very difficult. This research did not, however, examine the accuracy of School Certificate to predict preparedness to work at the next curriculum level. Certainly students who secure high marks in School Certificate are more likely to be prepared to operate at the 6th Form Certificate level but, in my experience, high marks alone in School Certificate may not be a sufficient predictor of future academic success.

Three of the schools in the research sample have clear mark or grade boundaries for their accelerate students that are higher than their normal transition boundaries. The fourth school has no clearly defined policy, but expects a higher than normal standard of achievement from its accelerated students before they are allowed to move to the next curriculum level. According to the schools concerned, these policies are in place to try and ensure that schools are confident that students will be able to study effectively at the higher levels. In practice, many schools may like to set a higher mark boundary for their non-accelerate students, but are concerned about putting themselves in potential conflict situations with parents, or of losing students to other schools.

The opportunity to preview the structure and work level of the courses one year in advance was seen as a positive outcome by all participants in this research. Students highlighted that sitting School Certificate early in one or more subjects introduced them to studying and sitting major external exams without the pressure of needing to do this in all subjects at once. They perceive that many of the study and work skills that they picked up in year 10 helped them to perform better in year 11, when they needed to complete the rest of their School Certificate courses. The effect of previewing higher-level course structures is continued in subsequent years, as students initially grapple with the intricacies of internal assessment in the 6th Form Certificate course and then the demands of Bursary mathematics. Students also felt that working at split-levels helped them to remain familiar with sitting major external exams.

The four schools in the research sample have different approaches to accelerating their students so they can sit the School Certificate mathematics exam at the end of year 10. These range from completing the year 9 and 10 curricula in year 9, to missing out the year 10 curriculum completely. In most instances students reported that there were no significant problems compacting the curriculum. Students generally felt that they needed to increase their workload to accommodate the new material. In most schools, however, there were few significant concerns raised about inferior understanding of the curriculum. Students perceive that any problems tend to be minor and diminish as the students get older. Their perceptions are not supportive

of teacher's concerns about inferior understanding of the curriculum raised in the literature (e.g. Holton & Daniel, 1996; Southern et al., 1993; Townsend, 1996). It should be noted, however, that it may be unrealistic for students to make an informed decision about their own level of understanding of the curriculum.

Students in school A did, however, express some concern about workload pressures. Many felt that the curriculum delivery was too fast and they perceive this resulted in gaps in their knowledge. This research has not uncovered the reasons why students at school A hold different perceptions from the other schools, but we can hypothesise. One contributing factor may well be the school's policy of giving its junior accelerate students considerably less curriculum delivery time than non-accelerate students, although this alone does not appear to be the sole factor. Year 10 accelerate students in school C also have less curriculum time than their non-accelerate peers and they have missed out on the entire year 10 curriculum. Despite these factors, juniors at school C reported that there were no significant problems with lack of knowledge or excessive workload.

No absolute measure of workload was undertaken in this study so it is difficult to know whether school A students are actually working harder than students at other schools. It may be that in an effort to compete with other students at the school, students who are performing towards the bottom of the class may increase their workload and effort to improve their standing. Unfortunately if they do succeed in improving their position in the class, then displaced students may in turn increase their workload to compensate and so the cycle continues.

Another contributing factor may be the strongly performance oriented environment reported by students at school A. Students' perceptions of ability, understanding and workload may be relative. Students who do not perform near the top of the class may feel they have poor ability and understanding. Compared with the top students, they may indeed have less ability and understanding in relative terms, but in absolute terms they may have more than sufficient mastery of the curriculum material. This research did not compare standardised measures of achievement of accelerate students from different schools in the sample. It would be interesting to see if those students from school A, who claim to have a lack of understanding of certain curriculum areas,

score lower than students from other schools in the sample, who do not make this claim.

A good work ethic was highlighted as a positive outcome of participation in the programme. The value of a good work ethic can be seen in students' perceptions of the attributes needed to succeed in the acceleration programme. The majority of students agreed that a potential accelerate student required above average ability, but they also emphasised that ability alone was not sufficient to do well in the programme. A positive work ethic and determination to succeed were highlighted as key attributes for accelerate students. Participants from school A, the students expressing the most concern about high workload levels, were also the students who were the strongest advocates for a positive work ethic being both a prerequisite for success and a major outcome of participation in the programme.

Many students in the research sample reported being bored with the curricula at the junior levels and were looking for more challenging work. A reduction in perceived boredom was often cited as a positive outcome of participation in the acceleration programme in years 10 and 11. Only one of the schools, school B, had an extension or enrichment programme. This programme operated during the students' year 9 course and involved students working on year 9 material from outside the core curriculum. Evidence from this school suggests that participants did not find this programme to be beneficial to their overall learning. Participants reported that the material presented in this course was not harder or challenging, it was just different. This adds weight to the argument presented by Van Tassel-Baska (2000) that any enrichment activity must be at a higher curriculum level, if it is to be considered valuable. As Townsend (1996) argues, *Good acceleration is effective enrichment and effective enrichment demands acceleration* (p.370).

Participants valued teachers they felt had the enthusiasm and skills to maximise their learning. They enjoyed it when the teacher discussed some of the mathematical principles in more depth or used a variety of pedagogical techniques to enhance their learning. They felt that their skills and abilities were being recognised and they were generally treated as if they were one year older. Participants commented that this increased their sense of self-worth and confidence. These views are in accord with

studies by Benbow et al. (1996) in which accelerated students reported that the greatest emotional benefit of acceleration programmes was the acknowledgement of their abilities and increased self-confidence.

There was general agreement amongst students from the participating schools, that being in a standalone accelerate class has distinct advantages over being in a normal class of mixed ability students. Three of the four schools have some standalone accelerate mathematics classes and most students felt these classes were more purposeful and the learning environment was extremely supportive. Students commented that having a class of students with similar ability allowed the teacher to adapt the pace and pedagogy of the curriculum delivery to suit the needs of this special group. These views agree with the commonly accepted curriculum adaptation of gifted and talented learners espoused by Van Tassel-Baska (1993).

The extent to which a school can have standalone accelerate classes is largely determined by the number of students involved in the programme. To achieve standalone classes, especially in the senior school, a large number of students must be accelerated. This is often only practical for large schools. It also raises the question of the reasons behind accelerating large number of students. Is it that we believe that all of those students will benefit from acceleration or are we simply accelerating large numbers so that we can have standalone accelerate classes in the senior school? One of the schools in the research sample currently accelerates about 20% of its year 9 and 10 students. They find that a large number of these students fail to secure the necessary marks to continue with the programme into year 11 and are now questioning their entry criteria into the programme and the number of students whom they accelerate.

Winsley (2000) has reported that whole class acceleration is not the norm in New Zealand. If only small numbers of students are accelerated then what sort of class do they go into in year 10? Do they go into a normal mixed ability year 11 class? If, as Van Tassel-Baska (1993) suggests, gifted learners differ in both the speed and the way they acquire knowledge then it is questionable whether simply putting students up a year will meet the specific learning needs of the gifted and talented student. Accelerated students may work on material that is a year or more ahead of their age

peers but the level, speed and sophistication of pedagogical delivery may not be significantly different from the class they left behind (Holton & Daniel, 1996).

8.4 Social affective issues.

The research literature highlights concerns from practitioners that students who take part in acceleration programmes will suffer from undue stress and may develop social problems (e.g. Kulik & Kulik, 1984; Southern et al., 1989; Swiatek & Benbow, 1991b; Townsend, 1996). Although this research did not evaluate the differences in socio-emotional development between accelerate and non-accelerate students it is interesting to note that there were no reports of any major social or emotional difficulties from participants in any of the acceleration programmes studied.

In general, participants in this study reported little tension between accelerate and non-accelerate students and no participant reported getting 'picked on' or bullied because of their involvement in the programme. The students in this study perceive that, although people are aware they are accelerated, they are not singled out by either the school or the student body as being accelerated. They perceive that the vast majority of comments passed between the two groups are good-natured and light-hearted. Accelerate students perceive that they have a normal adolescent development and are able to take part in any extra-curricula activities that they choose.

It has been suggested in the research literature that students who are accelerated will have difficulty making friends (Holton & Daniel, 1996; Southern & Jones, 1991). Evidence gathered in this research project does not support these claims. All participants report that they have a large number of friends and do not experience any problems forming relationships with other students. Accelerate students in all the research schools perceive that friendships, in general, are not affected by participation in the accelerate programme, yet many of the students, especially the junior students, report that the majority of their friends are also involved in the accelerate programme. There appears to be some relationship between participation in acceleration programmes and friendships, but this research has not provided conclusive evidence

to show whether the acceleration programme has a direct or an indirect affect on students' friendships.

It could be suggested that there is a direct relationship and that students of high ability will naturally make friends with other students of high ability. Perhaps participation in the programme simply increases the contact and interaction time between students of similar intellect. Comments from some students suggesting that it is frustrating trying to have conversations with students who are not on the same intellectual level, tend to reinforce the view that friendships are determined by similarities in intellect. These comments possibly confirm the view that gifted and talented students should spend some time each day with others of similar ability and interests (Riley, 2000).

The balance of the evidence, however, suggests that friendships are determined more by the indirect effect of grouping accelerate students into classes and that students will naturally make friends with other students in their class, regardless of ability level. Some participants claimed that they tend to make friends with other students with whom they have regular contact, regardless of academic ability. Senior students also commented that as they grow older and the number of in-class and out-of-class interactions increase, so their friendship base increases and diversifies to include not only same age non-accelerate students, but also students of other ages as well.

Further support for this view can be seen in the perceptions of students at school C, the school with only a small number of accelerate students and no standalone accelerate classes. Junior participants reported that they tend to mix with other students from within their own age group and usually from their form class. In contrast, the senior students mix with students from a range of age groups and form classes. In both groups participants argue that, although they have a number of friends who are also accelerated, they have a larger number of non-accelerate friends and feel that their friendship base has not been affected by their participation in the accelerate programme.

Participants from all schools commented that in the senior school accelerate students are often in classes with older non-accelerate students. The majority of participants reported that, although it took the first term for them to feel comfortable being in the

class with older students, interactions between accelerate students and older students are generally relaxed. Many of the accelerate students formed relationships with the older non-accelerate students in their classes. At times these relationships were of a different nature and participants reported that the older students were classmates rather than close friends. Perhaps understandingly, participants reported always liking having other same-age accelerate students in their classes and would, at times, make friends with these students in preference to the older students in the class. Increased out of class interaction in the senior school served to increase the friendship base of many accelerate students.

These age related patterns of friendships support the findings of overseas studies, that accelerate students initially formed friendships with other accelerate students, but then later their friendship circle widened to include both same age and older non-accelerated students (e.g. Janos et al., 1988; Olszewski-Kubilius, 1998). Virtually none of the participants could cite a specific example that illustrated a significant problem existed. Since this research was limited to the perceptions of accelerated students, it is not clear how the older non-accelerate students feel about having younger accelerate students in their classes and the effect this may have on the older students' self-esteem and learning. One thing does appear clear, that in general older and non-accelerate students are not refusing to have anything to do with participants in this study simply because they are accelerated. So although the grouping of students and the placing of students in particular classes are affected by inclusion in the programme, friendships in general are not directly affected by participation in the acceleration programme.

8.5 Do students view their participation in a positive light?

Almost without exception, students were pleased that they had taken part in the acceleration programme and felt that it had been beneficial to their learning. Interestingly this included those students who had dropped out of the programme and reverted back to a normal year level course. Three out of the four schools have a number of students who repeat either School Certificate or 6th Form Certificate courses. Participants who had repeated a year did not seem to regret their

involvement in the programme and in general perceive that their involvement has given them an advantage over non-accelerated students. Focus group participants perceive that there is no stigma or ill feeling from either the school or other students towards those who repeat a year.

It appears that consultation with students that schools are proposing to accelerate is an important factor in allowing students to identify individual motivations for taking part in the programme. One school in the research sample did not do this and this was the only school that had students who felt that their participation in the programme had been a mistake. In this school all of the top stream students were automatically accelerated in mathematics. One problem with this practice is that the streamed classes do not necessarily contain all of the top mathematics students. They may contain students who are weak in mathematics but strong in other subjects. This school was also the school that had a large majority of its year 10 accelerate students repeat their School Certificate course. Students should be specifically assessed for all subjects they may be accelerated in, so that their individual needs are identified and efforts are made to meet them.

An examination of this research evidence suggests that participants have a wide range of interests and attitudes towards mathematics and it is interesting to note that it is not just the students with a highly positive view of mathematics who take part in acceleration programmes. The variety of interest in and attitudes towards mathematics was evident, especially in school D. In this school there were students who commented that maths was their favourite subject and there were students who commented that they hated maths. Coincidentally this was also the school that, according to the students, failed to ask them if they wanted to take part in the programme. It was unclear whether all of the students at this school, would have elected to be accelerated if they had been given the option.

It has been suggested that ability grouping for gifted and talented students produces a moderate improvement in attitude towards the subject for which the students are grouped (Kulik & Kulik, 1997; Rogers & Span, 1993). The acceleration programmes studied in this project grouped students of similar ability together to differing degrees, however, an examination of the findings reveals that the majority of students perceive

that their involvement in the acceleration programme has had no significant effect on their interest and attitudes towards mathematics. A few students claimed that their interest had increased slightly or decreased slightly, but few students perceive that the effect has been dramatic. It is also interesting to note that the challenge of being exposed to more demanding mathematics had different effects on different students. Some found the subject more interesting because they had to work much harder to master the material, while other students claim that their interest has waned a little for exactly the same reason. For some their interest had not changed significantly, although they attributed their continued interest in mathematics to their participation in the programme, arguing that if they had not been involved in the programme then they would have become bored and their interest would have suffered as a result. This has been identified within the research literature as a potential outcome of not providing for gifted and talented students (Ministry of Education, 2000).

It has been suggested that students involved in acceleration programmes may suffer burnout as the novelty of inclusion in the programme wears off and the development of other interests competes with students' limited time (Terwilliger & Titus, 1995; Winsley, 2000). Research evidence presented by Swiatek and Benbow (1991b) has challenged this view. This current research has provided inconclusive evidence on this issue and the results are open to differing interpretations. In general, the seniors at school C perceive that the programme had a slightly negative effect on their interest and attitudes towards mathematics. This is in contrast to the generally positive views held by the juniors at this school. It is not clear, from the research evidence, why the seniors hold a different view. Since the students at school C claimed that their main motivation for being involved in the programme was to reduce boredom, perhaps now as seniors their boredom levels have increased and they have lost some motivation for being involved in the programme.

Further evidence concerning burnout can be seen from school A. The juniors reported that they would nearly all be coming back for year 13 studies, but many of the seniors were either considering leaving or had considered leaving at the end of year 12. Some of the senior students also perceive that the pressure they faced as junior students in the acceleration programme has caused a slight loss of motivation in the senior school. What remains unclear is whether this is indicative of burnout or of some other

unidentified factor. In contrast, the other two schools in the research sample showed no difference in attitudes or interests between their junior and senior students and no evidence of loss of student motivation.

This project did not gather information about the perceptions, interest and attitudes towards mathematics of non-accelerated students. It did not compare accelerate students' views prior to and subsequent to participation in the programme to gauge whether students' interests and attitudes changed significantly. Accordingly, it is hard to assess whether the views espoused by participants in this project are significantly different from non-accelerate students or merely reflect the normal range of interests and attitudes towards mathematics.

A number of students commented that their involvement in the programme had a range of positive affects that were not subject specific. The first of these was an increase in self-confidence and self worth. A number of students reported that they felt proud to have been selected for the programme, adding that it felt good to know that other people had confidence in their ability to do well in the programme. A second positive effect was that it heightened students' expectations of future career paths. Participants indicated that they were considering a wide range of future career choices and most were considering some form of tertiary training. Interestingly, few were considering mathematics based careers, although a number were considering careers where a strong mathematical background would be an advantage.

Two things are clear: 1. A high level of interest is not necessarily a prerequisite for success in the programme, although one could hypothesise that the higher the intrinsic level of interest in the subject the more likely one is to succeed and 2. Involvement in mathematics acceleration programmes does not turn all students into passionate mathematicians.

8.6 Implications.

It is important to consider the issues raised in the preceding discussion and their implications for the educational provisions made for gifted and talented students in

secondary schools. The major implication of this research is that the fear held by educational practitioners, that undue stress will cause socio-emotional harm in accelerated students, is not supported by the perceptions and experiences reported by participants in this research. There were no reports of any major social or emotional concerns held by students. Students were happy to have participated in their respective acceleration programmes and felt that they would not have achieved as much if they had not been involved. An implication of this is that teachers and schools should not automatically discount acceleration as a possible provision for meeting the needs of their gifted and talented students based solely on unjustified fears about students' social and emotional wellbeing.

This research also has implications for schools looking to develop or modify their provisions for gifted and talented students. When schools are considering using an acceleration programme, they must address the issue of the proposed goals of the new programme. The current research did not formally examine the schools' motivations and goals of acceleration programmes. However, the schools in the research sample essentially appeared to have two types of goals for their students: 1. long-term goals of either securing Scholarships, or broadening a student's Bursary subject base; or 2. short-term goals of motivating and challenging able students. The question of long and short-term goals is critical to the discussion because they will affect the number and type of students identified as well as the design of the acceleration programme.

If a school only has long-term goals that can only be realised towards the end of a student's secondary education then they should be selecting only those students who they know will be advantaged in the long run by inclusion in the programme, for example, students who will secure an A Bursary, Scholarship or perhaps broaden their senior subject base. In contrast, if a school also has short-term goals for students who participate in the programme then it can afford to accelerate more students, knowing that a large number of them may well not continue with the programme through to the Bursary level.

This research highlights the fact that some students repeat either their School Certificate or 6th Form Certificate courses. Feedback from students suggests that they do not regret being involved in the acceleration programme and indeed feel that it has

given them an advantage over non-accelerate students who took these courses only once. Many perceive that the workload and comprehension of the material is a lot easier the second time around. If taking two years to complete a course does advantage some students, then this may have implications for the number and type of students who are selected for acceleration programmes. Since some students commented that the junior curriculum is often too easy, but find they have difficulty at the Bursary level, perhaps there is scope for programmes that provide students with the opportunity to study at a higher level until they reach a point where they are comfortable to operate academically. There is also scope for programmes that combine enrichment and accelerated experiences as suggested by Van Tassel-Baska (1993). With the new National Certificate in Educational Achievement qualification system starting in 2002, the potential for schools to provide a wider range of possible course options may be increased.

8.7 Further research.

As is common in Masterate research projects, more questions are raised than are answered. This research study is no exception. The following areas identified from the results and implications of this study are suggested for further research:

1. If, as Ames (1992) suggests, a learning orientation promotes long-term, high-quality involvement in learning, then encouraging a strongly performance oriented environment may actually hinder the maximisation of gifted and talented students' learning potential. Further research should be carried out to track students from both strongly learning oriented and performance oriented acceleration programmes and compare their long-term academic success and their future participation in mathematics learning.
2. The introduction of the NCEA in 2002 raises a number of research questions. Firstly, will this change to standards based assessment create a more learning oriented focus in our schools as predicted by Covington (1999)? Secondly, how will the introduction of the NCEA impact on current school accelerate

programmes? Will it provide schools with more flexibility to better cater for the learning needs of our gifted and talented students?

3. This study recognised that some students use acceleration programmes to complete their secondary education in only four years. Why do students leave school after four years? Is it that they feel that they have obtained all that they hoped to from secondary school or are there other reasons? Is the prospect of having a break from their studies and perhaps working and trying to save some money for their tertiary education more appealing than securing Scholarships or broadening their subject base at a Bursary level?
4. The opportunity to secure Scholarships is a stated goal of some acceleration programmes and a motivation factor expressed by some students. Does being accelerated really increase students' chances of securing Scholarships or would they have been better off to stay with their normal year level?
5. Evidence from participants suggests that repeating either School Certificate or 6th Form Certificate courses may make it easier for them to achieve at this level. A controlled study comparing the achievement levels of accelerated students who repeat a year level with other able, but non-accelerated students, could be undertaken to examine the validity of this statement.
6. It would be useful to schools and teachers if more could be found out about those participants in acceleration programmes who do experience problems or drop out of the programme. A case study project could be undertaken to identify the root causes of any socio-developmental problems and to identify whether acceleration has impacted negatively on these students' academic and social development.
7. More research into the provisions for gifted and talented students within secondary schools needs to be done. Recent publications by the Education Review Office (1998) and the Ministry of Education (2000) have provided schools with valuable resources for working with gifted and talented students, but more analysis of the strengths and weaknesses of existing programmes needs

to be undertaken. Of special interest would be programmes that provide individual subject acceleration as well as enrichment activities in an attempt to individualise programmes for gifted and talented students.

8.8 Limitations.

It is important when considering the interpretation of these results that the limitations of this study are emphasised. This research project describes the perceptions and experiences of a relatively small sample of accelerated students from within four different secondary schools in New Zealand. It is not intended that the results of this project can be generalised to other school accelerate programmes. For the findings of this study to be applied to other acceleration programmes would require an underlying assumption that the four participant schools are representative of all New Zealand secondary schools that accelerate students in mathematics. From the description of the research schools and the commentary of the students' perceptions from within those schools, we can see that many of the comments are specific to the individual schools and their current accelerate programmes.

Although there are some similarities in the accelerate programmes, there are also noticeable and major differences in, not only the programme design, but also the philosophy and culture of the schools. Small changes in any of these characteristics may markedly alter the experiences and perceptions of its pupils. The relatively small number of schools also limits the extent to which the findings of this study can be generalised to other accelerate programmes.

It should also be remembered that the data gathered in this research project are the perceptions and experiences as reported by the participants. It is not intended to imply that such perceptions and experiences are a true record of events, circumstances, policies or practices of the participant schools. These are the students' views and should be examined in light of their unique perspective on acceleration programmes, but it should be remembered that someone watching a magician will always have a different perception of what they witness, than the magician themselves.

Focus group interviews are a valuable tool for collecting perceptions, experiences and beliefs (Vaughn et al., 1996; Morgan & Krueger, 1993; Frey & Fontana, 1993). Focus groups provide a situation where the synergy of the group adds to the depth and insight of individual and group views (Anderson, 1990). They are not, however, without their shortcomings, and problems can arise if they are not conducted correctly. An interview schedule was developed to ensure that each interview was conducted in the same manner (Appendix 4). Despite these efforts it must be accepted that the data gathered may not reflect the true views held by the participants. It was noticeable, both in the interview and in the review of the research tapes, that students from one school in particular were reticent in offering their views. The two interviews conducted at the school were done on different days and at different times of the day. We can only hypothesise as to the reason why this was so. Perhaps it was the way the sample of students had been obtained from within the school, or perhaps it was the way the school liaison teacher presented the project to the students. It may have been the room the interview was conducted in or perhaps it has something to do with the culture of the school.

A questionnaire was also developed and given to participants in the focus groups interviewed. The intention of this questionnaire was to provide participants with the opportunity to comment further on any of the questions or concepts touched on in the focus group interview. Participants were asked to send their responses back to the researcher, but data collected from self-selecting tools must always be treated with caution. Accordingly, care was taken when these views and experiences were added to the interview data to ensure that they carried the appropriate weighting and did not overshadow other perceptions and experiences gathered through the focus group interview process.

The analysis of the qualitative research data for this project requires a shared cultural knowledge base that allows for the expansion of that data (Mishler, 1986). To accomplish this the researcher must utilise factual material from other parts of the interview as well as their general knowledge of the situation. Not all statements can be taken at face value and must be judged within the context of the broader discussion. All efforts were made to ensure that this process was carried out as

accurately as possible. The researcher conducted the interview and transcribed the research tapes. Efforts were also made to understand the culture and philosophy of the school and the design of its programme, in as much detail as necessary. However, as Mishler points out, given the nature of the qualitative data gathered, a considerable amount of subjective interpretation is unavoidable.

This research project is intended to provide an overview of the range of possible perceptions of accelerated students experiences within New Zealand secondary schools. The findings of this study contribute to our understanding of the effects of existing acceleration practices from the participant students' point of view. It is hoped that schools might use the findings of this study to help them develop appropriate programmes to meet the needs of their gifted and talented students. To that end, the reader is cautioned to consider the above conclusions and discussion points within the context of the situation from which they were drawn and limit the extent to which they apply the findings of this study to other school acceleration programmes.

This research has not debated whether acceleration should occur, nor has it examined other provisions made for gifted and talented students and compared and contrasted them with established acceleration programmes. This body of research has focussed on the nature of acceleration programmes but one should not forget that there are other options for schools. Accordingly this research should not be read in isolation. It is merely one of the jigsaw pieces and, although each piece is important, the whole picture can only be seen when all of the pieces are put together.

8.9 Conclusion.

The findings of this research study contribute to our understanding of students' perception of their experiences in mathematics acceleration programmes within New Zealand secondary schools. No single motivation for participation in acceleration programmes emerged although a number of common motivational factors were evident.

Many students appreciate the opportunity to study one or more Bursary subjects earlier than their age cohort. Two primary reasons were stated: 1. it allows them to repeat a Bursary subject and try and improve their mark and possibly secure a Scholarship, and 2. it allows them to take more Bursary subjects than normally would be possible and hence broaden their subject base. Reducing the amount of time spent in formal education and the challenge of working at a higher level safe in the knowledge that they could always revert back to their normal year level, were also stated as motivational factors for taking part in acceleration programmes.

Contrary to fears identified by educational practitioners, this research does not support the commonly held belief that students who are accelerated will suffer from undue stress that may hinder their socio-emotional development. Accelerated students in this research project reported no significant concerns about in-class or out of class interactions with non-accelerated students. Students perceive that inclusion in the programme has not affected their friendship base and they reported being comfortable being in classes with older students. Students perceive that they have a normal adolescent social and emotional development.

Coupled with these findings is the fact that, almost without exception, students felt that participation in the acceleration programme had been beneficial to their learning needs. No significant problems with compacting the curriculum or gaps in knowledge were identified by most students in the research sample. Even the students who have repeated either their School Certificate or 6th Form Certificate course perceive that their inclusion in the acceleration programme has given them an advantage over non-accelerate students.

It should be remembered that this research is based on the perspectives of participant students. Accordingly, although the students speak in generally positive terms about their involvement in the acceleration programmes, it is beyond the scope of this research to determine whether alternative programmes may well have been as, if not more, effective than the acceleration programmes studied here.

The results add to a growing body of literature concerning provisions for meeting the educational needs of gifted and talented students within New Zealand secondary

schools. Overall, this study demonstrates students' endorsement of acceleration programmes. Acceleration is perceived as a viable and valuable tool for meeting the educational needs of gifted and talented students within New Zealand secondary schools. The question still remains whether acceleration alone will be sufficient to maximise the learning potential of our most able mathematicians. This research suggests that it will not, and schools are urged to develop individual, cohesive and flexible programmes that will identify and address the many and varied learning needs of all gifted and talented students. Programmes developed around the Renzulli Triad model (Renzulli & Reis, 1986), coupled with individual subject acceleration as appropriate, will allow schools the flexibility to provide for their gifted and talented students, not just in mathematics, but from a multi-disciplinary point of view.

There is also a strong need for a national policy for the education of gifted and talented students and the resources to support it. Only then will schools be able to fulfil their governmental directive and break down barriers to learning by providing an equality of educational opportunities that will enable all students to realise their full potential. Education is a right, not a privilege.

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5. Either you or a friend may have experienced some difficulties, why do you think that was? (Are the problems to do with being able to do the maths or were there other problems? Do you think it was a mistake for them (or you) to be involved in the programme?)

6. Tell me about your friends. (Do you have a different group of friends than FROM before? Is it difficult being in a class with older students? Have you had problems with some of your friendships because of the fact that you have been accelerated?)

7. Has acceleration changed or affected your interest in maths?

8. Do you feel that you would have done as well in maths without being accelerated?

Appendix 2: Information Sheet

A Student's Perspective of the effect of Acceleration in Mathematics in New Zealand Secondary Schools.

INFORMATION SHEET FOR STUDENTS

My name is Peter Rawlins and I am currently doing research for my Masters in Educational Studies in Mathematics. I have been working for the last five years as the Head of the Mathematics Department for a large New Zealand secondary school. My school currently has an acceleration policy and practice in place for Mathematics that enables students to sit School Certificate, Sixth Form Certificate and Bursary earlier than they would have normally.

I have found it enlightening to talk informally to some of the students who have been involved in this programme. Often their experiences are very different than I would have expected as their teacher. Further investigation reveals that there is little current research on acceleration from a student's point of view. It is therefore important to find out what students feel about the acceleration programmes that they are currently involved in. What are the students' experiences and perceptions of these programmes? This research will provide an overview of students' views and will provide schools with a valuable tool to help them assess their current acceleration practices.

You have been invited to take part in this research because you are currently involved in an acceleration programme offered at your school. Participation is voluntary and is independent of any assessment procedures associated with their course of study. In accordance with the requirement of the Massey University Ethics Committee students have the right:

- to decline to participate;
- to refuse to answer any particular questions;
- to withdraw from the study at any time;
- to ask any questions about the study at any time during participation;
- to provide information on the understanding that their name will not be used unless they give permission to the researcher;
- to be given access to a summary of the findings of the study when it is concluded.

During this research students will be invited to take part in a focus group interview. In this interview a group of six to eight students of a similar age and from the same school will be asked to respond to questions posed by the researcher. This format provides students with the opportunity to discuss their experiences of being involved in an acceleration programme in depth. The information gathered will be used in the preparation of a research report. If more than eight students from each year group

elect to be involved in the research then the schools liaison teacher will randomly select the required number of students from those indicating a willingness to be involved. This will ensure that the researcher does not know the names of the students participating in the research

Each focus group interview will last about 45 minutes and a mutually acceptable time will be arranged between their teacher and the participating students. It is intended that this research will not interfere with students' in-class time. Each student will only be asked to take part in one interview.

Interviews will be recorded on audio tape with the permission of the interviewees and I will make transcriptions of the recordings. All information given will remain confidential to the research and any publications resulting from it. The tapes will be held securely and will be destroyed at the completion of the research. Although the students involved in each focus group interview will be aware of the others in their group the names of all students and the schools involved will remain confidential to the researcher and supervisors. Neither the school nor any individuals will be identified either directly or indirectly in verbal or written form. Direct quotes from the interview tapes will be used but students will be assigned pseudonyms to maintain their anonymity. A summary of the research findings will be sent to your school in term four.

If after reading this information sheet you would like to be involved then could they please give your name to your maths teacher at school. If you are randomly selected to take part in the research you will be given a consent form that will need to be signed and returned.

If you have any further questions please contact either me or my supervisors.

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Appendix 3: Consent Form

A Student's Perspective of the effect of Acceleration in Mathematics in
New Zealand Secondary Schools.

CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand I have the right to withdraw from the study at any time and to decline to answer any particular questions.

I agree to provide information to the researcher on the understanding that my name will not be used without my permission.
(The information will be used only for this research and publications arising from this research project).

I agree/do not agree to the interview being audio taped.

I also understand that I have the right to ask for the audio/video tape to be turned off at any time during the interview.

I agree to participate in this study under the conditions set out in the Information Sheet.

Name:

Signed: **student**

..... **parent /guardian**

Date:

Appendix 4: Interview Schedule

Interview Schedule for focus group interviews. (adapted from Vaughn et al. 1996).

Introduction

Welcome and thank you for coming to this focus group. My name is Peter Rawlins and I teach maths. Each of you has been selected because your point of view is important to this study. I know that you are very busy and I greatly appreciate your contribution to this project. This interview is not a test nor in any way should it be viewed as a series of questions with right or wrong answers. Remember I am very interested in what you think and feel. I want to know your opinions on these issues, and I'm certainly not interested in your agreeing with the opinions and feelings of others. There may be times, however, when you do, and it is appropriate for you to let me know that as well. Please feel free to 'talk around' the question. In other words don't be restricted to just answering the question directly. I'd like you to elaborate and to give examples, bring up other issues if you think they are relevant.

Purpose

The purpose of this focus group interview is to determine your perceptions and opinions about your experiences in the acceleration programme that you are involved in.

Guidelines

There are a few guidelines that I would like to ask you to follow during the focus group interview.

1. First, you do not need to speak in any particular order. When you have something to say, please do so.
2. Second, please do not speak while someone else is talking. Sometimes the exchanges get emotional and it is tempting to 'jump in' when someone is talking, but I ask you to refrain from doing so.
3. Third, remember that there are many people in the group and it is important that I obtain the point of view of each one of you.
4. Fourth, you do not need to agree with what everyone or anyone in the group says, but you do need to state your point of view without making any negative comments or 'put downs.'
5. Finally, because we have limited time together, I may need to stop you and redirect our discussion.

With your permission I'm going to tape the interview so that I can concentrate on what you are saying and I'll listen to the tape again later so that I can draw some conclusions about what you have said. Does anybody have any questions? Okay, lets begin.

Questions.

Warm up question. Designed to loosen up the group and make the participants comfortable with the focus group procedure.

1. Do you know how you were selected to be in the programme? Do you think it was because you were hard workers or because you were able mathematicians, or able students?
2. Do you think this is a good way to select students or can you think of a better way?

Research questions.

3. Now that you are in the acceleration programme do you think that you need any special attributes to succeed? Do you need to be an able mathematician or do you just need to be quite good at maths and prepared to work hard?
4. Why are you taking part in the accelerate programme?
5. What do you see as the main purpose of the accelerate programme?
6. Tell me the good things about the acceleration programme. What are the things you like? What is the best thing about being in the accelerated class?
7. What do you see as the negative aspects of being in the accelerate programme?
8. What changes would you like to see happen in the acceleration programme and how do you think these changes will make the programme better?
9. How are things different in your accelerated maths classroom? For example do you work harder than in other subjects? Do you do more homework? Do you find the subject more difficult? If it is more difficult do you find this a challenge? Are the topics taught in a different way? Do you go faster than you did in your other maths class? Do you have more class discussions?
10. What sort of teacher is good for the acceleration class? Do you think that the way the class is taught should be different from the way other sorts of classes are taught and if so how should it be different?
11. Either you may have experienced some difficulties or you might have friends who have had some trouble, why do you think that was? Are the problems to do with being able to do the maths or were there other problems? Do you think it was a mistake for them (or you) to be involved in the programme? Do you think there was a problem with the selection process?
12. Tell me about your friends. Do you have a different group of friends than before? If so do you think this is because of the fact that you are in the accelerate programme? (Is it difficult being in a class with older students?) Have you had problems with some of your friendships because of the fact that you have been accelerated?
13. Has acceleration changed your interest in maths?

14. Do you feel that you would have accomplished as much without being accelerated?
15. What are you hoping to do when you leave school? Are you going to go into an area that will use your maths? Have these aspirations changed because you have been accelerated in maths?
16. (For Junior focus group interview only). Are you going to complete a seventh form year or do you think you will leave at the end of the sixth form?
17. (For senior focus group interview only). Did many of your classmates who were in the accelerate programme leave at the end of the sixth form, if so where did they go? Or are any of you sixth formers thinking of leaving at the end of the year, if so what are you thinking of doing?

Closing questions, designed to summarise the main points.

18. So to wrap up then what do you see as the main advantage of being in the acceleration programme?
19. What do you see as the main disadvantage, if any, of being in the acceleration programme?
20. If someone asked for your advice on whether they should go into the accelerate programme what do you think you would say to them?