

Students' perceptions of their experiences from within acceleration programs in mathematics

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Introduction

The need for specialist provisions for gifted and talented students has been a contentious issue within the New Zealand educational system, a system which traditionally has been characterised by a strong egalitarian view, the 'one size fits all' approach. Some have questioned the need for specialist provisions for this group, arguing that they can 'make it on their own' or that they are already well served by the education system (McAlpine & Reid, 1987). In recent times, however, these views have become moderated with teachers becoming more aware of the consequences of not attending to the needs of this specialist group. '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).

Recent legislative changes have provided New Zealand school board of trustees with a clear direction, requiring schools to 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).

My interest in this controversial area has developed over the 18 years that I was teaching secondary school mathematics. Up until the end of 2002, I had a direct involvement in teaching accelerated students in a number of schools and, as a result, felt I had a good appreciation of the culture within accelerated programs in New Zealand secondary schools. I had a number of concerns about the suitability of acceleration programs for meeting the needs of all of our gifted and talented students but I had also seen a lot of successes. My school was in the process of examining a number of other programs for

meeting their needs and it seemed appropriate, therefore, to have a more in depth look at the strengths and weaknesses of our existing programs. This paper reports on the findings of a research project examining participant students' points of view on accelerated programs in mathematics from four state secondary schools in New Zealand.

Gifted and talented

Let's start our discussion with a brief look at the term 'gifted and talented'. Even among 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.

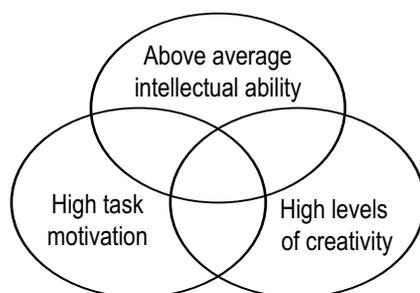


Figure 1. Renzulli, 1986.

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.

Acceleration versus enrichment

The provision of educational programs for gifted and talented students has resulted in two general approaches: acceleration and enrichment. There are a number of varied definitions for these two terms, so for the purposes of the research project reported here, any program that results in student placement in a higher year level, with ability to sit higher level 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 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 thirty 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 points to positive effects both in academic and non-academic areas.

Research within New Zealand indicates that many educational practitioners and parents are concerned that students in acceleration programs are at an unacceptably high risk of suffering social and emotional maladjustment (Townsend, 1996; Townsend & Patrick, 1993). What is not clear is whether the concern relates to the concept of acceleration *per se* or the effectiveness or suitability of existing programs.

Critics of acceleration have argued that it 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. 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. Acceleration programs are often assumed to have the same purpose and end result for all students so that they are all presented with the same material, with little attention paid to individual needs (Townsend, 1996). This denies the uniqueness of talent.

Despite concerns, the research on the effects of acceleration (mostly from the US) suggests that gifted and talented students benefit academically from acceleration and that acceleration poses no direct risk to their social and emotional development (e.g. Benbow et al., 1996; Kulik & Kulik, 1992). Research also amply demonstrates that most gifted and talented children are socially mature with strong personal resources and are unlikely to experience any long term harm (Southern et al., 1993). Apart from individual instances of poor adjustment, which may or may not have been caused by their acceleration, there is considerable evidence to show that the majority of students seem to adapt well to acceleration programs (e.g. Cronbach, 1996; Gallagher, 1996). Moreover, research suggests that children who are gifted but not accelerated exhibit more behaviour problems, feel less comfortable and have poorer attitudes towards school. '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).

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. Despite the large pool of evidence supporting acceleration, it is a relatively unused option in educating gifted and talented students. Much of the reluctance to use acceleration seems to be centred on a common concern that students will be subject to undue stress, or may develop social problems (Townsend, 1996; Townsend & Patrick, 1993). 'Students who are pushed to learn faster sacrifice their childhood on the alter of academic precocity' (Southern & Jones, 1991, p.12). This belief may well be reinforced because extremely gifted students have also been identified as being most at risk of psychosocial harm (e.g. Richardson & Benbow, 1990). Adolescent adjustment should be considered in the context of normal development and it is unlikely

that many young people achieve maturity without taking risks and experiencing setbacks but these may or may not be as a result of their acceleration experiences. If we contrast the overwhelmingly positive research evidence of the effects of acceleration programs with educational practitioner's reluctance to use it, it appears that the issue of whether acceleration is effective is overshadowed by whether it is acceptable.

In recent years schools have been looking at alternatives to acceleration for their gifted and talented mathematicians. As a result, in-class enrichment is now one of the most preferred means of catering for this specialist group. Despite the advantages of catering for individual needs while retaining students within their age cohort, enrichment has also attracted a number of criticisms. Often it seems that everything teachers do outside the normal mathematics curriculum is labelled enrichment (Townsend, 1996).

The design of this research project 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 programs. The project reported here has focussed on the type of acceleration program most commonly found in New Zealand. With the recent move away from using acceleration as a tool for meeting the needs of our gifted and talented students we could be guilty of throwing out the 'baby with the bathwater'. At the very least we need to find out more about acceleration programs particularly from the students point of view.

Methodology

The major goal of the research study reported in this paper was to examine acceleration programs in mathematics within New Zealand secondary schools, from the participant student's point of view.

The four participant schools in this research offered a variety of different acceleration designs and philosophies and were different in size location, decile rating and character. The project did not examine the entry criteria for the acceleration programs, although it should be noted that identification of gifted and talented students is a complex area and beyond the scope of this article.

Since the Australian and New Zealand school year level nomenclature differs by one year (New Zealand Year 9 is Australian Year 8) I have adjusted the year levels to reflect the Australian system. Accordingly all year levels quoted below are as they would be in Australia. In most instances students start secondary school in Year 8 with national qualifications traditionally being sat in Years 10, 11 and 12.

The key details of the program designs for the four schools are summarised in Table 1.

The student participants in this research were chosen because they were representative of the same acceleration experience or knowledge base, not because they represented the general school population. Students who were either currently involved in an acceleration program or who had been involved, but had dropped out of the program, were invited to take part in

Table 1. Key details of the acceleration programs of the four participant schools.

School A	Stand-alone classes at all levels. All students accelerated in Mathematics, Science and English.
School B	Stand-alone classes at Year 8 and 9. Older students in mixed classes. Accelerated in Mathematics and Science (not all in both).
School C	Between 4 and 8 students. Generally only accelerated in Mathematics, although two students accelerated in all subject areas.
School D	Stand-alone classes at Year 8 and 9. Older students in mixed classes. Whole of top stream accelerated in Mathematics.

the project. From all who expressed an interest in involvement in the research a random selection were asked to take part in a series of focus group interviews. There were two focus group interviews of between six and eight students for each school, one at the lower secondary and one at the upper secondary level. The interviews were audio taped with transcripts made of the recording. The data was analysed using a narrative analysis based on a four stages framework developed by Vaughn et al. (1996). This analysis uses direct quotations to support summaries of common themes.

This report will discuss three of the main focus areas of the larger research project namely:

1. What reasons do students state, as primary motivators for participation in acceleration programs?
2. What do students see as the social/affective issues of being involved in acceleration programs?
3. Do students view their participation in a positive light?

Student motivators for participation in the program

Although there was no single motivational factor for students taking part in acceleration programs there are a number of common factors cited by students from the four schools in the research sample.

Many students appreciated the opportunity to study one or more Year 12 subjects earlier than their age cohort. Two primary reasons were stated. Firstly it allowed them to repeat a Year 12 subject and try and improve their mark and possibly secure a scholarship, and secondly, it allowed them to take more Year 12 subjects than normally would be possible and hence broaden their subject base. Many enjoyed the challenge of working at a higher level, safe in the knowledge that they could always revert back to their normal year level if things proved too tough.

‘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.’

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 Year 12 course to secure a mark in the 60s could be considered 'successful' acceleration. However, for many participant students, it appears that acceleration is not solely about securing scholarship passes.

A commonly reported outcome of acceleration programs from overseas is that they allow students to reduce the amount of time spent in formal education. Two of the schools in the research sample have programs that give students the opportunity to complete their secondary school education in only four years. School A has a program design that allows all its accelerated students potentially to complete their secondary education at the end of Year 11. Both the school and the students reported that, despite strong encouragement from the school to stay, many of the high achieving students leave at the end of Year 11. School C has some students that are in a higher grade in all subjects. These students intend to leave at the end of Year 11 rather than returning for a Year 12 course.

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 Year 12 passes from Year 11. A number of participants indicated they felt students were unwise to leave secondary school early, arguing that they should use Year 12 to improve on their secondary school qualifications, or broaden their academic base.

'What's the point of just getting one year ahead anyway, you could broaden out rather than just going up.'

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 programs could be equally, or possibly more, beneficial to the learning needs of our gifted and talented students.

Students' perceptions of the school's motivation for having an acceleration program varied. Many students perceived that the prime reason their school has an acceleration program 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 accelerated students to raise its profile in the wider school community.

Social affective issues

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.

Participants in this study felt that parents, teachers and peers tend to have higher expectations of them including 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 they 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 program.

‘Being put into a program 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.’

Despite these perceptions of higher expectations, participants felt that their teachers do not call on them to answer more questions in class than non-accelerated students, indeed they feel they are not generally identified by the school as being accelerated students.

It should be noted that for a few students 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 accelerated students or whether this is just the perception that students in this research hold.

Participants commented that 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 increasing 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 programs was the acknowledgement of their abilities and increased self-confidence.

Students perceive that inclusion in the program has not affected their friendship base and they reported being comfortable being in classes with older students. The balance of the evidence suggests that friendships are determined more by the indirect effect of grouping accelerated students into classes and that students will naturally make friends with other students in their class, regardless of ability level.

‘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.’

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-accelerated students, but also students of other ages as well. Participants reported that, in

general, they are not bullied because of their inclusion in the program and the vast majority of dealings with non-accelerated students are generally good-natured.

Do students view their participation in a positive light?

Almost without exception, students felt that participation in the acceleration program had been beneficial to their learning needs. Interestingly this included those students who had dropped out of the program and reverted back to a normal year level course. Participants who had repeated a year did not seem to regret their involvement in the program and in general perceived that their involvement had given them an advantage over non-accelerated students.

'I felt because I did Year 10 twice that I understood the maths really well. Other people kept getting left behind.'

For some, their interest in mathematics had not changed significantly, although they attributed their continued interest to their participation in the program, arguing that if they had not been involved in the program 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 is also interesting to note that no significant problems with compacting the curriculum or gaps in knowledge were identified by most students in the research sample.

A number of students reported that they felt proud to have been selected for the program, adding that it felt good to know that other people had confidence in their ability to do well in the program. A second positive effect was that it heightened students' expectations of future career paths. Participants 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: firstly, a high level of interest in mathematics is not necessarily a prerequisite for success in an acceleration program, although one could hypothesise that the higher the intrinsic level of interest in the subject the more likely one is to succeed; and secondly, involvement in mathematics acceleration programs appears unlikely to increase student's innate interest in mathematics.

Implications and conclusions

The major implication of this research is that the fear held by educational practitioners, that undue stress will cause social or emotional harm in accel-

erated students, is not supported by the perceptions and experiences reported by participants in this project. Accordingly, 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. Coupled with these findings is the fact that, almost without exception, students felt that they had benefited academically from their involvement in the acceleration program.

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 program, they must address the issue of the proposed goals of the new program. The current research did not formally examine the schools' motivations and goals of acceleration programs. However, the schools in the research sample essentially appeared to have two types of goals for their students: long-term goals of either securing scholarships, or broadening a student's Year 12 subject base, or short-term goals of motivating and challenging able students.

If a school has only long-term goals, 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 program, for example, students who will secure scholarship passes or perhaps broaden their senior subject base. In contrast, if a school also has short-term goals for students who participate in the program then it can afford to accelerate more students, even though a large number of them may well not continue with the program through to Year 12. Since some students commented that the junior curriculum is often too easy, but find they have difficulty at the more senior levels, perhaps there is scope for programs that provide students with the opportunity to study at a higher level until they reach a point where they are no longer comfortable academically.

This research is based on the perceptions of participant students and should be examined in light of their unique perspective on acceleration programs. Accordingly, although the students speak in generally positive terms about their involvement in the acceleration programs, it is beyond the scope of this research to determine whether alternative programs may well have been as effective, if not more, than the acceleration programs studied here. 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 programs.

As a concluding remark I think it is important to remember that the two main approaches to catering for our gifted and talented students, namely acceleration and enrichment, are not mutually exclusive (Townsend, 1996). 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. The challenge is not to determine which of these two strategies to employ in schools but rather to provide an integrated program that gives flexibility in meeting the learning

needs of a highly varied population. An integrated approach will utilise the strengths of both techniques. Acceleration and enrichment may be regarded as legs that support the same chair, the development of the educational potential of our gifted and talented students.

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