Catering for 'gifted and talented' technology students

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Abstract

In Term One of 2005 it became mandatory for all New Zealand state and state-integrated schools "to show how they are meeting the needs of their gifted and talented learners" (Ministry of Education, 2004, p.6). There is evidence that New Zealand schools are catering for their gifted and talented students in curriculum areas such as mathematics, languages, science and the arts. Are New Zealand schools, however, catering for gifted and talented students in technology, and if so, how is this being achieved?

This article investigates and explores how twenty diverse primary schools from the Auckland region, are catering for their gifted and talented students within the technology curriculum. The definition of the term 'gifted and talented', the criteria of identification, the purpose of the identification, and also the aims and expectations for those identified and discussed. Comparisons are established between the schools in order to understand the nature of gifted and talented technology programmes in New Zealand schools.

Technology Education and Information Communication Technology

Technology education is one of the eight essential learning areas in New Zealand schools (Ministry of Education, 2006). The importance of technology education was reinforced in 1999, when the Ministry of Education made technology education compulsory for all students until the end of year ten (Creech, 1999). Technology in the New Zealand Curriculum (TNZC) identifies technology education as "a planned process designed to develop students' competence and confidence in understanding and using existing technologies and in creating solutions to technological problems" (Ministry of Education, 1995, p.7). Technology education is not limited solely to information and communication technology (ICT) as many people believe (Brown & Vossler, 2000). ICT is expected to be integrated across all areas of the curriculum as

well as being covered in technology where it is only one of seven compulsory technological areas within the TNZC (1995).

The development in Gifted and Talented education

In the last seven years New Zealand education has seen a rise in initiatives to provide relevant and appropriate education for students who are deemed gifted and talented. These initiatives include the publication of the Ministry of Education's handbook, Gifted and Talented Students: *Meeting Their Needs in New Zealand Schools* (Ministry of Education, 2000); the Ministerial Working Party on Gifted Education (Ministry of Education, 2001) and the most recent and influential, a change to the National Administration Guidelines (NAGs). The change in the NAGs highlights the need for relevant New Zealand theory and research that supports the development and implementation of policy and best practice for gifted and talented children in New Zealand schools. Research has been commissioned by the Ministry in order to fulfil the need for theory relevant to the New Zealand setting (Ministry of Education, 2004). This research focusses on approaches to identify and provide for gifted and talented students.

The change in the National Administration Guidelines (NAGs)

Prior to 2005, the NAG1(iii) required schools to be able to show how they were meeting the needs of students who were not achieving; who were at risk of not achieving; and those who had special needs through good quality assessment information (Ministry of Education, 2004). As of Term One 2005 however an alteration was made to NAG 1(iii)c which now states schools are required to identify and meet the needs of students "who have special needs (including gifted and talented students)" (Ministry of Education, 2004, p.6).

The purpose of this research paper is to identify whether schools have fully implemented this requirement (NAG 1 (iii)c) to cater and extend gifted and talented students in the area of technology education. How are technology students being identified as gifted and talented? Is it by the skills and achievement or the passion and drive that a student has for technology? How do technology education programmes, challenge and extend these identified gifted and talented students?

Literature Review

The Ministry of Education (2004), acknowledged that due to the recent implementation of the NAG 1 (iii)c and the low level of awareness of catering for gifted and talented students prior to 2000, there is an increased need for theory and practices to support this requirement.

Defining gifted and talented students in New Zealand schools is very complex. It is acknowledged by the Ministerial Working Party on Gifted Education (2001), and Bailey, Knight & Riley (1995) that it is not possible to have a universal term to define gifted and talented students. The Ministry of Education (2002) does indicate that gifted and talented education is unique, in that New Zealand "recognises that giftedness and talent does mean different things to different communities and cultures, and there is a range of appropriate approaches towards meeting the needs of all such students" (Ministry of Education, 2004, p.9).

The report from the Ministerial Working Party on Gifted Education (Ministry of Education, 2001) states that it is necessary for schools to develop a definition based on that school's environment and cultural influences using the advice stated in the handbook, 'Gifted and Talented Students: Meeting their Needs in New Zealand Schools' (Ministry of Education, 2000). The Ministry of Education (2004) suggests the following definition as a guide for schools:

> "We welcome and celebrate the fact that there are gifted and talented students in all areas of school life – academic, creative, sporting, and social. They come from all backgrounds and show above average ability and/or commitment in one or more areas. They have particular personal and learning needs which we need to identify and nurture, in the same way that we respond to specific needs of other identified groups" (Ministry of Education, 2004, p.11).

From this definition it is apparent that all areas of school life should be catering for the gifted and talented student, including technology education.

A major contributing factor in catering for gifted and talented students in technology education is how to identify a child who is gifted and talented in this area. The Ministry of Education (2000) recognizes the importance of the definitions relating to the identification process of gifted and talented students. Without this definition it is

not possible to have mediation between the identification of learners and the programmes developed later on. Throughout the relevant research it has been stressed that the identification of gifted and talented students should never be sourced from one method only but a number of methods should be used (Ministry of Education, 2000). The report from the Ministerial Working Party on Gifted Education (Ministry of Education, 2001), states that the identification process should start as early as possible, and use a variety of people and methods, such as teacher nomination, rating scales, portfolio assessment and standardised tests (Bailey, Knight & Riley, 1995; Ministry of Education, 2000, 2002, & 2004).

When dealing with the essential learning area of technology education it is vital to remember that the 1995 curriculum statement is composed of seven technological areas. Children may have special abilities in one of these areas and not another. The focus question for teachers is therefore can they be then identified as gifted and talented? "A child may be talented at one aspect of Design and Technology: at making rather than designing or designing wonderful ideas that cannot be made" (Hope, 2004, p.156). Diverse abilities in design may lead people into career choices which support their talents. For example, the person talented at sketching designs may select architecture whilst the practical designer may choose electronic engineering or a career as a chef. It must be acknowledged by teachers of technology that there are not experts in all aspects of design and technology in the workforce, so expecting this in one child is unrealistic.

Technology education also aims to contribute "to the intellectual and practical development of students, as individuals and as informed members of a technological society" (Ministry of Education, 1995, p.7). This is reinforced by Lewin (1994), who expresses a similar view on the extension of gifted and talented students in order to contribute to society through technology education.

The Ministerial Working Party on Gifted Education (2001) states,

> all children have a right to an education that acknowledges and respects their individuality and that offers them maximum opportunities to develop their strengths and abilities. Gifted and talented children will flourish in a society that acknowledges and respects individual difference and recognises and celebrates the abilities of its most able (Ministry of Education, 2001, p.5).

Teachers of technology education should therefore be catering for gifted and talented students.

Methodology

Forty one diverse schools were selected from two zones in the University of Auckland, Faculty of Education, primary school directory booklet. These two zones supplied an assortment of full primary, contributing and intermediate schools. This provided a diverse range of schools with a mixture of decile rankings that were spread over a number of suburbs. By choosing schools from these two zones, variables such as discrimination against decile ranking, prominent ethnicity groups, levels of abilities, and funding and resources were minimised. All forty one schools in the two zones were contacted, with twenty schools' teachers agreeing to be interviewed.

To receive accurate and relevant information about the programmes provided in each school the interview process was directed to the teacher appointed either as head of technology education, or head of the gifted and talented programmes. In those schools where there was no identified teacher responsible for such programmes the interview was undertaken with the principal or deputy principal. In a few of the schools the receptionists were told to respond to the call. This method of research is identified by Leedy (1997) as 'Field study research.' Leedy defines field study research to be a type of research "in which data are gathered directly from individual cases or social or community groups in their natural environment" (Leedy, 1997, p.111). For the purpose of this research paper information was collected in a qualitative manner. This method was selected because it provides rich data and "uses a naturalistic approach that seeks to understand phenomena in context-specific setting" (Hoepfl, 1997, p.1). Information was gathered from individual schools using a structured interview whilst allowing schools individual input into the research. This input "results in a different type of knowledge than do quantitative inquiry" (Hoepfl, 1997, p.2). As the revised National Administrative guideline had only been recently introduced at the time of the interviews, there was little evidence of professional awareness of this and, therefore it required the researcher to "act as the 'human instrument' of data collection" (Hoepfl, 1997, p.4), in being able to adapt to the various directions of each teachers' response. Teachers were asked three questions in a telephone interview to identify whether they provided programmes for gifted and

talented students in technology. The first two questions were designed to gather data about gifted and talented programmes in general *'How does your school cater for gifted and talented students?' and 'In what subject areas do you cater for gifted and talented students?*' This allowed technology to be mentioned without drawing attention to the purpose of the interview. The third question targeted technology *'Do you have a programme in place that promotes extension in technology?'* The last question was specifically designed to determine whether schools catered for gifted and talented students in technology.

Qualitative data was also gathered through two techniques of field notes, known as *jotted notes* and *direct observation notes*. The two techniques were used to complement one another. For the purpose of the interview jotted notes were used as they "are short, temporary memory triggers" (Neuman, 1997, p.350). However, once the interview was completed, direct observation notes were written immediately following the conclusion of the interview. The notes were a "detailed description of what she heard and saw in concrete, specific terms" (Neuman, 1997, p.351). The researcher did not attempt to alter the statements in order to 'tidy up' notes which "included ungrammatical speech, slang and misstatements" (Neuman, 1997, p.351).

The researcher's role throughout the interviews was one identified as 'total researcher' (Gans, 1982, cited in Neuman, 1997, p.354). Gans (1982) identifies this type of researcher as having "little personal involvement and is a passive observer, 'on the sidelines', who does not influence events in the field" (Gans, 1982, cited in Neuman, 1997, p.354).

It is important to acknowledge that since the Picot Report (1988) and subsequent curriculum direction changes, New Zealand schools are able to place emphasis on different curriculum areas (Chamberlain & Nightingale, 1991). Schools can choose what subject areas are most relevant to their community. If a school places a greater emphasis on academic knowledge this may influence the time and resources that are put into extending children in subjects like technology, the arts and physical education. This becomes a significant variable in research in this area. A second variable that may affect how gifted and talented programmes in technology are

implemented into schools is by having specialist teachers whose sole purpose is technology. A third variable is where it is the role of a teacher to design gifted and talented programmes.

Findings and Discussion

The results that were gained from question one 'How does your school cater for gifted and talented students?' provided information on how schools are addressing the implementation of NAG 1 (iii)c. The most common method was that teachers cater for gifted and talented students within their mainstream classroom programmes. This method was acknowledged by 75% of schools interviewed. One school stated, "We encourage in class programmes to extend children, however it is the teacher's responsibility". As only 20% of respondents acknowledged providing teachers with professional development in order to implement successful extension programmes, the question needs to be asked whether teachers have the knowledge or the experiences to extend students effectively.

Of the teachers interviewed, 35% recognised the importance of specialist teachers and sent gifted and talented students to 'one-day schools'. These schools are designed to provide programmes for gifted and talented children. Children in these schools are usually identified to have talent in the area of mathematics and language. Another 30% of teachers interviewed provided withdrawal programmes for students, although two teachers acknowledged that withdrawal programmes were dependent on specialist teachers available within the school community.

Figure 1 below illustrates the response to the second question, 'What subject areas do you cater for gifted and talented students?' This question gave the opportunity to identify what curriculum areas they were addressing. All twenty identified that they were catering for the curriculum areas through either extension in class, one-day programmes or withdrawal classes. All schools (100% of respondents) believed they were catering for language (oral, written and visual language) while 90% acknowledged that their school was catering for gifted and talented children in Mathematics. Of all twenty, 55% recognised the Arts (visual art, music, dance and drama) and 20 % had sport academies in place, providing extension for children gifted

and talented in sports. Science was extended in only 15 % of schools. Social Studies and ICT was extended in identified gifted and talented children in only 10% of schools. Not one of the schools acknowledged the extension of gifted and talented students in technology education.

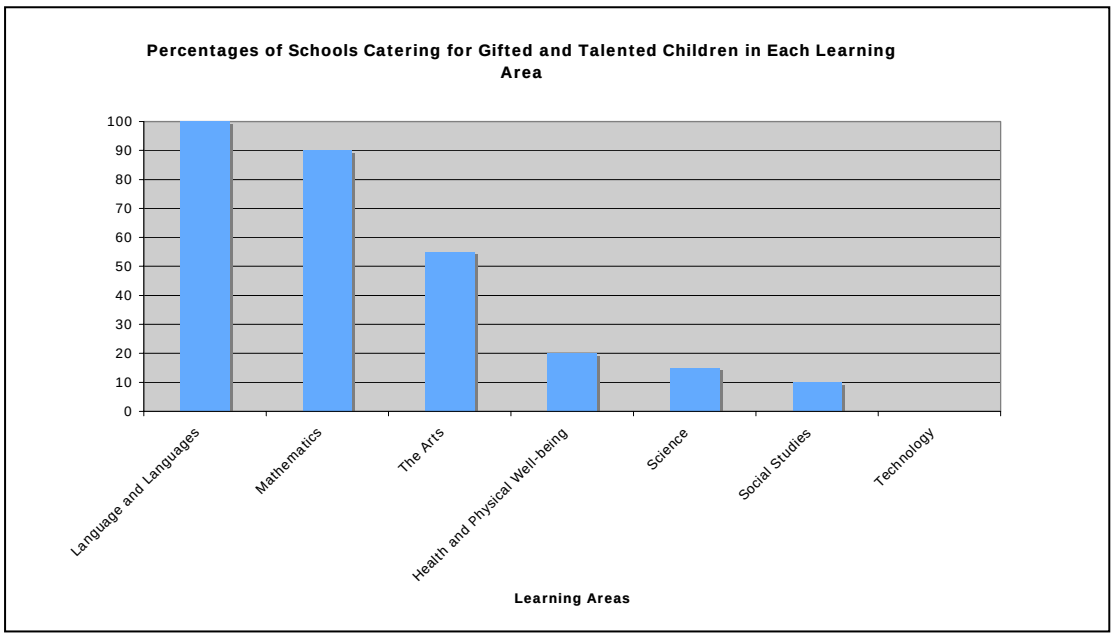

Figure 1: Percentage of respondent schools catering for gifted and talented children in each learning area.

The third interview question was designed in order to give an opportunity to mention if they provided gifted and talented programmes in technology education even if they had not initially responded when first asked. Of the twenty, 65% responded to the question, 'Do you have a programme in place that promotes extension in technology?' with a 'no' response. When asked why, reasons where given as "Not yet, will get there" and "We only extended one subject area a term on top of maths and reading" and "That's the least of our worries". From such comments it is possible to see that many schools are not placing technology as high a priority as other learning areas such as mathematics and language for their gifted and talented children.

Although initially none mentioned a technology focus for their gifted and talented programmes, 35% (when prompted directly with the third question) stated they did cater for these children. Of these, 15% identified themselves as catering for gifted and

talented programmes within the existing technology school programme. However when asked how they achieved this, it became apparent that they did not understand the difference between ICT and technology education with comments such as "We integrate technology in with a lot of our core subjects by getting them to do power point presentations, filming and editing" or "Yes of course we cater for technology. We integrate it with our literacy programme. Students present their work by using the computer" and "Yes, they go to the ICT suite once a week; gifted and talented go about twice a week, sometimes a whole day."

The remaining 20% also stated they catered for gifted and talented students in technology within existing classroom programmes. One stated that it was the "teachers' responsibility to extend students in all curriculum areas, including technology". In effect there was no additional programme in these schools other than expecting the teacher to cater for all children's needs by adjusting the programme and activities accordingly.

Conclusion:

A classroom teacher has to have the knowledge of technology and also the appropriate learning experiences in order to extend these gifted and talented students. Many teachers are unsure about what technology is and how you are expected to teach it. The high level of confusion amongst teachers about existing perceptions of technology, the nature of technology and curricula expectations were recognised throughout the world (Anning, 1993; Jones & Carr, 1992; Mittel & Penny, 1997). Consequently it is probably a fair question to ask whether students are being extended in technology within the classroom setting.

Although it is mandatory for all New Zealand state and state-integrated schools "to show how they are meeting the needs of their gifted and talented learner" (Ministry of Education, 2004, p.6), the majority of schools, from the data gathered, are not catering for children with strengths from each of the learning areas. Language and mathematics seem to have additional extension programmes in place but extending a gifted and talented child in technology education seems to be either not occurring or being left to the classroom teacher. As findings from this study show, there is still some confusion over what is entailed in the technology curriculum and how it is

distinguished from ICT. Brown and Vossler (2000) believe there is still a great deal of confusion between ICT and technology. From these apparent findings it is still apparent that some teachers and principals need to be informed about what technology entails.

Leaving extension programmes in the hands of staff who are not confident, familiar or both with the technology curriculum risks programmes that do not meet the needs of the child or the expectations of the documents. Further research is required to investigate why schools are selecting children to attend extension programmes outside the classroom, in all other learning areas other than technology education. Is this due to the fact that principals and teachers place low priority on the subject? Or is it too hard to identify children? Is it too difficult to staff and resource an extension programme? Does the community not wish the children to be extended in this learning area? Do they believe children's needs are better catered for within the classroom programme? Or are children gifted and talented in technology education extended within existing classroom programmes for another reason? Further research needs to be undertaken to investigate how these children can be best catered for. Is it extension programmes, with specifically trained staff, facilities and resources or is it best achieved within the classroom programme? Do children naturally extend themselves in this curriculum area, and as such no specialised programme is necessary? One thing is for sure; unless schools are made to critique and justify their selections of students and programmes for gifted and talented children, nothing will change.

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