# EXPLORING EDUCATORS’ AND PARENTS’ PERCEPTIONS OF POLICY, PROVISIONS, AND PRACTICE TO GUIDE POLICY DEVELOPMENT AND REFORM FOR GIFTED AND TALENTED SCIENCE EDUCATION IN NSW.

A Thesis submitted by

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## ABSTRACT

The purpose of this study was to explore educators' and parents' perceptions of provisions, practice, and current policies to guide policy development and reform for gifted and talented science education in NSW. Specifically, it sought the perceptions of Expert Educators, Teachers, and Parents regarding the appropriateness of the NSW Department of Education (NSW DoE) Gifted & Talented (G &T) policy and investigated the status quo in schools.

Gagné's model for G & T education has been referred to in Australia for the past 10-15 years, with all states claiming to use his model to inform their policies. However, no policy presents a rationale for using this model or for the selection of this model over others. Additionally, students in NSW who have outstanding potential to contribute to Australia's intellectual capital have been left behind in terms of policy with no updates since 2004. Although there is a new High Performing and Gifted Education policy (HPGE), for implementation in 2021, it is not vastly different. There is no evidence that components of a policy reform cycle were employed, nor is there evidence of an evaluation. This study finds that the current policy is not widely implemented, nor does the current policy use Gagné's model or definitions correctly.

It was demonstrated that there is a lack of confidence in policy for gifted education, and general education. First-hand data provided evidence that most educators are not aware of Gagné's models as used in the NSW DoE G & T policy, nor do they use his definitions to define G & T students. Policy is not deemed useful by NSW educators, but instead perceived only as an element of compliance. Additionally, educators do not have a clear understanding about what is provided for gifted education in relation to resourcing and information, nor are there consistent pedagogical approaches employed. Instead, teachers use their own, or the students' initiative, to create isolated and intermittent educational opportunities. This is partially due to the misconception that gifted students will succeed without help, and the belief that student selected and directed strategies are exemplary. It is also because gifted education is not a priority for science educators. They are time poor, focussed on minimum standards, and are pressured to meet the needs of those who have learning difficulties, are learners with English as an additional language or dialect (EALD), or learners from low socio-economic status SES backgrounds.

The state of gifted education is NSW is disorganised, disjointed, low priority, and confusing for those who work in education. There is limited structured support and there is conflicting information provided by leading government educational institutions, particularly when defining the gifted population. Clear directives and resources for students who are underperforming, or for those who have unique learning needs, are missing from gifted education policy in NSW. Additionally, educators are acutely aware that selection methods for gifted classes are incorrectly based on performance only, not potential. Despite this awareness the practice continues.

Recommendations include creating a national G & T policy, with funding provided by the federal and the state governments. Clear procedures, strategies, identification tools, and professional development for educators must accompany the policy. In addition, a consensus must be reached about the definitions of the terms gifted, talented, and twice exceptional students for Australia. This study provides preliminary information regarding the trait combinations unique to gifted science students that may be of benefit to a science specific G & T sub-policy.

Overall, this research has shown that Gagné's Differentiated Model of Giftedness and Talent (DMGT) is an appropriate talent development model to use to establish a working G & T Australian education policy. However, there must be provision for gifted student identification, and interventions for students who are not ready to participate in the activities or respond to Gagné's catalysts. Additionally, his model must be used correctly, and in its entirety, or evidence produced to justify why individual components are selected while others ignored.

This thesis has been formatted according to the guidelines of the American Psychological Association (APA) (7th Edition), but with Australian English spelling. Tables have been formatted on an individual basis to enhance readability.

# ACKNOWLEDGEMENTS

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This journey has not been easy. This academic team suffered enormously with the recent death our dear friend and my principal supervisor, Jenny Donovan. Jenny and I met first via zoom, not in person, when she enthusiastically responded to my email and then subsequently accepted me as her PhD student. Jenny was a teacher who inspired other teachers. She had boundless energy, never ending passion, and a love of her job and students that is rare to find. Jenny and I had many wonderful academic conversations as she passed on her skills, knowledge, and life experience. Jenny was also my mentor. This doctorate was more than a piece of work, but a journey where we could together learn to manage disappointment, challenges, and failures. We also celebrated many joys and successes both academic and personal. I deeply regret that you are not here Jenny to see the completion of this work that we started together. I thank you from the bottom of my heart for sharing the final part of your life with me and for believing in me.

To Karen and Eileen, I am extremely grateful to you both for supporting and encouraging me as I completed a very stressful and all-consuming final year.. Your feedback, conversation, friendship, and mentorship have furthered, refined, and cemented the learning from this journey. I am looking forward to the next chapter of our work together as we aim to improve education standards for the next generation. I know Jenny would be proud of what we have accomplished together.

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## CERTIFICATION OF THESIS

This Thesis is entirely the work of Kelly-Anne Jawerth except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Principal Supervisor Prof Karen Trimmer

Associate Supervisor Dr Eileen Slater

Special acknowledgement to the late Dr Jennifer Donovan. Principal and Associate supervisor (2015-2020)

## ABBREVIATIONS

| | |
|---|---|
| ACARA | Australian Curriculum and Reporting Authority |
| ACER | Australian Council for Educational Research |
| AISNSW | The Association for Independent Schools New South Wales |
| AITSL | Australian Institute for Teaching and School Leadership |
| ATAR | Australian Tertiary Admissions Rank |
| BFLPE | Big Fish Little Pond Effect |
| CEO | Catholic Education Office |
| CSNSW | Catholic Schools New South Wales |
| DMGT | Differentiated Model of Giftedness and Talent. From 2013 the D indicates Differentiating |
| DMNA | Developmental Model for Natural Abilities |
| EALD | English as Additional Language or Dialect |
| EMTD | Expanded Model of Talent Development |
| ETM | Enrichment Triad Model |
| G & T | Gifted and Talented |
| GERRIC | Gifted Education Resource Research and Information Centre |
| HPGE | High Performing and Gifted Education |
| HSC | Higher School Certificate |
| ICT | Information and Communication Technology |
| ICSEA | Index of Community Socio-Educational Advantage |
| IQ | Intelligence Quotient |
| MI | Multiple Intelligences |
| MMG | The Munich Model of Giftedness |
| MMR | Mixed Methods Research |
| NAPLAN | National Assessment Program – Literacy and Numeracy |

| | |
|---|---|
| NESA | New South Wales Education Standards Authority |
| NT | Northern Territory |
| NSW DoE | New South Wales Department of Education |
| OCS | Office of the Chief Scientist |
| PISA | Programme for International Student Assessment |
| ROSA | Record of School Achievement |
| SEM | Schoolwide Enrichment Model |
| SERAP | (Department of Education NSW) State Education Research Applications Process |
| SES | Socio Economic Status |
| STEM | Science, Technology, Engineering, and Mathematics |
| TIMSS | Trends in International Mathematics and Science Study |
| UNSW | University of New South Wales |
| USA | United States of America |
| USQ | University of Southern Queensland |
| WISC-V | Wechsler Intelligence Scale for Children – Fifth Edition |

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# CHAPTER 1: INTRODUCTION

## 1.1 Personal Background

I have always been labelled "different". I am now so comfortable with this label that I asked my mother, with trepidation, if she thought I was normal. I was so desperate to hear from her that I was still abnormal and that I had not succumbed to the pressures to be like everyone else. Thankfully, she answered, "Yes, you're not normal", I think she has given up hope.

From the day I started talking, which was before I was one, my poor mother was bombarded with questions and conversation from a small inquisitive child standing behind a baby gate while she longed for a single minute's peace. But she did not get a break with the next child either, as my very normal and intelligent brother, now a highly accomplished Chemistry and Physics teacher, did not utter a word until he was nearly two. So, he was taken to a doctor as my mother feared he was developmentally delayed.

Although not an early walker, I was not gifted in that regard, I was talking well before I was walking and reading while I was still a toddler in the pram. I recall my Grandmother telling me how I would read the swear words graffitied on the play equipment in the park. A proud English woman, she would promptly wheel me home, highly embarrassed.

The story continued as I spent much of my youth trying to fit in with my peers. I realise now that I was badly managed at school. I would gravitate to older people who had more time and patience for someone a little quirky. Today, the schools may have labelled me a gifted child, had strict performance criteria married to my Intelligence Quotient (IQ), placed me into one of "those special classes", or sent me to psychologists to understand a lack of connection with those my own age. I am not sure if I am glad I grew up in a time where the pressures were less and labelling children was not a fashion of the times, or if I would have benefited from some of the approaches taken today.

I finally found my own way in Science Education as a classroom teacher, a syllabus writer, a teaching educator, a university lecturer/tutor, and a Ph.D. student. At times, I have been involved with the education of children who are labelled gifted, although we now call them "high potential learners" and put them into "opportunity classes". These terms still befuddle me because does that mean everyone else has limited potential or the other classes we run have no opportunities? I have seen children break down over almost perfect exam marks. I have watched the underachieving gifted and talented child miss deadlines and forget assignments in a mess of disorganisation. I have seen bored but brilliant students create havoc in the classroom; also, the child who cannot engage in their classroom work yet can understand complex medical journal articles in an area of their interest.

I have sat awkwardly at parent/teacher nights while parents desperately plead with me, "What can I do to help my child? How can we bring her grades higher?" The child received 92%. School administrators have presented me with a list of students' names, their IQ, and semester marks, and asked me to "Please explain?" Please explain why students have dropped three marks in my class from their last semester's result. Three marks out of 100. As a teacher I was expected to know what to do with each individual child and any fluctuation from their set point was a bad mark against my name, yet I was not directed to any policy; I was not given procedures; I was not supported with resources. I was just meant to know.

As a teacher, I had a duty to assist these children. What on earth is a gifted child? Who decided this and how? I was lost, I was confused, and I was no closer to an answer about how to work in a system that on many levels does not appear to be geared toward supporting successful learning.

There was turmoil within the gifted child and turmoil within the parents, yet it also seemed that most parents believed their child was gifted. The more I delved into this topic the more confusing it became for me as an educator. If only there was a road map, good policy, clear procedures, or management strategies that could help guide educators; it might not be perfect, but it would be a start. I found nothing that could be used without having extensive prior experience, which neither my colleagues nor I had. Even then, what I did find was not current and was difficult to implement as a classroom teacher. I began to think that the gifted, and their teachers, were just meant to get on with it.

This apparent lack of strategy and minimal formal support was the catalyst for my research. Working in a classroom would allow me to assist a limited number of students but I wanted to make a widespread difference. Thus, began my interest in policy, a desire to create a common direction and support to guide teachers and educators.

So why Science? Science is my passion, for me a way of life. I wanted not only to explore policy for gifted science students but also use my working scientifically skills to bring a scientific perspective to science education. It made sense to choose to explore policy through the lens of science education but sense and whim are not enough when investing years delving into a topic. There was another reason for choosing Science. Australia is a lucky country. We have good health care, social, and educational systems, but Australia will only continue to be the lucky country if we invest in those who produce our intellectual property in areas of Science, Technology, Engineering, and Mathematics (STEM). Our gifted science students could fit into this STEM category perfectly.

This introductory chapter will establish that NSW educational policy-makers have not given serious consideration or priority to our gifted and talented (G & T) students or their education (G & T education) for nearly 30 years. This will be demonstrated through an examination of the current and historical versions of the NSW DoE Gifted and Talented Policy and by exploring what makes good policy. Elaborations of the NSW school system and connections between key educational bodies will be explained, demonstrating there is no single point of reference of support for G & T education in NSW. It will be shown that without published rationale or explanation, the Australian approach to G & T education is based on Gagné's model alone. It is important and timely to review our policy in the context of what our schools and students need, using current evidence-based research.

## 1.2 The Problem

"Education shall be directed to the full development of the human personality" (United Nations, 2015, Universal Declaration of Human Rights, Article 26, p. 7). I think it would be difficult to find an educator, teacher, or politician that disagreed with the above statement. However, putting it into practice can be challenging.

In Australia, notable gaps in achievement occur based on location, socioeconomic status, and parental background, thus much of the concern in terms of educational equity is directed towards overcoming disadvantage (Public Policy Institute, 2011). Achieving minimum standards is one such example (New South Wales Education Standards Authority [NESA], 2017a). At one level it is necessary and appropriate to ensure all Australians have a minimum standard of education; however, there is another group of individuals who, by definition (to be discussed in detail), have outstanding potential to contribute to Australia's intellectual capital and yet who have been left behind in terms of recent policy – G & T students.

There is an abundance of policy, documents, and discussion surrounding the disadvantaged and for those with special educational needs but there is no national policy for the education of the G & T. The Public Policy Institute (2011) discusses excellence, but only in the context of striving for equal outcomes, not equal opportunity. In this scenario, G & T students from disadvantaged backgrounds may be overlooked for intervention if they are achieving above or matching the minimum standards. National level documents such as the Australian Curriculum (The Australian Curriculum And Reporting Agency [ACARA], 2016a) and the Professional Standards for Teachers (Australian Institute for Teaching and School Leadership [AITSL], 2014) offer only broad advice regarding the need for individualised programs and differentiated strategies. The Australian curriculum had been released for three years before such advice was added in 2013 (ACARA, 2016a).

This lack of policy and priority is not exclusively an Australian problem, nor is it a new problem. In 1972, Marland, the U.S. Commissioner of Education wrote the following statement in a report to the United States Congress; "Intellectual and creative talent cannot survive educational neglect and apathy" (Marland, 1972, p. vii). This report was damning of the situation in the United States of America (USA). Having defined G & T, it recognised that the services for G & T in the USA reached only a small proportion of the target population, so these students were deprived, yet where support was given, it yielded measurable outcomes. Importantly, this situation was seen to result from a lack of policy, priority, and funding, with many well-meaning statements of intent but little or no action. This lack of support for G & T students was creating "enormous individual and social cost" (Marland, 1972, p. xi). In the USA, Stephens and Karnes (2000) noted that each state ultimately modified existing definitions or created its own definition of G & T, with some abandoning definition completely. These researchers report that this fractured situation has led to inconsistency and instability in programs for the G & T. Given the poor performance of US students on international measures such as Program for International Student Assessment (OECD, 2018), 40 years later, it seems that the US situation may not have changed as much as was clearly warranted by Marland's 1972 report.

The policy situation in Australia in 2020 appears to be similar to that reported in the USA in 1972. There is a lack of national and state policy; therefore, each Australian state and system, also known as sectors, has the responsibility for developing policies and thus definitions, regarding G & T education. This doctoral research will be conducted in NSW and so will focus on the policies and the schools in NSW. However, before creating, analysing, or attempting to reform policy it is essential to understand the intended recipients of the policy.

## 1.3 Definitions

### *1.3.1 Gifted and Talented*

There have been many attempts to define giftedness and talent over the past 100 years but due to the prevalence of the adoption of Gagné's definition in Australia, this thesis offers his 2013 definition as a starting point. Educators will be asked for their understanding and practical use of his definition (Gagné, 2013).

> Giftedness designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers.
>
> Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of 'learning peers' (those who have accumulated a similar amount of learning time from either current or past training). (p. 5)

Gagné's model is one of several, these will be discussed more in Chapter 2.

### *1.3.2 Twice Exceptional/Multi Exceptional*

The term twice exceptional student, often expressed as '2e', was a term created to explain those students who had been identified as gifted but also had one or more learning disabilities or difficulties (Beckley, 1998). While there is still no agreed upon definition in Australia, Beckley (1998) divides these students into three subgroups: 1) Students who are identified as gifted but exhibit difficulties and would typically be classified as the underachieving G & T, 2) Students who have disabilities and have been recognised as gifted, however, the disabilities are inadequately supported, and 3) Students who neither qualify for gifted or disability support but each trait masks the other so they go unnoticed (Beckley, 1998). The current model for gifted education in NSW is loosely based Gagné's Differentiated Model of Giftedness and Talent (DMGT) (Gagné', 2003). The DMGT relies on identification through performance; initial performance and sustained performance.

### *1.3.3 Policy*

James Gallagher supposed that social policy, which includes educational policy, reflects the values of a system or country (Gallagher, 2015), and similar to a definition for gifted individuals, there is no single description for what constitutes good policy. Gallagher refers to policy as the means by which society creates rules and standards to allocate scarce resources to an infinite need (Gallagher, 2002). Others refer to policy as public statements made by organisations, such as governments, that outline the principles intended to steer the conduct of individuals, achieve certain institutional or business goals, or steer the conduct of individuals, such as teachers within the organisation (Taylor et al., 1997). Workplace policies can be defined as public guiding statements of principles and practice that form frameworks of how the enterprise will meet and respond to the organisation. When taking these different perspectives into account it can be said that good policy provides broad guidelines in high-level, explicit statements for the action required. Therefore, the definition of policy for this thesis will be appropriated from what is commonly understood in the workplace, educational environments, and other public settings. This gives rise to the following definition: Policy is a public statement or statements intended to guide or steer conduct to meet the vision and goals, and define the principles and values of an organisation.

#### *1.3.4 The Purpose of Policy*

In a broad sense, a policy is written to address issues that are often industry and subject-specific and therefore may vary in their scope, evolution, and delivery (Nakamura, 1987). Nevertheless, all policy should contain similar key elements. These are 1) title, purpose, and scope, 2) parties targeted 3) reasons for the policy 4) key definitions 5) the policy statement 6) enactment date 7) related policies, procedures, forms, guidelines, and resources, 8) history including revision dates and 9) contact information (Nakamura, 1987; Northeastern University, 2017; University of Colorado, 2018).

#### *1.3.5 Provisions*

Provisions can be described as the resources available, that is, what is granted for use (Gallagher, 2015), and can take the form of physical resources, monetary funding, or human resources. In an economic sense, public provision in education is seen as redistribution (Levy, 2005), often of wealth, but sometimes of opportunity. In this sense, provisioning in the form of specialised G & T funding and assistance is often isolated to a select number of schools and classes rather than being all inclusive (NSW Department of Education, 2011; Govt. SA., 2014). Therefore, unless a child is accepted into a selective government school or individual schools choose to make provisions, no funding is available to support G & T children. There is no provision of federal funding for gifted children in Australia, and no longer gifted education units provided for by the states (Walsh & Jolly, 2018). Unfortunately, lack of funding, resources, and provisions can considerably influence the learning opportunities by limiting pedagogy.

### *1.3.6 Pedagogy*

Pedagogy, also referred to as practice, are the things that teachers and educational systems do that influence the way students learn (Child Australia, 2017). The interaction that individual students have with their learning (pedagogy) is affected by the environment, the teaching methods employed by the teacher, resources available, the cultural and political values we place on learning, and the discipline studied (Child Australia, 2017; Siraj-Blatchford et al., 2002). Thus, at times, the resources themselves can affect the learning interactions and the experiences that are offered for student learning. In the context of science education, the setting in which this research is conducted, it is important to examine the interplay.

### *1.3.7 Science in the Context of Science Education*

Science is a way of thinking, including observation, experimentation, verification, critical analysis, and communication. Writing about science is not the practice of science. Memorising facts is not the practice of science. NESA (2017b) acknowledges the link between pedagogy and the study of science where teachers should provide lessons that deliver opportunities for students to “develop understanding based on evidence and reason” (p. 12). The nature of science lends itself to an inquiry framework but that often depends on certain resources being available for experiments, investigations, observations, and gathering evidence. This type of equipment is specialised in science and includes items such as classroom laboratories, chemicals, microscopes, precision measuring tools, and safety equipment. Scientific discourse, science literacy, methods for questioning, and explanation also form a key component of a science pedagogy (Quigly, 2011), providing students an opportunity to communicate in a scientific evidence-based manner about their understanding. In addition to an overarching G & T policy, it is essential to provide explicit and specific pedagogical strategies, techniques, and resources that are specialised for science learning. Part of this research will examine the current status quo in our classrooms and the perspectives of our education leaders to determine if we do indeed need an overhaul of our current model and policy for gifted education, particularly in the context of science education.

## 1.4 The NSW School System

All children in NSW must be enrolled in school before their sixth birthday and must remain enrolled until they complete year 10 or reach the age of 17 (Education Act, 1990, No. 8). They may attend a school in one of the three school systems or approved home-schooling. The school systems are NSW Department of Education (NSW DoE), Member non-government schools including systemic Catholic schools, or Individual non-government schools. All schools are verified and reviewed by NESA but are managed by the authorities of their individual system (NESA, 2017c). Regardless of the system, schools must be registered; however, the process for school registration and accreditation differs between government and non-government schools. The term registration refers to the licence required for a non-government school to operate under the Act. Accreditation is the authorisation for non-government schools to offer their students a Record of School Achievement (ROSA) or the Higher School Certificate (HSC). All schools must follow and implement the set K-12 curriculum, and subject-specific NSW syllabuses, adhere to teacher accreditation and maintenance requirements, plus other education guidelines that are set and monitored by NESA (NESA, 2018a).

The NSW DoE and NESA are the direct responsibility of The NSW Minister for Education and Early Childhood Learning, currently The Hon Sarah Mitchell MLC (NSW DoE, 2020a). The Minister is responsible for setting policy and the delivery of strategies that achieve government outcomes. These two tightly affiliated bodies govern over the policies and requirements for all schools from the perspective of compliance, registration, and accreditation of all schools in NSW but they do not create nor implement specific policies or procedures for the non-government schools (NSW DoE, 2018a).

Catholic Schools NSW is an overarching body formed by the 11 diocesan bishops to provide leadership to all Catholic Schools in NSW (CSNSW, 2017a). The main role of this body is to distribute state and federal funding according to legislation, ensure schools comply with the mandatory registration and compliance requirements, and assist the Bishops with complying with Church and Catholic law (CSNSW, 2017a). The advice given to schools around the above requirements is obtained from other bodies such as NSW DoE, NESA, and AITSL (CSNSW, 2017b). The CSNSW does not engage with the administration of schools beyond ensuring legislative compliance and is a finance and jurisdictive policy body (CSNSW, 2017a).

According to the CSNSW (2017c), the Catholic schools in NSW fall into two groups; those governed by one of the 11 Diocesan Catholic Schools Authorities (systemic or member Catholic Schools), and those governed by one of 20 Religious Institutes (non-systemic or individual Catholic Schools). The Diocesan Bishops are responsible for the quality of their schools and offer assistance and advice for school administration from their Diocesan School Authority. The Religious Institutes operate congregational schools under the direction of brothers, nuns, and priests. They have their own administration and may have some support from their local Diocesan School Authority.

Independent schools are non-government educational bodies that represent communities from diverse groups. They may, but not necessarily, take one or more focuses including; religious affiliation, represent a specific educational philosophy, work to a different interpretation of a mainstream system or provide for special needs students and other specialised groups (Independent Schools Council of Australia, 2016). The Association for Independent Schools NSW (AISNSW) provides Independent schools in NSW with advice, professional learning opportunities, funded programs, and research (AISNSW, n.d.). It is a support body and is not responsible for making or enforcing policy, nor the rules or governance requirements for school registration and accreditation. Each independent school is responsible for its own administration, collection, and determination of additional non-government funding, and ensuring its own governance requirement compliance, as stipulated by NESA (NESA, 2018a). Ultimately, NESA is responsible for certifying that Catholic Systemic, Catholic Independent, and Independent/Individual/Private schools meet registration, accreditation, and compliance requirements (CSNSW, 2017c, NESA, 2018a).

As stated earlier, all schools are required to teach from the NESA prescribed syllabus for each key learning area. The syllabus documents are intended to guide teaching and learning as students meet the requirements for each outcome (NESA, 2018b). Most syllabuses, including early Science syllabuses, do not advise regarding pedagogy but focus only on content including the Australian National Curriculum syllabuses. However, for the first time, NSW Science Syllabuses have been developed and implemented with an embedded inquiry pedagogy for Kindergarten to Year 6 (NESA, 2017b) and Year 11 and 12 Science Syllabuses (NESA, 2017d). Inquiry-based pedagogy aligns these syllabuses with best practice science teaching (Oliveira, et al., 2017). Unfortunately, Stage 4 and 5 Syllabuses have not yet been rewritten to incorporate an inquiry approach.

In each NSW syllabus, regardless of the subject discipline or stage, the only reference to G & T students is alongside reference to students with special needs and students learning EALD. Advice for all is minimal, but that for G & T students lacks links to further support or information found in the other two categories. The statement of support by NESA "School decisions about appropriate strategies are generally collaborative and involve teachers, parents, and students with reference to documents and advice available from NESA and the education sectors" (NESA, 2017b, 2017d) demonstrates a lack of central support. There is no clarification or method for how to access the 'education sectors' or NESA for this information and the statement itself suggests that there is no single place for support.

It would be expected that each sector, independent school group, independent school, or sector association should have developed, co-developed, or have available appropriate instruction for their own policy. However, the NSW DoE is the only sector that has a publicly available policy. There is no common non-sector based place to go for advice or a streamlined system to assist schools with the strategies, policies, or decisions for G & T students in NSW. There are no specific or research-based procedures that are available to be embedded into the syllabi nor are there learning expectations for the different subject disciplines, including science education, the focus of my research.

## 1.5 NSW Department of Education Policy G&T Policy

With a better understanding of how the three sectors are linked and governed it is time to look further into the policy that is currently published by the NSW DoE. This section discusses the implementation and revision processes of the NSW Department of Education Gifted and talented policy that replaced the 1991 NSW Department of School Education, Policy for the Education of Gifted and Talented Students, Sydney. The 1991 policy was accompanied by support materials published in the same year and will now be referred to as the 1991 Policy Package. In 2000 the Department of Education approved the current G & T policy; however, it was not published until 2006. This policy was accompanied by two support documents that were published in 2004 but have documented revisions and formatting changes prior to the actual G & T policy publication in 2006. These support documents are Policy and implementation strategies for the education of gifted and talented students and Guidelines for the use of strategies to support gifted and talented students. In late 2016 the policy webpage cites an update for the policy only, not the support materials. An alternative webpage for policy information, the NSW DoE Policy Library contents webpage, lists the revision date as 21/12/2017 yet this page hyperlinks to the same document found on the policy webpage accessed May 2019. This webpage has no date but the copyright webpage is dated 2019. The date discrepancies themselves are inconsequential but demonstrates the potential for confusion or lack of consistency when obtaining information and support for G & T education. The 2016 update and unrevised 2004 support material documents will henceforth be referred to as the 2016 Policy Package.

### *1.5.1 An Examination of the NSW Department of Education Policies Over Time*

This section will present the contents from the NSW DoE 1991, 2006, and the 2016 revision of policy statements for comparison and examination. A comparison of the 1991 and 2006 policy statements was made by highlighting the changes in the policies. Where there is no highlight the 2006 policy statement is identical to the 1991 policy statement. As the structure and layout of the 1991 and 2006 documents are quite different, it was not relevant to compare the abstract, applicability, superseded documents, and context. A similar comparison was made between the 2006 policy statement and 2016 revision statements. Comparison of the abstract, applicability, superseded documents, and context has been included for the 2006 and 2016 policies.

For ease of comparison, parts of the 2016 policy have been reorganised and are no longer in the order that they are presented in the actual policy, consequently, the numbering is not sequential. Similarly, where there is a blank space in the table there is no corresponding statement in the other policies.

Table 1.1 shows and compares the contents from each of the G & T policy statements for 1991, 2006, and 2016, and compares the supporting elements from the 2006 and 2016 policy packages.

**Table 0.1**

*Comparison of the G & T Policy Statements for 1991, 2006 and 2016, and Comparison of the Supporting Elements from the 2006 and 2016 Policy Packages*

| 1991 Policy Statement | 2006 Policy Statement and supporting elements | 2016 Policy Statement and supporting elements |
|---|---|---|
| As the structure and layout were significantly different between the 2006 and 2016 policies it was deemed unfeasible and unnecessary to make the comparison for the elements: Abstract, applicability, superseded documents, and context. | 1. **Abstract** The New South Wales Government aims to identify gifted and talented students and to maximise their learning outcomes in all public schools.<br><br>Giftedness refers to potential distinctly beyond the average for the student's age and encompasses a broad range of abilities in the intellectual, creative, socio-emotional and physical domains.<br><br>Talent denotes achievement distinctly beyond the average for a student's age as a result of application to training and practice.<br><br>School communities have a responsibility to develop effective and equitable identification procedures and developmentally appropriate programs for gifted and talented students.<br><br>Professional development will occur at state and regional levels and within school communities to enable provision for gifted and talented students.<br><br>The Director-General will report on the outcomes of schooling for gifted and talented students and ensure that policy implementation is monitored and evaluated. | The NSW Government aims to identify gifted and talented students and to maximise their learning outcomes in all public schools.<br><br>3.2 -Giftedness refers to potential distinctly beyond the average for the student's age and encompasses a broad range of abilities in the intellectual, creative, socio-emotional and physical domains.<br><br>Talent denotes achievement distinctly beyond the average for a student's age as a result of application to training and practice |

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| | 2. **Applicability** This policy applies to all staff employed in State Office, regions, NSW public schools, their school communities and all students who attend public schools. | **2. Audience and applicability**<br>2.1 - This policy applies to all staff employed in State Office, regions, NSW public schools, their school communities and all students who attend public schools. |
| | 3. **Superseded documents** This policy replaces:<br>• NSW Department of School Education. (1991a). Policy for the education of gifted and talented students. Sydney.<br>• NSW Department of School Education. (1991b). Implementation strategies for the education of gifted and talented students. Sydney. | |
| | 4. **Context** All government schools have a responsibility to educate all students to their potential. The NSW public school system is committed to high quality educational outcomes for all gifted and talented students. | **3. Context** |
| | Gifted and talented students are found in all communities regardless of their ethnic, cultural or socio-economic backgrounds. The gifted population includes students who are underachieving and who have disabilities. | 3.1 - Gifted and talented students are found in all communities regardless of their ethnic, cultural or socio-economic characteristics. The gifted population includes students who are underachieving and who have disabilities. |
| | It is imperative that school communities develop effective, equitable and defensible identification programs that avoid cultural bias and provide developmentally appropriate programs for gifted and talented students. | |
| | Educational practices promoted in the field of gifted and talented education draw on information about: | 3.3 - Educational practices promoted in the field of gifted and talented education draw on information about: |

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| | • the nature, identification and development of giftedness and talents in the school population<br>• implementation of effective curriculum and instruction for gifted and talented students. | the nature, identification and development of giftedness and talents in the school population.<br>the implementation of effective curriculum and instruction for gifted and talented students. |
| | 5. **Policy Statement** This policy statement recognises that decision making in relation to programs and provisions for gifted and talented students is a complex and interactive process.<br>School principals, in consultation with parents/caregivers, teachers, school counsellors and other appropriate personnel, have the prime responsibility for decisions in relation to the education of gifted and talented students. | **1. Objectives - Policy statement** |
| | • School communities have a responsibility to identify their gifted and talented students. | 1.1 - School communities have a responsibility to identify their gifted and talented students. |
| | • School communities have a responsibility to foster collaborative home–school partnerships to support gifted and talented students. | 1.2 - School communities have a responsibility to foster collaborative home–school partnerships to support gifted and talented students. |
| | • School communities have a responsibility to provide a range of opportunities and to monitor and evaluate programs for their gifted and talented students. | 1.3 - School communities have a responsibility to provide a range of opportunities and to monitor and evaluate programs for their gifted and talented students. |
| This policy statement recognises that decision making in relation to provisions for gifted and talented students is a complex and interactive process. | • Teachers, with support, have a responsibility to identify the gifted and talented students in their classes. | 1.4 - Teachers, with support, have a responsibility to identify the gifted and talented students in their classes. |
| | • Teachers have a responsibility to select and implement a variety of teaching strategies for inclusion | 1.5 - Teachers have a responsibility to select and implement a variety of teaching strategies for inclusion |

School principals, in full consultation with parents, teachers, counsellors and other appropriate personnel, have the prime responsibility for decisions in relation to the education of gifted and talented students.

1. School communities have a responsibility to identify their gifted and talented students.

2. School communities have a responsibility to provide a range of opportunities for their gifted and talented students.

*2.1* School Principals have the final responsibility for deciding when the **early entry** to school of students who are intellectually gifted and talented is appropriate to meet their educational, social and emotional needs.

2.2 School Principals have the final responsibility for deciding when any form of **accelerated progression** is appropriate for individual gifted and talented students in Years K-12 to meet their educational, social and emotional needs.

3. Teachers have a responsibility to identify the gifted and talented students in their classes.

in programs for the range of gifted and talented students in their classes.

• Regions and schools have a responsibility to co-ordinate school provisions for gifted and talented students when it is feasible for more than one school to share this responsibility.

• Regions and schools have a responsibility to provide opportunities for staff development in the education of gifted and talented students for principals, teachers and other appropriate personnel.

•The Director-General has a responsibility to account for the implementation of Government policy and to report on the outcomes of schooling for gifted and talented students in NSW.

in programs for the range of gifted and talented students in their classes.

1.6 - Regions and schools have a responsibility to co-ordinate school provisions for gifted and talented students when it is feasible for more than one school to share this responsibility.

1.7 - Regions and schools have a responsibility to provide opportunities for staff development in the education of gifted and talented students for principals, teachers and other appropriate personnel.

1.8 - The Director-General has a responsibility to account for the implementation of Government policy and to report on the outcomes of schooling for gifted and talented students in NSW.

**4. Responsibilities and delegations**
4.1 - The Principal is responsible for implementing the gifted and talented education policy.
4.2 - The Director-General will nominate a senior officer at state level to have responsibility for policy on the education of gifted and talented students.
5. Monitoring, evaluation and reporting requirements
5.1 - Senior Curriculum Policy Officer, Gifted and Talented will monitor the implementation of this policy and will report, as required, to the Director, NSW Curriculum and Learning Innovation Centre.
6. Contact
Leader, Primary Curriculum (02) 9266 8473.
Leader, Secondary Curriculum (02) 9244 5697.

4. Teachers have a responsibility to select a variety of teaching strategies for inclusion in programs for the range of gifted and talented students in their classes.

5. Regions and schools have a responsibility to coordinate school provisions for gifted and talented students when it is feasible for more than one school to share this responsibility.

6. Regions and schools have a responsibility to provide staff development opportunities for principals, teachers and other appropriate school personnel in the education of *gifted* and *talented* students.

7. The Director-General and the Central Executive have a responsibility to account for the implementation of this policy and to report on the outcomes of schooling for *gifted* and *talented* students in NSW Government schools.

When examining the three policies, a scientific term comes to mind, devolution. The 1991, 2006, and 2016 policy statements are almost exact replicas. Two sub-statements (2.1, 2.2 in 1991) have been omitted when the 1991 statement was replaced by the 2006 policy statement and the wording was tweaked in four of the seven statements. There were no changes to the actionable policy in the 2016 revision. However, the 2016 revision removes four statements from the 2006 policy package and information about the superseded documents. The sections Policy statement, audience, and applicability, and context in the 2016 policy are an exact copy from the 2006 policy package. A section on responsibilities and delegations that appears to be new to the 2016 update can be found in the 2006 policy package support materials. In addition, the policy and implementation strategies document provided in the 2006 policy package delivers the same message and content as the 1991 policy package. The 2016 revision has no new support materials or implementation strategies documents, nor does it direct users to the useful 2006 support materials.

In 2017 at the 22nd Biennial World Council for Gifted and Talented Children World Conference, Mark Scott AO from the NSW DoE presented a keynote “Delivering on the promise of potential” (Scott, 2017). He asserted that NSW public schools have an established reputation for providing quality provisions and opportunities for gifted students from all backgrounds. He claimed that there was a new G & T education policy being developed by examining student performance data, relevant research, and a consultation process. In 2019, a High Potential and Gifted Education Policy (HPGE) was announced by the Minister for Education. This replaces the former policy that was revised in 2016 and is mandated to operate in schools from day 1, Term 1, 2021.

The HPGE policy webpage references Gagné’s DMGT 2.0 from 2009 and presents an adapted version of his visual model. It is not clear from the literature review provided by NSW DoE why his latest work is not incorporated and a 10-year-old adapted version of the DMGT is used. Similarly, the NSW DoE do not state or discuss the definitions of giftedness apart from acknowledging that prevalence is dependent on the definitions used (Centre for Education Statistics and Evaluation, 2019).

This new HPGE policy is greater in length than the 2016 update. However, it does not provide vastly different information, nor does it provide greater clarity around how to implement the policy. There were no new formal procedures or supporting documents publicly available in late 2020. Additionally, the new NSW DoE HPGE policy for implementation in 2021 adds complexity to the situation as it does not provide clear or upfront definitions of the terms gifted or talented within the policy. Instead, definitions are embedded within other statements and are not found until page four (NSW DoE, 2021). Four definitions are now provided in the NSW DoE HPGE policy, and new terminology is introduced. This terminology is not discussed in the literature review. NSW DoE HPGE policy indicates that potential can occur in one of four domains (intellectual, creative, social-emotional, and physical) but that talent is in a specific domain or field of endeavour. Abridged versions of the definitions are provided (emphasis added):

high potential students - potential **exceeds** that of most students

gifted students - potential **significantly exceeds** that of most students

highly gifted students - potential **vastly exceeds** that of most students and are in the top 1% of their peers

talent development - a process to develop potential into high achievement in a specific **domain or field** of endeavour.

Gagné’s work is misrepresented in this policy and in the supporting web pages. While acknowledged as an adaption of his work, there are no evidenced-based justifications for these changes or reasons for why particular elements were chosen over others. Gagné’s model demonstrates a talent development process and definitions are provided for talent. This policy defines talent development, but not talent. Gagné describes six domains of natural ability, this policy includes only four. The fields and talents differ between Gagné’s DMGT 2.0 and those in the visual diagram found on the departmental web pages. The developmental processes are entirely omitted in the HPGE policy, and the catalysts are given an abridged mention.

At the time of data collection for this research, the 2021 HPGE policy was not due for implementation. Therefore, no further analysis or commentary on this policy will take place. Suffice to say that it is not a policy using Gagné’s model with integrity and fidelity.

Essentially these comparisons demonstrate that there have been no significant changes in the policy from 1991 despite a new policy in 2006, an update in 2016, and claims of a new policy in 2017. Considering the lack of change presented in the policy packages from 1991 to 2006, and then the minimal differences presented in the 2016 update, it is clear that the NSW Gifted and Talented Policy has not altered in meaning nor does it demonstrate an evolution of thinking for the management of our G &T students in almost 30 years.

### *1.5.2 What Makes Suitable Policy for Gifted Education and How Does This Align With the Current NSW DoE Policy?*

According to Gallagher (2002), the core details of the policy, or policy statement, should be specific enough to divide the scarce resources and provisions equitably to those named in a policy. He determined policy statements relating to the education of gifted students should answer four key questions. He states that when these questions are answered, together with an implementation structure, they provide a clear picture of what is required (Gallagher, 2015). The four questions supported by Gallagher (2015, p. 77) are:

Who receives the resources?

Who delivers the resources?

What are the resources to be delivered?

What are the conditions under which the resources are delivered?

As Gallagher (2015) noted, answering these four questions alone is not enough. Policy statements and implementation strategies and structure should be backed up with mandatory procedures that outline in more detail how the policy statement/s should be implemented. It is only then that we can ensure that policy is enacted with the integrity and intent for which it was written.

A policy cycle can be used to monitor and drive policy reform. Althaus et al., (2012) provide an Australian policy cycle with eight elements. The elements used sequentially are: identifying issues, policy analysis, policy instruments, consultation, coordination, decision, implementation, and evaluation. Höchtl et al., (2016) support the use of stages but indicate the dynamic nature of each and the interplay between them. Each of these elements are necessary to provide a good process for policy development, thus, avoiding an uncoordinated approach that rarely leads to good policy (Althaus et al., 2012). In the first instance, the identified issues drive the demand for a policy. Practice and enactment of the policy often drifts from what was intended, so evaluation is crucial and drives the next policy cycle (Althaus et al., 2012). Sanderson (2002) emphasises the importance of evidence-based evaluation. If improvement is to occur, then evidence for how well policies work in different scenarios is required, including how they achieve change. A pilot approach can provide preliminary information for new policy.

Analysis and interrogation of 2016 revised policy was formative in determining the necessity of this research. The document analysis therefore represented Phase 1 of the research and is presented here as foregrounding the necessity for Phase 2. An analysis of the NSW Department of Education Gifted and Talented Policy (NSW Government, 2016) showed that the policy is lacking in many of the key elements outlined earlier in section 1.3.4. Specifically, key elements 1, 3, 4, 5, 7, and 8 are not present;

1. A clearly defined purpose and scope are not evident, hence there is no aim; however, a title is present. There are no vision, values, or goals indicated.

3. Clear reasons for the policy are missing, other than a series of delegations under the heading "Objectives - Policy Statement". Thus, the objectives do not describe the purpose.

4. Key definitions are not included. G & T is referred to in the 2016 policy statement but is not defined. It is however similar to the definition provided in the 2006 support materials. There is a link to a revision history where a list of subject keywords is provided. These are; gifted, talented, maximise potential, accelerate, and gats. Of these words, only gifted and talented are used in the policy.

5. A policy statement is included but it is unclear and does not contain strategies, procedures, or an implementation structure that Gallagher (2002, 2015) states are required for successful, equitable, and meaningful policy. There is no mention of what resources or provisions should be provided, so it is not surprising that there is also no strategy for the fair and equitable allocation of the non-specified resources/provisions.

7. There are no related policies listed. Links to two implementation documents are present on the website but the documents do not contain specific strategies and are lacking in procedures or the conditions by which resources can be delivered. Despite being implemented in 2006, they have not been updated since 2004.

8. A link to the document history is provided; however, there are no references or detail to verify the 2016 update. The policy itself was approved in 2000 and the most recent year mentioned in the links provided is 2006. There is no evidence that a policy cycle was used to warrant updates or changes to the policy.

On a more positive note, the policy document contained the basic administrative elements 2, 6, and 9.

2. The targeted parties are "all staff employed in State Office, regions, NSW public schools, their school communities and all students who attend public schools". This broad-brush target leads to the question, who apart from the parents or guardians are not included as targets?

6. The enactment or implementation date is clear, 2006. with the revised version implemented in 2016

9. Contact phone numbers are included for Leader, Primary and Secondary Curriculum, but neither was answered in person nor voicemail when communication was attempted on three occasions (February 2019, July 2019, August 2019).

When reviewing the above in the context of the literature, the policy outlined above is not a suitable document nor is it a useful policy for teachers within the NSW DoE. It is similarly unhelpful for those in other sectors who must take advice from the Minister of Education's policies and government priority agendas.

It is difficult, if not impossible to define the goals of an intervention or the overarching purpose of the policy without mention of resources/provisions or procedures/strategies/pedagogy for delivery. It is a case of what exactly are we doing with what and for what outcome?

## 1.6 The Role of Gagné's Work in the NSW Gifted and Talented Policies

This section will present the definitions and understanding of G & T given in the policies and compare these to the cited or referenced works of Gagné as shown in Table 1.2

**Table 0.2**

*Gifted and Talented Definitions or Understanding Given in Policies for Gifted and Talented Students with Corresponding Reference from Gagné.*

| Policy Date | Referenced Works | Definitions or Description of G & T in Policy Documents | Gagné's Definitions from Works Cited or Referenced in the Policy Documents |
|---|---|---|---|
| 1991 | Gagné 1985.<br>No citations but in reference list | Gifted students are those with the potential to exhibit superior performance across a range of areas of endeavour. Talented students are those with the potential to exhibit superior performance in one area of endeavour. | Giftedness corresponds to competence which is distinctly above average in one or more domains of ability.<br>Talent refers to performance which is distinctly above average in one or more fields of human performance (Gagné, 1985). |
| 2006 | Document states the definitions are based on Gagné, 2003 | Gifted students are those whose potential is distinctly above average in one or more of the following domains of human ability: intellectual, creative, social and physical.<br>Talented students are those whose skills are distinctly above average in one or more areas of human performance. | Giftedness designates the possession and use of untrained and spontaneously expressed natural abilities (called outstanding aptitudes or gifts), in at least one ability domain, to a degree that places an individual at least among the top 10 per cent of age peers.<br>Talent designates the outstanding mastery of systematically developed abilities (or skills) and knowledge in at least one field of human activity to a degree that places an individual at least among the top 10 per cent of age peers who are or have been active in that field or fields (Gagné, 2003). |
| 2016 | No citation and no reference list | Giftedness refers to potential distinctly beyond the average for the student's age and encompasses a broad range of abilities in the intellectual, creative, socio-emotional and physical domains.<br>Talent denotes achievement distinctly beyond the average for a student's age as a result of application to training and practice. | Giftedness designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers.<br>Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of 'learning peers' (those who have accumulated a similar amount of learning time from either current or past training) (Gagné, 2013). |

There are significant differences in the definitions provided for the policies versus Gagné's definitions from the cited or referenced works. The definition is similar but not similar enough that it authentically represents his work. The 1991 policy states that talent is the potential to exhibit above average performance in one area whereas Gagné's definition states that talent is performance distinctly above average in one or more areas. More interestingly, despite stating that the 2006 policy definitions were based on Gagné's 2003 DMGT, the definitions have not significantly changed and certainly do not acknowledge the evolution of his work, closely aligning to his 1985 definitions.

In the 2016 update there are no citations or references. The "definitions" of G & T have been replaced with an understanding of G & T that is identical to that found in the abstract of the 2006 support materials and once again does not align with Gagné's current work. The 2016 NSW DoE published understanding of G & T leaves out an important part of Gagné's 2013 definitions. There is no acknowledgement of talent or mastery as measured against "learning peers" and those who have had similar opportunities to develop their gifts. The lack of acknowledgment may lead to children from disadvantaged backgrounds, and some underachieving students, remaining unidentified. The inclusion of the underachieving student is fundamental to the work of Gagné (1985) who early on, provided a critique of Renzulli's 1978 model and instead included a provision in his model for those who had not or could not develop their gift. Gagné defined "these people as gifted intellectually, but not talented academically" and provided for those who may possess "exceptional abilities, without having manifested his giftedness in any academic talent" (Gagné, 1985 p 112).

Although Gagné has continued to develop this model considerably over time (Gagné, 1991, 2000, 2003, 2004, 2008, 2009, 2010, 2011, & 2013) the contents of the NSW policy have not been changed in their meaning since 1991, nor have they been updated with the emergent research, despite a new policy in 2006 and an update in 2016. The three policies have characteristics of the definitions from Gagné's DMGT demonstrating his influence in NSW G & T education for almost 30 years, albeit diluted versions.

As demonstrated above, Gagné's definitions have influenced the definitions in NSW G & T policies since 1991; but using the definitions is not equivalent to adopting his DMGT. Despite the policy clinging to the same definitions, there is no evidence that his DMGT has been used. Additionally, it should be noted that appropriate referencing and in-text citations cannot be found in any of the policy documents. This could be considered unscholarly.

The evolution of Gagné’s model and discussion of this will be explored in Chapter 2.

## 1.7 Australian Approaches to Gifted and Talented Education Policy

As presented above, it is Gagné’s definitions of G & T that have been adopted in NSW and not his model. However, the word model will be used in the following section when discussing the prominence of Gagné’s work in Australia.

NSW is not the only state that has accepted Gagné’s model and although no rationale has been presented within the actual policy documents, there is a history behind the selected use of his model for G & T policy. Australia has not always adopted Gagné’s model. During the 1980s, performance-based measures of giftedness were used to identify already achieving G & T students, but ignored those who may have had the ability but were not performing (Merrick & Targett, 2005). Gagné’s model was one that recognised disadvantaged and/or underachieving children so this may be one reason his model began to replace the performance-based measures of giftedness.

However, Gagné’s model has come to dominate Australian G & T education as shown in Table 1.3. Each Australian state or territory department of education has a policy or documents that guide the education for G & T students. This will be referred to as the policy in the table heading.

**Table 0.3**

*Gifted and Talented Policies in the Australian States with Definitions and Adopted Models*

| State or Territory and Policy Date | G & T definition | G & T Model | Policy Status and Procedural Advice |
|---|---|---|---|
| New South Wales 2004. Website states 2016 update. The policy has the same contents as 1991 policy | Giftedness refers to potential distinctly beyond the average for the student's age and encompasses a broad range of abilities in the intellectual, creative, socio-emotional and physical domains.<br>Talent denotes achievement distinctly beyond the average for a student's age as a result of application to training and practice (NSW Government, 2016).<br>Uncited but reflects Gagné's 1985 definitions. | None.<br>Gagné's definitions adopted. | Unstated. Minimal and non-specific. Not updated since 2004. |
| Victoria<br>2014 | In Victoria, the widely accepted definitions of giftedness and talented are adopted from Françoys Gagné's model (2004), where 'giftedness' is understood as outstanding potential and 'talent' as outstanding performance (Victoria State Government, Education and Training, 2015).<br>No formal definitions given but elaboration and an explanation on the above is provided. | None.<br>Gagné's definitions adopted. | Unstated but mandatory is implicit. Procedural advice given |
| Queensland<br>2013 | The following definitions reflect the distinction between potential and performance. They recognise the factors involved in developing a student's giftedness into talent.<br>Gifted students are those whose potential is distinctly above average in one or more of the following domains of human ability: intellectual, creative, social and physical.<br>Giftedness designates the possession and the use of outstanding natural abilities, called aptitudes, in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers in the school.<br>Talented students are those whose skills are above average in one or more areas of performance. Talent designates the outstanding mastery of abilities over a significant period of time. These are called competencies (knowledge and skills). Outstanding mastery is evident in at least one field of human activity to a degree that places an individual at least among the top 10% of age peers in the school who are or have been active in that field (Queensland Government, Department of Education and Training, 2016).<br><br>Cited Gagné 2003 but definitions contain modifications. | None.<br>Gagné's definitions adopted. | Policy is a requirement. Some procedural advice given. |

| | | | |
|---|---|---|---|
| Tasmania<br>2016 | Gifted students - Students who are gifted have the capacity for advanced development relative to their age peers in at least one ability domain (cognitive, physical, creative or social) to a degree that places them at least among the top 10% of their age peers. Talent - Talent refers to outstanding performance in one or more area/s of aptitude. Talent emerges as a consequence of the learning experiences with which a student engages. Significant modification to the educational program of gifted students is often necessary to develop their gifts into talents (Tasmanian Government, Department of Education, 2016).<br><br>Year unstated but definitions match closely to Gagné 2003. | None.<br>Gagné's definitions adopted. | In all schools. Some support materials. |
| Northern Territory<br>2016 | Gagné's Differentiated model of Giftedness and Talent (2008) shows that gifted students are those potential is distinctively above average in one or more of the domains of human ability such as intellectual, creative, social and physical; and talented students are those whose skills are distinctively above average in one or more areas of human performance. According to Gagné, talent emerges from giftedness through a complex developmental process and through a number of influences including teaching and learning opportunities (Northern Territory Government, Department of Education, 2019). | Gagné's definitions adopted, model referred to and supplied as an appendix. | Requirement.<br>Supported by documents that include other models for G & T education |
| South Australia<br>2020 | Curriculum, pedagogy, assessment and reporting: early childhood services to year 12<br>Not a gifted and talented policy but a statement embedded in the policy above as an appendix for Learner diversity. The statement is 140 words with no definitions provided (Government of South Australia, Department for Education, 2020) | None.<br>No definitions. | Mandatory and all staff are required to adhere to the content. |
| Western Australia<br>2010<br>Minor updates in 2018 | Gifted – the possession and use of outstanding natural abilities, called aptitudes, in at least one ability domain.<br>Talent – Outstanding mastery of systematically developed abilities, called competencies (knowledge and skills), in at least one field of human activity. Talent emerges from ability as a consequence of the student's learning experience (Government of Western Australia, Department of Education, 2018).<br><br>(Uncited but definitions match Gagné's earlier work). | None. Gagné's definitions adopted. | Mandatory Policy.<br>No procedural advice but website has details of programs. |

| | | | |
|---|---|---|---|
| Australian Capital Territory<br>2014 | Gagné's Differentiated Model of Giftedness and Talent provides research-based definitions of giftedness and talent that have a logical connection to identification and curriculum programs. Gagné makes a distinction between innate or natural abilities (giftedness) and the superior mastery of systematically developed abilities in at least one field of human endeavour (talents).<br>Giftedness refers to a student's outstanding natural abilities or aptitudes, located in one or more domains: intellectual, creative, social, perceptual or physical, and recognises the diverse abilities of students.<br>Talent refers to a student's outstanding performance in one or more fields of human activity: academic, technical, science and technology, arts, social service, administration or sales, business operations, games or sports and athletics (Australian Capital Territory, Education and Training, 2014).<br><br>Gagné's DMGT identified in policy but no citations, references or dates of work provided. | None.<br>Gagné's definitions adopted.<br><br>Gifted and Talented (GAT) flowchart to track G & T student management from nomination, identification, provisions and evaluation. | Requirement.<br>Policy is supported by documents |

Table 1.3 makes several important points. First, it indicates that Gagné's model, albeit applied from different dates of Gagné's work, is the sole model of choice in Australia apart from South Australia, who in 2019, replaced their G & T policy with an appendix for diverse learners, omitting definitions. The reasons for the prevalence of Gagné's work are unclear as there is no indication of whether they have evaluated other models or the rationale for their selection of Gagné.

The Northern Territory (NT) acknowledges other models by including information about these in an appendix. The NT is the only state attempting to include an indigenous definition of giftedness in the policy. The definition acknowledges the cultural influence on what is deemed to be a domain of giftedness. "Giftedness from an Australian Aboriginal perspective needs to incorporate intellectual strength that is innate in their worldviews. It is suggested that Aboriginal concepts of giftedness should include Linguistic, Spatial, Interpersonal, Intrapersonal, Naturalist and Spiritual intelligences." (Northern Territory Government, Department of Education, 2019, p. 2).

ACARA previously acknowledged other models of giftedness, on their 2016 webpage, including Tannenbaum's (2003) Sea Star Model and Renzulli's (1978) three ring model; however, they indicated preference and acceptance of Gagné's work for G & T. This page has since been removed and replaced with another webpage containing uncited information on meeting the needs of G & T students (ACARA, n.d). The Victorian government has published a parliamentary paper that provides a significant amount of information about G & T students, their needs, and educational strategies, including other models for G & T education (Parliament of Victoria, 2012). However, the policy document refers only to the definition from Gagné's 2004 model, while some of the other models are discussed in the parliamentary paper.

Thus, the policy found in Australia could not be considered 'evidence-based' yet the literature on policy evaluation suggests this is an important criterion (Althaus et al., 2012; Höchtl et al., 2012). The dominance of Gagné's model could be a case of "follow the leader" where each state follows the other, though it is hard to know who the leader was. The second point, of even greater significance for the location of this study, is that all the other states and territories have updated their policies since 2010, some very recently. NSW sits in a precarious position with a policy from 1991, given that the new policy in 2004 and 2016 update did not alter the actual policy. The update appears to be simply a restructure for tangibly accessing the policy documents and minor rewording.

Importantly, there is no policy in any of the Australian States or Territories that explicitly adopt Gagné's model, or any other evidence-based model for G & T education, despite the prevalence of his definitions of G & T. NSW is not alone in this oversight and potentially this is another case of "follow the leader". This doctoral research is thus timely, and the anticipated results advising on models, not just definitions, to support G & T education in science will be valuable.

With almost 20 years since the approval of the NSW policy and nearly 30 since its conception, it is timely to review the G & T policy because

1. Gagné's model is one of several models for the constructs of giftedness and talent, yet there is no rationale to suggest why this model was chosen over others.
2. The strategies presented in the policy packages are not referenced to the literature and therefore cannot be considered evidence-based.
3. The application of Gagné's model is not evident.
4. The current policy appears to be structured around the definitions of G & T from Gagné's 1985 model. The current 2016 policy update, therefore, does not include the latest evidence-based research in gifted education, including that of Gagné.
5. The current policy has not changed in message or context in almost 30 years.

The overarching focus for this research, therefore, is which model or combination of models are the most appropriate for developing policy for the education of G & T science students in NSW in the 21st century.

## 1.8 Why Science as the Context for This Research?

It would be ludicrous to tinker with a system that was working and providing strong frameworks for the education of our students. Therefore, how will we know that our current policy is adequate or serving those whom it is intended to serve? This research will explore one major key learning area, science, and explore whether our current methods and strategies adequately guide learning and growth for G & T students. If found lacking in this area, it then makes sense to look for evidence-based solutions or alternatives. The intention to explore science will appropriately limit the scope of the study as it would not be feasible nor practical to explore the entire G & T framework in one research project. Therefore, the enactment and perceptions of G & T policies will be evaluated in one domain, science. This allows for comparisons without the confounding variables of different specifics of the distinct learning areas. The background experience and interests of both candidate and supervisors make science an obvious choice, but there are other justifications for the selection of science as the context (or domain) for the research:

(1) ***Science is a national priority***. As we move well into the 21st century, STEM subjects become paramount in our country's progression (Prinsley & Baranyai, 2015). We rely on science education, knowledge, innovation, and influence to understand our health, the use of vaccination, the application of technology, the introduction of new drugs to treat disease, and our economic progression (Chubb, 2012). There is an urgent demand that we have a scientifically literate community and a community that can evaluate these claims and developments (Chubb, 2012). Hence, more than ever there is a sense of urgency to promote STEM subjects as "Science and innovation are recognised internationally as a key for boosting productivity, creating more and better jobs, enhancing competitiveness and growing an economy" (Office of the Chief Scientist [OCS], 2016, p. 7). Of the fastest growing occupations, 75% require STEM skills (OCS, 2014) and Australia needs more science graduates to fill these roles. The former Australian Chief Scientist (May 2011-Jan 2016), Ian Chubb, asserted that the future of our country is Science (OCS, 2014); yet most science students do not identify with the importance of science in their future and even fewer non-science students recognise its value (Chubb, 2012). This viewpoint may partly contribute to the significant decrease in retention rates in school science and mathematics and the flow on decline in enrolment in university science courses (Chubb, 2012; OCS, 2016).

Therefore, to be internationally competitive, Australian schools must provide opportunities for our gifted students to explore and develop their interest and ability in science subjects. Through the implementation of suitable policies, we can provide effectively for G & T science students, viable candidates to fulfil this need.

(2) ***Australia is falling behind in science and maths (PISA and TIMMS).*** Australia's international Program for International Assessment (PISA) science and maths ranking steadily declined over the last ten years, with 2019 results the exception, and fewer Australian students have performed at Trends in International Mathematics and Science Study (TIMSS) advanced levels when compared to the top five countries (Australian Council for Educational Research [ACER], 2020; OCS, 2016). These tests are large-scale international assessments that are used to inform policy and practice and give perspectives on

the teaching and learning of science and mathematics in Australia. PISA assessment measures scientific literacy and determines this as the ability to engage in science, scientific ideas, and the processes of science (ACER, 2018). The TIMMS assessment measures mastery of the content, factual aspects, and procedural knowledge of science but also investigates contextual factors that affect learning including student attitude to science, self-perception, home environment, and educator perspectives (TIMMS, 2013). PISA and TIMMS measure different aspects of scientific education and when considered together they may provide an important snapshot of the current situation. Unfortunately, there is an up to 18-month timeframe for the PISA report from the date of the assessment (ACER, 2019a) and a two year wait for TIMMS report (ACER, 2019b). The impact of delayed results can in turn delay action and given the recent syllabus reform for science (NESA 2017b, 2017d), these action strategies may no longer be suitable or reflect the new situation. Long lag reporting makes it even more important to be proactive and revise our G & T policy so that we cater for our gifted science students with suitable, relevant, and robust policies that are effective in a 21st century Australian classroom.

### 1.9 Contribution to Knowledge

As demonstrated earlier, Gagné's model for G & T is prevalent in Australia with all states using his model to form their policies for the past 10-15 years, and NSW almost 30 years. No policy presents a rationale for using this model or the rationale for the selection of this model over others.

This research will gather empirical data on the status of G & T education in NSW schools to assess whether this is in keeping with the model in the current policy i.e., Gagné's model. This will be ascertained by analysing interviews with experienced science educators and science education leaders on their perceptions of relevant inclusions in a G & T policy, understanding of the current NSW DoE G & T policy, and alternative theoretical models, guiding education. They will also be interviewed to identify the existence and value of a school G & T policy and the inclusion of G & T provisions and practices. Educator's perceptions will be collected anonymously and in larger numbers by using surveys that ask questions around G & T policy, the understanding of G & T, required resources for G & T, and useful G & T pedagogy. From the findings, theoretical and practical consideration will be given as to whether Gagné's model is the most appropriate model for 21st Century students in science, or whether other published models could be justified as being more appropriate.

Criteria for this judgement will be detailed in Chapter 2. There is potential for a new model to emerge from this study thus contributing to the theoretical aspects of educational research and reform.

It will be necessary to gather factual data about the G & T policies in schools, the provisions available for G & T, and the practices utilised in science classrooms for G & T students. However, policies are enacted by people whose beliefs about and attitudes towards a policy will influence how the policy is enacted (Coburn, 2001). Thus, it will also be necessary to ascertain the perceptions of participants regarding the current policy and possible alternative models of G & T education. Questions of perception are important as they provide information about beliefs, understanding, behaviours, and attitudes (Presser, et al., 2004). The research questions that emerge from the literature review (Chapter 2) are therefore designed to examine both facts and perceptions to review the current use of Gagné's model of giftedness as a basis for policy in NSW and to determine the most appropriate model for moving forward in G & T science education.

# 2 CHAPTER 2: LITERATURE REVIEW

## 2.1 A Review of Chapter 1 and Chapter 2 Introduction

Chapter 1 demonstrated that there is no organisation responsible for national or state policy for the education of Gifted and Talented (G & T) students in Australia. This leaves the responsibility for policy development with the individual sectors which are: Department of Education NSW (NSW DoE), Catholic Education Office (CEO), and the Independent Schools. An overview provided for each schooling sector system demonstrated the influence of, and the relationship between, the NSW DoE and NSW Educational Standards Authority (NESA). A comprehensive analysis of the NSW DoE policy for G & T students found that there had been minimal change in the policy since 1991. The 1991, 2006, and 2016 G & T policies are iterations of the same material and do not demonstrate an evolution in thinking despite progress in this field of education. The analysis also found that the 2016 policy did not conform to defined criteria of good policy (Nakamura, 1987; Northeastern University, 2017; University of Colorado, 2018).

The chapter introduced and defined the key concepts for this research including definitions for G & T, twice exceptional/multi-exceptional/2e, policy, good policy, provisions, pedagogy, and science in the context of science education. In particular, the influence and prevalence of Gagné's work in Australia were described. It was found that only his definitions are used, in their various versions. No Australian policy explicitly uses an evidenced-based model for its G & T policy.

Chapter 2 will examine some of the key areas of the literature as they pertain to the development of an appropriate G & T policy for science students. The definitions of G & T people will be expanded upon from the definitions provided in Chapter 1, and the evolution of the definitions will be explored. Fundamental concepts of identification and labelling will be considered, demonstrating the difficulty, controversy, and divided perspectives in this area of the field. Gagné's work was presented in Chapter 1 as the dominant influence in Australian G & T education and policy, Chapter 2 will introduce other evidence-based models that could be considered when defining and catering for gifted students. The literature will be reviewed with respect to the current status quo and recommended provisions and pedagogy for identified and emerging G & T students. When all is considered, this will lead to the presentation of a conceptual framework and the research questions as defined by the review of the literature. Chapter 2 is presented in two parts. Part 1 will present matters of giftedness and the educational setting for which this research is placed. Part 2 will present models, practice/pedagogy, and provisions and discuss how they are appropriate to G & T people and gifted education. A visual representation of the framework for this literature review is presented at the end of this chapter in Figure 2.8.

## 2.2 Defining Giftedness

When considering policy and the appropriate management of a group of people, definitions become necessary as they are the criteria by which scarce resources are allocated to an infinite need (Gallagher, 2002). This research aims to determine the most appropriate model for the development of policy for G & T science students in NSW, and although defining the population of G & T students is integral to assessing, creating, or examining policy, this research primarily concerns the theoretical models used to drive policy development for G & T science students. In this chapter the literature demonstrates that there is limited agreement about the characteristics and presentation of a gifted individual, making it difficult to arrive at a consensus to conclusively define this population of individuals. It is therefore beyond the scope of this discussion to present in detail the evolution of our current G & T definitions, however, a summary of some of the accepted definitions will be presented as it applies to this research, keeping in mind that the field is large and broad.

Chapter 1 presented the concept of a G & T person using the definitions from Gagné's most recent work (Gagné, 2013). Presented again are his definitions as this section will explore the historical development of some of the key influences in defining G & T people.

> Giftedness designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), into at least one ability domain, to a degree that places an individual at least among the top 10% of age peers.
>
> Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of 'learning peers' (those who have accumulated a similar amount of learning time from either current or past training). (Gagné, 2013, p. 5)

Gagné's definitions of G & T are the ones accepted and used in Australian G & T policies but there has been a multitude of definitions, identification practices, and scientific study of giftedness going as far back as 1869. Francis Galton first published "Hereditary Genius" rather than "Hereditary Ability", a decision he came to later explain in his 1892 updated version, "for ability does not exclude the effects of education, which genius does" (p. viii). He explained, that while he regrets his choice of title, it cannot be altered as he was simply "expressing an ability that was exceptionally high, and at the same time inborn." (p. viii).

> By natural ability, I mean those qualities of intellect and disposition, which urge and qualify a man to perform acts that lead to reputation. I do not mean capacity without zeal, nor zeal without capacity, nor even a combination of both of them, without an adequate power of doing a great deal of very laborious work. But I mean Hereditary Genius a nature which, when left to itself, will, urged by an inherent stimulus, climb the path that leads to eminence, and has strength to reach the summit—one which, if hindered or thwarted, will fret and strive until the hindrance is overcome, and it is again free to follow its labour-loving instinct. (Galton, 1892, pp. 37-38).

Galton (1892) argued that those men who are true geniuses are not exempt from life challenges and hindrances, are not exempt from hard work, come from all social classes, and struggle with feelings and ideas. He asserted that hardship was no barrier to genius as the Englishmen who exhibited genius were not fewer than those found in America, or other great countries, where their hindrances had been removed. He states that those who are mediocre and have the benefits of social class may take prominent roles but when they die there is no public mourning, only a gap left for a short while, before it is filled again. A man of true genius is rare, "very first-class-men—prodigies—one in a million, or one in ten millions" (p. 40).

Presented, is one of the earliest credited definitions of giftedness (Galton, 1892) alongside the definitions, used in its various adaptations, for 21st Century Australian G & T education (Gagné, 2013). Notably, there is little difference given 144 years of research. Gagné and Galton both recognise the distinction between giftedness and talent; Gagné directly separating the two terms, while Galton stating natural ability is an intertwined capacity and zeal, followed by hard work to achieve an exhibition of scholarly acts or performance. There are other key influencers in the development of gifted education and the conceptions that define G & T; however, it is interesting and important to examine early definitions when considering what has "worked in the past" and where we want to head in the future.

A definition presented by Lewis Terman (1925) in the early days of G &T research that could be regarded as narrow, described giftedness as the top 1% in general intellectual ability, as measured by the Stanford-Binet Intelligence Scale or comparable instrument. Gardner (1999), on the other hand, presents a broader theory of intelligence rather than an exact definition. His theory initially encompassed seven, but later expanded to eight key areas of performance. These areas are linguistic, musical, logical-mathematical, spatial, bodily-kinaesthetic, intrapersonal, and interpersonal (the personal intelligence), and naturalistic (Gardner, 1999). Renzulli (1978) suggested that one means by which to view definitions of G & T were to view it as a continuum from conservative to liberal. To avoid political connotations the words conservative and liberal were replaced with the terms narrow and broad. With this continuum of definitions of G &T in mind, Table 2.1 summarises some of the key definitions and conceptions of G & T.

**Table 2.1**

*Comparison of the Definitions of Giftedness and Estimated Population Size*

| Year and Author(s) | Definition of Giftedness | Size of Population |
|---|---|---|
| 1892<br>Francis Galton | By natural ability, I mean those qualities of intellect and disposition, which urge and qualify a man to perform acts that lead to reputation. I do not mean capacity without zeal, nor zeal without capacity, nor even a combination of both of them, without an adequate power of doing a great deal of very laborious work. But I mean Hereditary Genius a nature which, when left to itself, will, urged by an inherent stimulus, climb the path that leads to eminence, and has strength to reach the summit—one which, if hindered or thwarted, will fret and strive until the hindrance is overcome, and it is again free to follow its labour-loving instinct (Galton, 1892, pp.37-38). | 0.00001% to 0.0001% of the population |
| 1916<br>Alfred Binet and Théodore Simon | Development of a tool for the quantitative assessment of intelligence. Known as the Binet-Simon Scales (Binet & Simon, 1916).<br>Scales have evolved to provide a range of giftedness ranging from moderately impaired or delayed IQ range (40 – 54) to Very gifted or highly advanced (145-160) (Lim, 2009). | Not stated as a percentage |
| 1925<br>Lewis Terman | Intelligence is a unitary trait and the "gifted" are those who score in the top 1% or greater on the Stanford-Binet Intelligence Scale (Terman, 1925). | Top 1% as measured on the scale |
| 1972<br>Sidney Marland | Gifted and talented children are those (identified by professionally qualified persons) who by virtue of outstanding abilities are capable of high performance. These are children who require differentiated educational programs and/or services beyond those normally provided by the regular school program in order to realise their contributions to self and society.<br>Children capable of high performance include those with demonstrated and/or potential ability in any of the following areas, singly or in combination: General intellectual ability, specific academic aptitude, creative of productive thinking, leadership ability, ability in the visual or performing arts, psychomotor ability (Marland, 1972, p. 3). | 1.5 – 2.5 million out of 51.6 million<br>Calculated to be<br>2.9% - 4.8% of the population |
| 1978<br>Joseph Renzulli | Giftedness consists of an interaction among three basic clusters of human traits — these clusters being above-average general abilities, high levels of task commitment, and high levels of creativity. Gifted and talented children are those possessing or capable of developing this composite set of traits and applying them to any potentially valuable area of human performance. Children who manifest or are capable of developing an interaction among the three clusters require a wide variety of educational opportunities and services that are not ordinarily provided through regular instructional programs (Renzulli, 1978). | Top 15-20% have potential (Renzulli & Delcourt, 1986) |
| | Tannenbaum's (1983) definition of giftedness embodies five factors: (a) general ability (or intelligence with a varying threshold for different fields, (b) special | Not stated |

| | | |
|---|---|---|
| 1983<br><br>Abraham Tannenbaum | ability, (c) nonintellective factors, (d) environmental factors, and (e) chance factors.<br><br>'Keeping in mind that developed talent exists only in adults, a proposed definition of giftedness in children is the potential for becoming critically acclaimed performers or exemplary producers of ideas in spheres of activity which enhance the moral, physical, emotional, social, intellectual or aesthetic life of the community' (Tannenbaum, 1983, p. 86) | |
| 1983<br><br>Howard Gardner | Defined Intelligence rather than a concept of giftedness. Encompassed eight domains in his theory. These areas of are linguistic, musical, logical-mathematical, special, bodily-kinaesthetic, intrapersonal, and interpersonal (the personal intelligences), and naturalistic (Gardner, 1983, 1999). | Not stated. |
| 1989<br><br>James H. Borland | Those students in a given school or school district who are exceptional by virtue of markedly greater than average potential or ability in some area of human activity generally considered to be the province of the educational system and whose exceptionality engenders special-education needs that are not being met adequately by the regular core curriculum (Borland, 1989, p. 33). | Not stated |
| 1994<br><br>Jane Piirto | Those individuals who, by way of learning characteristics such as superior memory, observational powers, curiosity, creativity, and the ability to learn school-related subject matters rapidly and accurately with a minimum of drill and repetition, have a right to an education that is differentiated according to those characteristics. They may or may not become producers of knowledge or makers of novelty. These children can be found in all socioeconomic and ethnic groups…. These children have no greater obligation than any other children to be future leaders or world class geniuses (Piirto, 1994, p. 34). | Not stated |
| 1997<br><br>Barbara Clark | Giftedness is a biologically rooted concept that serves as a label for a high level of intelligence and indicates an advanced and accelerated development of functions within the brain, including physical sensing, emotion, cognition, and intuition. Such advanced and accelerated functions may be expressed through abilities such as those involved in cognition, creativity, academic aptitude, leadership, or the visual or performing arts (Clark, 1997, p. 26). | Not stated |
| 2011<br><br>Rena Subotnik, et al. | Giftedness (a) reflects the values of society; (b) is typically manifested in actual outcomes, especially in adulthood; (c) is specific to domains of endeavor; (d) is the result of the coalescing of biological, pedagogical, psychological, and psychosocial factors; and (e) is relative not just to the ordinary (e.g., a child with exceptional art ability compared to peers) but to the extraordinary (e.g., an artist who revolutionizes a field of art) (Subotnik, et al., 2011, p. 3). | Not stated |
| 2013<br><br>Françoys Gagné | Giftedness designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers. Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of 'learning peers' (those who have accumulated a similar amount of learning time from either current or past training) (Gagné, 2013, p. 5). | Top 10% of age peers.<br><br>He provides levels and incidence of giftedness. See section 2.3 |

| | | |
|---|---|---|
| 2016<br>Mimi Wellisch | Giftedness is an accelerated state defined by significant achievements and/or characteristics, behaviour, and/or biology of the gifted individual, nurtured within an environmental context that s/he actively seeks to co-create to satisfy the need for knowledge of the perfecting of production or performance – a state (regardless of whether assessed or seen) to be adequately demonstrated by superior performances or creations at a particular point in time (Wellisch, 2016, p. 25). | Not stated |

As demonstrated in Table 2.1, there are differences in how G & T is viewed and therefore defined. Renzulli's definition (1978) very clearly acknowledges that other factors are involved in developing giftedness, such as creativity, and motivation. He does not specify any domains where giftedness can occur and, in this sense, his definition allows for the recognition of giftedness in domains and areas of human endeavour appropriate to individual societies. Another way of viewing his omission of the word domain is that gifted people may not fit neatly into one defined area. In a similar but not identical manner Gagné (2013) does not specify within which domains gifted individuals found, but does indicate that identification of giftedness is typically within discrete areas, and encompassed by defined boundaries. Barbara Clark (1997), indicates specific areas of giftedness, potentially narrowing the focus, and excluding those who do not seem to fit into the neatly packaged boxes. This assertion is in tune with Watters' and Diezmann's (2003) comment, that any qualities that we use to define exceptionality are a "spirit of the times" (p. 48). Society needs to be ready and willing to appreciate any given type of giftedness and recognise that an underlying reliance on social constructs partially explains the continual difficulty of agreeing on how to categorise people. As new technologies emerge, and old theories are challenged, there will be further changes in the identification processes, definitions, and appreciation of G & T students as demonstrated in Table 2.1.

### 2.3 The G & T Population

Aside from defining giftedness, the size of the G & T cohort is another contested issue in the literature giving rise to the question, who are these G & T individuals, and by what means are they identified? The population size may depend on the applied definitions and the recognised domains of giftedness. The percentage of the population that is gifted ranges from 0.00001% to 10%, as suggested by Galton (1892) and Gagné (2013) respectively. Gagné (2007) differentiates levels of giftedness. His levels correlate with IQ equivalents that range from Level 5, those who are extremely gifted with an IQ of 165 and population incidence of

1:100,000 (0.001%), to Level 1, those who are mildly gifted with an IQ of 120 and population incidence of 1:10 (10%).

However, giftedness is not always transformed into talent, and Merrick & Targett (2005) suggest there are significant numbers of children not reaching their gifted potential, implying some inadequacy of identification methods, strategies, or provisions to assist gifted individuals. According to Merrick and Targett (2005), gifted people may make up 15% of the population. This raises the likelihood that some gifted individuals are currently underachieving, as current identification methods rarely recognise such a large group. The authors explain this may be due in part to the limitations of identification methods; for example, reliance on IQ tests reduces the likelihood of identifying gifted children from different cultures. Children may also try to avoid identification - all children compare their abilities with those of other children, but gifted children undertake this ‘norm referencing’ at an earlier age. Their sense of being ‘different’ may lead them to underplay their abilities, leading to underachievement – and the subsequent waste of human potential (Gross, 1997a). This underlying premise for the unidentified, underachieving G & T student forms the basis for the Gifted Education Resource Research and Information Centre (GERRIC) teacher education modules used by both NSW department and Catholic Education Schools (Merrick & Targett, 2005). Seeley (1993) described the evolving conceptualisation of the underachieving G & T student, flagging inappropriate environments as a major factor in school dropout rates. He suggested that good management and preventative strategies exist, and should be adopted before underachievement occurs (Seeley, 1993).

### 2.4 Challenges of Identifying Giftedness

Over the last century and a half, there have been a myriad of proposed definitions, terms, and identification practices, with still no easy or agreed upon characterisation of a gifted person. Table 2.1 highlights there are considerable differences in how giftedness is described and what it means to be gifted. There is disagreement in which domains gifted individuals are legitimately found, the size of the gifted population, and the means and tests by which these individuals are identified. This makes identification very challenging.

Alongside the aforementioned challenges, the descriptions, and qualities presented in the literature, appear to be as varied as those individuals who are characterised, but ironically the same literature places G & T students into a single distinct group as though they are only one cohort (Colangelo & Wood, 2015, Song & Porath, 2006; Watters & Diezmann, 2003).

However, there is no combination of common attributes to form a uniform profile of a gifted individual (Colangelo & Wood, 2015). Gifted individuals may develop personality and ability attributes asynchronously (Colangelo & Wood, 2015; Lovecky, 1994). Thus, a gifted individual may be difficult to identify due to the infinite number of trait combinations (Lovecky, 1994; Song & Porath, 2006) or masked by being twice/multi-exceptional, as defined in Chapter 1 (Wellisch, 2016).

With no clear-cut qualities and alternative theoretical perspectives of giftedness (Koshy & Pinheiro-Torres, 2013), there is significant mythology surrounding how a gifted individual should look or behave, and giftedness is not always recognised. The profile presented by a gifted individual may be in part due to asynchronous development whereby, an individual's advanced cognitive abilities combine with their heightened sensitivity and intensity to create experiences qualitatively different from their peers (Columbus Group, 1991). For example, asynchronous development may cause internal burdens if an academically gifted individual is distressed by a lack of ability in other areas, including physical, social, or emotional (Robinson, 2002). This can make their subjective experience different from that of their peers. Similarly, a gifted child may be highly capable of the cognitive processes required to fulfil a difficult task but lack the language or organisation skills to articulate their ideas into a written argument (Lovecky, 1994), sometimes inviting criticism from others for “unwarranted” special provisions (Robinson, 2002).

This asynchronous development can occur in infinite, and sometimes unusual, combinations making a gifted person even more difficult to identify at times (Lovecky, 1994; Song & Porath, 2006). Robinson (2002) states that the degree of internal differences felt by a gifted child is similar to that of a child who is disabled and is greater than that of what is experienced by a child with average cognitive development. Heightened or advanced cognitive understanding of the implications of danger, combined with normal emotional development, may cause great distress when they encounter world or personal problems such as war, famine, illness of a family member, or financial problems in the home (Robinson, 2002). Gifted people may also have disabilities and are no longer thought to be found in only white, middle to upper-class society (Colangelo & Wood, 2015).

Despite the uncertainty found in the literature, Frasier and Passow (1994) have published a list of the 10 common or core traits they believe can be seen in gifted children. The children may not display all traits or display them intermittently. These traits are: motivation, intense unusual interest, highly expressive communication skills, effective problem-solving ability, excellent memory, inquiry (curiosity), quick grasp or insight, uses logic and reasoning, imagination or creativity, and the ability to convey and pick up humour. Other characteristics suggested by Lovecky (1994) and Song and Porath (2006) include the ability for abstract reasoning, early moral concern and need for justice, the need for precision, exceptional memory, empathy, and intensity. Traits such as ‘creativity’, ‘motivation’, or ‘ability for abstract reasoning’ fit neatly within the definitions provided in Table 2.1, but others such as ‘pick up humour’, ‘empathy’, or ‘highly expressive communication skills’ could be seen in non-gifted individuals or could be thought of as domain specific traits. Frasier and Passow (1994) have qualified that these traits are not always present meaning that in the absence of other indicators, these ‘core traits’ may not be particularly useful when identifying gifted individuals.

According to Moon (2009), many people, including educators, have the misconception that a gifted individual is exempt from the usual challenges of life, and because of their superior intelligence and often coveted ability, it is thought that their problems and trials are easily overcome. It is often assumed that because they have a high IQ and some or many of the positive traits mentioned, they are therefore excluded from boredom, depression, stress, and confusion. Colangelo and Wood (2015) further state that the achieving G & T person is no more or less likely to suffer from mental health issues than people in other populations, and they are just as susceptible to physical health issues, loneliness, and issues surrounding poor self-esteem.

Simonton (1994) explored the personality traits present in those who become world leaders, scientific geniuses, and others in the spotlight. He found, amongst other traits, that they are not satisfied with the status quo and often break free from the stereotypical social norms. For example, in past times women were often socialised to be home makers and did not give a second thought about their role in the home. The women who challenged this were gifted adults, possibly unhappy with the status quo and with a desire and the personality traits to persist with seemingly insurmountable obstacles. Marie Curie, a twice Nobel Prize winner was a woman who was clearly gifted yet was not afforded the same privileges as her husband until his death (Simonton, 1994). Marie overcame the obstacles, defied the social norms of her time, and made a significant, unique, and creative contribution to science. It would be hard to imagine that her road was smooth and stress free. Indeed, her desire to use her gifts in a world where she was unable, most likely caused her boredom and frustration.

## 2.5 Traits of the Underachieving G &T Person

Wellisch and Brown (2012) have identified traits commonly found in underachieving gifted children. These characteristics included a tendency to be easily frustrated, introversion, have perfectionistic tendencies, and for boys, less interest in sport. They do acknowledge that their research used a small sample size and that care should be taken not to generalise, nevertheless, their work is important for several reasons. Wellisch and Brown conducted their research in Australia where there is a cultural emphasis and priority on sport. Research in other countries may not have reported this lack of interest, particularly where cultures do not value prowess in sport to the same degree. Secondly, we may be able to use sports training to help channel the frustration, improve peer relationships and acceptance, assist with skill development, and increase self-esteem in children (Wagnsson, et al., 2014). Improving and supporting gifted individuals outside their domain of giftedness, may help with underachievement through social interaction or social and self-acceptance. Of course, these are not the only reasons for underachievement however, they may help some individuals, thus warranting more research and investigation in this area.

A senate inquiry into the education of G & T children (Commonwealth of Australia, 2001) also identified that underachieving G & T person may suffer from physical and psychological disorders such as: stomach and head aches, depression, self-harm, poor self-esteem, sleep disorders, and stress induced eczema.

As such, G & T students, and people, are not a homogenous group, and from the literature it seems that they may benefit from being further separated into sub-groups. By doing so, traits that cause great or significant distress, anxiety, and underperformance can be addressed with integrity, not necessarily alongside the trait of being gifted. If co-existing needs are addressed, this may assist with the challenge of identifying individuals who are capable of developing their talent.

Gagné (2011) suggests an alternative and a separate pathway for gifted students who have special educational needs or who are underachieving. His premise is that equity in gifted education programs is not about ensuring proportional numbers of socio-economic or ethnic representation, but true talent development. Focusing on performance as the main measure for entry into a program ensures equity and objectivity when selecting students to participate. He does not offer any specific pathway for the underachieving individuals, possibly because their needs are so varied, but his is a performance-based model, whereby past successes are the best predictor of future success. As such, it must be questioned if equity can be achieved where there is a focus on performance only. Many gifted children do not have an environment that allows for talent development.

Gagné (2011) states that those students who are performing require challenging enrichment as the current curriculum does not meet their advanced learning aptitudes or their accelerated learning pace. He clearly separates enrichment from differentiation as programs that deliver this enrichment promote development, not simply meeting the same goal sooner. Talent development programs should be more rigorous and provide significant challenges greater than those programs for the typical learner. Programs for gifted students, therefore, will be significantly different from the programs that are needed to assist students who have special needs or who need assistance to close gaps, regardless of their potential or giftedness.

Wellisch (2016) challenges Gagné's DMGT asserting that his model, while acknowledging the underachieving G & T person, leaves those who are in minority groups "without a legitimate claim to be identified" (p. 18). Minority groups specifically included are those with low socio-economic status (SES), unidentified disabilities, specific learning disorders, and socio-emotional problems. Gagné's assertions, published five years earlier, had already addressed this claim by stating, "observable performance creates an equitable comparison base, thus effectively silencing inequity accusers" (Gagné, 2011, p. 10). This should not be dismissive of those with the special needs mentioned above, rather an assertion that the talent development model proposed by Gagné may be more suitably entered when an individual is ready for the greater challenges. Unfortunately, not all gifts are transformed into talents, which gives rise to these questions: should there be alternative pathways for those who are performing from those who are not? Would these pathways more faithfully and fairly serve the individuals within? Should the pathway be inclusive (Wellisch, 2016) or separate?

Gagné's definitions clearly differentiate giftedness, or potential, from talent. From the separation of these terms, which is similarly evident in many of the other accepted definitions, we may infer that gifted individuals need to develop and cross an imaginary bridge from gifted to talented. Those with special needs may need specific additional support before they are ready to cross.

## 2.6 Attitudes Towards Gifted Students

Teacher attitudes towards G & T students may influence their classroom practices. Geake and Gross (2008) found that teachers' negative attitudes towards intellectually gifted and talented children led to a lack of appropriate practices for these children. Gross (1997) stated teacher views of gifted children were stereotypical and included qualities such as arrogance, self-centredness, and overconfidence. She states that gifted students are often met with an open hostility that is not confined to any one culture or background (Gross, 1997b). Aside from the hostility and negative attitude towards gifted children, Gross (1997) states that the inability of the gifted child to fit in socially is the most common reason given by teachers as to why they do not accelerate a gifted child. Masse and Gagné (2002) confirmed that social peculiarity is often perceived to go hand in hand with high intelligence. Studies have demonstrated that the higher the intelligence, the greater the risk for difficulties adjusting socially (Dauber & Benbow, 1990; Gross, 1993). However, none have shown causation, only correlation. Other studies find the opposite to be true, that students with high IQ have no greater behavioural or social problems than those with an average IQ (Lee et al., 2012; Persson 2007). Persson (2007) suggests that the problems faced by highly gifted people are caused by the reactions of others, constant rejections, and social peers that are often threatened by their high abilities. Masse and Gagné (2002) reported that gifted individuals feel the envy of their social peers, whether perceived or real. The emotional issues reported are often not due to a psychological disorder, but a reaction to social isolation, exclusion, and feelings of being different. These reactions would affect a non-gifted person in the same way (Persson, 2007).

Classroom teachers play a substantial role in the learning, development, social inclusion, and achievement of G & T students (Clark, 2002, Mullen & Jung, 2019). Clark (2002) indicates that teacher attitude, style, experience, expectations, and response patterns are directly related to classroom productivity, stating the need to ensure that teachers of G & T students possess suitable characteristics for optimal student learning (Clark, 2002). Mullen and Jung (2019) have found primary school teachers are comparatively more supportive of gifted students and gifted education than secondary school teachers. They suggest this attitude may be a product of the system whereby primary school teachers have a greater understanding and influence on the holistic learning needs of the child, whereas secondary school teachers are specialists and generally teach in single faculty areas.

Teachers who have an incredible impact on their students' learning and education are often remembered years later, but they are usually very rare (Hattie, 2017). Hattie (2017) states that the "why" is more important than the "what", indicating that attitude and thought behind decisions have a significant impact on its success. His meta-analysis on "visible learning" has shown that the student-teacher relationship has a great impact on learning, including reducing student anxiety when those relationships are safe and trusting. It should be no surprise that gifted children want to feel as included, loved, and accepted as everyone else.

## 2.7 Implications of Labelling

Previous research has focused heavily on the identification of G & T students with extensive debate and contrasting theoretical positions about what it means to be gifted (Craven, et al., 2000; Koshy & Pinheiro-Torres, 2013). Renzulli (1978) suggested that the terms 'gifted', 'genius', 'eminent creators' or 'highly creative persons' are used interchangeably. Adding to this list could be 'high performance', 'high potential', 'bright', 'intelligent'. Most people would consider this list of labels positive, but unfortunately, such labels do not always lead to beneficial outcomes. Hewitt (2005) states the external pressure to do well from teachers, friends, and parents often leads to unrealistic internal high expectations. Concurrently, teachers may perceive equity in education as equal outcomes and achievements, rather than equal opportunities for an appropriate and enriching education (Lassig, 2003). Therefore, efforts to assist those who are already considered advantaged may be met with contempt and resistance (Clark, 2002; Lassig, 2003).

Unfortunately, there are also negative stereotypes, labels, and attitudes attached to academically gifted children (Hewitt, 2005; O'Connor, 2012). Negative labels for gifted children include terms; 'deviant', 'precocious', 'geek', 'nerd', 'little mad professor' and 'teacher's pet', 'boff or swot' (Hewitt, 2005; Koshy & Pinheiro Torres, 2013; O'Connor, 2012). However, it is not only the negative labels and name-calling that are potentially harmful to the self-esteem and self-worth of G & T. Geake and Gross (2008) demonstrated that teachers' attitudes towards intellectually G & T children are often negative and special provisions are often not implemented. This is supported by Coburn (2001) who showed that even when policies, resources, and/or strategies are available for teachers to use, their interpretation and quality of implementation are strongly linked to their beliefs and attitudes. In addition to the non-compliance of some educators, gifted students may be further exposed to teaching practices such as 'tall poppy syndrome' whereby those who are already seen to be privileged are cut down to size (Geake & Gross, 2008; Lassig, 2003).

Given the mixed attitudes and beliefs surrounding G & T students, identification and the application of labels is contentious. Hewitt (2005) states that those responsible for identifying a G & T child should do so with great care, for once identified these children will need special provisions, teaching, and management to not be at a disadvantage. O'Connor (2012) further discusses the implications of applying labels to people, even labels that are typically seen as positive. Once a label is applied there are a series of expectations, beliefs, management, and attitudes that accompany this label (Hewitt, 2005; O'Connor 2012; Zeigler & Phillipson 2012). Therefore, caution must be practised when applying labels and assigning attributes to our G & T students and educators must ensure that other outcomes, such as their self-esteem, personal happiness, and life goals and satisfaction are not neglected (Muratori & Smith, 2015; Ziegler & Phillipson, 2012).

Despite these issues, meeting the educational requirements for a unique group remains. The next section will discuss the importance of identification.

### 2.8 Importance of Identification and Development of G & T People

It is well recognised that for G & T students to achieve their potential, specialised interventions and provisions are needed to develop their unique abilities and to minimise the potential for them to feel socially conflicted or isolated (Muratori & Smith, 2015). Tannenbaum (2003) asserts that bright productive students will emerge as productive and performing adults, if underachievement and unfavourable environments or circumstances are addressed (see also Ford, 2003). Those that specialise in, or advocate for gifted education aim to address this including; preparing the gifted child for the future, providing opportunities for satisfaction at school, and encouraging the emergence of happy, successful, and productive adults who contribute uniquely to society (Rinn & Bishop, 2015, Subotnik, et al., 2011). However, this is not always a straightforward task. Winner (2000) states that researchers are more interested in and preoccupied with the "deviant". She asserts that there is more focus on the other end of the spectrum on conditions such as retardation, as this is seen as a problem that we may one day rectify.

Moon (2009) agrees that G & T students need supportive and challenging academic environments to counteract some of the common problems faced by G & T students. He suggests that they need work that is not too easy or too hard, environments that celebrate academic achievement, and those that advocate to ensure their unique needs are met. Subotnik et al. (2011) elaborate on this premise and emphasise that talent development is specialised by domain and needs to be carefully cultivated, it is specific with its onset, peak, and end, requires a commitment by the gifted individual to access the opportunities presented, and attention given to the psychosocial variables of an individual. Gagné (2011) asserts that there must be a concrete process for giftedness to develop into talent, and as such, they are separate concepts. Gagné's 2011 model for talent development, provides six main elements; "(1) an enriched curriculum/training program; (2) a clear and challenging excellence goal; (3) selective access criteria; (4) systematic and regular practice; (5) regular and objective assessment of progress; (6) personalized – accelerated of course – pacing" (Gagné, 2011, p. 12).

For children to grow to be gifted adults, demonstrate high performance, and fulfil their potential they need appropriate and meaningful opportunities. Providing these opportunities to gifted students requires resources. Gallagher (2015) advises that resources are scarce, and consequentially, not all worthwhile actions can be implemented. Gifted students need to be identified so that they qualify for resources and support. They cannot receive support until they are identified (Karantzas, 2017).

## 2.9 From Gifted Children to Eminent Adults

Most definitions of giftedness refer to the potential of an individual, and by so doing, imply a prediction of success. However, this is not a promise or an assurance of excellence later in life. Olsewski-Kubilius et al. (2017) contend that adults who contribute to society in a meaningful way or display excellence, do so in a very domain specific manner, and therefore have vast amounts of specialised knowledge and or skills. VanTassel-Baska (2005) states that these skills and knowledge are rarely seen in childhood and thus conceptions of giftedness that allow for the specificities of a domain are the most likely to promote talent development. Hence, creating the need for a strong and deliberate talent development program. Gagné (2011) acknowledges the specificity and intensity required to develop gifts in academic domains and as such, this development requires regular learning, practice, and feedback that is relevant and specific to the area of enrichment. Other areas of giftedness including art, sport, or poetry similarly require specificity in their instruction and identification. For example, an athlete will not refine their physical fitness through mathematics instruction or by simply reading books about their fitness. Specific development is still required for an individual to reach their peak performance, even when starting from a higher base than their peers. Olsewski-Kubilius et al., (2017) have noted that expression of talent occurs in domains, not as a general intelligence that is defined by “being smart” (p. 65) or as determined by IQ tests alone. Tannenbaum (2003) advocates cognitive IQ measurements but endorses the use of concurrent assessment that measures specific abilities (achievement tests) to complement this score.

As suggested by Subotnik et al. (2011) developmental aspects of giftedness are essential in forming a useful definition and support for the emergent talent. They assert that giftedness in different domains emerges during developmental stages and therefore, can present with distinct trajectories. The trajectory for development can be divided even within domains, and is linked to training and education, including school, or growth and experience that comes with maturity. For example, academic development can be divided into early and late specialisation. Mathematics is considered an early specialisation, starting in childhood, peaking in adolescence through to middle adulthood, and ending in late adulthood. Psychology on the other hand is a later specialisation and does not start until late adolescence, peaks in early adulthood, and ends in late adulthood. Other non-academic domains, such as athletics, may not peak until full physical development has occurred.

As stated earlier, one of the main goals of gifted education, in fact, all education, is to develop children into adults who make a meaningful contribution to the sociocultural context in which they live and the idea that talent and recognition of superior accomplishment occur in domains is important when providing opportunities for talent development. Considering domain specific trajectories Olsewski-Kubilius et al. (2017) suggest that gifted education and the subsequent programs have domain-specific policy where students can be measured against benchmarks or expectations distinct to that domain or field. In addition to the domain-specific knowledge, deliberate and precise teaching of the psychosocial components for domain success are often neglected or de-prioritised yet are essential (Subotnik & Jarvin, 2005).

A further question to be answered is, do gifted children remain gifted as adults? “It’s not as though these former children slough off their giftedness like a discarded skin at the age of sixteen, eighteen or twenty-one. Gifted children do grow up, and they become gifted adults” (Jacobsen, 1999a, p. 9). When children are identified as gifted using Intelligence Quotient (IQ) scores, the scores remain relatively stable throughout life (Deary et al., 2004), therefore, they are still gifted by this definition in adulthood. Baxendale (2011) demonstrated that even with an age-related decline in IQ, those individuals with higher than average IQ declined later, and at a slower pace.

Winner (2000), however, considers there is an end to giftedness, which can occur in one of three ways. Her first suggestion, and the most positive, is that one end point is the emergence of an adult that disrupts or makes vast contributions to progress in a domain. However, she suggests “most gifted children, even most child prodigies, do not go on to become adult creators” (p. 165), indicating that gifted children who go on to be happy, successful, and productive adults, but not ‘adult creators’, are no longer to be considered gifted. By this statement it can be inferred her measure of giftedness in adulthood is an individual that makes a significant and remarkable contribution to society. Disturbingly, there is no empirical evidence or citations for the studies to support these claims. What is worse, this uncited and unsupported claim has been quoted by Rinn and Bishop (2015), potentially perpetuating an unsubstantiated claim which may negatively taint the attitudes towards assisting gifted and talented children.

It is not only Winner (2000) that purports such unevidenced assertions. Subotnik et al. (2011) state that “in every domain, the percentage of eminent adults is considerably smaller than the percentage of children with gifted potential” (p. 8). These authors have not provided figures, numerical data, or secondary sources cited that supports the mathematical claim of a smaller percentage. The work of Subotnik, Olszewski-Kubilius, and Worrell, individually and collectively, is generally well evidenced, helpful in understanding some of the complexities in gifted education, positive, and informative. They have provided good references for their other claims in this same research article, so this may well be an oversight. Olsewski-Kubilius et al. (2017) discuss that the acknowledgement and judgement of creativity in adulthood is done so by the gatekeepers and other determined experts in the field. The newcomer must provide evidence that their idea or product complies and belongs in the domain, but is also novel and creatively different to add value. It is by this standard they define giftedness in adulthood.

The second end to giftedness, according to Winner (2000), is when child prodigies fail to make the transition into the adult world and become stagnant. She gives examples, such as childhood music stars, whose motivation changes and greed overtakes their desire to create from intrinsic motivation, or psychological issues related to fame or fortune disrupt their ability to have a normal life. Again, this assertion must be questioned as these statements assume that a person who has a gift is obligated to use their gift to assist, entertain, amuse, or provide for others. In fact, she states “The moral value of service, of giving back to a society that has devoted extra resources to the gifted, ought to be considered as important as the value of self-actualization of the gifted” (p. 167). Piirto (1994) disagrees, and her definition of giftedness includes the statement “these children have no greater obligation than any other children to be future leaders or world class geniuses (p. 34). Winner’s (2000) third assertion is that giftedness ends when gifted children become of service to others. She claims that if schools have resourced the needs of gifted individuals, they have an obligation to give back. What could be inferred from her ‘second end to giftedness’ now becomes clear as she plainly states “Thus, one of the ends of giftedness might be argued to be service” (p. 167). It was with much consideration that her work was included in this review, however, given that she has been cited by others for these claims, it was necessary to bring this to light for several reasons.

First, Winner (2000) relies on several anecdotes or stories that claim to support the statements. Could Winner (2000) be approaching her assertion from a theoretical or anecdotal position? Neither position make this true without data or evidence. Ralph Lewis (2018), a practicing psychiatrist and author states that personal stories such as anecdotes impress others, they provide reasons for people to believe untested claims. He further states that the process of peer-review, neglected in anecdotes, provides a clearer insight into the flaws and biases not seen by those who are emotionally, financially, or otherwise invested in a particular outcome. The claims made by Winner (2000), some of which have been discussed, are supported, or explained by such stories and are unreliable as they require subjective perception. As neatly stated by Shermer (2002), “Anecdotes – stories recounted in support of a claim – do not make a science. Without corroborative evidence from other sources, or physical proof of some sort, ten anecdotes are no better than one, and a hundred anecdotes are not better than ten.” (p. 48).

Secondly, if teachers feel that gifted education ultimately only serves a small portion of the population who received the resources, as claimed by Winner (2000), then this could possibly lead to increased negative attitudes of the teachers. The implications of labelling as discussed earlier, provided evidence that some teachers already have negative attitudes towards gifted children and that further, unsupported, unevidenced, and negative claims may not improve these unfavourable beliefs, and subsequently the approach for which G & T people are supported. The word support is used in the previous statement as Winner (2000) acknowledges that there are gifted children who need support, and even some gifted children who are never discovered due to unchallenging and unstimulating environments. However, from her three ends to giftedness it could be surmised that she advocates for the support and development of gifted children, but with a price attached – service to society.

Finally, some statements to ponder, which may cultivate varying levels of agreement amongst educators. These questions challenge Winner's three ends to giftedness, in a way that could be viewed as more supportive.

- Does a gifted person have to be a celebrity or famous to be considered gifted?
- Does a gifted person have to advertise or announce their gifts to be using them?
- Is it wrong for a gifted person to appear as a normal mother, father, daughter, or son and be using their gifts in a way that enriches the lives of those immediately around them?
- Is it reasonable for a gifted person to choose to pursue activities, including an occupation, that makes them appear typical?
- Does a gifted person have additional obligations to society than those required of any other or 'non-gifted' person?

### 2.10 Current Challenges for Talent Development

Underachievement in school educational environments, negative attitudes, contested domains for giftedness, size of the gifted population, and defining G & T people are considerations for those who provide support for G & T students. These considerations extend to include those that create the policies and review the suitability of the models directing our education system. The following possibilities for our current challenges arise from a review of the literature and may be appropriate when moving forward to determine which model or models are appropriate for developing policy in the 21st Century.

1. We are using the wrong framework or set of tools to identify giftedness (Subotnik et al., 2011)
2. There are some talents that are more in-line with the school curriculum and those students receive more resourcing (Cross & Coleman, 2014; Subotnik et al., 2011). There are two implications a) we are correctly identifying individuals but not providing adequate support if it does not fit the current school system or b) in a school curriculum we are not providing opportunities for gifts outside the curriculum to be identified.

3. Improved definitions of the terms G & T are needed to reflect the complexity and include the developmental aspects of giftedness (Subotnik et al., 2011).
4. High-ability is not the only factor involved when developing talent or eminence (Gagné, 2011, 2013; Renzulli, 1978).
5. Underachieving identified G & T children need an alternative but inclusive pathway in a talent progression model (Wellisch, 2012).
6. Only children currently performing should be included in a talent development program to guarantee objectivity and equity (Gagné, 2011, 2015).

With these possibilities in mind, models of giftedness will be examined and assessed as they are appropriate to a science specific domain specialisation.

# CHAPTER 2 PART 2: MODELS, PRACTICE, AND PROVISIONS

This section of Chapter 2 will explore and discuss four selected models for gifted education. Key issues will be brought to the attention of the reader. The chapter will expand on the pedagogies/practices used for the education of identified gifted children, and the provisions available. The chapter will conclude with the presentation of the research questions and the visualisation of the conceptual framework.

## 2.11 Models of Gifted and Talented Education

Models of giftedness are as diverse as the gifted students and for good reason. *Conceptions of Giftedness* edited by Sternberg and Davidson (2005) presents 17 models or conceptions of giftedness. Some of these are highly specific, for example, gifted women, nurturing gifted students of colour, and extreme giftedness. It is not within the scope of this literature review to cover every conception of giftedness. The approach taken was to briefly describe the known models and to elaborate on those which can be justified as most relevant to this research. It is important to note that there are substantial differences between models of giftedness, particularly the terms used to describe the population. Some researchers use the terms gifted and talented interchangeably, while some have discrete definitions for each.

Models of giftedness range from those that present "no conception of giftedness" (Borland, 2005) to those that rely almost entirely on general mental ability factor (*g*) (Terman, 1916, 1925). These two extreme models will be briefly discussed before the discussion of the selected models. The models selected include DMGT (beginning from 1985), Three-Ring Conception of Giftedness (Renzulli, 1978, 2005) and the Schoolwide Enrichment Model (SEM) (Renzulli & Reis, 2010), the Munich Model of Giftedness (MMG) (Heller, 2005), and Multiple Intelligences (MI) (Gardner, 1983, 1999). Although included, MI is not a model of giftedness or talent development. MI is a theory of intelligence that is familiar to many Australian educators. Each of the models acknowledges '*g', the general intelligence factor,* albeit to varying degrees. The justification for using these models is that they embody many of the elements found in other models of giftedness. They were thought to be familiar to or easily accessible for educators, as they are more well known to Australian educators. Models that were easy to understand and explain were needed as there was no certainty that educators had a nuanced familiarity with policy, models of giftedness, or current literature in the field of gifted and talented.

## 2.12 Borland and Terman: Book Ending the Continuum

Borland (1997, 2005) contests the entire construct of gifted and talented, contending that as it cannot be accurately measured, it is arbitrary potentially harmful; "the construct of the gifted child is not necessary for, and perhaps is a barrier to, achieving the goals that brought this field into existence in the first place." (Borland, 2005, pp.2-3). He argues that without the social platform in which one individual can be compared to another, there would be no conscious awareness of intelligence (Borland, 1997). However philosophically interesting it may be, Borland's model does not fit with the previously described and well-accepted definitions of G & T. He notes that his ideas are dissimilar to the beliefs of many researchers, psychologists, and educators (Borland, 1997).

Considerable research indicates that there is a spectrum of human capability and in the interests of inclusivity, the examination of all areas of the spectrum, including the top end, however defined, is worthy (Sternberg et al., 2011). These authors consider that the aim of G & T education is to allow not only gifted individuals of the calibre of Da Vinci, Bach, Galileo, and Newton but also those with less obvious giftedness to flourish in today's competitive and globalised world. Borland (2005), recommends a shift to gifted education for all students, rather than the concept of gifted children. However, this research explores the provision of suitable policy specifically for gifted students with the assumption that they require an education that is specialised to their unique and fast-paced learning profile. Thus, Borland's ideas around no conception of giftedness will not be further considered unless evidence is found to support it in terms of this research.

There is a common misconception that giftedness and high IQ go hand in hand (Winner 1996). This is not surprising since historically IQ tests, such as those described by Terman (1916), were the beginnings of classic measurement and identification of giftedness. Winner (1996) states that overall score from an IQ test does not distinguish areas of giftedness, yet entry into gifted classes is arbitrarily cut off at a given score. Membership to societies such as Australia Mensa Inc. (2017) still requires a score in the 98$^{th}$ percentile on one of eleven such tests, and many gifted programs still rely on the identification of gifted students by this mode (Sternberg et al., 2011). This, however, is not the case in NSW where performance dominates potential as measured by IQ. This is elaborated on in the section discussing selective school and opportunity class entry (section 2.21.2).

There are good reasons why educators and psychologists rely on these tests; including that they are reasonably objectively quantifiable, IQ tests are familiar, there is a history in their use, there is reliability between and within tests, and school performance correlates with the scores (Sternberg et al., 2011). However, this is not the only point of view. Many of the gifted education models rely on more than IQ tests in their talent development identification process. Gagné's DMGT is one of these models.

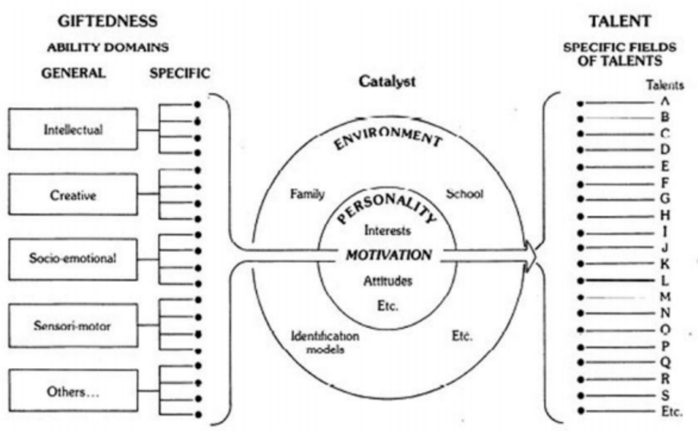
### 2.13 The Brief History of Gagné's DMGT

As described in Chapter 1, the NSW G & T policy includes Gagné's definitions of the terms gifted and talented. However, as there are no elaborations on his model it is unlikely, but not conclusive, that his DMGT is implemented alongside the definitions. To answer the research questions with integrity, it is necessary to examine Gagné's DMGT alongside other potential suitable models, as it cannot be said his model is inappropriate if it has never been appropriately used.

The DMGT (1985, 2004, 2005, 2008, 2013) has evolved in response to the developments in psychology and education research. The first publication of the DMGT 1.0 in 1985 presented a model where gifts, or ability domains, were separated from the specific fields of talents (Gagné 2013). To progress from possessing a gift to exhibiting a talent, a person had to successfully navigate and interact with various catalysts. The catalysts included family, school, identification models, personality, motivation, and other personal factors. Figure 2.1 presents his model from the first DMGT.

**Figure 2.1**

*Gagné's Differentiated Model of Giftedness and Talent (DMGT); DMGT 1.0*



Note. From “The DMGT: Changes Within, Beneath, and Beyond” by F. Gagné, 2013, *Talent Development and Excellence, 5*(1), p. 5.

This version of the DMGT recognised four general fields of giftedness; intellectual creative, socio-emotional, and sensori-motor. It acknowledged great diversity in fields of talent but did not show what Gagné considered these to be, or if the ability domains correlated specifically with talent fields. Gagné (2013) acknowledged this version of his model was crude. However, in this first model, he challenged the distinction between gifted and talented and provided definitions for these two terms (Gagné, 1985). Importantly, Gagné argued that a person can be gifted but not talented. By this notion, Gagné’s model acknowledged the presence of underachieving G & T students. However, the model does not provide direction to assist any gifted children once identified.

Gagné published several iterations over the next two decades, and a major update in 2007-2008, the DMGT 2.0. This will now be presented before linking this to his latest work, the modified DMGT 2.0 with the biological basements.

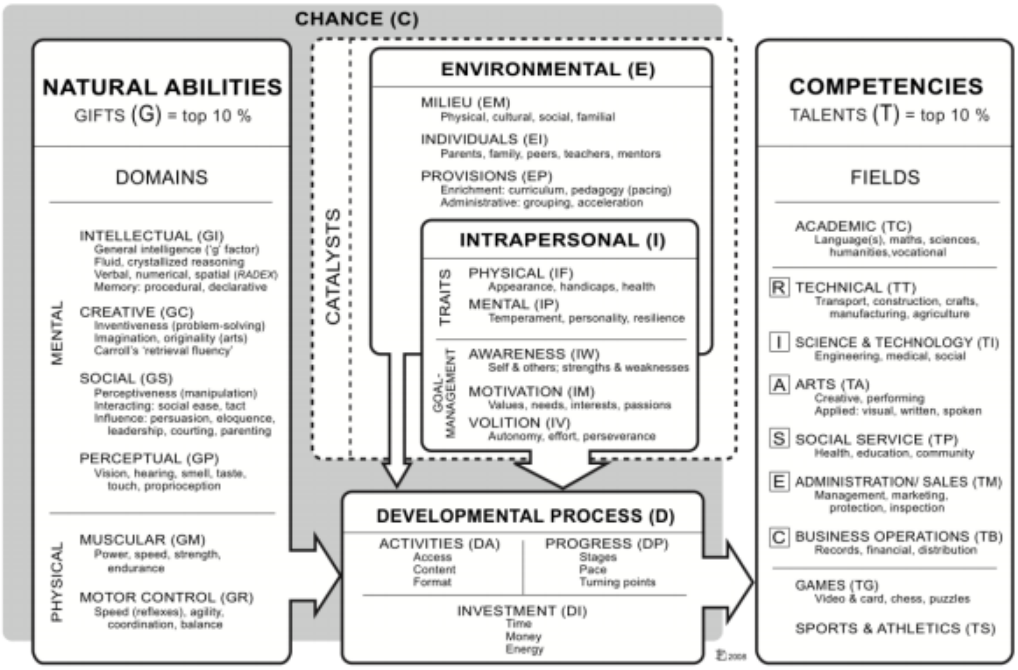
### *2.13.1 The DMGT 2.0*

This revised DMGT 2.0 (Gagné, 2004, 2008) comprises six components, natural abilities, or gifts (G), environmental (E), intrapersonal (I), developmental process (D), competencies or talents (T), and chance (C). You will recall his earlier version had three elements: natural abilities, catalysts, and talents as presented in Figure 2.3. These six components are divided into two core areas, 1) the talent development process (G, D, and T) and 2) the catalysts (I, E, and C), acknowledging that the catalyst components can, to varying degrees, be positive or negative in their contribution to the transformation of a natural ability into a talent. The DMGT 2.0 is presented in Figure 2.2.

According to Gagné (2004), the five components are significant but not equally weighted. He places them in order of their importance on the emergence of talent. The talents (T), are the product of the process so they are not ranked. In decreasing order of importance, the rankings are chance (C), gifts (G), intrapersonal (I), developmental process (D), then environment (E). Gagné states that chance is given his number one priority, even though it does not produce anything, because possessing natural ability (G) and many intrapersonal factors (I) are random events. Given that his biological basements were not added until 2013, there is no ranking. It could be assumed that these are as important as the gifts (G) as they influence the developmental processes.

**Figure 2.2**

*Gagné's Differentiated Model of Giftedness and Talent (DMGT 2.0; 2008 update)*



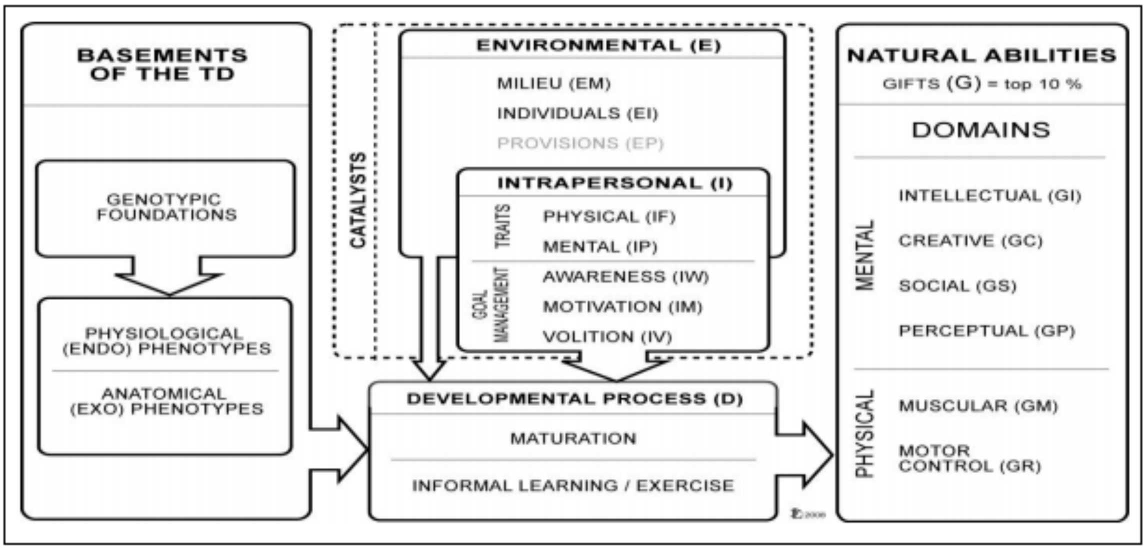

Note. From "The DMGT: Changes Within, Beneath, and Beyond" by F. Gagné, 2013, *Talent Development and Excellence, 5*(1), p. 5.

### *2.13.2 Gagné's Extended Model for Talent Development (EMTD)*

A modified version of the DMGT 2.0 was introduced in 2013. The 2013 update includes the biological basements, a seventh component in his model (Gagné, 2013). Biological basements were added to acknowledge the biological foundation upon which natural ability is constructed. This model, an amalgamated DMGT 2.0 and biological basements, has been renamed Gagné's Developmental Model for Natural Abilities (DMNA). The addition of biological basements acknowledges the influence of genes, and their expression, that are measurable in the case of gene variants, phenotypical IQ, visible anatomical structures, or behaviours. The DMNA is presented in Figure 2.3. As a matter of interest, Gagné plans to release a new book in November 2020. However, this was not released with time for inclusion in this thesis

**Figure 2.3**

*Gagné's Developmental Model for Natural Abilities (DMNA)*



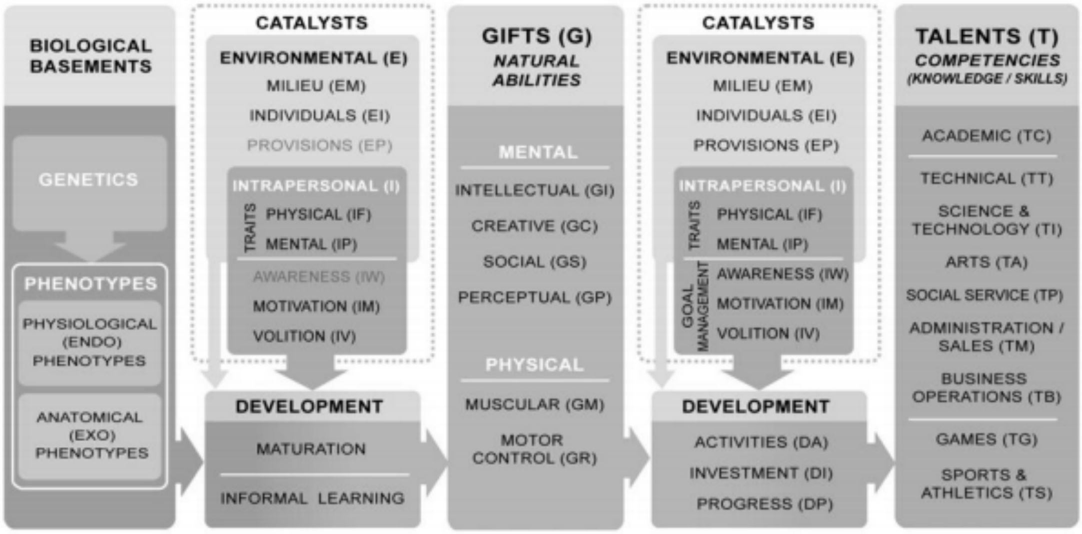

Note. From "The DMGT: Changes Within, Beneath, and Beyond" by F. Gagné, 2013, *Talent Development and Excellence, 5*(1), p. 5.

The DMNA shows how the catalyst and biological basements feed into the natural abilities. His most current model moves beyond the DMGT; thus, he presents an amalgamation of the DMNA and the DMGT 2.0, the Expanded Model of Talent Development (EMTD). The EMTD is presented in Figure 2.4.

Gagné's EMTD in Figure 2.4 shows two clear pathways, the pathway to an awareness of talent, and the pathway from gifted to talented. Gagné describes the first pathway at the foundational level and a place where the natural abilities are moulded. The learning in this space is informal, it is typically not an institution like instruction. At this level, there is no awareness by the individual, of their abilities. The second pathway is the more familiar DMGT 2.0.

**Figure 2.4**

*Expanded Model of Talent Development (EMTD)*




Note. From "The DMGT: Changes Within, Beneath, and Beyond" by F. Gagné, 2013, *Talent Development and Excellence, 5*(1), p. 5.

### *2.13.3 Overview and Considerations*

Gagné insists that the word innate not be used to describe gifts, as though a person has been born exhibiting a specific skill, or woke up one morning and was able to miraculously perform certain tasks. He states that those who appear to have mastered skills, or who are talented without practice, have simply moved through the developmental process more rapidly than others (Gagné, 2013). In his DMGT 2.0, he states that the "natural abilities are treated as the "raw materials" or the constituent elements of talents" (Gagné, 2004, p. 132). However, without this exhibition of talent, or accelerated developmental pathway, there is no way to identify those who have natural abilities. This is where informal learning or developmental activities must be appropriate and enriching.

Gagné (2011) argued that if his DMGT was followed then issues of equity would diminish. Unfortunately, most gifted programs have "little to do with "real" academic talent development" and are "inspired by a meritocratic ideology" (Gagné, 2011, p. 1). He states this is primarily due to improper identification practices to avoid disproportionate ethnic representation. He asserts that a disproportionate number of individuals from minority groups are included in gifted programs to appease those who believe underrepresentation is a moral inequity. This inclusion is not based on merit or need but to ensure the correct socially appropriate numbers.

In Australia we have minority populations, including our own indigenous people, and those with a background other than English. Refugees are commonplace, particularly in our Western Sydney schools with one school supported by the researcher comprised of 86% of students with a language background other than English (ACARA, 2015). The problem Gagné describes is not unique to his homeplace Canada.

Gagné underpins his talent development model on a performance-based system where demonstrated high achievement is rigidly relied upon for selection into programs (Gagné, 2011). His criteria not only require a natural ability, combined with performance, but the other skills and attributes to ensure success. Gagné describes a neat, and almost impossible, intersection of genetics, passion, interest, "unfailing perseverance" (p), determination, support from parents and teachers, and the chance to develop natural abilities into talents. It is clear by these criteria, that the underachieving, or twice exceptional gifted children, have a very narrow, if any, route through his academic talent development model.

By defining a clear, albeit challenging and ambitious pathway, Gagné has identified that there is a distinct route for academic talent development for those students who possess the attributes to progress from natural ability to outstanding mastery. Academic development is different from other talent development pathways (Gagné, 2011). He cites Renzulli and Reis (1991) in justifying his core business, "Talent development is the "business" of our field, and we must never lose sight of this goal, regardless of the direction that reform efforts might take" (p. 34).

Alongside this, he identifies a gifted population of up to 10% and a talented population of up to 10%. This was discussed in Section 2.3 and presented in Table 2.1. Recall, he also acknowledged underachieving gifted people. If these two values are considered correct this could indicate that 100% of those with natural abilities transform those into the relevant talents, including foregoing other pathways that do not align with their natural ability. Alternatively, the talented population may reside at a lower threshold, and include "talented" people who were never initially considered gifted. Given the advocacy for an inclusive underachieving and twice exceptional gifted population, (Dai et al., 1998; Moon, 2009; Reis & Renzulli, 2010; Wellisch, 2016; Wellisch & Brown, 2011) a fluid model may be appropriate. This could be a model that acknowledges that some gifted people do not, or choose not to, transform their natural ability into a directly related talent, or at least not a talent that is highly valued by the dominant white culture.

Therefore, Gagné's model could be thought of as a theory of academic talent development whereby children who have the appropriate combination of attributes are provided with experiences and assistance to develop their gifts into talents. The development of the gifts into talents requires learning and practise and is either enhanced or hindered by intrapersonal and environmental catalysts. His model provides an appropriate pathway for gifted students when all the correct elements are in alignment.

### 2.14 Renzulli

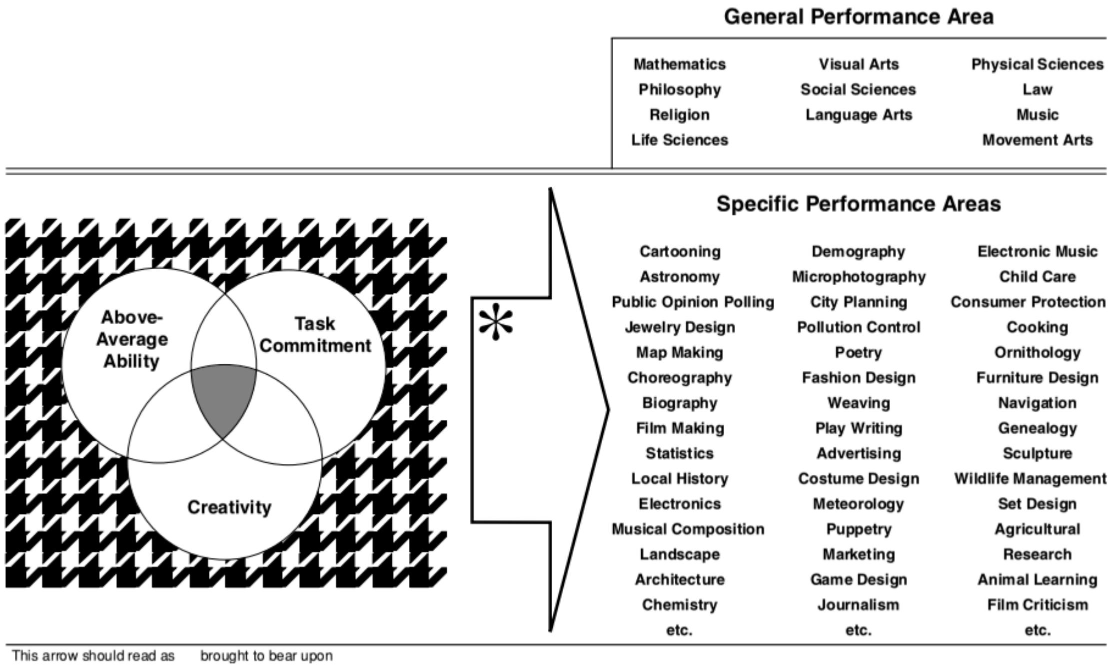
Renzulli (2005) stated that a theory is of little value if it does not provide specific direction for those that enact that theory. In an applied field of study, such as education, practical, political, financial, and individual perspectives need to be considered separately from the theoretical perspective (Renzulli, 2005).

Renzulli describes two types of giftedness, one of which is *schoolhouse giftedness* which translates to good grades, high test scores, and performance on IQ tests. The other type is *creative-productive giftedness*, seen predominantly in adults when they compose music, explore science, or make medical breakthroughs (Renzulli, 2005). These two types are not separate as he describes the importance of both, and the interaction and intersection between them (Renzulli, 2005). He highlights the problem where children are viewed by the schoolhouse definition, and adults by the creative-productive definition, yet these two types of giftedness do not necessarily correspond with age. Gifted children do not necessarily become gifted adults and gifted adults were not necessarily identified as gifted children (Renzulli, 2005; Winner 1996).

Renzulli's Three-Ring Model of Giftedness (1978) presents a model showing the interaction of three "ingredients", above average ability, task commitment, and creativity. It is a model that shows what gifted behaviour entails and is best suited to his creative-productive type of giftedness. A visual representation shown in Figure 2.5 shows his Three-Ring model and the performance areas.

**Figure 2.5**

*Renzulli's Three-Ring Definition of Giftedness Represented Visually*




Note. From *Conceptions of Giftedness* (p.257) by J. S. Renzulli, 2005, Cambridge University Press.

Renzulli (2005) predicates above average ability coupled with task commitment and creativity are required to identify as gifted. This is the shaded portion of the three rings where the traits intersect (see Figure 2.5). However, the focus is on gifted behaviour and not gifted as a person (Renzulli, 2005). He states that while a person can have potential until that potential is witnessed as performance, the person is not exhibiting gifted behaviour. The components of the Three-Ring Model of Giftedness are equally weighted in their contribution to gifted behaviour (Renzulli, 2005). This is represented by equal sized circles in the pictorial representation of the model on a houndstooth background, named operation houndstooth. Each of these components, and the purpose of the background, will be discussed.

### *2.14.1 Above Average Ability*

Ability is separated into two groups, above average and well-above average (Renzulli, 2005). Above average is not restricted to a cohort size, but well-above average is considered to comprise the top 15-20% of the population. Although these percentages do not correspond to well-above average on the bell curve, Renzulli (2005) states that “I am not restricting my use of percentages to only those things that can be measured by tests.” (p. 260).

Ability is also used to help define areas of potential performance, with an above average ability “brought to bear upon” general and/or specific areas. General performance areas are deemed to be those that can be applied across all domains, e.g., general intelligence *(g)*, or more broadly in areas such as verbal skills, spatial recognition, abstract thinking, or advanced memory (Renzulli, 1978). Specific abilities refer to those that are of a specialist nature requiring the acquisition of distinct knowledge or skill. They are applied in a restricted way in situations that present in everyday life. They are not typically the abilities that are seen in test-taking situations e.g., ballet, musical composition, photography, chemistry, or mathematics (Renzulli, 1978). Some specific abilities such as mathematics and chemistry correlate highly with general abilities, and as such, they are not always neatly separated.

IQ and other academic tests, provide a discrete and restrictive way to define and measure intelligence (Renzulli, 2005). Renzulli states that scores on academic tests only serve to predict future scores on similar tests and productive adults were not necessarily the straight-A students (Renzulli, 1978, 2005). Other studies, such as those by Deary et al., (2004), show the predictive validity of IQ tests concerning mortality, morbidity, and greater success with a person’s chosen occupation. However, Renzulli states more is required than above average, or well above average ability for an individual to display gifted behaviour. The second of three aspects, task commitment, is also found in creative-productive people (Renzulli, 1978).

### *2.14.2 Task Commitment*

Task commitment describes a group of traits consistently found in those individuals who are considered to have creative-productive giftedness (Renzulli, 2012). Traits such as perseverance, determination, will power, and high energy are what drives the ability to sustain engagement to a task over a long period (Renzulli, 1978). It differs from the initial flurry of excitement or activity that is typically known as motivation. It is highly linked to intrinsic motivation where an action is carried out to achieve feelings of self-competence and self-determination (Renzulli, 2005).

Renzulli draws on the work of Galton (1892), whose definition of giftedness was provided earlier in this chapter. Renzulli, like Galton, believes in the necessity for hard work and determination to reach excellence (Renzulli, 2005). Those who have this attribute can persist under pressure and in cases of hardship. They have the determination to persist where others may give up (Renzulli, 2012). The third and final ingredient in Renzulli's Three-Ring model is Creativity.

### *2.14.3 Creativity*

Creativity refers to the possession of original thinking and approaches to problems, an ability to appropriately move from conventional methods and procedures, and elegance in providing solutions to social, visual, or technological problems (Renzulli, 2005).

There have been many gifted scientists throughout history, but the scientists whose work we admire and respect, whose names have remained recognisable in scholarly communities and among the general public, are those scientists who used their creativity to envision, analyse, and ultimately help resolve scientific questions in new, original ways (Renzulli, 2012, p. 153)

### *2.14.4 The Gifted Environment*

Operation Houndstooth, the houndstooth background, demonstrates the interchange and interaction between six co-cognitive factors, optimism, courage, romance with a topic or discipline, sensitivity to human concerns, physical/mental energy, and vision/sense of density (Renzulli, 2005). Similar to Gagné's DMGT and EMTD, Renzulli recognises the interplay of many human traits and circumstances to witness gifted behaviour. Represented in Figure 2.6 by the houndstooth background are the environment and personal aspects of an individual. The performance area is represented by the arrow, with the note "should be brought to bear upon" that emerges in one of the general and/or specialised talent areas (Renzulli, 2005, p. 257). The houndstooth background is expanded upon in his later work.

### *2.14.5 Overview and Considerations*

Renzulli's model is unique in that it can be applied to almost any potentially valuable area of human performance. However, it is a model for gifted behaviour not gifted development. Therefore, unless it is considered an identification tool, it must be used in the context of the development of the behaviours. Renzulli provides the Enrichment Triad Model (ETM) and SEM as a way of supporting and identifying those who have superior performance (Renzulli, 2005).

However, giftedness does not sit in isolation from the performance area it emerges within, nor the environmental and personal aspects of the individual. Unfortunately, this model does not provide for those students who are yet to discover their interest area, or for those who are still to develop their non-intellectual psychosocial skills. Subotnik, et al., (2011) suggest that it is important to teach skills pertaining to managing challenge, criticism, task commitment, and motivation, as it is these skills that ultimately differentiate those with ability versus those who also become highly successful.

> It is also our view that psychosocial awareness and skills should be taught in all domains by parents, teachers, coaches, and mentors explicitly and deliberately, not left to chance. We suggest that this psychological strength training is as important as content and skill instruction and practice in a talent area. It should not be assumed that students who possess developed ability also have these psychosocial skills, nor that such skills can be generated without direct guidance and teaching. Students should be helped to prepare for coping with the stresses, strains, and rewards of each stage of talent development, from potential to eminence (Subotnik et al., p. 40).

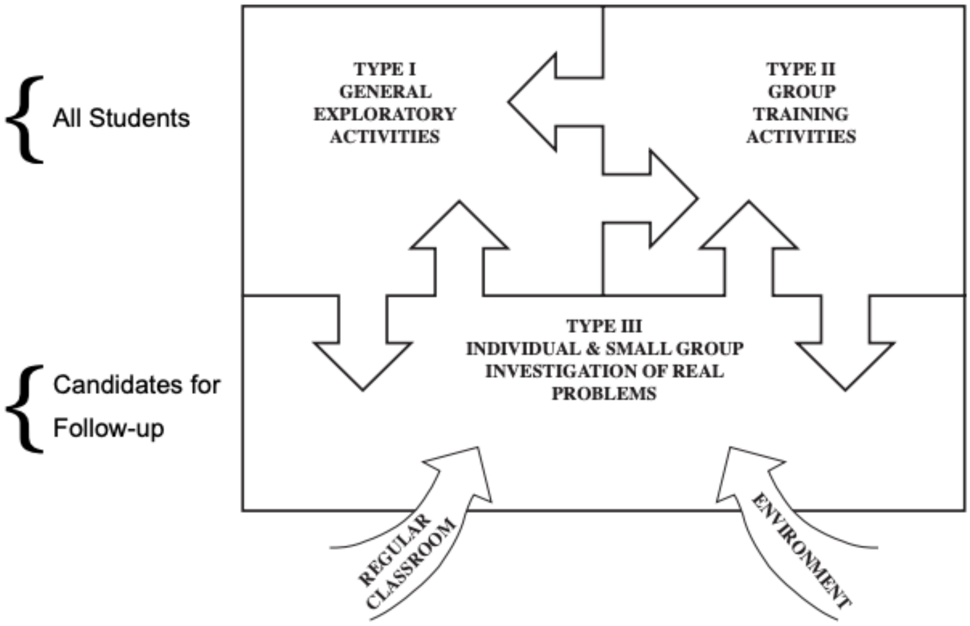
### *2.14.6 The Enrichment Triad Model*

True to his word, Renzulli aims to bring theory and practice together, offering an ETM. The ETM is a learning theory designed to practically assist the development of creative-productive giftedness in three ways. Type I - exposure to many topics and areas of interest and explicit instruction in advanced thinking, Type II - content integration and problem solving, and Type III - the provision of opportunities and resources to encourage self-directed learning. His model is presented in Figure 2.6.

Renzulli (2012) emphasises the importance of individual pace and choice for students to take advantage of their unique interests, skills, and learning styles. He acknowledges that using pedagogical approaches on a continuum, ranging from didactic on one end to investigative at the other, is appropriate for a well-balanced approach to learning. His ETM displays this continuum from activities (Type I) to training (Type II), to Investigations (Type III). Note the interaction between the types whereby the model is not sequential or cyclical but an interchange as necessary between the components.

**Figure 2.6**

*Renzulli's Enrichment Triad Model*




Note. From "The schoolwide enrichment model: A focus on student strengths and interests" by S. M. Reis & J. S. Renzulli, (2010), *Gifted Education International, 26*(2-3), p.140-156. https://doi.org/10.1177/026142941002600303

### *2.14.7 The Schoolwide Enrichment Model*

Renzulli applied his Three-Ring Model of Giftedness together with his ETM to develop the Schoolwide Enrichment Model (SEM). As the name indicates, the SEM is implemented within the whole school. The goal of the SEM is to provide a continuum of services to challenge gifted students and include higher order learning opportunities in regular classrooms. It is used to assist the identification of students who require additional enrichment opportunities, to ensure that all learners are challenged and have the opportunity to be included in gifted programs, and to preserve and protect gifted education specialists for the gifted programs (Reis & Renzulli, 2010; Renzulli, et al., 2014). The program provides a continuum of services that embeds high order learning opportunities for all students

Those students who qualify in the top 15-20% are invited to participate in the enrichment opportunities. These opportunities are provided to this elite cohort without specific evidence that the top “15-20%” specifically require any qualitatively different pedagogies than the top 30%. It provides opportunities for a few that would benefit many; opportunities for those who are already performing.

Those students who obtain high IQ test or achievement scores are automatically included, offering a pathway to underachieving students. Once accepted, the curriculum is compacted, providing time and opportunities for enrichment (Renzulli, 2005).

Renzulli’s Three-Ring Model for giftedness, ETM, and SEM provides a framework whereby gifted behaviours can be developed. His framework includes identification systems and opportunities for entry through testing and non-testing criteria, allowing underachieving students to enter programs before their underperformance is addressed. However, when viewed in isolation, the Three-Ring Model displays the characteristics of gifted behaviours, not necessarily the behaviours of gifted children before they have matured. Therefore, it is the entire framework that could be considered the talented development pathway. Renzulli (2005) states that our responsibility as educators is to include more children in the talent development pathways, rather than close them off using strict criteria. Thus, those with a high potential for high levels of creative-productive giftedness are not overlooked.

Renzulli’s model provides the scope for identification of performing students through the high order thinking opportunities in the SEM, and for the underachieving with IQ tests results (Renzulli, 2005). However, as noted by Olszewski-Kubilius (1999), his model does little to differentiate the instruction by ability area once identified. She also suggests that in early grades, Type III activities in the ETM are not suitable, as children are not able to work independently or to that cognitive level.

As with any model, success relies on correct implementation. Olszewski-Kubilius (1999) express concern that educators use the SEM to remove their responsibility to specifically identify and provide for gifted students. She asserts that this may be due to the emphasis by Renzulli on certain elements of his model and his support of inclusive classrooms and enrichment activities. Absolute inclusion does not allow differentiation for gifted students with different needs, including those who are highly gifted or twice exceptional (Konza, 2008). Konza (2008) acknowledges the increasing burden on teachers in Australian Schools, particularly where they have limited resources but are still expected to cater for students with unique needs.

Michael McDowell (2017) proposes a similar triad approach to learning that is an inclusive model for education, rather than one with a focus on G & T students. He suggests that in the context of a rigorous problem-based learning (PBL) approach, learners are encouraged to develop as competent and confident learners at point of need ways. McDowell (2017) is purposeful in his selection of Type I activities, uses Type II tasks or investigations to refine the skills in different domains, and delivers Type III success through the application of competencies to a new situation. Type I, Type II, and Type III are referred to as surface, deep, and transfer learning respectively (McDowell, 2017). This is similar to Renzulli's ETM where students move through and between the various levels in a non-linear manner, revisiting the surface level knowledge when the deeper understanding is hindered. However, it is not based on a model for giftedness but shows that in education there is often an overlap of ideas.

## 2.15 Munich Model

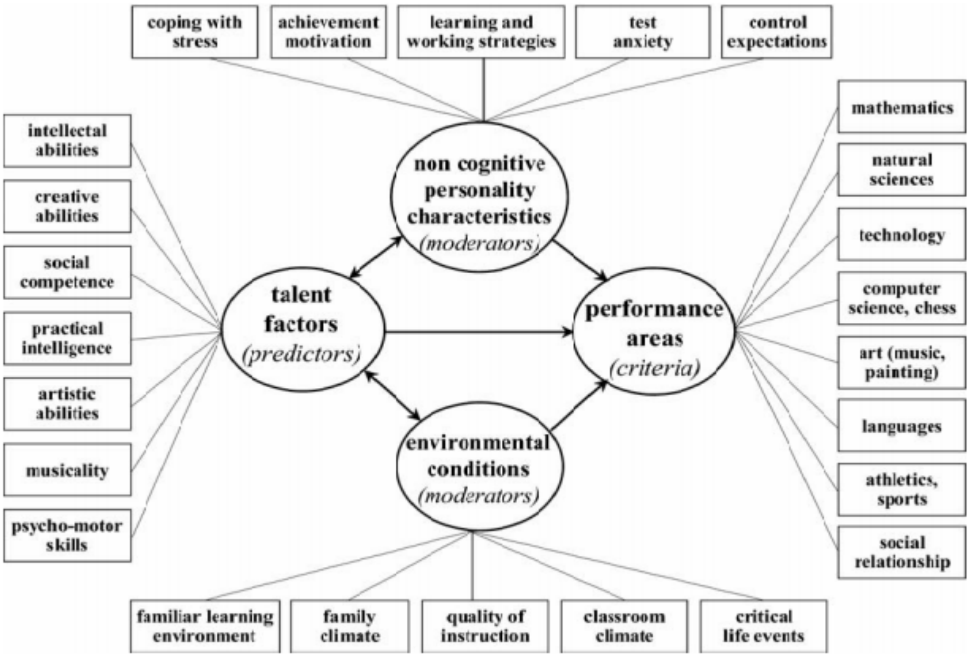
The Munich Model of giftedness (MMG) is a multifactorial model designed to identify and promote gifted students (Heller et al., 2005).

The MMG uses the term "predictors" and "talent factors" to describe ability or potential. These talent factors are considered relatively independent (Heller et al., 2005). The moderators (non-cognitive personality factors and environmental conditions) influence the potential that will manifest in performance areas (Heller, 2005). Figure 2.8 presents the MMG.

When examining the MMG, there are similarities with Gagné's DMGT. Visually they are similar where abilities are listed on the left-hand side and via moderators, an individual transforms to display high levels of performance in the areas displayed on the right of the diagram. Gagné (1985) uses the term catalysts instead of moderators to refer to environmental and intrapersonal influences. Heller (2005) states that the talent factors, displayed in Figure 2.7 are not complete but represent the areas of giftedness most commonly discussed in the literature.

**Figure 2.7**

*The Munich Model of Giftedness (according to Heller et al., 2005)*




Note: From *Conceptions of Giftedness* (p.149) by K. A. Heller, 2005, Cambridge University Press.

Heller (2005) does not separate the terms gifted and talented but instead refers to gifted or talented interchangeably. This is different to Gagné's definitions where gifted and talented are separate states of being. Heller (2005) acknowledges that a gifted/talented person can transition to produce excellent performances with the correct influences. Thus, the idea that there is a progression from potential to performance is not dissimilar to Gagné, although the terminology differs.

Similarities exist between the MMG and Renzulli's TRM, however, the emphasis and interpretation of elements differ. The MMG includes "achievement motivation" as one of many moderators indicating that task commitment is an important factor. However, he does not place the same emphasis on this element as Renzulli where task commitment is one third of the requirement for gifted behaviour. The MMG includes creativity as a talent factor, but given that these talent factors are relatively independent, there is not the same intersection that Renzulli's Three-Ring Model requires. Heller further demonstrates the MMG does not require an intersection of creativity and ability to achieve gifted behaviour. He has distinct and separate criteria to be intellectually gifted, creatively gifted, or socially gifted (Heller &

Perleth, 2008). For example, one possible criterion for intellectual giftedness is abstract thinking. This is not listed as a possible criterion for creative or social giftedness.

The MMG has been included in this review of the literature and the research as it specifies non-cognitive elements and environmental conditions that are different from Renzulli and Gagné. For example, the MMG explicitly includes learning and working strategies. Similar to Renzulli's Three-Ring Model and Gagné's DMGT, the MMG provides a model where the manifestation of giftedness is not isolated. Giftedness is expressed in the context of high performance and is influenced by the environment and intrapersonal factors. The MMG shows that excellent performance is the combination of predictors (ability), willingness, and the non-cognitive aspects (including: personality, motivation, mental health) of an individual to interact with their environment.

In other work by Heller, he shows an interest in adapting and using his model to nurture and understand scientific ability (Heller, 2007). According to Heller (2007), "'Scientific ability', as a hypothetical construct, can generally be defined as the ability to scientifically solve problems" (p. 216). Research has demonstrated that there are specific aptitude and non-aptitude traits of people who have scientific and creative ability (Focquaert, 2007; Heller 2007). Heller (2007) presents the work of Van der Meer (1985) and Klix (1983). Unfortunately, these works have not been translated into English and there is little other research specifically defining the characteristics of G & T science students. These aptitude and non-aptitude traits are summarised in Table 2.2.

**Table 2.2**

*Traits of Students with Scientific Ability and Creativity. (Table Adapted from Focquaert 2007; Heller, 2007)*

| Aptitude Traits | Non-Aptitude Traits |
|---|---|
| Formal logical cognitive abilities (convergent) | Intellectual curiosity |
| Abstract thinking | Thirst for knowledge |
| Systematic thinking | Exploratory drive |
| Richness of ideas | Desire to question intellectually |
| Fluency of ideas | Intrinsic motivation |
| Flexibility to restructure problems | Task commitment |
| Flexibility in the use of general and domain-specific knowledge | Goal orientated |
| Original solutions to methods and problems (divergent) | Persistent |
| Reduce the complexity of problems | |
| Ability to use cognitive energy to problem solve. | |

Interestingly, Heller (2007) suggests that both convergent and divergent thinking are required, but for different purposes and at different times. Convergent thinking is required when a situation or task necessitates conclusive reasoning. Divergent thinking is required for open and unstructured questions that lead to a creative response. Science thinking incorporates both, as scientific problems are difficult and complex, requiring flexible use of knowledge that is general and domain specific (Heller, 2007). He expands on this stating that creating hypotheses use primarily divergent thinking and changes as the process of science progresses. Important to this research, Heller (2007) asserts that "a primary task of formal (school and university) education, therefore, is to mediate necessary subject knowledge in science and technology, and to demonstrate how this can be flexibly employed – that is, in unconventional ways and individually challenging manners." (pp 224-225).

Certainly, identification is easier if performance is present. However, alternative identification methods are necessary, otherwise, in the absence of performance, gifted students may be left unidentified and subsequently unchallenged. The MMG is the only model that additionally provides a specific model, pathway, and resources for identification

(Heller, 2005). The identification model will not be discussed further as the focus of this research is to determine suitable models to develop G & T students once they are identified, not the identification process.

### 2.16 Gardner's Theory of Multiple Intelligences

Gardner, an American educational philosopher, defined intelligence as "the capacity to solve problems or to fashion products that are valued in one or more cultural settings" (Gardner & Hatch, 1989, p. 5). In his book *Frames of Mind*, Gardner (1983) proposed the idea that strength or weakness in one area did not predict the performance in another and proposed his Theory of Multiple Intelligences. The core tenant of the MI theory is that a single measure of intelligence is false. Rather, cognition comprises discrete bits of intelligence that influence performance from early childhood. Gardner emphases the importance of "crystallising experiences", whereby the person with a given intelligence is exposed to materials within that modality to spark interest and allow for their gift to be developed (Walters & Gardner, 1986). He states that the crystallising experiences do not necessarily fit with traditional ideas of education and may occur prior to, or in the absence of formal instruction (Walters & Gardner, 1986).

The MI theory was first published in 1983 when Gardner proposed there were seven separate domains of intelligence. Gardner (1983) proposed that the measured IQ was only relevant in the school environment and had little predictive power for successes later in life. Other research evidence does not support this statement (Deary et al., 2004; Sternberg et al., 2001). Further to this, he has not considered the varying perspectives of success which for some can include, happiness, money, or family.

It is a theory concerned with the nature of intelligence and cognition rather than a theory of development (Gardner, 1983). The seven intelligences are mathematical/logical, verbal/linguistic, spatial, musical, bodily-kinaesthetic, interpersonal, and intrapersonal (Gardener 1983). Over the years, suggestions have been made to add to the list of his intelligences. However, they did not meet his criteria. In his revised work, he added an eighth intelligence, naturalist intelligence (Gardner, 1999). Gardner's criteria for an intelligence will be listed prior to a brief description of each of the intelligences.

Gardner (1999) notes that the criteria for his intelligences is somewhat fluid but generally is indicative when the following eight signs are present. In no specific order,

- Potential isolation by brain damage
- An evolutionary history and evolutionary plausibility
- An identifiable core operation or set of operations
- Susceptibility to encoding in a symbol system
- A distinctive developmental history, along with a definable set of expert "end state" performances
- The existence of idiot savants, prodigies, and other exceptional individuals

Note. *The use of language, such as idiot savants, to describe autistic children is no longer common, and is not considered acceptable in Australian schools. In his later work he has removed the word idiot (Gardner, 2006).*

- Support from experimental psychological tasks
- Support from psychometric findings

(Gardner, 1999, pp. 36-41)

Gardner (1983, 1999, 2006, 2020) relies on neurobiological, genetic, social, and behavioural research to describe the intelligences. He begins by providing prerequisites for an intelligence "a human intellectual competence must entail a set of skills of problem solving – enabling the individual to *resolve genuine problems or difficulties* that he or she encounters and, when appropriate, to create an effective product – and must also entail the potential for *finding or creating problems* – thereby laying the groundwork for the acquisition of new knowledge" (Gardner, 1983, pp 60-61). His eight intelligences are presented below.

**Musical Intelligence** – the ability to compose, play, and/or recognise the elements of music such as pitch and rhythm and then to combine and organise them in a culturally pleasing way.

**Bodily-Kinaesthetic Intelligence** – the ability to control and execute bodily movements in a specialised manner. This intelligence is traditionally considered to manifest as sporting ability but it may extend to the use of tools.

**Logical-Mathematical Intelligence** – the ability to think logically and with reason, often in an abstract manner. Scientific thinking is included in this intelligence. According to Gardner (2006), this intelligence, along with linguistic intelligence provides the basis for IQ tests.

**Linguistic Intelligence** – the ability to use language intentionally and deliberately with a sensitivity to grammar, sounds, rhythms, inflections, and meters of words, combined with a purpose to please, persuade, explain, or reflect. This intelligence operates independently of a single input or output. e.g., sign language

**Spatial Intelligence** – problem solving ability by manipulating or creating mental images. Situations that use this intelligence include, navigation, playing chess, or visual arts. The ability is not limited to those with sight as blind people can use a tactile modality to express this intelligence.

**Interpersonal Intelligence** – is the capacity to distinguish human emotion and intention. This includes moods, temperaments, desires of others, and their intentions. This intelligence is found in professions such as teaching, psychology, and marketing

**Intrapersonal Intelligence** – is the ability to understand and access one's own emotions for the end purpose of guiding behaviour.

**Naturalist Intelligence** – the ability to recognise and distinguish species of plants, animals, mountains, or cloud configurations. Charles Darwin is considered to have had naturalist intelligence.

Gardner (2020) acknowledges that many psychologists have not adopted his theory as they favour the concept of general intelligence, *g*. However, his MI theory has come into favour with teachers and the educated public who often use his work to pronounce preferred learning styles, rather than multiple intelligences (Gardner, 2020). Gardner responded to this misconception about his work in an article published in the Washington Post (Strauss, 2013). He states that the terms of multiple intelligences and learning styles have been used interchangeably, and thus, incorrectly. The idea of a preferred learning style such as visual or kinaesthetic does not acknowledge the cognitive processes that occur with the learning, only the pathway by which the information enters the brain (Strauss, 2013). Gardner states "Drop the term 'styles'. It will confuse others and it won't help either you or your students." (Strauss, 2013). Gardner (1999) dedicated an entire chapter in his book, *Intelligence reframed*, to refuting myths that had occurred over the years. To his horror, Gardner (1999) noted that his work had been applied in areas that align certain intelligences to ethnic groups. There was also the intention to construct standardised tests that measure multiple intelligences to provide scores. Ideas such as left-brain and right brain learning, learning styles, and standardised testing were merged with his MI theory to create an educational and curriculum monster (Gardner, 1999). Perhaps his response in the Washington Post was strategic. A non-academic publication may mean that his perspective would be further reaching, to those who may not ordinarily access academic journals.

### *2.16.1 Overview and Considerations*

Gardner is not the only scholar to suggest multiple intelligences. Examples of intelligences, other than Gardner's eight include:

- Emotional Intelligence (Mayer & Salovey, 1997)
- Creative Intelligence (Dewey et al., 1917)
- Collective Intelligence (Lévy, 1997)
- Artificial Intelligence (McCarthy et al., 1955)
- Social Intelligence (Sternberg, 1985)
- Practical Intelligence (Sternberg, 1985)
- Digital Intelligence (Adams, 2004, 2011)
- Analytical Intelligence (Sternberg, 1985)

It is well beyond the scope of this literature review to discuss in depth the intelligences listed above. However, Emotional intelligence will be outlined to demonstrate that alternative perspectives exist and that there are multiple definitions and criteria for intelligence. Gardner and his Theory of Multiple Intelligences provides only one perspective.

Emotional Intelligence (EI) has attracted great interest in recent years, particularly in the popular press (Maul 2012). Mayer and Salovey (1997) were the first to propose EI. It is an intelligence comprising four specific abilities: perceiving and expressing emotions, using emotions, understanding emotions, and managing and regulating emotions. However, to be considered a scientifically legitimate intelligence they state that three criteria must be met (Mayer et al., 1999). These criteria are vastly different from the criteria proposed by Gardner (1999). The criteria proposed by Mayer et al. (1999) are not fluid or signs but precise and stringent measures that must be fulfilled. Briefly, they are

- The intelligence must not be a way of behaving but reflects a mental performance.
- The intelligence should comprise a defined set of abilities that are moderately correlated.
- The named intelligence develops with age and experience.

Eysenck (1998) noted that the eruption of these new and unproven intelligences, were the "offspring of the Gardner tradition" p. 108. Specifically, he was referring to the work of David Goleman and his claim that EI, renamed emotional quotient (EQ), mattered more than IQ when measuring success. Eysenck states that Goleman "exemplifies more clearly than most the fundamental absurdity of the tendency to class almost any type of behaviour as an "intelligence" (p. 109).

Gottfredson (2016) provides an interesting perspective on the theories of intelligence. She states that theories of multiple and co-equal intelligences, such as those proposed by Gardner (1983) and Sternberg (1985) were attempts to destroy the scientific credibility of *g,* a highly heritable, measurable, and empirically evidenced construct. Gardner did not deny the existence of *g* or its compatibility with MI "but the province and explanatory power of *g*. By the same token, MI theory is neutral on the question of the heritability of specific intelligences instead underscoring the centrality of genetic and environmental interactions" (Gardner, 1999, p. 87). Carroll (1993) published an 800-page book, *Human Cognitive Abilities*, reanalysing the current and published factor-analytic studies on cognitive abilities. He concludes that while there are special abilities, these alone are not enough for performance in specific fields, IQ is needed in addition. Similarly, IQ correlates positively with outstanding abilities in the domains of language, reasoning, memory and learning, visual perception, idea production, cognitive speed, and psychomotor abilities (Carroll, 1993).

Gardner (1999) stated that *g,* and thus intelligence, measured by psychometric tests, narrows the field of human capability. However, his paradigm does not support the measurement of any individual intelligences (Gardner 1983, 1999). Eysenck (1998) and later Waterhouse (2006) noted that there is an absence of empirical evidence for MI Theory, something unlikely to change as the intelligences themselves cannot be measured or defined, thus providing a methodological conundrum.

Learning, applying knowledge, dealing with new situations, understanding, applying reason, thinking abstractly, and problem solving. These words summarise the associated ideas from some of the definitions of intelligence given by scholars and researchers. If the definitions of other scholars are to be considered, then Gardner's eight intelligences are simply an application of these definitions and not discrete intelligences as he presents (Macnamara, 2016).

## 2.17 Summary

Four models have been described and discussed, the Differentiated Model of Giftedness and Talent (DMGT), the Three Ring Model of giftedness (TRM) including the Schoolwide Enrichment Model (SEM), the Munich Model of Giftedness (MMG), and Multiple Intelligences (MI). Three are models of giftedness, the DMGT, the TRM/SEM, and the MMG. Gardner's theory of MI has been included as it is a popular model cited by teachers. To summarise, the key features of these models are presented in Table 2.3.

**Table 2.3**

*Summary of Key Features of Models of Giftedness.*

| Model | Key features |
|---|---|
| DMGT<br>Gagné<br>(1985 – 2013) | The DMGT is a talent development pathway. It recognises underachieving gifted students and the impact of maturation/development, personality, and the environment have in transforming a gift to a talent. It has evolved considerably to include a biological basis for giftedness. The model was renamed the Expanded Model of Talent Development. In more recent times Gagné places a greater emphasis on initial performance and sustained performance to be included within his model. |
| TRM and SEM<br>Renzulli (1978)<br>Renzulli & Reis (2005) | The TRM describes gifted behaviour, not a gifted person. The intersection of three equally weighted traits is required, above average ability, creativity, and task commitment. When gifted behaviour is observed it is either in general or specific performance areas. The TRM has been applied with the enrichment triad model into a schoolwide enrichment model to provide services for the gifted and challenging tasks to assist in identification. Together these models create a talent development pathway for gifted students. Provides a more inclusive definition of giftedness and can be more appealing to the wider education community. |
| MMG<br>Heller (2005) | The MMG is a talent development pathway comprising key ability areas that are moderated by non-cognitive personality factors and environmental conditions. It can be considered a multifactorial model as these moderators, affect to varying degrees, the development of performance areas. There are distinct and separate criteria for giftedness in different areas. This extends to his work on the traits of gifted science students. |
| MI<br>Gardner<br>(1983, 1999) | There are eight separate intelligences, linguistic, logical-mathematical, musical, bodily-kinaesthetic, spatial, interpersonal, intrapersonal, and naturalist (Gardner, 1983; 1999). Crystalising experiences are required for these intelligences to develop. MI is giftedness as ability not a talent development pathway.<br>Well known to educators and the general public. Often mistakenly used as styles of learning |

## 2.18 Models to Address Asynchronous Development

Despite the number of models for giftedness, none specifically address or acknowledge asynchronous development. Sternberg and Davidson (2005) included 24 chapters in their book *Conceptions of Giftedness* with no mention of the term asynchronous. Colangelo and Davis (2003) include 47 chapters in their *Handbook of Gifted Education,* yet only one index listing for the term asynchronous. However, the asynchronous development of a gifted person is well discussed in the literature (for example, Gross, 1993; Terrassier, 1985; Silverman, 1997). The Columbus group goes further and provides a definition of giftedness as asynchronous development. However, this is not a model or theory of giftedness.

> Giftedness is ***asynchronous development*** in which advanced cognitive abilities and heightened intensity combine to create inner experiences and awareness that are qualitatively different from the norm. This asynchrony increases with higher intellectual capacity. The uniqueness of the gifted renders them particularly vulnerable and requires modifications in parenting, teaching, and counseling in order for them to develop optimally (Columbus Group, 1991).

Gagné's DMGT 2.0 acknowledges an underachieving gifted person, who may or may not have asynchronous development, but as discussed, there is no provision for their inclusion. Wellisch and Brown (2012) argued the need for a model that more than acknowledges the underachieving gifted person, proposing a Model of Inclusive Gifted Identification and Progression. There is an explicit acknowledgement of the underachieving gifted student and specific interventions, but this model does not directly address the asynchronous development of a gifted person. She uses the terms well-adjusted for those children who do not have learning or other disorders, (a performing gifted child), and places them on a separate, but later converging and integrated path to those who are twice exceptional. This model theoretically includes those with differences due to asynchronous development, but it should be with caution that labels for twice exceptional, or the opposite of well-adjusted, are employed. In circumstances where there is no advanced development, a child may be perceived to be age appropriate and well-adjusted. Thus, there is no specific provision in her model for children who exhibit asynchronous development.

### 2.19 Gagné – A Special Commentary

Gagné was intensively critiqued for his 2011 article titled "Academic Talent Development and the Equity Issue in Gifted Education", stating that a performance-based model would not discriminate against those from minority groups and cultural backgrounds (Gagné, 2011). Wellisch and Brown (2012) refute Gagné's premise. They state that his article attracted 40 commentaries, indicating that their view is not unique.

Gagné (2011) asserts that underrepresentation is not inequity but due to distinct differences in the natural abilities, citing a moderate correlation between SES and IQ. He questions that it is not Asian students who are underrepresented in academically gifted programs, but those from Black and Hispanic backgrounds (Gagné, 2011). Conversely, there is a far greater proportion of athletes from an African American or African background than there are Caucasian or Asian, but this is not questioned (Gagné, 2011). Wellisch and Brown (2012) replied that issues of underachievement are not limited to lower SES or minority groups, but are also apparent in those who are twice exceptional. Gagné (2011) reported on equity issues in the USA due to data availability but states that his findings of underrepresentation can be applied to any country where equity issues arise. However, cultural differences between America and Australia are great, making an Australian perspective valid. Thus, cultural norms in one country may not be appropriate to use as reasons to dismiss an observation of underrepresentation in another country. Moon (2009) reminds us that gifted children from all backgrounds face challenges and are not immune to the problems that lead to underachievement.

Bannister-Tyrrell (2017), reviewed the iterations and development of Gagné's DMGT, acknowledging the influence of his models in all Australian states. She challenges the seemingly ill-thought-out approach to choosing a single model for Australia with each state using different versions to different degrees. The needs of Australian G & T students could be consistently met if the DMGT 2.0 were used (Bannister-Tyrell, 2017). Merrotsy (2017) goes further stating that within Australia, organisations and entire states choose, use, and/or mention only selected components. Gagné's definitions are adopted in Australia but his model is not. His work is rather misrepresented, and adopted in our education system as discrete or outdated statements (Merrotsy, 2017). This is countered by Henderson (2018) who states that Merrotsy (2017) has not adequately discussed how, or to what extent Gagné's models are applied. She states that this cannot be concluded by document analysis alone. Thus, this research is timely, providing first-hand information about NSW educators' familiarity with, and the adoption of Gagné's models and definitions in their workplaces.

Current Australian researchers disagree about the level of integrity and fidelity with which Gagné's models are adopted. However, all indicate that it is not wholly adopted and agree that the model has merit within an Australian context. Merrotsy (2017) propounds that the DMGT is a "dynamic model that provides a robust framework for policy and practice for the education of students who are gifted and talented" (p. 38).

## 2.20 Parents Perspectives in Gifted Education

Colangelo and Dettmann (1983) acknowledge the importance of parent and family involvement in the education of gifted children. However, they note a lack of research about parent perspectives. More than 25 years later, Australian researchers note that this gap still exists (Gallagher et al., 2012; Morawska & Sanders, 2009).

Parents identify the need for assistance in many areas notably: children's emotional regulation, parent relationships with the school, peer relationships, motivation, achieving potential, accessing engaging activities, advocating, the definition of and identification, asynchronous development, and self-esteem/efficacy (Morawska & Sanders 2009). Madawaska and Sanders (2009) also showed that parents often request support for the educational needs of their children, even when asked questions about their requirements for parenting strategies. Feldman and Piirto (1995) suggest that parents of gifted children feel a greater responsibility to be involved in the education of their children than do parents of non-gifted children.

The process of parenting a gifted child is daunting (Feldman and Piirto,1995). This is hardly surprising when gifted individuals often attend out of school tuition, private lessons, and participate in hours of practice in their chosen domain (Subotnik et al., 2011) which will in part, depend on parental resources (Kulieke & Olszewski-Kubilius, 1989). The ability of parents to provide these resources depends on many factors including, parental age and the physical energy available, cultural expectations and values, financial resources, and the importance placed on talent domains (Feldman & Piirto, 1995). Bloom (1982) puts forward the importance of parents' influence on their child's development by articulating expectations, motivating the child, and devoting time and resources to the child. These are integral to their development in their talent domain. Unfortunately, many parents are unsure or unfamiliar with which exact strategies, interventions, and provisions are required when parenting a gifted child, often with asynchronous development (Morawska & Sanders, 2009).

Bloom (1985) conducted a retrospective study investigating the talent development process of individuals who were considered accomplished in their field before the age of 35 years. He provided evidence that there was a long, enduring, and supportive process of nurturing and education from parents and teachers (Bloom 1985). Prior to completing the 1985 study he published partial findings of those who were eminent as concert pianists, Olympic swimmers, and research mathematicians (Bloom, 1982). Bloom (1982) interviewed parents of talented mathematicians and found two characterises that were generally present in the child before age eight, and often as early as three years. These were 1) asking questions 2) using the answers to the questions and 3) solitary activities. Solitary activities were noted to be working on complex mathematics in their head, before committing the answers to paper (Bloom, 1982). Bloom suggested markers or attributes of giftedness in the teenage years including the ability for independent learning and high capability in school mathematics and science (Bloom, 1982).

As these characteristics often present well before school age, the responsibility of identification resides with the parents or carers of gifted children (Merrick & Targett, 2005). In NSW, the age that children typically enter formal schooling is five years (NSW DoE, 2020). Merrick and Targett (2005), note that parents are the knowledge keepers of vast amounts of information on the child. They intimately know the positive and negative character traits, ages of developmental stages, and witness key indicators of giftedness such as early speech, movement, and reading.

Teachers and schools are often wary of parents who advocate for their child, and the popular stigma of the pushy parent appears to be prevalent (Gallagher, et al. 2012). However, parents often underestimate their child's ability, rather than overestimate, as their reference is usually other family members (Merrick & Targett, 2005). As Worthington (2001) reported, parents make reliable and accurate estimates regarding their child's performance, abilities, and intelligence. Gallagher et al. (2012) demonstrated that parents do not deserve the pushy parent stigma and that parent cooperation was instrumental in the success of practices used for gifted children. For example, acceleration and ability grouping. Accordingly, it is important to include parents' perceptions in studies that research educational provisions for gifted children (Gallagher et al., 2012).

### 2.21 Practices in Gifted Education

The use of the term 'practices' here aligns with the ideas of Kemmis et al. (2014) as being ways of saying, doing, and relating, conjoined for specific purposes. Specifically, it refers to pedagogies chosen and enacted in classrooms to suit situations. Presently, providing accommodation for achieving G & T students requires identification before implementing one of the four main practices in our current repertoire; ability grouping (G & T placed together in schools or classes), acceleration (including skipping grades), enrichment (extra and more challenging work), pull out programs (temporary removal from regular instruction), and financial (scholarships) (Ziegler & Phillipson, 2012). They suggest that these practices are an attempt to remove, isolate, prevent, and protect the newly identified individual from the shortcomings of general education. An education that supports the needs of homogenous groups instead, of catering to individual students and their needs.

The usual practices for gifted education are not inclusive, where inclusive refers to catering for all children rather than a narrow focus on special education (Booth & Ainscow, 1998). Catering for the needs of gifted children should be thought of as special. However, Booth and Ainscow (1998) indicate that the term inclusive education is limiting and often conceptualised as meeting the needs of students who have low attainment or emotional and behavioural issues. With the practices of exclusion, that is exclusion from mainstream peers, gifted children may be extended or challenged in some areas. However, the focus is not on increasing self-efficacy, self-esteem, and social interaction but rather on removing perceived distractions, difficulties, and financial burdens (Craven et al., 2000; Ziegler & Phillipson, 2012).

The purpose of education should be to challenge all children to maximise their achievement. However, teachers may perceive equity in education as equal outcomes and achievements rather than equal opportunities for an appropriate and enriching education (Lassig, 2003). Therefore, efforts to assist those who are already considered advantaged can be met with contempt and resistance (Clark, 2002; Lassig, 2003). This, in conjunction with negative stereotypical perceptions of the arrogant, self-important, or non-compliant gifted student may manifest in teachers' practices as 'tall poppy syndrome', whereby those who are already seen to be privileged are cut down to size (Lassig, 2003; Geake & Gross, 2008).

This discussion will now focus on outlining three of the four key exclusion practices, ability grouping, acceleration, and enrichment. Financial practices will not be discussed as this is not relevant to the context of this research. Financial practices and scholarships for school science are also not commonplace in Australia.

## 2.22 Ability Grouping

Ability grouping refers to the practice whereby individuals are placed with other academically similar people so they are not held back by the slower pace of average ability learners (Ziegler & Phillipson, 2012). It is also colloquially known as streaming or setting. This grouping usually occurs in three ways, within classes, between classes, and between schools (Macqueen, 2012).

### *2.22.1 Within Class and Between Class Ability Grouping*

The NSW DoE G &T policy package (2006) recommends grouping as one of the management strategies for G & T students, stating that they are more likely to have learning gains when with other students of the same ability. Their recommendations include a variety of groupings from small short-term strategies to grouping by subject and achievement level. There is no data to show the number of schools in NSW that participate in the different strategies. According to NESA (NESA, 2019a, 2019b) advice on differentiation and catering for diverse learners, the need for these practices is determined by individual schools, and there are no records kept of their enactment.

Macqueen (2012) states that there is little recent research into the outcomes of within school ability grouping concerning the long-term academic success of a gifted individual. Preckel et al. (2010) similarly indicate a lack of research into the effect that increasing challenge through ability grouping has on boredom, a reason often cited for the practice. Macqueen (2009, 2012) provides an Australian NSW perspective in primary classrooms, indicating that grouping provides non-significant differences in academic growth. However, this is not the situation for some studies in mathematics. Brulles et al. (2012) demonstrates that gifted and non-gifted students can benefit from ability grouping with respect to academic growth. They state with certainty that non-gifted students are not disadvantaged by the grouping. However, without ability grouping it is the gifted students who are left behind with respect to their academic growth. As such, class compositions must be structured so that gifted students can be adequately challenged and the teacher can present appropriate opportunities for all students.

### *2.22.2 Selective Schools and Opportunity Classes*

In NSW government schools, there are two government funded accommodations designed for gifted students, 1) opportunity classes (Year 5 entry, 75 schools), and 2) selective schools (Year 7, 48 schools). On the NSW DoE website, reference is made to the "High Potential and Gifted Education Policy" stating that placement in either an opportunity class or selective school is best suited to students who have "very high to extremely high academic merit." (NSW DoE, Sept 2020, para 2). There is also reference to the Wechsler Intelligence Scale for Children – Fifth Edition (WISC-V) IQ test and the typical bell curve visual representation of IQ. Here, arrows indicate that those students with an IQ between 120 and 130 are very high and those between 130 and 140 are extremely high. In the Selective

High School and Opportunity Class Placement Policy it is indicated that students are selected and placed based on academic merit only. That is, a combination of performance in English and mathematics, and the placement test (NSW DoE, 2020). It is worth noting that while the policy was updated in 2020, there were only minor changes to text and contact details. The policy implementation date was 2006, the same date as the current NSW DoE Gifted and Talented Policy.

In 17 fully selective, 26 partially selective, four agricultural high schools, and one virtual selective (Aurora College) school across NSW, there were 4,226 places for 2020 and 15,079 applicants (NSW Government, 2020a). This equates to an approximate 28% success rate. Three selective schools have targeted places for Aboriginal and Torres Strait Islander students (NSW DoE, May 2020). In the 75 opportunity classes, there were 1,740 places for 12,344 applicants (NSW Government, 2020b), a success rate of 14%.

These figures indicate that more than 78% of students in NSW who wish to partake in the offerings of a selective school or opportunity class cannot. Therefore, the students that are not selected are catered for in either, independent, Catholic, non-selective government schools, or home educated.

It is worth noting that entry to opportunity classes and selective schools is through placement tests. These were previously written by the Australian Research Council for Educational Research (ACER) but have been replaced by new tests for entry in 2022 (NSW DoE, July 2021). The areas tested are mathematics reasoning, thinking skills, and reading comprehension, or reading, mathematical reasoning, thinking skills, and writing for opportunity and selective places respectively (NSW DoE, July 2021). As the test will not be sat by students until late July 2021, there is no relevant information about the latter parts of the process (NSW DoE, July 2021).

Craven et al. (2000) compared the academic and non-academic outcomes for gifted students in selective programs with gifted students in mixed ability or main stream classes. They found that student-self-reported non-academic outcomes, self-concept, and motivation, were significantly lower if they studied in a selective environment. Academic outcomes were unchanged. They attribute the decline to the manifestation of a ‘big fish little pond effect’ (BFLPE) whereby the self-concept of able and high achieving students is diminished in the presence of other high achieving students (Craven et al., 2000). These assertions are confirmed by Göllner et al. (2018) who demonstrate that the benefits of a high-status school are partly negated by a high achieving school. They propose that a moderate achieving cohort has more benefit on long term life successes, social satisfaction, educational attainment, income, and occupational prestige. G&T students often have greater self-concept when in mixed ability classes which translates to achievement, interest, and motivation (Craven et al., 2000). Gross (2009) challenges the assumption that BFLPE is not apparent with highly gifted students and rests upon the assumption that self-concept is linked to the ranking in a classroom. She suggests that many students are not aiming to become big fish, but rather master the challenging tasks at hand. Thus, it is paramount that there is purposeful selection of practices to cater for individual gifted students, rather than solely the gift.

Encouragingly, Hattie (2002) conducted a meta-analysis and found that the greatest account of the variance of student achievement, apart from student ability at around 50%, was the individual teacher (30%). Hattie (2002), claimed that composition has little effect as teachers rarely change their practice to align with the ability of the students in their classroom. "Good teaching can occur independently of the class configuration or homogeneity of the students within the class" (Hattie, 2002, p. 449).

### *2.22.3 Acceleration*

Miraca Gross, an Emeritus Professor of Gifted Education at the University of NSW (UNSW), provides a unique view on the concept of acceleration. She states acceleration is a poor word choice for the practice as she deems that it is "freeing up" rather than "pushing along" or accelerating (Mensa, 2016). There is no pressure to move more quickly, but a gift to the child whereby they can access a more suitable curriculum (Mensa, 2016; MacLeod, 2004). Gross further describes acceleration as "a coat of many colours" (Mensa, 2006, p. 2) as it can take several forms from early admission to kindergarten, through to radical acceleration later in schooling.

In the UNSW gifted and talented education professional development package for teachers, Bailey (2005) describes six types of acceleration: subject acceleration, grade skipping, early entry, concurrent enrolment, telescoping, and radical acceleration. The 2006 NSW DoE G & T policy package identifies three types, subject acceleration, grade skipping, and early entry (NSW DoE, 2004). The types of acceleration are:

**Subject Acceleration** – students are accelerated in single or multiple subjects where they are high achieving (Bailey, 2005; NSW DoE, 2004).

**Grade Skipping** – students are moved forward into the next grade ahead of time. They typically are moved one year at each skip before reassessment (Bailey, 2005; NSW DoE, 2004).

**Early entry** –early entry is when students enter education at a young age. This can be either kindergarten or university (Bailey, 2005; NSW DoE, 2004). It is not early acceptance to university based on predicted Australian Tertiary Admissions Rank (ATAR), a practice becoming more common in NSW.

**Concurrent Enrolment** – students are dual-enrolled in school and tertiary subjects. This differs from the vocational pathway offered for students who attend trade schools (Bailey, 2005)

**Telescoping** – students either individually or in groups complete subjects in a shorter amount of time than usual. For example, two years of maths in one year, or six year of schooling in five years. Telescoping is usually used for ability grouped students (Bailey, 2005).

**Radical Acceleration** – is used for profoundly gifted students and employs strategies that allow for graduation from school three or more years earlier than their age peers (Gross, 2005; Bailey, 2005).

Gross (2006) recommends that gifted children should be accelerated early. She indicates that the greatest time of social rejection occurs between the ages of four and nine. Many children who are not accelerated and remain in aged based classes, camouflage their abilities as a coping mechanism to fit in with peers and please teachers (Gross, 2006). Unfortunately, educators do not always believe that acceleration is positive for gifted children, particularly radical acceleration (Chalwell & Cumming, 2019). However, if certain needs are met, such as the early response to acceleration, family support, student involvement in planning their education, and well thought out plans, acceleration can provide a positive and successful pathway for gifted children (Gross, 2004).

The pathway of acceleration is not always smooth and students who are accelerated may miss some of the other skills and social development acquired over time. Chalwell and Cumming (2019) suggest single subject acceleration allows peer relationships to continue and can prevent social isolation. However, Gross (2006) notes that gifted children are more likely to seek out older children for friendships as they are mentally and intellectually similar. Thus, social isolation can occur if they are not accelerated. Likewise, those who are intellectually disabled or delayed may seek out those who are at the same level of development. The skills developed by the "apprenticeship" of learning still need explicit teaching (Chalwell & Cumming, 2019). Skills such as test taking, receiving marks and feedback, organisation, and the social norms of classroom etiquette are not necessarily inherent because a person is gifted in one domain. Gifted children are not homogenous and as such, will need individual pathways to support their unique learning and developmental needs (Chalwell & Cumming, 2019).

### *2.22.4 Enrichment*

The NSW DoE defines enrichment as "the broadening of the curriculum to develop knowledge, application, thinking skills and attitudes to a degree of complexity appropriate to the students' developmental level" (NSW DoE, 2004, p.3). It is defined as separate from extension, with enrichment viewed as extra-curricular provisions rather than extension activities that "involve deepening of the students' knowledge, understanding and skills" (NSW DoE, 2004, p.3). They consider both as differentiation. However, no further details are provided. It is difficult to see the difference between the two concepts apart from when they take place, within or outside school.

MacLeod (2004) uses the term differentiation to describe enrichment and extension occurring in the context of the regular cohort and peer group. A resource provided by Catholic Education Melbourne (2019) describes differentiation as adjustments made to the core curriculum that allows learning needs to be met effectively. These adjustments may include faster paced instruction, change in depth and breadth, and additional learning opportunities. Thus, the terms differentiation, enrichment, and extension are often used interchangeably.

Enrichment programs were developed in response to the socioemotional concerns of gifted children who were accelerated (Kulik & Kulik, 1992). Enrichment programs became a way of addressing these needs while allowing experiences and a pace that suitable for their intellectual needs. The SEM is one model that provides for student enrichment using a personalised approach (Renzulli & Reis, 2010). Three factors are considered, student strengths, curriculum differentiation, and enrichment opportunities. This is usually applied within the regular curriculum and within a "continuum of services", including "enrichment clusters, cluster grouping, mentoring, counselling, acceleration and a variety of grouping arrangements based on abilities, interests, and learning styles" (Renzulli et al., 2014, p. 26).

Renzulli et al. (2014) acknowledge that schools need to develop their own continuum of services suitable to their own context, as there is more than one appropriate way to organise programs.

Golle et al. (2018) conducted a study into the effectiveness of enrichment programs stating that while well intentioned, systematic evaluation of their value needs to be reported. They note that the empirical studies conducted about the effectiveness of enrichment programs were often focused on single subjects, rather than the overall effectiveness of broad enrichment experiences. MacLeod (2004) states that successful enrichment programs are strategically implemented with full leadership support. Support included planning days, regular shared planning, and follow up for staff with experienced consultants. The advice from Chalwell and Cumming (2019) is reiterated; schools that actively and willingly provide support to teacher specialisation and education in gifted education are more likely to be successful.

Even with successful academic and social outcomes, enrichment programs are not straightforward for schools. MacLeod (2004) stresses the importance of developing sequences of learning where enrichment and extension activities are planned and clearly mapped out. They should not be dip in and dip out, or fragmented (MacLeod, 2004). This is difficult given the belief by teachers that the current curriculum in NSW lacks the "flexibility to address students' very different learning needs" (NESA, 2020, p. 28)

A second issue facing teachers when creating enrichment programs is the mandatory outcomes and vast amount of content that drive the NSW 7-10 Science syllabus. The 2020 curriculum review findings indicate that the curriculum is overcrowded, overly prescriptive, and content driven at the expense of learning and exploration. It was reported that our current system rewards those who are good at test taking rather than those who have critical thinking and problem-solving ability (NESA, 2020). These findings were after the new syllabuses implemented for K-6 and Stage 6 sciences that had an inquiry pedagogy embedded within the syllabuses. As intended by NESA in the development of the syllabuses, the inquiry pedagogy should allow for an experiential process of learning and deep exploration of real-world phenomena (NESA, 2019c). However, the continued pressure of tests external to schools, such as the HSC and the National Assessment Program – Literacy and Numeracy (NAPLAN), prevent teachers from using bespoke and inquiry teaching strategies that are often put on hold to prepare for these exams (NESA, 2020).

Meeting the needs of gifted students within the requirements of the current system is challenging. MacLeod (2004) suggests approaches to provide differentiation based on the level of giftedness. Mildly and moderately gifted students could have a compacted learning program that allows time for extension in the core areas or an in-school mentoring by a student studying at a higher level. Given the increasing pressure on teachers by schools and the reporting requirements by NESA (NESA, 2020), student mentorship is a practical option that provides benefits to both students. Highly gifted students could access more advanced content from the curriculum or additional online resources and e-learning courses (MacLeod, 2004). Exceptionally gifted students require special consideration and mentoring by specialist and experts can help prevent feelings of isolation once in school areas of the curriculum and resources are exhausted (MacLeod, 2004).

### 2.23 Some Specific Strategies for Science – Inclusive Practices

Unfortunately, many science lessons taught in classrooms do not replicate or even provide insight into science and its lessons in the real world (Watters and Diezmann, 2003). Educators attempt to provide students with authentic experiences for learning but many teachers confuse authentic tasks with authentic learning experiences (McDowell, 2017). He notes that students should spend more time immersed in cognitive experiences and less time creating and producing products that aim to replicate the end game of highly skilled experts. Watters and Diezmann, (2003) support the development of gifted science students in a practice they term a “cognitive apprenticeship”. This emphasises a real-world approach to science rather than traditional methods for instruction that are often found in Australian schools (Watters & Diezmann, 2003). They highlight their concern that school science rarely gives experiences similar to that of genuine science, but rather supports the learning for norm-referenced assessments that emphasise reproduction of facts. Bianchini and Colburn (2000) discussed that if results from scientific investigations differ between students, or between the provided answers and the student then the first assumption is that it must be because they, the student did something wrong. This belief is perpetuated as most school science activities have a defined, neatly devised, and discrete focus (Watters & Diezmann, 2003). Therefore, the assumption is not unexpected.

One practice that has been reported to be successful in science education is the use of inquiry-based instruction (Bianchini & Colburn, 2000; Oliveria et al., 2012). It is not certain when the practice first came about but it is thought to be a blended learning philosophy from the work of Piaget, Vygotsky, and Ausubel (Minner et al., 2009), underpinned by a constructivist approach. However, the word constructivism will elicit different meanings and depend on which educator is asked (Harlow et al., 2006). Through the examination of Popper's and Piaget's theories, Harlow et al. (2006) assert that constructivism must be more than the assimilation of new information but rather should be the continual testing and relevant incorporation of prior understanding. This begets that to create knowledge, knowledge is temporary and under constant refinement and growth.

The inquiry-based approach to teaching and learning has been shown to improve student growth in science for learning goals such as scientific knowledge, scientific reasoning through application of models, and construction and critique of scientific explanations (Wilson et al., 2010). Other scholars have shown similar learning gains but also increased engagement and motivation for learning (Lynch et al., 2005). However, to be effective, guidance from teachers is still required. Mayer (2004) notes that when teachers use constructivist approaches, students are often expected to work with little guidance or instruction. This, in part, could be due to the disparity in the meanings of constructivism or inquiry-based learning (Mayer, 2004; Pedaste et al., 2015). Constructivist approaches, including that of inquiry-based science, should be more than discovery and use methods that rely on guided cognitive construction (Mayer, 2004). Pedaste et al. (2012) defined inquiry as the "process of discovering new causal relations, with the learner formulating hypotheses and testing them by conducting experiments and/or making observations" (p. 48), stating it replicates the practices used by professional scientists. However, the knowledge constructed by students is rarely new to the world, so teachers must approach teaching and learning using components of learning that are logically developed, including those that highlight areas of subject importance (Pedaste et al., 2015). Pedaste et al. (2015) make special note that inquiry-based learning differs from problem-based learning, project-based learning, discovery learning, or game-based learning. They also note that inquiry-based learning does not need to involve the collection or testing of empirical data, a sentiment replicated by Mayer (2004).

## 2.24 Provisions

In an economic sense, public provision in education is seen as redistribution (Levy, 2005), often of wealth, but sometimes of opportunity. In this sense, provisioning in the form of specialised G & T funding and assistance is often isolated to a select number of schools and classes rather than being all inclusive (NSW Department of Education, 2011; Govt. SA., 2014). Similarly, the Director of Communication and Political Liaison of the AISNSW, who is responsible for distributing government funds to independent schools, has confirmed that there are no financial provisions made for any students identified as gifted and talented (M. Hunt, personal communication, 10 November, 2014). Therefore, unless a child is accepted into a selective government school or individual schools make provisions, no funding is available to support gifted and talented children in NSW.

There are no signs of improvement in this situation. Government education policies are focusing on accountability and redirecting funding to schools that are struggling to meet literacy and numeracy requirements as assessed by high stakes tests such as NAPLAN (Luke & Woods, 2008). A flow-on effect of this is a tendency to reduce funding for less-tested areas such as science (Luke & Woods, 2008), or redirection of funds to trendy curriculum developments often involving information communication technology (ICT). For example, the Queensland government recently announced that robotics would soon be part of the curriculum (Queensland Government, October 14, 2015). This initiative will be funded but is expected to take teaching time away from mainstream science in all compulsory years of schooling. There is no guarantee that all G & T students will find gratification in the practice of coding that will underpin this curriculum change, so some are likely to miss opportunities to engage with more appealing aspects of science.

The literature providing information about the provisions/resources available for science students in Australia is scarce. Rennie et al. (2001) published the results of a national study regarding science teaching and learning in Australian schools. The research primarily focussed on pedagogy, but findings regarding provisions were elucidated when investigating limiting factors for quality science education (Rennie et al., 2001). Their findings indicated more than half of teachers lacked the physical resources to implement good pedagogy and more than 40% provided their resources from home. Science teachers indicated that they were lacking in the following areas; time to prepare lessons, an adequate budget, professional development, time for collaboration, time to teach a heavy content rich syllabus, and resources to manage poor behaviour and welfare issues. A search of educational data bases, or the world wide web provides some resources including ideas, assessment tasks, worksheets, and programs. These resources are either for purchase or provided for no charge, often by other teachers. However, even if these resources are purchased from educational companies, it is unclear if they are used, how they are used, or if they support educators in implementing appropriate pedagogy for science.

### 2.25 Concluding Statement

Education as an institution has changed markedly in the past 10 years, yet we have not updated the model we are using for gifted education. There are now more single high-stakes testing and new minimum NAPLAN achievement required for eligibility for NSW HSC (NESA, 2017a). In 2017 NESA continues to trial critical thinking tests that target logical reasoning, qualitative analytical reasoning, and quantitative analytical reasoning. The NSW science syllabi have been completely restructured by NESA in 2016 and added two novel courses, Investigating Science and Science Extension. These major efforts and changes to teaching, however well-intentioned, are merely manipulating single elements that are aimed at creating a more rigorous curriculum. However, Renzulli (2016) argues that policymakers and practitioners need to come together in alignment to create educational reform. Merely changing one component without empowering teachers, providing financial support, and providing teacher development appears to improve standards but simply puts more pressure on teachers and schools within their current resources. We have seen the emergence and popularity of the latest educational trend, STEM, sometimes evolved as STEAM with an incorporated A for the "Arts"; but is this yet again, tinkering with our current system, creating all-inclusive approaches, rather than focusing on bringing substantial and lasting improvement? This piecemeal approach can be extrapolated to G & T education. It is therefore apt to explore how schools apply models of giftedness in their policy and practice, and to evaluate if the current model is still suitable for our circumstances.

Figure 2.8 presents a visual representation of the theoretical framework upon which this literature review has been constructed. It has been presented to assist the reader to understand the organisation of the subsections. This framework demonstrates one way of organising and discussing interrelated topics. Information on the policies was presented in Chapter 1, represented by a circle in the centre of the diagram. Chapter 2, part 1 presented the setting for this research and discussed the attributes, uniqueness, and difficulties faced by G & T people. This is represented by the cloud shape. Chapter 2, Part 2 presented models for G & T education and examined the learning environments in which policy is enacted for G & T students. These are indicated as squares and triangles interacting on either side of the centre circle. The framework assists with positioning the sub research questions presented in section 2.26

### 2.26 Research Questions

This review of the literature has provided the background information and discussion for the overarching research question about G & T policy in general:

Which theoretical model is the most appropriate to guide policy reform and procedure development to enhance the development of gifted and talented students in the context of NSW secondary education?

This is broken down into two phases and the following sub questions to guide the collection of appropriate data:

**Phase 1**

1. NSW DoE policy for G & T education
   a. How is evidence-based research used in the current NSW DoE policy for G & T education?
   b. How has the NSW DoE policy for G & T education evolved over the past 30 years?

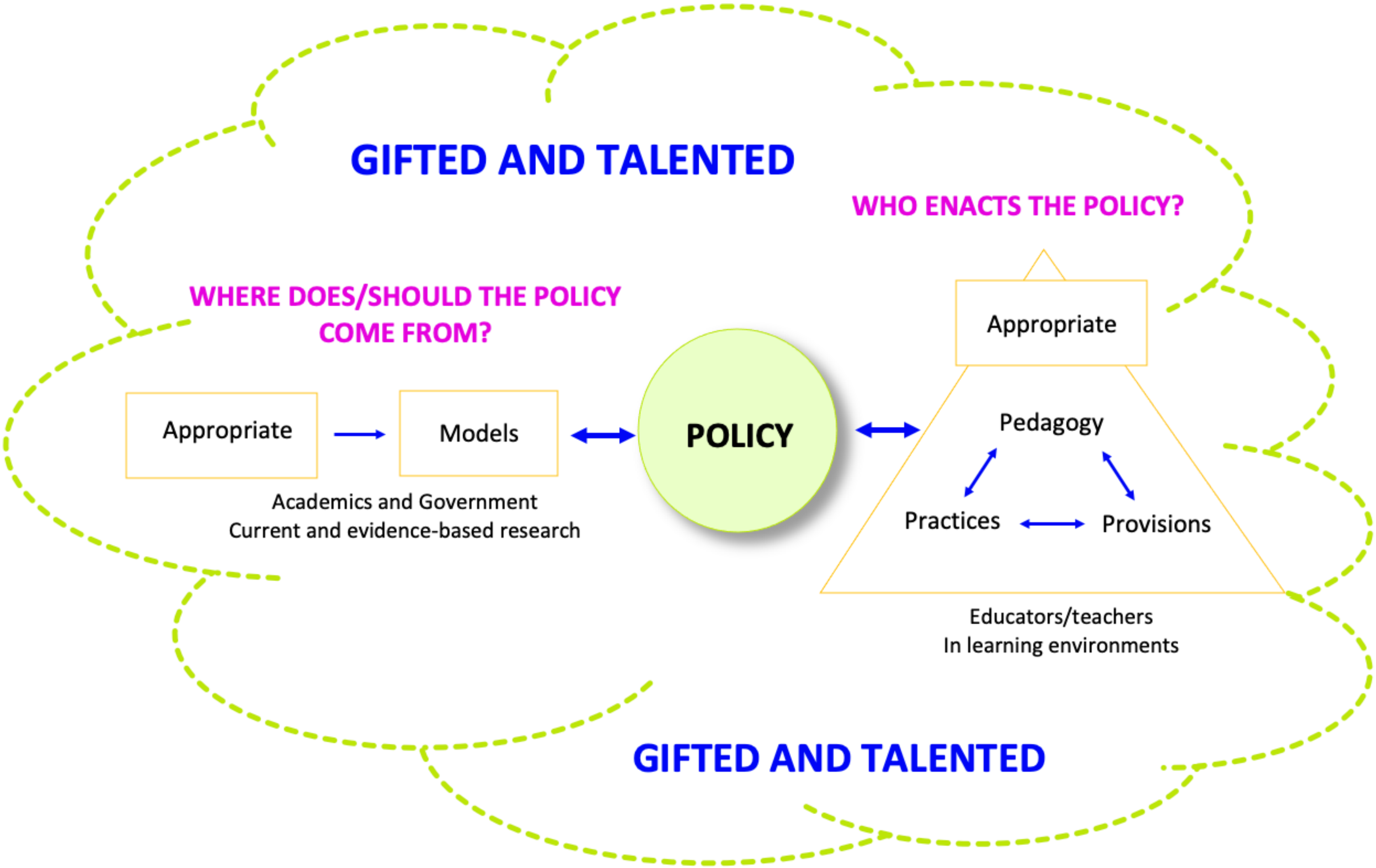
**Phase 2**

2. What are educators' perceptions of the appropriateness of the NSW DoE policy for G & T education?
3. School policy for G & T education
   a. What are educators' perceptions of the appropriateness of their school policy for G & T education?
   b. Where school policy for G & T does not exist; What is the rationale given for the absence of a policy?
4. With provisions defined as resources, what provisions are available and used by each school for G & T students in the context of science?
5. With practices defined as teaching strategies, what practices are enacted by individual teachers for G & T students in each school in the context of science?
6. When presented with alternative models for G & T education, what are educators' perceptions of their appropriateness for science education?

Phase 1 findings and discussion are presented in Chapter 1, Phase 2 findings and discussion are presented in Chapter 4 and 5.

**Figure 2.8**

*Visual Representation of the Framework for the Literature Review.*



# 3 CHAPTER 3: METHODOLOGY AND METHODS

## 3.1 Introduction

Chapter 2 examined and presented some of the key definitions for G & T people demonstrating that there is no clear consensus about who is included in the gifted population, the size of the cohort, or the characteristics of a gifted person. The fundamental concepts of identification and labelling were considered, demonstrating the difficulty, controversy, and divided perspectives, on the need to identify children. Presented was a need to identify gifted children if resources are to be directed to their education, but this should be balanced with other social and emotional needs of the individual. The second part of the Chapter, Part 2, examined and challenged the current gifted education and talent development models. Evidence was presented that models other than Gagné's DMGT (2013) should be considered and that domain specific models may be appropriate.

An initial research design was proposed, but unfortunately, there were difficulties with obtaining sufficient data. This made it necessary to alter the design, how the participants were selected, and the participants targeted. While interesting, a discussion regarding the unsuccessful research design may cause confusion to the reader. Hence, this will be addressed in a separate document at a later time.

This chapter presents the methodology for the research, a mixed methods research (MMR) methodology. The description of the methods will be divided into two parts.

- Part 1 describes the enacted research design and methods used to collect the data.
- Part 2 describes the approach to data analysis.

Described in the first part of this chapter, are the methodology, research design, analytic procedures, trustworthiness, and research implications.

## 3.2 Mixed Methods Research

This research explores a complex problem. It involves specifics such as what educators of G & T students have (i.e., policy and resources), what they do with it (i.e., practices), adherence to G & T policy, and constructs such as educators' perceptions of the appropriateness of the NSW DoE G & T policy. As such, it would be inappropriate and inadequate to adopt any one epistemology and methodology as it would not fully explore all aspects. Thus, an MMR methodology was employed.

Using MMR is not without its difficulties. Typically, quantitative methodologies align with a positivist paradigm and qualitative methodologies a constructivist paradigm (Tashakkori & Teddlie, 1998). At the core of these methodologies, the schema could not be more different. Positivism ascribes to the ontology that there is a single reality, an epistemology that the known and knower are independent, and causal linkages can be measured. Conversely, constructivism ascribes to the ontology of multiple realities, an epistemology that the knower and known are inseparably linked, and that cause and effect cannot be dissociated from one another (Tashakkori & Teddlie, 1998). It is not difficult to see why historically these two methods seemed diametrically opposed.

Although there are emerging agreements that quantitative and qualitative methods are compatible, there has been much contention from the purists and continuing controversy surrounding MMR. This is mainly for two reasons 1) the incompatibility of the paradigms and 2) the purpose of the research, one to create laws and the other to seek understanding. Howe (1989) countered these incompatibilities by introducing a new paradigm, pragmatism. He argues that these two methods are in fact highly compatible, and we must not hesitate to use all our ways of knowing to answer complex questions.

Relevant to this research is the assertion put forth by Howe (1989), that the dichotomous labels, quantitative and qualitative, cannot be neatly applied to data from a measurement nor an ontological perspective. For example, quantitative data fit into an ordinal, nominal, interval, or ratio scale, with the ontological perspective that they do not incorporate values of belief. i.e., the known is separate from the knower. In these definitions there is a cognitive dissonance when we are intentionally reporting quantitative data from methods, or analysis, that incorporates our values, beliefs, or perspective. An example relevant to this research is separating the terms “gifted” and “talented”. The number of educators can be counted, but it is over quantifying the findings not to go beyond the yes or a no response. There is as much value, intention, and experiential information important to the answer, as the answer is itself. Therefore, Howe (1989) asserts that the paradigm should not determine the method for inquiry. He states “But why should paradigms determine the kind of work one may do with inquiry any more than the amount of illumination dictate where one may conduct a search?” (Howe, 1989, p13).

Although my experience has previously leaned towards a scientific positivist schema, my pragmatic worldview facilitates agreement with Creswell (2009) and others, that not all questions can be answered by such means, and methods appropriate to the nature of the question should be used. Firebaugh's (2008) contention in his seventh rule of social research to "Let method be the servant, not the master" (pp. 207-234) further supports a decision to utilise a mixed methods approach to researching this complex problem.

MMR continues to gain favour in the social sciences with definitions emerging from different researchers. The definitions range from those that focus on the mechanics of the data collection (Johnson et al., 2007) through to those that include the integration, analysis, and the leverage provided by conducting MMR (Creswell & Plano Clark, 2011). The Creswell and Plano Clark 2011 revision includes procedural information which elaborates on the core definition. Thus, this research uses Creswell and Plano Clark's (2007) preferred definition MMR;

> a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone. (p. 5)

## 3.3 Strengths and Weakness of Mixed Methods Research

Enacting an MMR methodology poses challenges for the researcher. The most pressing is the factor of time. To successfully enact MMR, the researcher needs draw on both quantitative and qualitative strategies, thus familiarity with both is essential (Leedy & Ormrod, 2015). A challenge is similarly posed when the researcher is required to combine the two methods and make sense of the ensuing data.

The advantages of an MMR methodology may outweigh the difficulties. Using an MMR approach allows the use of a variety of tools to understand these problems or questions. Multiple methods of data collection may counterbalance the weakness of one with the strengths of another (Tashakkori & Teddlie, 2003). Educational research, and this research, measures social phenomena which is complex and often nuanced. The use of more than one method, qualitative and quantitative, can provide insights that would otherwise be left absent (Creswell, 2003). Teddlie and Tashakkori (2003) state that MMR can provide answers in research where other methodologies cannot. This methodology is useful to provide theory verification using quantitative methods, and theory generation using qualitative methods (Teddlie and Tashakkori, 2003).

Table 3.1, adapted from Tashakkori and Teddlie (2003) and Johnson and Onwuegbuzie (2004), illustrates that the advantages of using MMR are many, but that difficulties are also present.

**Table 3.1**

*Advantages and Disadvantages of Using Mixed Methods Research. Adapted from Tashakkori and Teddlie (2003) and Johnson and Onwuegbuzie (2004)*

| Advantages using MMR | Disadvantages for MMR |
|---|---|
| • Can answer research questions that other methods cannot<br>• There is an opportunity for a greater diversity of views.<br>• A multiple paradigm position allows the researcher to engage as appropriate to the research.<br>• Numerical data can be used to add weight and precision to an understanding<br>• Can add understanding and insight that is not apparent with a single method only<br>• Can be used to provide complete knowledge to inform theory and practice, particularly in education. | • There is no consistent typology<br>• There are numerous designs and no consistent nomenclature<br>• Is time consuming in data collection and analysis<br>• Challenging to learn multiple methods<br>• Conflicting results may arise<br>• Conflicting paradigms and researcher bias towards one. |

Although there are difficulties illuminated in Table 3.1, Tashakkori and Teddlie (2003) state “We believe that pragmatists consider the research question to be more important than either the method they use or the worldview that is supposed to underlie the method” (p. 21).

With the adoption of a pragmatic world view, a mixed methods research methodology was selected, and considered to be suitable for this research.

## 3.4 The Research Design

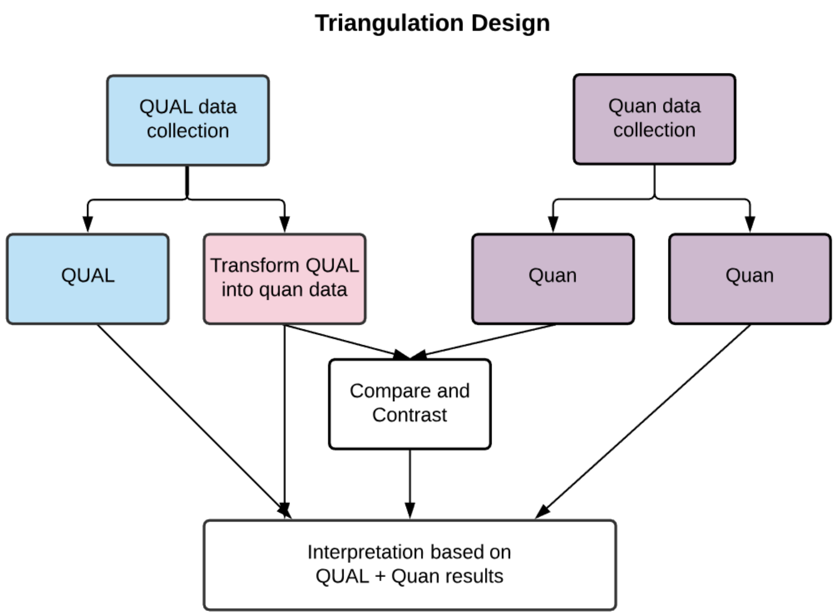
Creswell and Plano Clark (2007) describe four major MMR designs useful in the discipline of educational research. These are the Triangulation Design, the Embedded

Design, the Explanatory Design, and the Exploratory design. Each design can be enacted with quantitative and qualitative data collected sequentially or concurrently. Other researchers (Miller & Crabtree 1994, Stange et al., 1994), describe these approaches using similar, but not the same, terminology.

This MMR relied upon concurrent triangulation mixed methods (Creswell & Plano Clark, 2007, 2011). The four alternatives for a Triangulation Design are the convergence model, the data transformation model, the validating quantitative data model, and the multilevel model (Creswell & Plano Clark, 2007). Figure 3.1 presents two models of triangulation as it has been adapted to this research, the convergence model, and the data transformation model.

**Figure 3.1**

*Mixed Methods Concurrent Triangulation Design. Adapted from Creswell 2011*

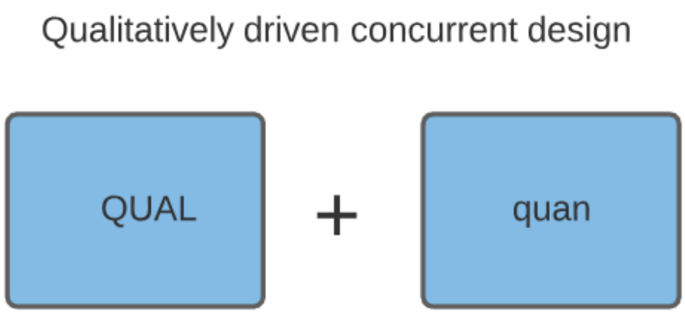



The design in Figure 3.1 fits Creswell and Plano Clark's (2007) simplest triangulation design, involving "concurrent, but separate, collection and analysis of quantitative and qualitative data" (p. 64). As each pathway will illuminate different aspects of the problem, findings from quantitative and qualitative pathways will be analysed individually and brought alongside each other (converge) at the presentation and interpretation stage to build a big picture. It also fits the Transformation model where some of the qualitative data will be transformed to quantitative data to facilitate analysis prior to the interpretation stage. Merging these two Triangulation methods ensured that the resultant picture was credible, that is, congruent with the reality experienced by participants (Merriam, 1998) and representative of the totality of the findings. This process will allow the answering of the over-arching research question that examines the appropriateness of theoretical G & T models that guide policy development.

One of the difficulties of an MMR is an inconsistent typology. Schoonenboom and Johnson (2017) recognise that creating an MMR from combining or modifying the more common designs is appropriate. This is supported by Morse and Niehaus (2009) who suggest that combinations of MMR design are created as needed. Using the notation system provided by Schoonenboom and Johnson (2017), this research design can be expressed as QUAL + quan (qualitatively driven concurrent design). This is illustrated in Figure 3.2.

**Figure 3.2**

*Research Design Using Notation System Provided by Schoonenboom and Johnson (2017)*




The capitalised QUAL indicates the core component is qualitative research with a supporting quantitative component (quan). The use of the plus symbol indicates that the collection of the two data types were simultaneous. The capitalised representations of the two data sources and their weightings are used in Figures 3.1 and 3.2

### *3.4.1 Analytic Procedures*

Analytic procedures followed a concurrent triangulated, transformative mixed methods methodology. According to Leedy and Ormrod (2015), there is no prescribed way to analyse MMR. Guest et al. (2012) suggests an integrated inductive exploratory approach using thematic analysis for the qualitative data. This type of approach to data analysis does not test a predetermined hypothesis and so differs from the counter confirmatory, or hypothesis driven, approach. The data are explored and reviewed several times using an inquiring approach looking for themes, trends, and ideas to generate primary data. The process of thematic analysis is described by Creswell (2013) and elaborated in the methods section of this chapter. As such, findings from an inductive exploratory study can subsequently be used in a confirmatory approach (Guest et al., 2012).

The qualitative data collected from the questionnaires and interviews were analysed using the described approach. However, thematic analysis requires greater interpretation from the researcher. The researcher is required to identify and describe the meanings of participant comments, not merely count, or focus on explicit language or words. This requires the researcher to have an intimate understanding of the research topic and field, to capture the nuances and complexities of the qualitative responses (Guest et al., 2012). The qualitative data were coded by interpreting the meaning of the participants' comments that lead to emergent themes. Where relevant, themes and codes were presented as numeric data to compare, contrast, or display the perceptions of the different participant groups (Guest et al., 2012).

The majority of the quantitative data was subjective quantitative data, demonstrating the reality or experiences of the participants. This cannot be measured using precise quantitative tools. For example, the instance of teachers' knowledge about provisions available, is what they believed, knew of, or chose to recognise. This does not replace objectively counting the actual provisions available but provides a perspective of what is accessible and may contribute a more intricate understanding.

## 3.5 Trustworthiness

This research strives to seek answers to questions about appropriate models for policy development and reform for G & T science students in NSW. Use of the word appropriate indicates that there will likely be multiple perspectives and fundamentally no correct answer. Sandelowski (2004) concurs that qualitative research is founded in human experience and therefore will generate knowledge from the perspective of the participant and their current or previous awareness, priorities, or values. This indicates that the findings are relevant to the researcher, the participants, or the reader which according to Creswell (2009), is one of the strengths of qualitative research. However, this does not imply that research incorporating qualitative data is not robust, methodical, rigorous, and capable of generating meaningful results. Creswell (2009) proposes using multiple strategies to enhance the accuracy and trustworthiness of the results and to provide the reader with confidence that the findings are applicable and accurate for the situation described. This research addressed the issues of trustworthiness using the following seven strategies.

### *3.5.1 Validity*

Processes are required to ensure the validity of data collected, analysis, and interpretation (Creswell & Plano, 2011). Tashakkori and Teddlie (2003) describe that words indicating validity and trustworthiness are often used interchangeably and that in the case of mixed methods research, researchers often coin their own terms to describe the processes used as they relate to their own research. Descriptive validity involves considerations to mitigate threats to the accuracy of the reported data by the researcher, including the effects of research presence, researcher bias, and respondent bias (Tashakkori & Teddlie (2003). Descriptive validity has been addressed in this research by

- Accuracy - Taking notes during the interview, and paraphrasing the participants' responses were used to ensure their perceptions were accurately received. This was captured on recordings and therefore, was available for analysis after the interview.
- Researcher bias - There were no validated instruments available to use in this research. Therefore, the questions for the questionnaires and interviews were independently assessed.
- Researcher presence – The participants were made comfortable and spoken with prior to the interview questions. Interviews were conducted in informal situations at times suitable to the participant. This put the participants at ease and allowed them to speak freely and honestly.
- Respondent bias – the questions asked were not personal or sensitive in nature. The interviews were conducted in a manner that allowed the participants to relax and respond honestly. There was no reason to withhold information.
- Respondent bias was more difficult to mitigate with the questionnaires. During the analysis it became apparent that some questions provoked social desirability bias. This will be discussed in Chapter 5.

### *3.5.2 Reliability*

This is a process by which another researcher, or the same researcher on a different occasion, would obtain the same result when analysing the data. There was an inter-coder reliability of 91% for a coded sample, whereby Miles and Huberman (1994) state an inter-coder reliability should be greater than 80%.

### *3.5.3 Triangulation*

Researchers employ multiple data sources, multiple approaches, investigators, or theories to analyse information and strengthen the credibility of the research (Creswell, 2009; Salkind, 2010; Weyers, et al. 2014). Denzin (1978) described the term triangulation as a way of combining data sources and further establishing validity by showing that independent data agree. In basic terms, this means that findings are supported by providing agreement through independent measures (Miles & Huberman, 1994). Tashakkori and Teddlie (1998) make an important point that many qualitative theorists do not triangulate as they believe there is no single experience or result to be triangulated. However, it is useful to use triangulation strategies to determine where there is convergence and then to further ask the questions why or why not? Similarly, for questions that rely on convergence of definitions amongst different groups of educators, or factual understanding, triangulation can highlight deficiencies or success in education and dissemination of information.

This research used three types of triangulation, type (MMR), methods (surveys and interviews), and source (participant groups).

### *3.5.4 Prolonged Engagement*

To readily understand the nuances in a field it is essential to spend time learning and engaging in the culture, building trust, understanding the language or jargon, and to recognise over expressed problems and the relevance to the research (Tashakkori & Teddlie, 1998). Aside from the time spent on this doctoral research, the researcher has more than 20 years of professional experience in the field of education or science holding varied roles from classroom teacher to writing and implementing new syllabuses for Science in NSW.

### *3.5.5 Presenting Negative or Discrepant Information*

When present, disconfirming quotes were included to demonstrate that divergent perspectives occurred. It is important to note that research that seeks perceptions will find multiple views that do not align (Creswell, 2009), and even when in the minority, these views still build a rich and realistic picture of the problem (Miles & Huberman, 1994). Miles and Huberman (1994) advise actively looking for disconfirming data to prevent unconscious conformational bias.

### *3.5.6 Member Checking*

Transcripts were offered to the participants for member checking (Creswell & Miller, 2000) to further establish the credibility of the qualitative data.

### *3.5.7 Clarification of Research Bias*

Included in this thesis is a narrative that reveals the early childhood background of the researcher. This narrative serves two purposes, to provide:

- an open and honest dialogue so that the reader understands how the researcher's background may have shaped the interpretation of the findings, as far back as the choice of research topic and question.
- it begins the thesis demonstrating education as a human endeavour and provides an interest point as the reader becomes familiar with the researcher as a person.

## 3.6 Evaluating Appropriateness

This doctoral research hinges on the criteria by which 'the most appropriate model' may be determined. The following criteria have emerged from both the literature review (theoretical and some practical constructs) and the research design (practical constructs relating to the nature of data that can feasibly be collected). It is probable that further specific criteria will emerge from the findings of the research. Current criteria emergent from the literature are presented (emphasis is added).

- **Suit the Australian context.** Gagné's work is from Canada, Renzulli, Piirto and Tannenbaum from the USA. Australia has not developed its own model to suit its own context, yet Australia is noted for the 'tall poppy syndrome' whereby those who are already seen to be privileged are cut down to size (Geake & Gross, 2008). An Australian model should not promulgate teachers' negative attitudes of doing more for the already privileged – rather, the model should foster the view of inclusion and achievement of maximum potential for all students, helping teachers to recognise that G & T students need different opportunities (Lassig, 2015).
- **Clarity** such that informative guidelines for implementation of the policy based on the model can be written. Currently, such guidelines are sparse in most states or outdated, as in NSW.
- **Evidence-based** as is appropriate for policy (Gallaher, 2002, 2015).

- **Defensible**, with a clear rationale for its selection over alternative models. This is not currently the case with the selection of Gagné's model in Australia.
- **Inclusive** of current achievers and under achievers (Wellisch, 2016).
- **Recognise different types of giftedness** (Renzulli, 1984).
- **Multi-domain**. The model should have the capacity to recognise and advocate for appropriate educational opportunities, provisions, and practices across domains, including science (domains have been added to and subtracted from G & T models over time).
- Perceived by Australian educators to be **feasible and practicable** for implementation at least initially with current provisions available in schools
- **Comprehensible by Australian educators.** For example, there is currently no evidence of whether Australian teachers differentiate between giftedness and talent, yet this is the foundation of Gagné's model. If this research finds they do not differentiate, then either the model is inappropriate for this context or this finding has professional development implications.
- **Promote challenging achievement in science**, not just busy work or accelerated content with inadequate pedagogy for G &T students, if the aim of encouraging them in science to pursue STEM careers is to be realised.
- **Fundable.** Although the economics of implementation is not part of this research, a model that has large funding implications cannot be deemed most appropriate for Australia's current educational system.

## 3.7 Summary

By describing a Mixed Methods methodology with merging Triangulation Designs, the contexts in which the data was collected, and the analysis methodology, future readers will be equipped to determine the transferability of the findings to their own contexts (Firestone, 1993; Lincoln & Guba, 1985). For example, although this research was conducted in NSW, an appropriate description of the research context may allow policymakers and educators in other states to determine the transferability of the findings to their context.

## 3.8 Part 1: Research Design and Methods

### *3.8.1 Ethics Approval*

Ethics application number H17REA144 was approved by the University of Southern Queensland on 4th July 2017 with an expiry 4th July 2020. This application was submitted simultaneously with the application for ethics approval to the Department of Education NSW State Education Research Applications Process (SERAP) and research repository. The approval date for SERAP application 2017220 was 7th July 2017 with expiry 7th July 2018.

An amendment to the original University of Southern Queensland (USQ) ethics application number H17REA144 was applied for and approved on 4th November with an expiry 10th November 2020. This gave ethical approval to include an additional participant group and provided an extension to the original ethics application

### *3.8.2 Framework for Data Collection and Analysis*

There were three sources of data for the research design, NSW DoE G & T policy, participant questionnaires, and semi-structured expert interviews. The research questions required the collection of both quantitative and qualitative data; for example, factual information regarding provisions, practices, and identification age of gifted children were sought using quantitative survey questions but surveys also gave participants the opportunity to respond qualitatively to questions about their experiences with gifted education. Interviews with educational experts were qualitative and provided in-depth information about policy, future educational directions, and perceptions of the current status quo. Table 3.2 demonstrates how the interrogation of the NSW DoE G & T policy, surveys, and interviews were used to answer the sub research questions in two phases.

**Table 3.2**

*Sub Research Questions and Tools used to Collect the Data*

| Question Number | Sub Research Question | Tools used to Collect the Data |
|---|---|---|
| **Phase 1** | | |
| 1 | NSW DoE policy for G & T education<br>a. How is evidence-based research used in the current NSW DoE policy for G & T education?<br>b. How has the NSW DoE policy for G & T education evolved over the past 30 years? | Policy Analysis |
| **Phase 2** | | |
| 2 | What are educators' perceptions of the appropriateness of the NSW DoE policy for G & T education? | Questionnaires, Interviews |
| 3 | School policy for G & T education<br>a. What are educators' perceptions of the appropriateness of their school policy for G & T education?<br>b. Where school policy for G & T does not exist; What is the rationale given for the absence of a policy? | Questionnaires, Interview |
| 4 | With provisions defined as resources, what provisions are available and used by each school for G & T students in the context of science? | Questionnaires, Interview |
| 5 | With practices defined as teaching strategies, what practices are enacted by individual teachers for G & T students in each school in the context of science? | Questionnaires, Interview |
| 6 | When presented with alternative models for G & T education, what are educators' perceptions of their appropriateness for science education? | Questionnaires, Interview |

Phase 1, Sub research question 1 was answered entirely using the NSW DoE policies dated from 1991 and has been presented in Chapter 1. Phase 2, Sub research questions 2, 3, 4, 5, and 6 were answered using questionnaires and the interviews with educational experts. An overall framework of how the research questions were addressed using the three sources of data is shown in Figure 3.4.

**Figure 3.3**

*Research Tools and the Process of Data Collection and Analysis*

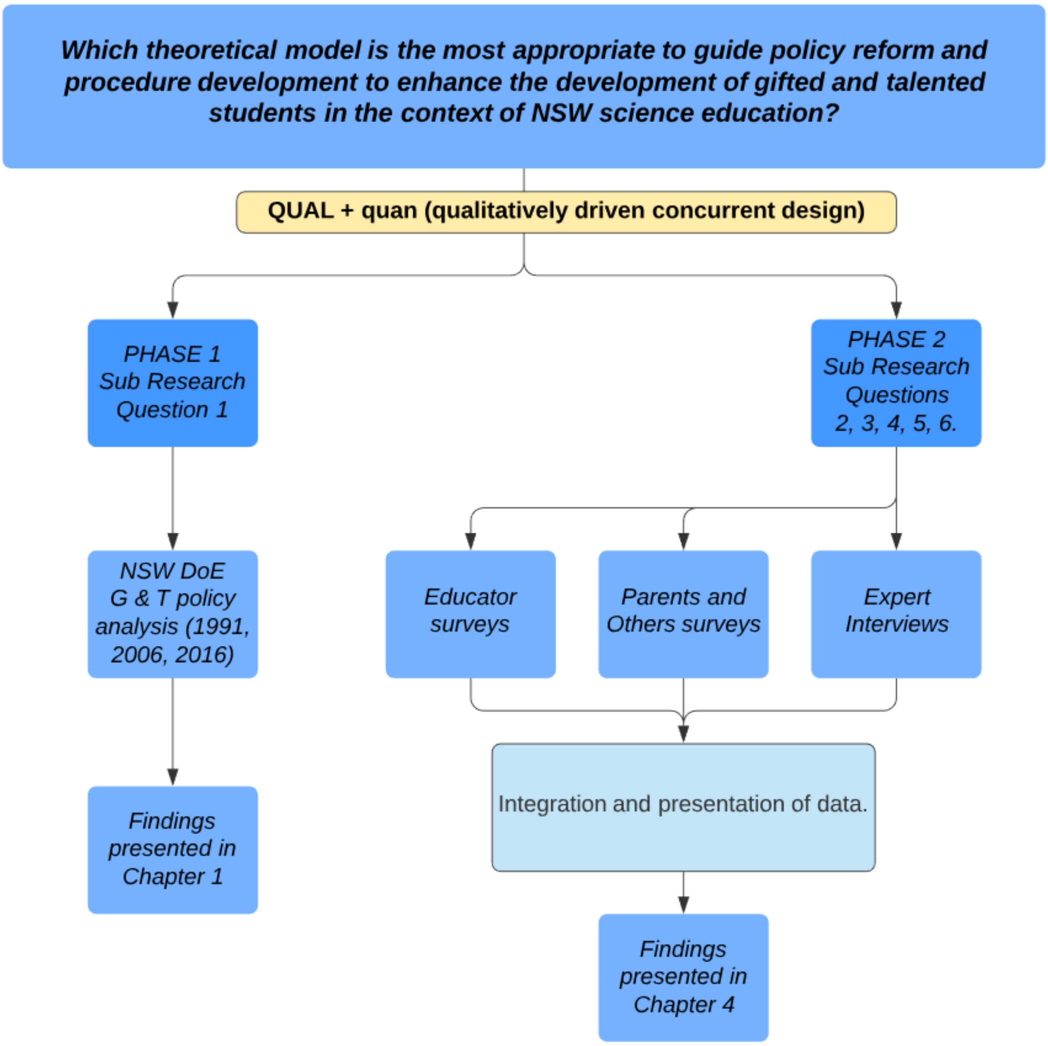



Figure 3.3 shows that three main sources of data were used; NSW DoE G & T and talented policy, targeted interviews with educators, and questionnaires. The questionnaires were further divided into questionnaires for science educators, and questionnaires for Parents. These three main tools (research instruments) will be described followed by a description of the analytical methods for each.

## 3.9 Research Instruments

### *3.9.1 NSW DoE Policy Analysis and Comparison*

Analysis and comparisons of the NSW DoE policy was a necessary task prior to asking educators' perceptions of the policy. Contents from the NSW DoE 1991, 2006, and the 2016 revision policy statements were compared and examined. The policies were compared by placing the contents statements of each policy into a column of a table and highlighting the differences. The order of the contents was not considered as important as the meaning of the statements, so the policy statements were rearranged to simplify the comparison. If there was no difference in a statement between policies it was left unhighlighted. This table can be found in Chapter 1, section 1.6, Table 1.1.

According to the literature presented in Chapter 1, Gallagher (2015) states that good educational policy documents should be specific and equitable in dividing scarce resources. He suggested four key questions about resourcing should be answered together with a clear implementation structure. These questions formed part of the interrogation of the NSW DoE policies. Similarly, detailed in Chapter 1 was that good policies should contain nine key elements, 1) title, purpose, and scope, 2) parties targeted 3) reasons for the policy 4) key definitions 5) the policy statement 6) enactment date 7) related policies, procedures, forms, guidelines, and resources, 8) history including revision dates and 9), contact information (Nakamura, 1987; Northeastern University, 2017; University of Colorado, 2018). These nine elements were paired against the current 2016 NSW DoE policy.

When merging the three key components: policy comparison, the four key questions, and the nine key elements, it was found that in almost 30 years there has been minimal change in policy content, support materials, and the approach by which G & T students are managed. In summary, there is an indication that a meaningful reform should be attended that draws from current evidence-based research and provides justification why particular theoretical models have been used to enact policy. Analysis and comparison of the NSW DoE policies from 1991, 2004, and 2016 answered Phase 1 sub research questions 1a and 1b regarding the use of current and evidence-based research and the evolution of the policies over 30 years.

### *3.9.2 Questionnaires*

Ethics approval was obtained as required before the administration of questionnaires. Volunteers were sourced from social media connections such as personal twitter connections and Facebook groups specific to science or G & T people. A pilot study was conducted in the form of an opt-in questionnaire using LimeSurvey (LimeSurvey, n.d), as required at that time by the University of Southern Queensland.

The questions, drawn from the literature, were presented in appropriate formats for online questionnaires. This included: short answer questions for open responses, multiple option questions for participants to indicate a range of answers, and 5-point Likert scales, typically used for measuring attitudes to a given subject by providing a range of responses to a particular statement or question (Gob, McCollin, & Ramalhoto, 2007). According to Johnson and Turner (2003) the use of closed-ended questions is useful to assist participants in providing answers that are relevant to the topic of research. For example, participants were asked about their awareness of the NSW DoE G & T policy. Three responses were directly pertinent to the research: The participant was not aware there was a policy, the participant was aware but knew very little about the policy, the participant was familiar with the details of the policy. However, an “Other” option was included where possible to ensure that participants were not forced into any given response and that teachers had the opportunity for their voice to be heard. Additionally, open comment provisions were included throughout to allow participants to elaborate on the posed questions or contribute other ideas.

Problems that are typically uncovered from pretesting include awkward wording, missing categories, and incorrect assumptions (Presser et al., 2004). These are seen when participants provide incomplete responses, inconsistent reporting, and selecting categories such as “I don’t know” (Presser et al., 2004).

Responses to the pilot questionnaire indicated that there were difficulties with some of the questions with respect to understanding, repetitiveness, or interpretation. The subcategories in the improved questionnaire included removal of unnecessary personal and school demographics, perspectives on appropriateness of the NSW DoE policy and school policies, available provisions for G & T science students, teaching strategies for G & T science students, and a space for other comments.

**3.9.2.1 Questionnaire Administration.** The questionnaires were administered online using Google Survey and were on average ten questions each. One questionnaire comprised eleven questions. Johnson and Turner (2003) support the use of short questionnaires and state that although brevity is one of their weaknesses, it is often necessary to ensure that participants complete the questionnaire and do not stop part way through leaving questions unanswered. Therefore, the questionnaires were purposefully kept short. The questionnaires contained minimal, if any, demographic data and therefore, participants could not be identified unless they chose to include their details in a free comments question**.**

These questionnaires were posted to the teacher Facebook groups: Science Extension Teachers NSW, Physics Teachers Australia, Investigating Science HSC for NSW teachers, Awesome NSW Science Teachers, and Chemistry Teachers Australia and to one non-teaching Facebook group, Parents of gifted children Australia.

The questions can be found in Appendix 1. They are displayed as they relate to each research question. Ad hoc questions used for clarification or conversational purposes have not been included.

Data was also collected from early questionnaires using Limesurvey, recording 15 responses. Unfortunately, the method used to recruit participants did not successfully yield adequate amounts of data. Subsequent data collection by the means described in this section was successful. Parts of these early data were used, where appropriate and relevant, alongside the teacher responses to the shorter questionnaires.

**3.9.2.2 Questionnaire Administration Strategy.** Individual questionnaires were posted in staggered intervals with each questionnaire being posted to all of the named Facebook groups at the same time. The members of the groups do overlap but there are members in one or two groups only, hence it was important to include all the groups named.

Facebook has a resource that alerts members when the same post has been shared on multiple sites that they are members of. These alerts help prevent people from accidentally answering the questionnaire more than once. However, as there was no demographics collected it was not possible to say for certain that a person answered the questionnaire once only. Given the difficulty in collecting responses as outlined earlier, it is not deemed likely that individuals would take the time to answer the same questionnaire multiple times.

Questionnaires that were posted to the Facebook group, parents of gifted children Australia were modified to suit a non-tertiary trained teacher expertise. However, monitoring other conversations that occur in this group highlighted that many of the members are parents that home school their gifted children. This reinforces the need to collect the perspectives of parents who are in fact, teachers of gifted children.

Additional questionnaires were added as themes emerged during the analysis or if data was incomplete. Incomplete data is another weakness of questionnaires and is again highlighted by Johnson and Turner (2003). Presented in Table 3.3 is an outline of the questionnaire administration strategy showing: The title of the questionnaire, participant group, number of questions in each questionnaire, number of responses received, and if the questionnaire was administered initially (Initial) or in response to data analysis (Emergent).

All participants were advised that they could withdraw from the research at any time provided that their responses could be identified. Identification would be unlikely as no personal details were collected. However, participants were given the option to provide an email address should they wish to receive information at the conclusion of this research. Reasonably, this would be the only form of identification.

**Table 3.3**

*Information About Questionnaires and Their Strategy for Administration*

| Questionnaire title | Facebook Group | No. Questions | Total Responses | Initial or Emergent |
|---|---|---|---|---|
| Short survey on your perspectives on gifted and talented science education. | Teacher groups | 6 | 36 | Initial |
| Short survey on your perspectives on gifted and talented science education (2) | Teacher groups | 9 | 46 | Initial |
| Transforming giftedness into talent | Teacher groups | 8 | 25 | Initial |
| Transforming giftedness into talent (parent survey) | Parent group | 11 | 77 | Initial |
| Educators' perspectives of provisions and practice for gifted education | Teacher groups | 10 | 12 | Emergent |
| Appropriate policy for gifted education in NSW | Parent group | 11 | 29 | Emergent |
| | | 55 | 225 | |

### *3.9.3 Interviews*

Nine Expert Educators were engaged in semi-structured interviews. See section 3.16.1 for selection criteria. Rapport was established with each participant so that they felt comfortable to describe their thoughts and options without fear of reprise or judgement (Johnson & Turner, 2003). The interviews followed what they describe as the "interview guide approach" (Johnson & Turner, 2003, p. 305). This approach uses informal conversation but does not fit a strict definition of pure qualitative research; "exploratory, inductive, unstructured, open-ended, naturalistic and free-flowing research" (Johnson & Turner, 2003. p. 297). Each participant was asked the same foundation questions, although sometimes in a different order or using slightly different words. The interviews followed a structure with predetermined questions however, this was not so rigid that it prevented participants from expressing their views about matters they wished to discuss.

Prior to the interview, the participants were given a soft copy interview pack that included the foundation interview questions, an electronic link to the 2016 NSW DoE G & T policy, consent documents, project information, Gagné's DMGT (2013), and a summary of three alternative G & T models. The alternative models were: Gardner's theory of multiple intelligences (Gardner, 1999), Munich Model of Giftedness (Heller, 2005), and Renzulli's three ring model (Renzulli, 1978).

Key considerations for the interview included:

- Prior administration of the interview pack to orientate participants to the intent of the research to facilitate their response to interview questions (Martin, 2006).
- Ethical and moral considerations regarding the nature of questions asked to minimise participants' misinterpretation or fear of recourse action (Cohen et al., 2007).
- Obtaining informed consent prior to collecting data
- Assuring confidentiality and anonymity by de-identifying data, non-disclosure of employment or educational sector, or other personal information before publishing or disclosing findings.
- When using direct quotes that may possibly suggest the participant's identification, additional written consent was obtained.
- The use of an oral interview allowed participants to verbalise their response rather than commit an answer to paper.

Some of these points will be discussed further in section 3.10 Ethics Considerations.

The interviews were recorded and partially transcribed (focusing on relevant answers and omitting pauses, asides, repeated words etc.); verbatim transcription was not required as this study was not utilising discourse analysis, in which these extra dimensions of the conversation would be relevant. Field notes taken during the interview served as a backup in case of technological failure, to reassure the participant that their responses are valued (McKay, 2006), and assist in the negotiation of meaning and shared understandings (Mack et al., 2005). Transcripts were offered to the participants for member checking (Creswell & Miller, 2000) to further establish the credibility of the qualitative data.

#### *3.9.4 Selection of Participants*

The predominant setting for this research was NSW high schools, in the context of G & T science education. The rationale for selecting high schools rather than primary schools was three-fold:

1. the high school curriculum is differentiated into clear scientific specialties, so some students may demonstrate interest and giftedness in one field over another;
2. high school science teachers are more likely to be specialists and presumably better equipped to recognise high performance in the domain and provide specialised instruction for G & T students in science than primary teachers; and
3. high school is a time of increasing independence when most students will find an increase in social contact and exposure to peer pressure. G & T students can become socially isolated as their ideas and reasoning are beyond those of their peers (Colangelo & Wood, 2015); consequently, empathetic, and effective management becomes paramount for their continued achievement (NESA, 2018b; Winner, 1996).

However, there were responses received that did not fit the preferred criteria of high school and NSW. For example, Parents' responses included information about infants and primary school children. Some of the Facebook groups selected had members who lived Australia wide, and not NSW only. These groups were chosen as single state groups were not available.

The preference was to receive responses from high school educators in NSW but the data relating to primary school students was not excluded. This was for three reasons.

1. It was not always clear if the information came from primary or high school sources without asking for demographic information. As described earlier, longer questionnaires are less likely to be completed. However, given the groups where the questionnaires were posted, is fair to say that the majority of the data was obtained from a high school perspective.
2. This research is about Science and G & T students so primary educators would have a valid perspective to offer.
3. There are primary teachers who have experience and an interest in science education. Tapping into their expertise and acknowledging their perspectives may assist with early achievement and management of G & T students of all ages.

Three distinct participants were apparent, Expert Educators, high school science teachers (Teachers), and Parents. The details of each of these groups will now be addressed.

#### *3.9.5 Expert Educators*

Educators who were experienced with G & T students, experienced science teachers, or influential educators in positions of leadership or authority were personally invited to participate in rich semi-structured interviews. Unfortunately, gaining participants for this study was not easy or straightforward. An amalgamation of convenience sampling and purposeful selection was used to recruit participants (Leedy & Ormrod, 2015). Convenience sampling makes use of those participants who are readily available and not every person in the population had the opportunity to be sampled (Leedy & Ormrod, 2015). A convenience sample is not necessarily representative of the population. However, participants were approached based on their qualifications, experience, and availability.

Nine educators agreed to participate in a semi-structured interview that each lasted between 50 minutes to one and a half hours. Seven of the experts held positions of responsibility or leadership at an educational system level or higher, two participants at a school level. Participants were from Catholic and Independent schools and educational organisations. Educators from NSW DoE schools were not available for interviews.

#### *3.9.6 School Teachers*

Volunteer participants were obtained from opt-in questionnaires distributed to member only science teacher Facebook groups: Science Extension Teachers NSW, Physics Teachers Australia, Investigating Science HSC for NSW teachers, Awesome NSW Science

Teachers, and Chemistry Teachers Australia. The questionnaires were posted to all of the Facebook groups so it is not possible to determine which responses came from which Facebook group. Table 3.4 provides details of the Facebook groups where volunteer teachers were obtained.

**Table 3.4**

*Details of Facebook Groups from Which Volunteer Responses Were Obtained*

| Facebook Group | Numbers in Group | Information Directly from the "about" Page on Each Group |
|---|---|---|
| Science Extension Teachers NSW | 965 | This group is for Science teachers in NSW who are teaching, or looking to teach, the NSW stage 6 Science Extension course. It is intended as a collaborative network for teachers to share experience and resources. For-profit promotional post will be deleted. |
| Physics Teachers Australia | 1712 | A place to ask and answer questions regarding teaching physics in Australia. Please answer the questions upon application to join group. Current high school students will not be approved by admin to join. |
| Investigating Science HSC for NSW teachers | 1576 | This group is for teachers of Investigating Science in NSW. It focuses collaboration of ideas and resources and discussion on all things relevant to the teaching of this course. |
| Awesome NSW Science Teachers | 6040 | Awesome NSW Science Teachers is a Facebook Group for NSW K-12 science teachers to discuss and share their practice. This includes primary school teachers who teach science and other subjects. |
| Chemistry Teachers Australia | 1602 | This group has been created to support Chemistry Teachers across Australia, particularly teachers working in NSW. Members can share resources, ask questions and discuss issues around learning and teaching Chemistry. |

### *3.9.7 Parents*

To provide additional rich data, and to determine if educators had similar or different perceptions from parents, short questionnaires were posted to a parents of G & T children

Facebook group. The rationale for including parents was twofold. First, as described in Chapter 1 and Chapter 2 Part 2, NSW Education Standards Authority states that strategies are collaborative and should involve parents and schools. Secondly, parents are usually, but not always, the first educators of their children. Parents are an underrepresented group in the literature and so their perceptions provide rich and compelling information from another perspective. Parents who are members of these types of groups are interested, involved, and concerned about the educational wellbeing of their G & T children. These parents may offer suggestions that provide alternative, but meaningful insights when compared to educators in a formal system.

## 3.10 Ethics Considerations

### *3.10.1 Benefits and Risks*

The first considerations were the benefits and risks to the participants. The questionnaires were distributed electronically and allowed participants to complete the questions in their own time and on their own devices, thus allowing freedom of when to participate. There were no foreseeable risks to the participants beyond their time, and those when using a computer.

Interviews were planned for completion in less than 45 minutes and participants were offered virtual interviews to provide a range of convenient times. Prior to the interview they were provided with information so that they were aware of the time commitment and what would be asked. This was to minimise discomfort or inconvenience. There were no foreseeable risks to the participants beyond their time.

The benefit to all participants was the knowledge that they would be assisting and providing information about the status quo in NSW schools and that this information may contribute to implementing a more appropriate policy for gifted and talented education. A flow on effect may include improved outcomes for gifted and talented students and their educators. This study gave participants a voice and opportunity to be heard, while remaining anonymous.

### *3.10.2 Confidentiality and Anonymity*

**3.10.2.1 General.** All participants were assured that their responses would remain confidential and that an employer, or any person outside the immediate research circle, would not have access to access to any unprocessed information, or information related to any individual school or system. Participants were encouraged to therefore answer questions as honestly as possible as there were no foreseeable ramifications for providing honest answers or answers of a sensitive nature. The questions asked were not intended to be of a sensitive nature, however, it was important to reassure participants as they may perceive their responses as such.

**3.10.2.2 Early Questionnaire.** Participants were advised that their completed questionnaire could contain details that could identify them personally as the questionnaire collected demographic information and personal facts regarding teaching experience and some participants received a unique code to access the questionnaire, which confirmed their identity. However, upon receipt by the researcher, their name was removed.

**3.10.2.3 Questionnaires.** Participants received the same confidentiality conditions as described for the initial questionnaire. However, as demographic information and personal facts were not collected, participants were given the option but were not required, to provide identifying information. There was limited possibility to unintentionally identifying any individual from any short questionnaire response.

**3.10.2.4 Interviews.** Participants were known to the researcher but were offered to be addressed and referred to by an assigned alias during the interview to protect their identity. All participants declined to use an alias. Part way through the interview, several participants specifically requested that they wished their responses to be anonymous and requested assurance for this. Given that many of the participants are in leadership positions or positions of responsibility, their roles and educational sectors were not disclosed in the findings as individuals or numbers from sectors. Any other information that may identify the participants was removed following transcription of the interviews and the recordings were destroyed.

### *3.10.3 Consent*

Completion of the questionnaires and interviews was voluntary. There was no payment or benefit to the participants other than what has been described above. A token of appreciation was provided to the interview participants that had a value of less than ten Australian dollars.

Consent for the questionnaire participation was implied. An electronic link was provided whereby the participant may choose to complete the questionnaire. There was no penalty for non-completion or incompletion.

Interview participants signed the consent form immediately prior to commencing the interview. Participants were given the opportunity to review their responses once they were transcribed and to receive a copy of their informed consent. The consent form contained their participant rights

Participants were informed that the collated, processed, and deidentified data would be used in a PhD thesis and may be published in various journals, made available to educational facilities, presented at conferences, and various other sources.

### *3.10.4 Secure Storage of Data*

Data were stored on password protected computers and could be accessed only by the researcher and the immediate supervisors. Data were collected using devices and software that were protected by passwords known only to the researcher.

Once all identifying participant information was removed then the option for the data to be accessed by other appropriate people was possible. Appropriate people included those requested to assist with the analysis or interpretation of the study results.

The USQ requires that data is stored for the retention period and as long as practically possible. After this time it will be deleted, and all traces removed from hard drives and portable drives. There were no participants that withdrew from the study but in such cases, their data would have been deleted according to USQ's deletion protocol and all identifiable information removed. When appropriate, data will be disposed of according to the General Retention and Disposal Schedule current guidelines as stipulated by USQ.

### *3.10.5 Support for Participants*

Participants were advised that support was available for any issue that may have resulted from their participation. Contacts suggested included the School Counsellor, Lifeline

Australia 13 11 14, or the Employee Assistance Program (Counselling) 1800 81 87 28. The researcher provided contact details should participants require further information or assistance as a result of participation.

### *3.10.6 Affiliations*

There were no conflicting affiliations involved with the researcher, the supervisors, the participants, or the research topic. The researcher has held the following positions during the course of the research, Teacher in an independent school, casual teacher in NSW DoE schools, Senior Curriculum Officer at NESA, and Teaching Educator at Catholic Education Diocese of Parramatta.

## 3.11 Part 2: The Analysis

### *3.11.1 Analysis of Questionnaires and Short Answer Interview Responses*

Likert scales questionnaires are a tool for measuring ordinal categorical data (Cohen et al., 2007). Responses can be collated into a rank order with some descriptive statistical analysis used to interpret responses. Measures such as the mode, median, frequency, and categorical range can be determined although it is important to note that equal intervals cannot be assumed between these ranks, and therefore measures of the mean, and standard deviation are not appropriate (Cohen et al., 2007; Gob et al., 2007; Jamieson, 2004). Comparisons were made between different participant groups i.e., Teachers versus Expert Educators. A Chi-squared test was then used to determine if the relationship between the independent variables i.e., type of educator and response to a given question was significant. For subgroup sample sizes less than five (Cohen et al., 2007), the equivalent Fisher Exact Test was applied instead of Chi-squared (Field, 2013).

### *3.11.2 Analysis Interviews and Free Response Questions*

Transcribed interviews and free response question responses are text-based but can provide rich data by counting responses or searching for meaning in phrases and longer answers. Therefore, both quantitative and qualitative analyses were used; inductive content analysis and thematic analysis. Content analysis is useful to obtain an overview of the data when there are no previous investigations into a particular problem or phenomenon (Elo & Kyngas, 2007), as it dissects written or spoken words into quantifiable categories whereby themes and patterns can be seen to emerge (Cohen et al., 2007). To obtain a richer picture, thematic analysis, a form of descriptive, interpretative qualitative analysis was also used

(Check & Schutt, 2012). This provided insight into the deeper meaning of participants' responses by analysing and presenting phrases rather than counting single words.

### *3.11.3 Inductive Content Analysis and Thematic Analysis*

The approach taken to analysing qualitative data is well described by Creswell (2013) whereby texts, images, or recordings are prepared and organised to find themes through the process of coding. Creswell (2013) also indicates that these codes can then be reduced further so that the data can be displayed as figures, graphs, or tables enabling a quantitative representation of qualitative data.

Miles and Huberman (1994) acknowledge the overwhelming challenge of analysing qualitative data, including the selective process whereby the importance placed on certain data is not always objective. They acknowledge the complexity and ambiguity in analysing words, as words do not provide meaning in and of themselves, but within the context and framework with which they were written or spoken. Dey (1993) states that qualitative researchers "learn by doing" p6., making the process intuitive and iterative. For this reason, the process of analysing qualitative data provides insight and impression that may not be captured in exclusively quantitative research (Creswell, 2013).

One option, as advised by Miles and Huberman (1994), is to begin analysis using the conceptual framework or research questions to negate the overload of data. Leedy and Ormond (2015) confirm this approach and suggest that the codes can also be derived from the literature, codes can be intuitive to the researcher, or reveal themselves as the data is perused. Leedy and Ormond (2015) provide a suggested list as a starting point and indicate that sub codes can follow on from the more major ideas. This list includes: specific topics, characteristics and attributes, actions, processes, emotions, beliefs, values, and evaluations (p. 311). This list proved useful and helped with the daunting task ahead, as it gave specific suggestions that could be purposefully adapted for this research.

### *3.11.4 The Process of Analysis*

Prior to analysis, the questionnaire and interview questions were labelled and numbered. These numbered questions were then sorted as they were applicable to answering a sub research question. Generally, the order of Phase 2 analysis was performed by sub research question. For example, all data relating to sub research question 2 was analysed before moving to the next sub research question.

The process of coding began by developing a series of start codes using one data rich question. These start codes were categorised and broken down into relevant sub codes as themes emerged from the participant responses (Leedy & Ormond, 2015). A second coder was used for inter-reliability, using the process described by Miles and Huberman (1994), giving an inter-rater reliability of 91%. Creswell (2009) terms this as an intercoder agreement (Creswell, 2009, p. 191) with Miles and Huberman (1994) suggesting that good reliability entails 80% agreement between two coders. As further questions were analysed and new codes, groups, and themes generated, samples of these were coded by a second coder to ensure continued inter coder reliability. Coding was an iterative process as new codes were generated and connections made between questions.

Each question was analysed in the same manner despite the difference in data sources, Expert Educators, Teachers, or Parents. That is, the participant comments were examined, the data collated, and then represented in thematic tables, quantitative graphs, or tables as relevant to the findings.

#### *3.11.5 Presentation of Findings*

Thematic tables were used where responses were rich, nuanced, and specific to the expertise of the participant. The participants' voices have been presented in the findings using excerpts from their responses. The responses were altered to correct spelling and grammar. Repeat statements were removed to improve readability, provided that the meaning of the response was not changed. Contractions were not altered as doing so made participant responses seem formal and stilted. If they were altered then it was believed that the authenticity of the participant voice would be lost. These examples have been termed excerpts, rather than quotes, for this reason.

Following thematic analysis, content analysis was used to provide a quantitative perspective of the qualitative data. Content analysis allows qualitative data to be presented quantitatively by presenting the content, using codes, as numbers to represent the information in tables and graphs. This gives the reader an instant view or snap shot without having to read a lot of text (Leedy & Ormond, 2015). Participant groups were examined individually, as a whole group, and compared to each other. First, the number of codes or individual comments in each theme were counted. Comments and codes were equally weighted, including the inferred emphasis sometimes found in words and punctuation within the response. If one participant's comment appeared particularly strong and another was a passing remark, they were both counted as one, that is, there was no weighting applied to comments based on position in the statement, apparent interpreted strength or belief, or ability to coherently express themselves. Graphs were chosen to best represent the data as percentages or as absolute numbers. This was dependent on the number of relevant responses received, particularly when making comparisons between participant groups.

Meticulous records were kept for all coding decisions, analysis decisions, and presentation of relevant findings. Cross checking and strategical discussions occurred regularly throughout the process with supervisors and other professional people. Microsoft Excel, and office 365 software, were used to organise, sort, and display the data and resultant codes. Lucid Charts was used to create Venn diagrams and some figures.

Chapter 4 will now present the findings of Phase 2.

# 4 CHAPTER 4: FINDINGS PHASE 2

Chapter 4 presents the data collected for the Phase 2 sub research questions 2, 3, 4, 5, and 6. Phase 1 sub-research Question 1 was presented in Chapter 1 as previously described.

This chapter will move sequentially through the research questions presenting the data as it is relevant to answering the questions. The research questions were answered from a number of different Aspects which are introduced at the start of each section. Boxed assertions will be used to indicate the critical findings. Where appropriate, hypothesis will be presented in the same manner.

## 4.1 Sub Research Question 2 - What are Educators' Perceptions of the Appropriateness of the NSW DoE Policy for G & T Education?

This question was answered by using data collected from Expert Educators' interview responses, and responses from Teacher questionnaires. This appeared to be a relatively straight forward question but it was answered in a variety of ways and surprisingly rich data was obtained across a variety of different aspects. These aspects came from asking direct questions of participants to understand if there was a general consensus about definitions of gifted and talented people. It was also important to establish awareness and familiarity with the NSW DoE policy prior to asking their perceptions. Aspects contributing to answering sub research question 2 were

2A. Separation of the terms gifted and talented
2B. Definitions of G & T students
2C. Familiarity with NSW DoE G & T policy
2D. Perceptions of the NSW DoE G & T policy
2E. Perceptions regarding the necessity for a state policy
2F. Characteristics of a good policy

2G. Expert Educators' thoughts about the use of Gagné's Model for G & T education in NSW

2H. Expert Educators' perceptions regarding the general emerging broader educational policies to provide direction for G & T students

#### *4.1.1 Aspect 2A - Separation of the Terms Gifted and Talented*

Expert Educators and Teachers were asked to provide definitions in their own words for their understanding of the terms Gifted and Talented. Each comment was assessed as to whether the participant separated the terms gifted and talented or used them as a single term. The written responses given by teachers to SQ2 indicated that only seven out of 34 participants separated gifted and talented. Of the Expert Educators' responses, five out of eight separated gifted and talented and one was unsure. Although the responses were not always in line with Gagné's definitions as used in the NSW DoE policy, these were still counted if the respondents acknowledged that being gifted is separate from being talented. This information is presented in Table 4.1.

**Table 4.1**

*How Expert Educators and Teachers use the Terms Gifted and Talented*

| Separates Gifted and Talented | Yes | No | Total |
|---|---|---|---|
| Experts | 5 | 4 | 9 |
| Teachers | 7 | 27 | 34 |
| Fisher Exact Test Statistic 0.088. Not significant at $p < .05$. | | | |

A Fisher Exact Test was performed using an online calculator as described in Chapter 3. Although Expert Educators demonstrated that they separate the terms gifted and talented more often than Teachers in this study, the result is not statistically significant with $p = 0.088$ Therefore, the two participant groups do not differ in their separation of these terms. A sample of the responses from each participant group are displayed in Table 4.2, this demonstrates separating and not separating the terms gifted and talented.

**Table 4.2**

*Key Examples of How Teachers and Expert Educators Combine or Separate the Terms Gifted and Talented*

| **Participant group** | **Comment** | **Separates G & T (Y or N)** |
|---|---|---|
| Teachers | *Someone who is naturally born with the ability to think creatively and logically beyond their years is gifted. Someone who is talented has the capacity to demonstrate the learning and high-level proficiency of a skill such as music, art, singing, dancing.* | Yes |
| Teachers | *Students who are able to use higher order thinking skills to make connections and produce results that a large majority of students would not be able to realise.* | No |
| Expert Educators | *I've worked with a lot of talented people in lots of different fields, um but gifted, like, I suppose I have seen people develop their talents over long periods of time and that sort of stuff but I've never really run across a person who understands things without any experience. And I don't know if that's what gifted is but you know I keep thinking it's the person who just walks up and can play the piano or the person who looks at a maths question and goes, wouldn't you just do that. There's sort of like, I haven't really come across that, um, whereas I have worked with lots and lots of talented people who are amazing but you can see what their development to that point has been. So, I don't really have a solid definition of what gifted is.* | Yes |
| Expert Educators | *Gifted and talented is those students who have a really good understanding, background understanding, even without lots of education can understand concepts quite well. They don't necessarily have to have gotten their formal education for them to be at the same level as other students might be, I would say gifted and talented students who if are directed or guided the right way can achieve quite a bit in their subjects and in my case this is science.* | No |

This question proved challenging to analyse as even those who separated the terms gifted and talented did not always do so succinctly or obviously. The first Expert Educator response presented in Table 4.2 is an example of this. At the end of the response the Expert Educator stated that they did not have a "solid definition". Most teachers do not separate the terms gifted and talented but slightly more than half of the Expert Educators do.

*Assertion 1*

*Educators do not separate the terms gifted and talented when providing definitions.*

### *4.1.2 Aspect 2B – Definitions of G & T Students*

This part of the research sought to understand who teachers believed to be the G & T students. By asking for definitions in their own words, the respondents had the chance to elaborate and explain rather than be influenced by selecting from predetermined definitions. Expert Educators' responses fit into three themes: Ability/Capability, Performance, or Other. Teachers' responses fit into the same themes with an additional theme, Characteristics. An explanation of each theme is presented in Table 4.3. Findings that represent the emergent themes are displayed in Tables 4.4 and 4.5.

**Table 4.3**

*Explanation of the Meaning of the Themes from Educators' Definitions of G & T*

| Theme | Explanation of meaning |
|---|---|
| Ability/Capability | Ability/capability is defined as the potential for performance. This can be likened to Gagné's definition of gifted. |
| Performance | Performance is the measured and witnessed activity by an individual. This can be likened to Gagné's definition of Talent. |
| Characteristics | Characteristics are attributes that may contribute to ability/capability or performance, but are not directly either. They include traits such as motivation, perseverance, creativity. This can be likened to the characteristics found in the literature or to Renzulli's Task Commitment or Creativity. Other characteristics include empathy, or socially aware. |
| Other | Other was the theme that contained comments that did not have enough numbers of comments to create a theme and those comments who did not fit into one of the other described themes. They included clarifying comments and were included as educators further elaborated on their understanding of defining a gifted and or talented person. |

**Table 4.4**

*Themes Present in Teachers' Definitions of Gifted and Talented*

| Theme and Summary | Excerpts |
|---|---|
| **Ability/Capability**<br>Some Teachers recognised that gifted is the potential for high achievement that is superior to peers, or an ability to understand what others find difficult.<br>Few, acknowledged the difference between being gifted and talented in a similar way to Gagné's definitions. Teachers acknowledged that ability could be in or more areas of learning.<br>The last excerpt example shows ability and performance separately. It recognises the developmental process | • *Gifted is having a natural ability to succeed (and exceed the expected level for their level of education) in an area, which may be small or large. Talented is being bright but working hard to be above the standard level of their peers. This tends to be wider ranging.*<br>• *Above average abilities and able to easily understand ideas that others find difficult*<br>• *A student with understanding and interest in an area of learning that far exceeds their peers*<br>• *Talent = gifted + work. Talent is developed* |
| **Characteristics**<br>Characteristics noted by teachers other than that related to ability included: curious and interested, empathetic, love learning, motivated, leaders, persistent, socially aware, and risk takers. Several teachers mentioned that gifted students had a high IQ.<br>IQ was included in the theme characteristics when mentioned separate from ability. | • *Displays a higher ability to perform a particular task or tasks, may be academically very able, highly emotional showing empathy, very skilful at a particular task or tasks, highly socially aware and able to lead and/or be able to converse in many different ways...etc.*<br>• *Students who can not only achieve good academic results but who are creative and curious, willing to take risks and seek out new challenges with perseverance.*<br>• *A student with a high IQ or who is exceptional in one or more areas* |
| **Performance**<br>Teachers commented on application of knowledge, measurement by tests, demonstration of proficiencies or mastery, and displays of high-level critical thinking and problem-solving strategies. Some comments fitted both ability and performance | • *Gifted is measured by different tests, some relating to IQ. Many students who are gifted don't perform well in schools and go undetected. Students tend to be talented in particular areas such as science, math, art, sport, etc.*<br>• *The individual is understanding, processing and most importantly applying concepts far above the state/school/national benchmark.*<br>• *Born with ability and harnessed through perseverance in a specific area of skill* |
| **Other**<br>These comments were generally clarifying. | • *An outstanding - well above average - strength in a given area, innate or developed.*<br>• *Gifted is measured by different tests, some relating to IQ. Many students who are gifted don't perform well in schools and go undetected. Students tend to be talented in particular areas such as science, math, art, sport, etc.* |

**Table 4.5**

*Themes Present in Expert Educators' Definitions of Gifted and Talented*

| Theme and Summary | Excerpts |
|---|---|
| **Ability/Capability**<br>Expert Educators were generally succinct in describing the potential of gifted students. They provided this part of a definition and then moved to explain using comments about performance and the development process.<br>One participant indicated that everyone is gifted in some area. | • *I've worked with a lot of talented people in lots of different fields but gifted, I suppose I have seen people develop their talents over long periods of time and that sort of stuff but I've never really run across a person who understands things without any experience.*<br>• *In my mind a gifted child is one who can have exceptional abilities in one or more areas of the various intelligences, or the various schooling domains. A talented child is one who displays that across multiple areas.*<br>• *I have a belief that everyone is gifted and talented in one way it's just that they're not discovered because we've got a very narrow band of assessment of what gifts are.* |
| **Performance**<br>Expert Educators had phrases related performance more often than they did phrases about ability. However, this was due to elaborations on how performance allows giftedness to be seen. Phrases relating to critical thinking, complex thinking strategies, and application of knowledge at an outstanding level were common understandings.<br>Expert Educators recognised that performance needs to be measured and our educational system does not always do this well. | • *I don't know if this is what gifted is but I keep thinking it's the person who just walks up and can play the piano or the person who looks at a maths question and thinks, wouldn't you just do that.*<br>• *Gifted and talented is those students who have a really good understanding, background understanding, even without lots of education can understand concepts quite well.*<br>• *They think outside the 9 dots, and are able to apply their knowledge at an outstanding level higher than their chronological age.*<br>• *….. but it's not measured in the HSC or in an English exam, or a maths exam, or geography exam.* |
| **Other**<br>Most of the Expert Educators' responses had phrases comments that fit into this category, Other. Possibly because there was the opportunity to elaborate on their definitions and to qualify their response. They also had the opportunity to be heard and to comment on their frustrations or perceived limitations for progressing G & T education. | • *One of the limitations when you have the general classroom is that the Gifted and talented is always the hardest part to actually, 1. Identify, and 2. Progress because your time is spent so much at the other end and that has also been one of the key focuses of a lot of Principals. They want to raise the lower end.*<br>• *I don't really have a solid definition of what gifted is.*<br>• *In primary school I would consider it to be over and number of different disciplines and in high school I would consider you can still be (gifted and talented) in one discipline but maybe not in in a few others. (i.e. domain specific)* |

There were no confirming or disconfirming excerpts to present as this question sought to understand how educators personally define gifted and talented students.

As displayed in Tables 4.4 and 4.5 the responses by Expert Educators and Teachers were divided into themes with some example excerpts provided. Expert Educators did not generally describe the characteristics of gifted or talented people but mentioned aspects of ability or performance. Three themes were present in their responses, ability, performance and other. The theme other was generally clarifying, explanatory, or general comments. The comments were counted in each theme displayed in tables. Table 4.6 shows the absolute number of comments in each of the themes.

**Table 4.6**

*Absolute Numbers of Comments in Each Theme for Definitions of Gifted and Talented by Participant Group, Expert Educators (N=9) and Teachers (N=34)*

| Theme | Expert Educators | Teachers |
|---|---|---|
| Ability capability | 11 | 32 |
| Characteristics | 0 | 13 |
| Performance | 14 | 38 |
| Other | 14 | 7 |
| Total | 39 | 90 |

Expert Educators and Teachers use similar language to describe or define gifted and talented students. Although, as described, Expert Educators are more likely to separate the terms. The prevalence of terms and sentences that fit into the defined themes was not significantly different. Some participants used more than one term/sentence per theme as seen by the overall comment numbers in Table 4.6. The prevalence of comments in ability and performance although performance was mentioned slightly more than ability.

| |
|---|
| *Assertion 2*<br>*Educators have familiarity with the terms, phrases, and/or language that is found in the literature about G & T students.* |

| |
|---|
| *Assertion 3*<br>*There is no consensus for definitions of the terms G & T* |

### *4.1.3 Aspect 2C - Familiarity with NSW DoE G & T Policy*

**4.1.3.1 Expert Educators.** Expert Educators were asked about their awareness and familiarity with the NSW DoE policy for G & T students. Nine Expert Educators gave free open-ended responses in an interview. Figure 4.1 shows the reported familiarity of Expert Educators with the NSW DoE G & T policy displayed as a percentage**.**

**Figure 4.1**

*Expert Educators Awareness of the NSW DoE G & T Policy (N=9)*

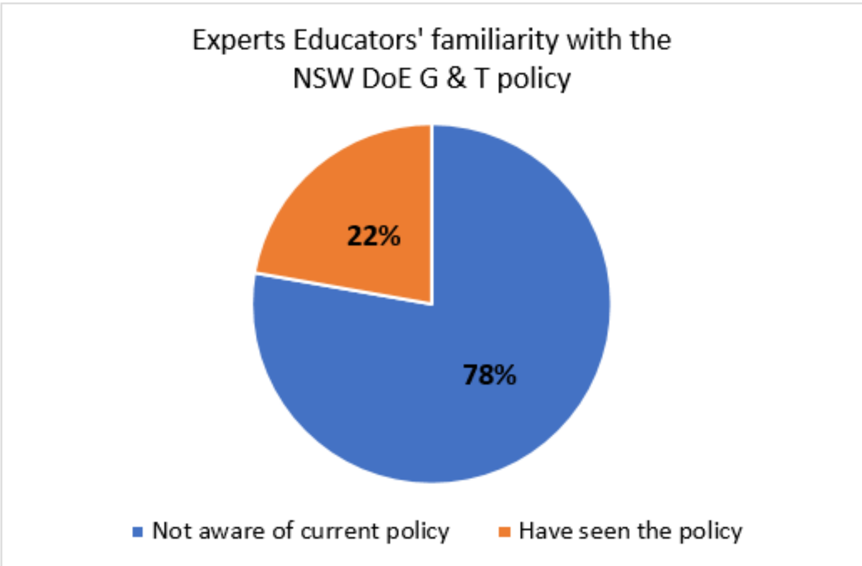



Figure 4.1 shows that most (78%, *N*=7) Expert Educators were not aware there was a NSW DoE policy. If they indicated that they had seen this policy (22%, *N*=2), they were not

familiar with the details. In the responses, some Expert Educators clearly stated “No”, while others qualified their lack of awareness with comments that were less definite but still indicated that they were not familiar. A sample comment from one Expert Educator is provided. To maintain confidentiality and anonymity, the sector where Expert Educators are employed is not disclosed. However, at the time of this research none were employed by NSW DoE. See section 3.14.4 for a full description of the participants.

**Interviewer -** *Prior to the pre-reading that I gave to you, how familiar were you with the NSW Department of Education gifted and talented policy?*

**Expert Educator** – *I wasn’t. I knew of it and that's really all there was to it. I hadn’t read it I hadn’t really looked at but it I knew it existed. I knew that as teachers we should be doing something with gifted and talented kids but I have never read it.*

**4.1.3.2 Teachers.** Teachers were given four multiple choice options, including an option “other” to indicate their awareness and familiarity with the NSW DoE policy. These options were: I am familiar with the policy, I am aware of a gifted and talented policy but not familiar with the details, I am not aware of a gifted and talented policy, and Other. There were 36 responses received. Of these responses, 15 were from the NSW DoE, four were from Catholic NSW teachers, 12 from Independent Schools NSW teachers, and five who identified as Other. The overall responses are displayed in Figure 4.2.

In addition to the online Teacher questionnaire, 12 responses were added from the initial questionnaire as described in Part 1 of Chapter 3. These responses were from Catholic NSW school teachers increasing the number of responses to 16 and overall number to 48.

Figure 4.2 shows that 62% (*N*= 30) of teachers are aware of the NSW DoE G & T policy but only 33% (*N*=16) of these are familiar with the details. 38% (*N*=18) of teachers were not aware of an NSW DoE G & T policy. The familiarity with the NSW DoE G & T policy is displayed by educational sector in Figure 4.3, Figure 4.4, Figure 4.5, and Figure 4.6.

**Figure 4.2**

*Teachers' Familiarity with the NSW DoE Policy Displayed by Percentage, All Sectors (N=48)*

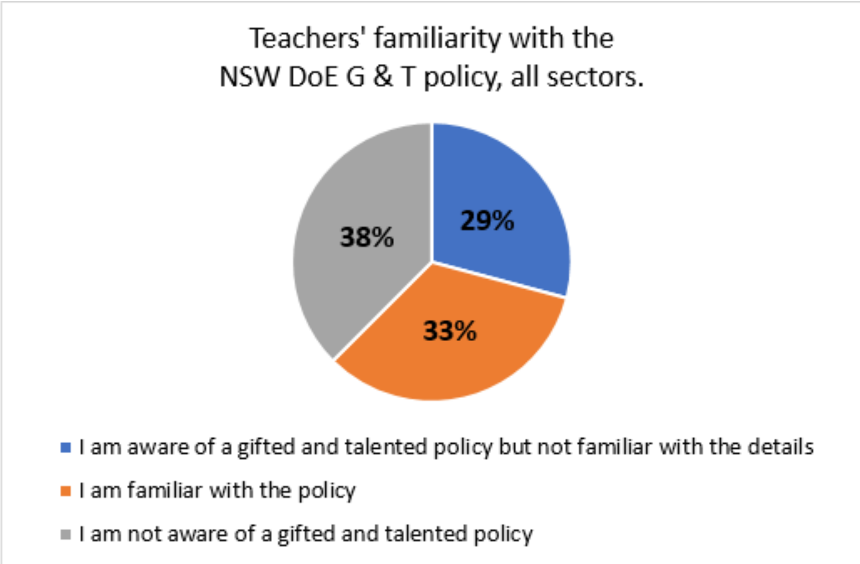



**Figure 4.3**

*NSW DoE Teachers' Familiarity with the NSW DoE Policy Displayed by Percentage, All Sectors (N=15)*

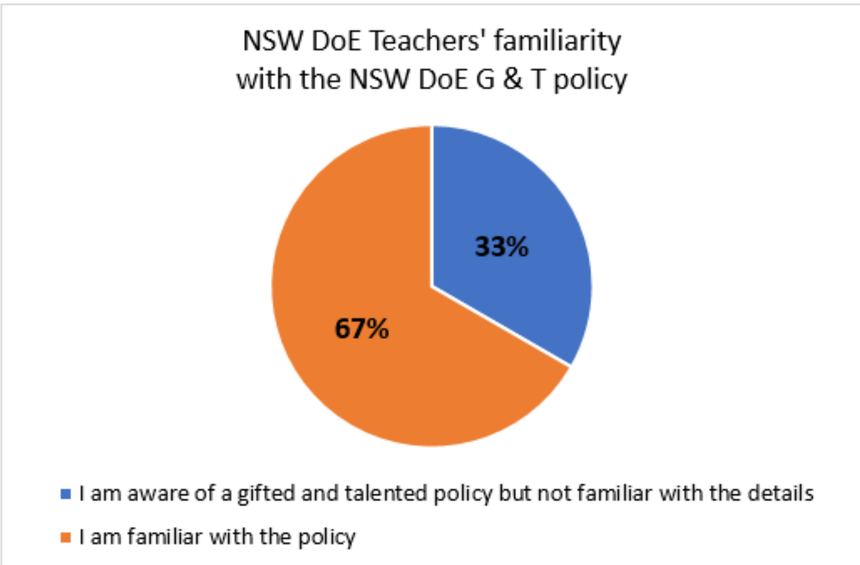


**Figure 4.4**

*Catholic (CEO) Teachers' Familiarity with the NSW DoE Policy Displayed by Percentage, All Sectors (N=16)*

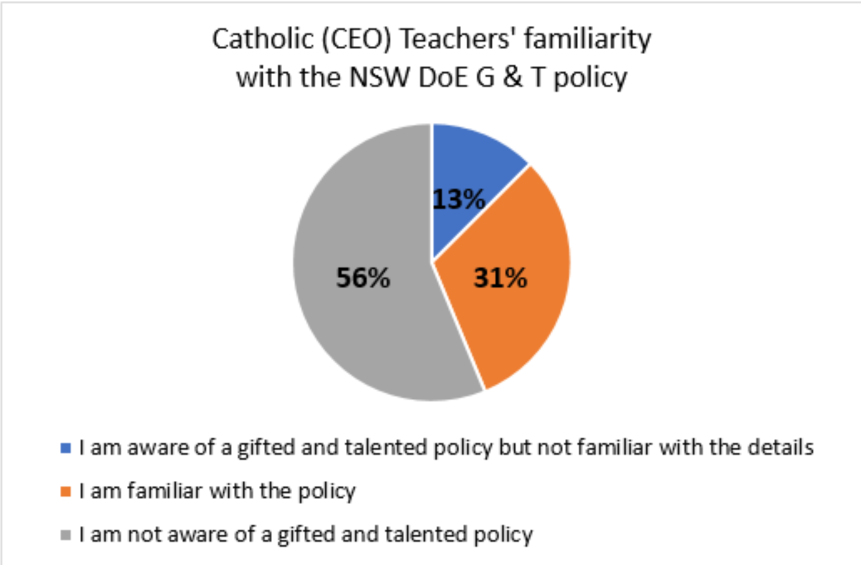



**Figure 4.5**

*Independent Schools NSW Teachers' Familiarity with the NSW DoE Policy Displayed by Percentage, All Sectors (N=12)*

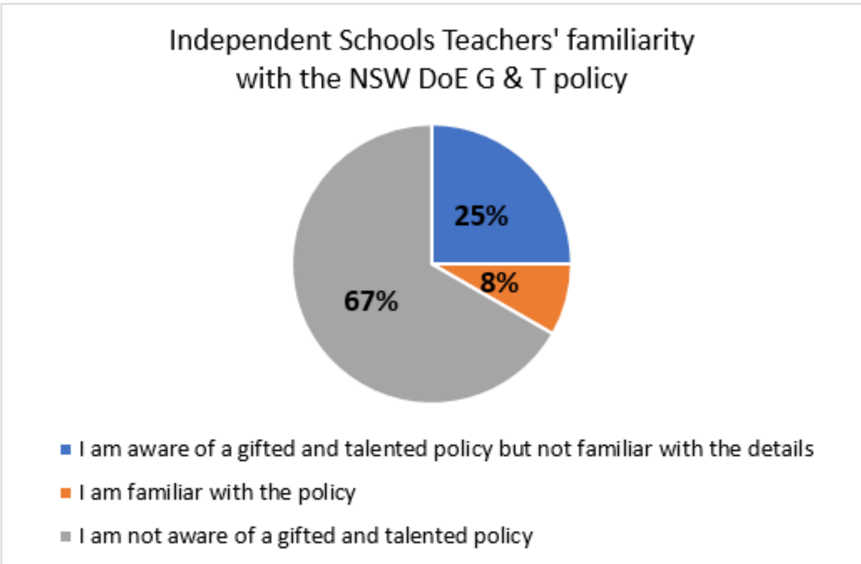
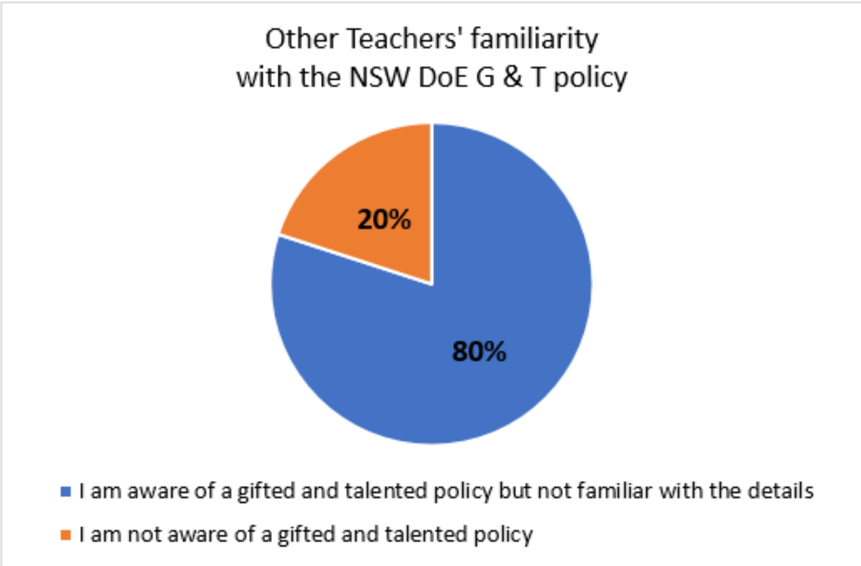


**Figure 4.6**

*Teachers' Who Identified as Other, Familiarity With the NSW DoE Policy Displayed by Percentage, All Sectors (N=5)*




Generalisability of the results is difficult due to limited sampling. However, from these data NSW DoE teachers are the most familiar with the NSW DoE G & T policy reporting 100% awareness of the policy and 67% (*N*=10) familiarity (Figure 4.3). Independent School NSW teachers were the least aware of the policy with 33% (*N*=4) awareness and 8% (*N*=1) familiarity (Figure 4.5). Most of the Independent School NSW teachers surveyed, 67% (*N*=8), report not being aware of the NSW DoE policy. Catholic NSW teachers are more familiar with the policy than Independent Schools NSW teachers but not as familiar as the NSW DoE teachers.

Teachers who did not specify a sector have been included for completeness but were not treated as a separate group. The absolute numbers have been displayed in Table 4.7.

**Table 4.7**

*Absolute Numbers of Teachers and Their Reporting of Familiarity and Awareness with the NSW DoE G & T Policy*

| Sector | Familiar with G & T Policy | Aware of G & T Policy but Not Familiar | Not Aware of NSW DoE G & T Policy |
|---|---|---|---|
| NSW DoE | 10 | 5 | 0 |
| Catholic (CEO) NSW | 5 | 2 | 9 |
| Independent Schools NSW | 1 | 3 | 8 |
| Not Specified | 0 | 4 | 1 |
| Total | 16 | 14 | 18 |

**4.1.3.3 Statistical Significance of Aspect C.** The data obtained from Expert Educators and Teachers regarding their awareness of the NSW DoE G & T policy was collated and organised into two categories for the responses: Aware of the NSW DoE G & T policy or Not aware of the policy. Although some educators reported that they were familiar with the policy it was not possible to rank or assign a value to their familiarity, hence, the most accurate reporting for subsequent statistical analysis was either the educator knew of the policy or they did not. A Fisher exact test calculator for a 2 x 2 contingency table was used to calculate the significance of these findings with respect to the independence of the variables, the participant group or teaching sector. For example, the test was applied between NSW DoE and all other sectors or Catholic (CEO) and all other sectors. Tables 4.8, 4.9, and 4.10 provide calculations from the Fisher Exact Tests.

**Table 4.8**

*Fisher Exact 2 x 2 Contingency Test for Independence of Awareness of NSW DoE G & T Policy Between One Sector and the Others*

| Sector | Aware of the NSW DoE G & T Policy | Not Aware of the NSW DoE G & T Policy | Fisher Exact Test Compared with All Sectors |
|---|---|---|---|
| NSW DoE teachers compared to teachers from all other sectors combined | 15 | 0 | The Fisher exact test statistic value is 0.0002. The result is significant at $p < .05$. |
| Catholic (CEO) teachers compared to teachers from all other sectors combined | 7 | 9 | The Fisher exact test statistic value is 0.116. The result is *not* significant at $p < .05$. |
| Independent Schools NSW teachers compared to teachers from all other sectors combined | 4 | 8 | The Fisher exact test statistic value is 0.0357. The result is significant at $p < .05$. |
| Not Specified | 4 | 1 | N/A |
| Total | 30 | 18 | |

**Table 4.9**

*Fisher Exact 2 x 2 Contingency Test for Independence of Awareness of NSW DoE G & T Policy between Expert Educators and Teachers*

| Participant Group | Aware of the NSW DoE G & T Policy | Not Aware of the NSW DoE G & T Policy | Fisher Exact Test |
|---|---|---|---|
| Expert Educators | 2 | 7 | The Fisher Exact Test statistic value is 0.0629. The result is *not* significant at $p < .05$. |
| Teachers | 29 | 18 | |
| Total | 31 | 25 | |

**Table 4.10**

*Fisher Exact 2 x 2 Contingency Test for Independence of Awareness of NSW DoE G & T Policy Between Individual Sectors*

| Sector | Fisher Exact Test |
|---|---|
| Catholic (CEO) and NSW DoE | The Fisher Exact test statistic value is 0.0008. The result is significant at $p < .05$. |
| Catholic (CEO) and Independent Schools NSW | The Fisher Exact test statistic value is 0.7047. The result is *not* significant at $p < .05$. |
| NSW DoE and Independent Schools NSW | The Fisher Exact test statistic value is 0.0002. The result is significant at $p < .05$. |

Statistical tests were used to determine if there were differences in awareness of the NSW DoE G & T policy between the teachers from the different school sectors. Again, it was not possible to establish the level of familiarity reported so the two categories "aware of" and "not aware of" the NSW DoE G & T policy were used. These tests were performed in two ways one school sector compared with the other two combined, and then between the sectors individually. This gave rise to six combinations. NSW DoE teachers were statistically more likely more to be aware of the NSW DoE policy than teachers from the other sectors combined ($p <.05$) and individually ($p < .05$). Independent school teachers were less likely to be aware of the NSW G & T policy than teachers from the other sectors combined ($p < .05$) and NSW DoE teachers ($p < .05$), but not Catholic school teachers. Of the NSW DoE teachers ($N$=15), 100% were aware of the policy, while only 33% ($N$=12) and 44% ($N$=16) of Independent and Catholic teachers respectively, were aware.

**4.1.3.4 Interpreting the Fisher Exact Test Statistics.** A Fisher exact test calculates the independence of the categorical variables (awareness of policy) and the groups (NSW DoE and all other sectors). If the responses of the categorical variables are similar over the groups then they are independent. That is, the responses received are equally likely from either group. In Table 4.10 this is presented in red text, as it is not significant. If the categorical variable responses can be attributed to the group then the result is considered significant and is presented in blue text. That is, a response from an Independent Schools NSW teacher will be different from that of all the other Teachers.

**Summary**

1. NSW DoE Teachers are statistically ($p < .05$) more likely to be aware of the NSW DoE G & T policy than, Catholic (CEO) teachers, Independent Schools NSW teachers and in all other sectors combined.
2. Catholic (CEO) teachers will statistically ($p < .05$) have the same awareness of the policy as Independent Schools NSW teachers, and Teachers from all other sectors combined, but statistically less likely to be aware of the NSW DoE G & T policy as NSW DoE teachers.
3. Independent School NSW teachers will statistically ($p < .05$) be less likely to be aware of the NSW DoE G & T policy than NSW DoE Teachers, and Teachers from all other sectors combined but will statistically have the same awareness as Catholic (CEO) Teachers.
4. There is no statistical difference in the awareness of the NSW DoE G & T policy between Expert Educators and Teachers.

*Assertion 4*

*NSW DoE teachers more likely to be aware of the NSW DoE G & T policy than teachers from other sectors.*

*Assertion 5*

*Independent Schools NSW teachers are less likely to be aware of the NSW DoE policy than teachers from other sectors.*

### *4.1.4 Aspect 2D - Perceptions of the NSW DoE G & T Policy*

Previous findings showed that most (78%) of the Expert Educators were not familiar with the NSW DoE G & T policy. Therefore, they were given a copy and time to examine it prior to being asked their opinion of the policy. Six Expert Educators responded to this question, and another three responded but not directly. There were 38 separate comments from eight responses.

Responses from Teachers (*N*=13) came from the initial questionnaire as described in Part 1, Chapter 3. An electronic link was provided to the NSW DoE G & T policy for those who were not familiar with the policy. There were 26 separate comments from 13 responses.

The overall emergent themes from both participant groups were similar. These themes were Directives, Definitions and needs, Lacking, Qualities, Questions, Constraints, and Other. The teachers had an additional theme, Constraints.

The responses were later divided into comments that were positive, negative, or neutral. If a question was asked this was considered neutral. Thematic and content analysis will be presented in the next two sub-sections.

**4.1.4.1 Expert Educators' perceptions of the NSW DoE G & T Policy.** The emergent themes from the responses from Expert Educators were Directives, Definitions and needs, Lacking, Other, Qualities, and Questions. A summary of the findings and sample excerpts within the themes are provided in Table 4.11.

**Table 4.11**

*Expert Educators' Perceptions of the NSW DoE G & T Policy by Themes*

| Theme and Summary | Excerpts |
|---|---|
| **Directives**<br>Directives indicate what Expert Educators perceived to be an order or directive within the policy.<br>Four of the eight participants felt that the policy was a series of directives and responsibilities with little regard for those who implement the policy or who the policy is for. It was stated that listing responsibilities does not progress things.<br>Two Expert Educators said the policy was not worth having (Excerpts 2 and 4).<br>All comments about directives were negative. | • *..school communities should do something about gifted and talented that it should be more locally based. I think that that sort of makes sense but it doesn't really progress things beyond what you would expect to be normal.*<br>• *It just says this is what the responsibilities are, it doesn't just say anything about what the policy is. The policy is useless, sorry.*<br>• *As I looked through it, it's a whole lot of directives, there's not a lot of next steps. As I was saying to you earlier it has that hierarchical top-down directive. This is the policy you need to implement this GET ON IT!!!*<br>• *I've seen it. It tells people we are doing something when we're not. It puts all the responsibility, on the school and the teacher. It's all about what the responsibilities are. There is very little about how it's done and they leave that for the school to implement.*<br>• *If schools ring people such as me with questions, I don't need to have an answer. I could just say that's the school's responsibility.* |
| **Definitions and needs**<br>Four of the Eight Expert Educators indicated that the policy did not define G & T well. The definitions were noted to be too broad or unclear.<br>Participants felt that the needs of G & T were not met through the policy. However, it was noted that it was good that there was a policy.<br>All comments about definitions and needs were negative. | • *It doesn't go very far in terms of defining in terms of gifted and talented, does it?*<br>• *You're responsible for identifying gifted and talented, how's that assessable? How do we draw that conclusion?*<br>• *It's pretty broad in saying it is someone who displays "potential distinctly beyond the average for students age and comes as a broad range of abilities" (reading off policy) it's such a subjective statement that is open to interpretation.*<br>• *I think it is fairly simplistic (The policy). When it is referring here (Gagné's diagram) to what gifted and talented is think this diagram has more detail.*<br>• *but it doesn't actually address anything about what is gifted and talented and how you can use the policy*<br>• *and somebody wrote a policy because you have to have a policy so it satisfies the needs of the department not the needs of the kids.* |
| **Lacking**<br>Lacking indicated that there is not enough information to understand how the policy should be used. It was noted that there is a lack of procedures, next steps and meaningful direction.<br>Participants also commented that the policy will not allow progress for G & T because it is lacking substance and is simplistic.<br>All comments about Lacking were negative. | • *There is a lack of procedures that should accompany a policy. There should be information about how you intend to carry out the policy.*<br>• *It's all about what the responsibilities are but there is very little about how it's done*<br>• *It is very public service isn't it? It seems to be a fair bit of verbiage but not really saying all that much of any use.* |
| | • *It is very public service isn't it?* |

| | |
|---|---|
| **Qualities**<br><br>Qualities describe the features of the policy. Some of the comments here were embedded within other comments about other aspects. Descriptions about qualities were all negative either directly or implied. Examples of implied meaning are provided in Excerpts 1, 2, and 3).<br><br>All comments about Qualities were negative. | • *...it's waffle, it's eduspeak, it's compliance, ticks the boxes...*<br>• *I think just by looking at it, it's too complex, it's a system's approach, in a name - useless and is another document written by bureaucracy...*<br>• *I think it's skinny* |
| **Questions raised by participants**<br><br>All questions were considered neutral. Three genuine questions were asked, rather than questions to make a point | **Paraphrased for clarity**<br>• How are the directives assessable?<br>• How do we identify gifted students?<br>• What are the differentiated activities mentioned? |
| **Other**<br><br>Other comments were general remarks that did not fit into one of the themes but there were not enough similar remarks to create a new theme.<br><br>Some of the comments here were embedded within comments about other aspects. There were four comments, three negative, and one positive (Excerpt 1). | • *I like that there is something that acknowledges gifted and talented. That's a policy that's actually written.*<br>• *So, the policy allows the public authority to be irresponsible.*<br>• *....another document written by bureaucracy that is satisfying its own needs and not really the needs of the gifted and talented kids or their parents.* |

Expert Educators' comments about the policy were mostly negative (89%) suggesting that they were dissatisfied with aspects of the policy, this is displayed in Figure 4.7. These comments displayed in Figure 4.8 by theme and comment type, positive, negative, or neutral.

**Figure 4.7**

*Expert Educators' (N=9) Perceptions of the NSW DoE Policy by Comment type. Type Refers to Positive, Negative, or Neutral*

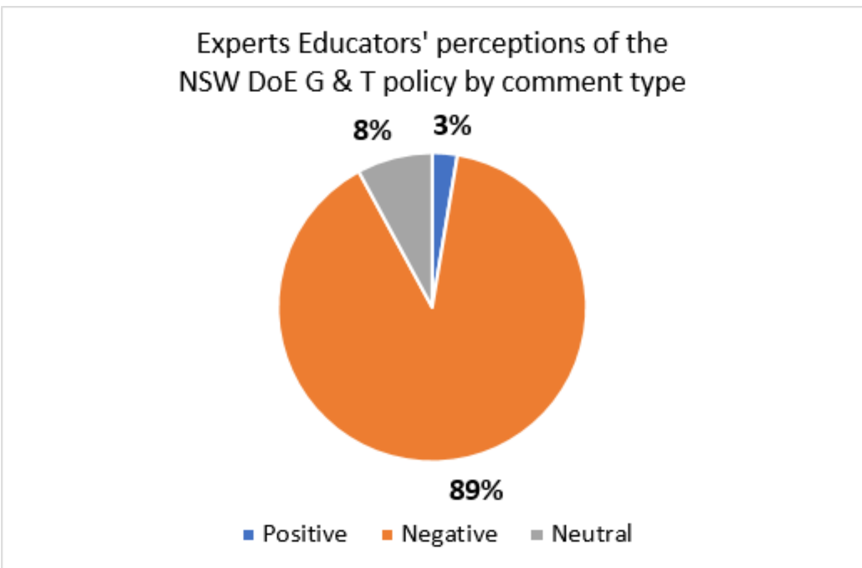


**Figure 4.8**

*Expert Educators' (N=9) Perceptions of the NSW DoE Policy by Theme and Comment Type. Type Refers to Positive, Negative, or Neutral*

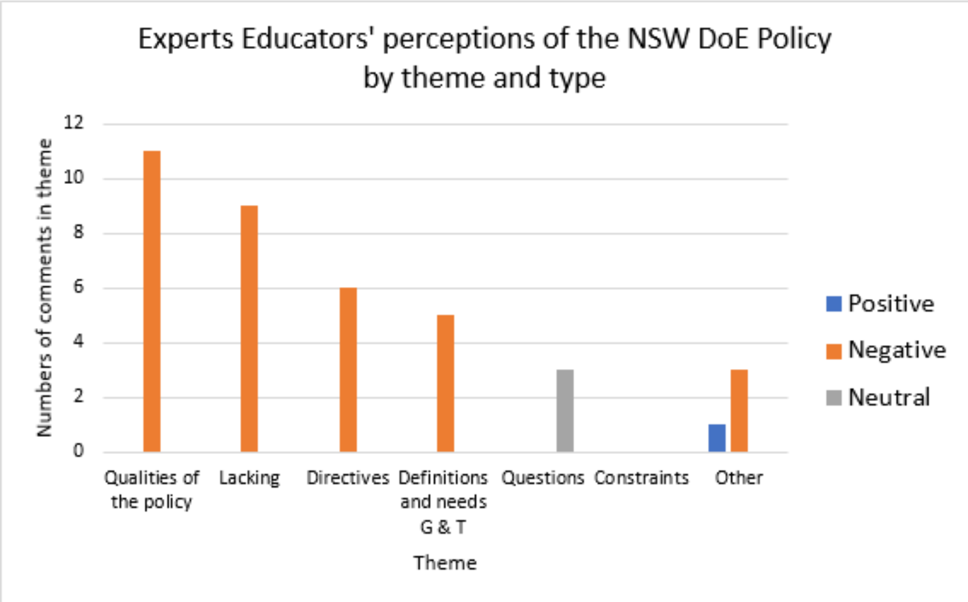



Figure 4.8 shows that Expert Educators are most dissatisfied with the qualities of the policy and secondly take issue with what they believe is lacking. Five comments from the nine Expert Educators were negative regarding the definitions for and needs of G & T in the NSW DoE policy. There was only one positive comment about the policy. Example excepts are presented in Table 4.11. The theme "Constraints" was emergent from Teachers' responses and therefore, has been included in this graph. Teachers responses are presented in section 4.1.4.2.

**4.1.4.2 Teachers Perceptions of the NSW DoE G & T Policy.** Teachers (*N*=13) were asked using a questionnaire, what they perceived to be the strengths and limitations of the NSW DoE G & T policy, and what would they like to see included. The responses were more succinct and less conversational than those from the Expert Educators, most likely due to the method for asking the question. Teachers' responses are presented in Table 4.12.

**Table 4.12**

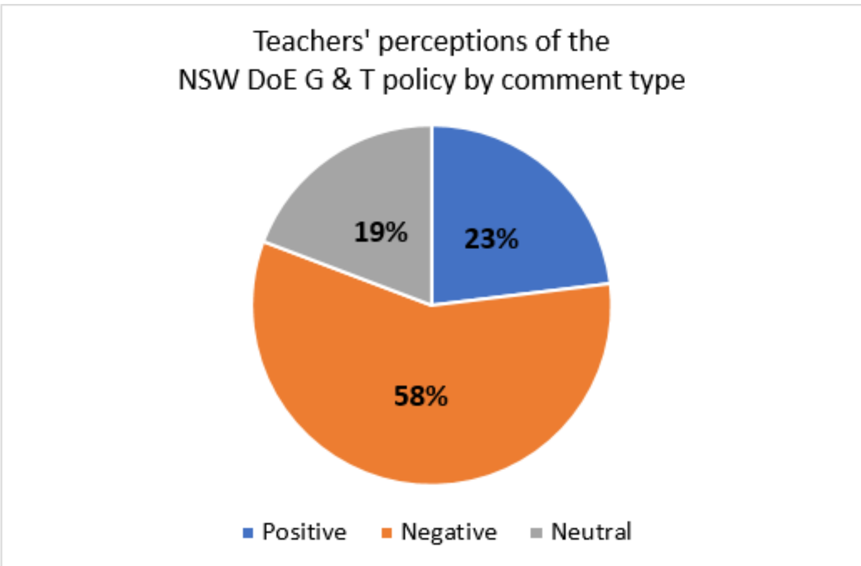
*Teachers' Perceptions of the NSW DoE G & T Policy by Themes*

| Theme and Summary | Excerpts |
|---|---|
| **Constraints**<br>Teachers comment on the constraints of implementing another policy. They highlighted four key points; Teachers are too time poor to implement policy, there is not enough support from other stakeholders, the policy relies on expertise to identify gifted students and that expertise is not provided.<br>All comments in the theme constraints were negative | • *The emphasis is on the teachers and does not incorporate all aspects of life.*<br>• *limitations - potential logistics of coordinating with other teachers - were all time poor*<br>• *Teachers have to identify students who are gifted and talented- ensuring that teachers know what gifted and talented students look like vs just intelligent or smart students*<br>• *Not enough support from parents, teachers and executives...including DET (NSW DoE) officers.....*<br>• *It exists and outlines what can be done. It relies on an expertise in recognising gifts and talents. This expertise is rarely provided.*<br>• *If this is the responsibility, mainly, of classroom teachers it won't get done as we already have too much to do* |
| **Directives**<br>Directives indicate what Teachers perceived to be an order or directive within the policy.<br>Teachers commented that the responsibility falls on teachers for implementing and identifying the students. Words like "have to" or<br>Notably in the constraints they state they do not have the expertise or support to implement the directives.<br>All comments in the theme directives were negative | • *Limitations - Responsibility to extend students and provide them with challenging and engaging tasks.*<br>• *Teachers have to identify students who are gifted and talented- ensuring that teachers know what gifted and talented students look like Vs just intelligent or smart students* |
| **Lacking**<br>Teachers believe that the policy omits areas of giftedness while being vague on how to carry out the responsibility.<br>A noted limitation to the policy is that it requires demonstratable performance by the student before being implemented.<br>All comments in the theme lacking were negative | • *However, its vague as to how teachers will carry out that responsibility completely and the specific programs, monitoring, reporting and professional development limitations/requirements that need to be made.*<br>• *There is however a limitation in that the recognition of gifted and talented requires that the student demonstrates their abilities as being above the "average" for their age.* |
| **Qualities**<br>Teachers' comments were positive and negative in almost equal proportions. Negative comments included that the policy was simplistic, overwhelming, and not specific. | • *Simply worded, really doesn't have any substance*<br>• *Benefits are that it seems to guarantee provision for all students and is inclusive of students with disabilities as well, which often goes hand in hand.* |

| | |
|---|---|
| They recognise that the policy allows teachers to acknowledge gifted students, cater for them, allows for extension and acknowledges twice exceptional.<br>Qualities were marginally more positive than negative | |
| **Questions**<br>Teachers asked two questions. Questions were considered neutral | **Paraphrased for clarity**<br>• What defines a gifted student?<br>• In what areas are students gifted (according to the policy)? |
| **Other**<br>Other comments were general remarks that did not fit into one of the themes but there were not enough similar remarks to create a new theme.<br>Some of the comments here were embedded within comments about other aspects.<br>Comments included suggestions for an overseeing body. | • *Allowing schools to find G&T students, excelling students.*<br>• *It is aimed at identifying students who are gifted in all educational aspects, both in and out of school*<br>• *why isn't there a local DET rep monitoring???*<br>• *Benefits - Time/ability/experience/PD provided for the teacher so they are able to meet the needs of these identified students* |

**Figure 4.9**

*Teachers' (N=13) Perceptions of the NSW DoE Policy by Comment Type. Type Refers to Positive, Negative, or Neutral*




Slightly more than half (58%) of the comments from Teachers' about the NSW DoE G & T policy were negative. Teachers were more positive than Expert Educators about the policy, providing 23% positive comments. The Teachers' comments are displayed by theme and comment type, positive, negative, or neutral in Figure 4.9.

Figure 4.10 shows that Teachers are most dissatisfied with constraints around the policy and second most with the policy written as a series of directives. Unlike the Expert Educators, Teachers commented positively about the qualities of the policy. There were also positive comments in the Other category. Figure 4.11 provides a comparison between the perceptions of Expert Educators and Teachers.

**Figure 4.10**

*Teachers' (N=13) Perceptions of the NSW DoE Policy by Theme and Comment type. Type Referring to Positive, Negative, or Neutral*

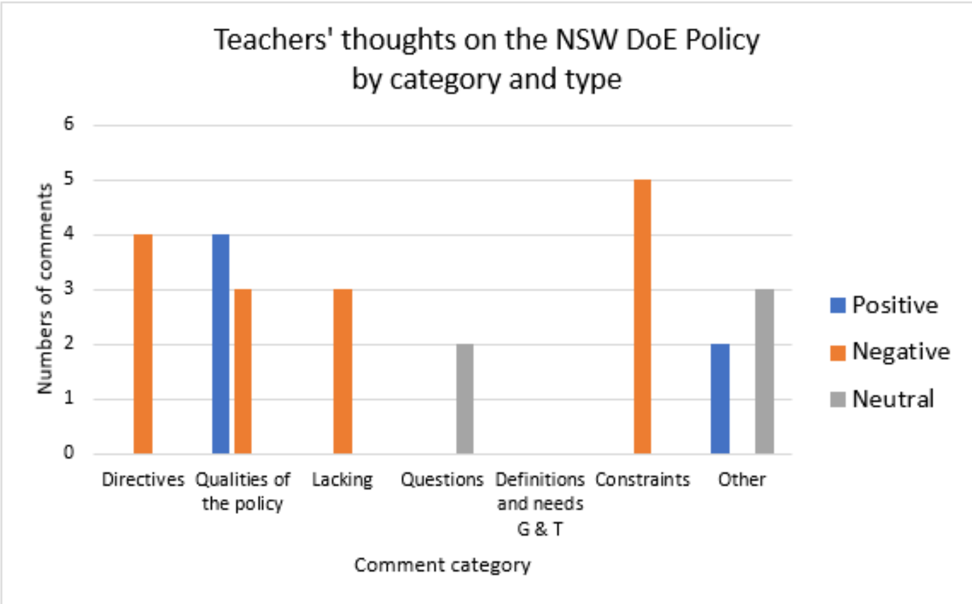
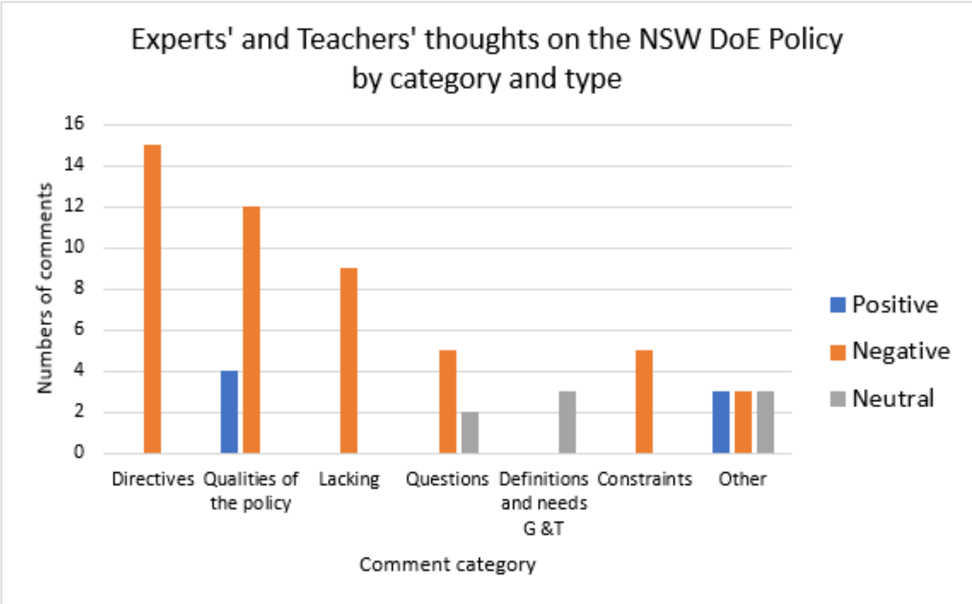


**Figure 4.11**

*Expert Educators' (N=6) and Teachers' (N=13) Perceptions of the NSW DoE Policy by Theme and Comment type. Type Referring to Positive, Negative, or Neutral*




| |
|---|
| *Assertion 6*<br><br>*When presented with the NSW DoE G &T policy, educators are generally negative about the policy. Directives within the policy were the greatest source of negativity. Teachers believe that it is too difficult to implement the policy (constraints) due to competing interests.* |

### *4.1.5 Aspect 2E - Perceptions for the Necessity for a State Policy.*

Expert Educators gave their nuanced perspectives so comments were all individual. All stated (100%, *N*=9) that there was a necessity for a state G & T policy and three directly stated that a policy for G & T would shift the focus from the bottom end and minimum standards. The codes based on their responses could be categorised into three major themes. These were: comments on the qualities of a good policy, why a G & T state policy is needed, and comments about the difficulties of having a policy. Some of the difficulties were targeted at a state policy while others were about general policy. Why a state G & T policy is necessary and difficulties of implementing the policy are presented in Table 4.13. In this instance a bullet list is provided as there are many nuanced viewpoints which are summaries of the responses provided from the Expert Educators. The findings for the qualities of a good policy will be presented alongside the Teachers' perceived qualities of a good policy in Table 4.15.

**Table 4.13**

*Expert Educators' Reasons for the requirements of a State G & T policy and Perceived Implementation Difficulties*

| Summary | Excerpts |
|---|---|
| **Reasons given for why a state G & T policy is necessary**<br>• The only discussion is at the top end is the HSC<br>• A guideline is useful so schools and educational groups so they see gifted education as important.<br>• A policy would achieve consistency across Principals (even in the same school)<br>• A policy would be useful to help frame up why we do things (at a system level)<br>• A policy would explain why we are choosing strategies<br>• A policy/statement would help crystallise for people what other documents are meant to do<br>• A state policy would close the gaps between schools for G & T students<br>• A state policy would ensure aspects are implemented correctly<br>• Currently it is up to individual teachers<br>• Fair and equitable is in the current policy. We need to therefore provide more resources at the top end.<br>• Guidelines are good for those who are involved in the delivery<br>• If we do not have a policy G&T can be stultified through misunderstanding them.<br>• Minimum standards are the current focus<br>• We do a lot of work for the bottom end<br>• We need an overarching intent to develop our next generation of scientists<br>• A policy would shift some of the focus from bottom end and minimum standards | *It is useful because for people who are involved in the delivery, it's good to have guidelines. I think they need to be fairly clear, particularly in terms the sorts of things that might be provided. I know from my experience it's very much up to the individual student needs. When you have a group of individuals what you provide for them needs to be determined by what they know, what they want to know, and how they work. I think that having a guideline may well provide opportunities to provide that sort of thing. If you don't have the guideline then a whole lot of schools and educational groups are not going to think that it's important enough.*<br><br>*Yes!! one that's workable, common sense, and doable in schools, in the classroom.*<br><br>*I feel it is definitely necessary especially if everyone knows about it and it is being implemented correctly. It could mean that G & T students at any school, it wouldn't matter what school, would be pushed as they were meant to be. So, I think a state initiative would be good, it is just making sure it is implemented by every school would be important.*<br><br>*We do a lot of work in the pedagogies and support that are aimed at supporting, students at the lower end of that spectrum. It makes sense to, absolutely, but is the way that the system setup and schooling is setup. We will we need to provide more resources at the top end as well.* |
| **Stated difficulties for implementing a G & T policy including a state policy**<br>• It may be difficult to implement in every school<br>• Normal teachers may not take notice of policies<br>• Teachers fear G & T<br>• Teachers fear the work for G & T as the work for the bottom end is too much.<br>• Teachers are too time poor for G & T | *I think that teachers are very scared of it after last 5 or 6 years. They've been pushed around what they are doing for the bottom end students. There are a lot of policies and implementation factors there. They have to scaffold for the bottom and kids and it is a lot more work. I think teachers are scared that if this comes in for the Gifted and talented students as well then, their work is going to increase beyond anything that is capable for them to manage long term. It is very difficult to keep going and manage.* |

*Assertion 7*

*One hundred percent (100%) of Expert Educators state that it is necessary to have a state G & T policy for education.*

*Assertion 8*

*Expert Educators acknowledge teachers' time constraints in implementing a state*

*G & T policy, particularly given the current focus and significant work required at the lower end.*

**4.1.5.1 Teachers Perceptions of Necessity for State Policy.** Teachers were asked using an online questionnaire whether it is necessary to have a state G & T policy for Education. A total of 46 responses were received from NSW DoE (*N*=25), Catholic (CEO) NSW (*N*=7), Independent Schools NSW (*N*=12), and not specified (*N*=2). Figures 4.12, 4.13, 4.14 and 4.15 show the perceptions of Teachers from all sectors, Catholic (CEO) Teachers, NSW DoE Teachers, and Independent Schools NSW Teachers respectively.

**Figure 4.12**

*Teachers from All Sectors (N=46) Beliefs that a State G & T Policy for Education is Required*

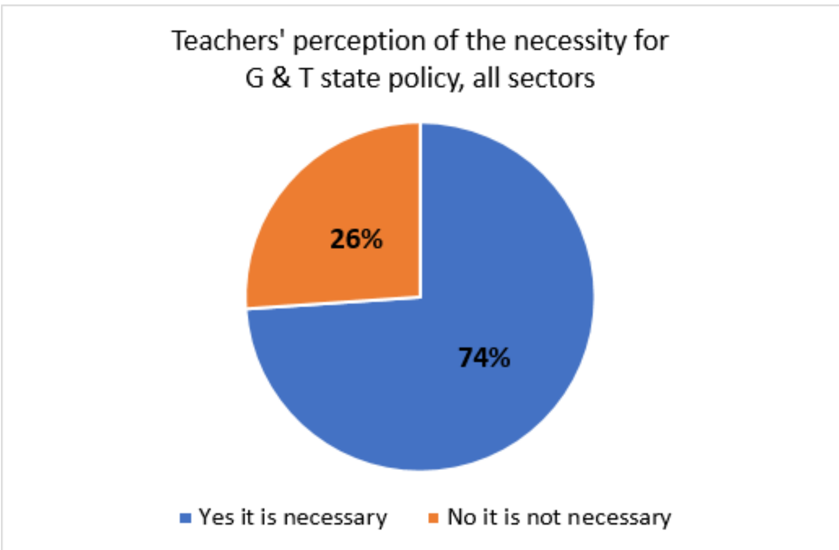


**Figure 4.13**

*Catholic (CEO) NSW Teachers' (N=7) Belief that a State G & T Policy for Education is Required*

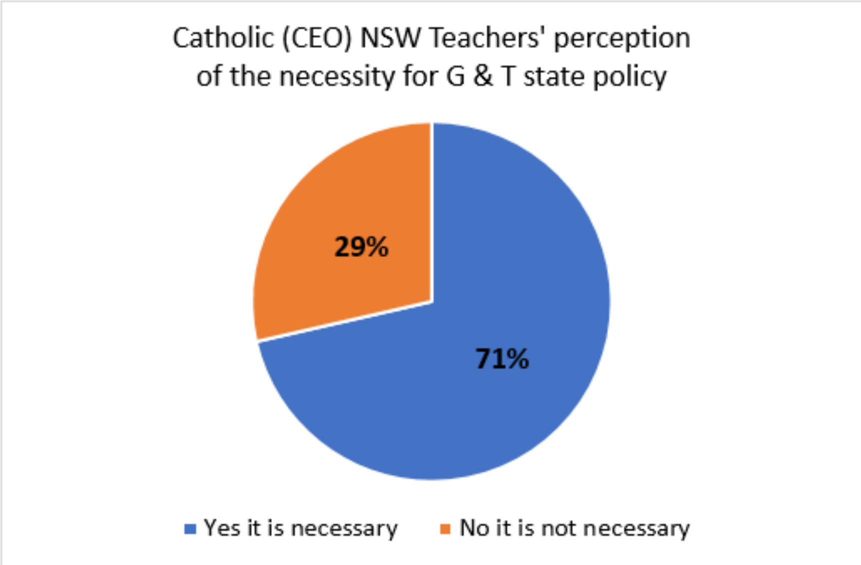



**Figure 4.14**

*NSW DoE Teachers' (N=25) Belief that a State G & T Policy for Education is Required*

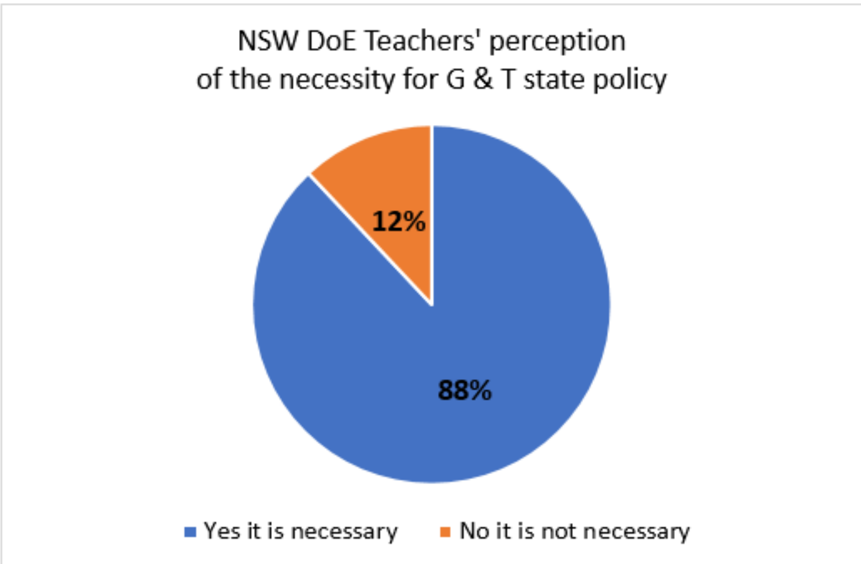


**Figure 4.15**

*Independent Schools NSW Teachers' (N=12) Belief that a State G & T Policy for Education is Required*

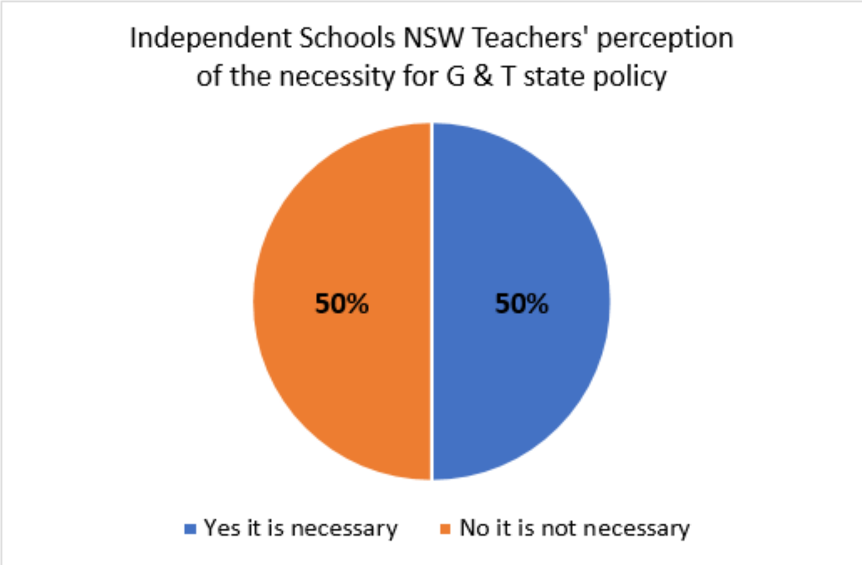



**Table 4.14**

*Teachers' Belief by Sector that a State G & T Policy is Necessary*

| Sector | Necessity for State Policy Response | |
|---|---|---|
| | **Yes** | **No** |
| Catholic CEO NSW | 5 | 2 |
| NSW DoE | 22 | 3 |
| Independent Schools NSW | 6 | 6 |
| Totals | 33 | 11 |
| NSW DoE vs Independent Schools - Fisher's exact test, significant at p = .0355 | | |

The numbers of responses per sector have been tabulated for clarity prior to reporting the results from Fisher's Exact tests (2 x 2 contingency table). Table 4.14 presents the absolute numbers.

These findings indicate that the teachers from the different sectors, NSW DoE, Catholic (CEO) NSW, and Independent Schools NSW differ in their belief that a state G & T policy is necessary. NSW DoE vs Independent School teachers (p = .0355.). Teachers from NSW DoE are significantly more likely to believe that a state G & T policy is necessary. The other Fisher Exact Tests calculated no significant difference.

There were no comments received from the Teachers who responded "no it is not necessary". However, some participants provided clarification for the response "Yes, it is necessary". Sample comments are provided from the Teacher Questionnaires.

**Questionnaire Excerpts - Teachers**

- *If there is no state policy then it may not happen across all schools*
- *This should include the definition of G & T to be used in this context.*
- *I feel it is considered already in differentiating learning, but only those teachers conscious of the needs of gifted students will cater to this.*

*Assertion 9*

*There is no consensus across sectors as to the necessity for a state G & T policy (p = .0457).*

### *4.1.6 Aspect 2F - Characteristics of a Good Policy*

The initial questionnaire asked teachers (*N*=15) what they would like to see included in the NSW DoE policy. Expert Educators (*N*=9) were asked their thoughts about the NSW DoE G & T policy and from these, the characteristics of a good policy emerged. Table 4.15 presents the comments from educators about their beliefs on the characteristics of a good policy displayed to show where they are in alignment with their characteristics. Comments were not identical between Expert Educators and Teachers but many were similar in meaning. They have been presented side by side for comparison.

**Table 4.15**

*Characteristics of a Good Policy - Comparison of Expert Educators' and Teachers' Opinions*

| Expert Educators | Teachers |
|---|---|
| • A policy should be understandable by all (parents, teachers, students) | |
| • A policy should be explicit | • More substance |
| • Policy needs to be clear on what is provided | • Policy should indicate specific provision of time<br>• Policy should indicate specific provisions of resources<br>• Policy should include training for teachers in identification<br>• Policy should include Support for teachers in the classroom |
| • Policy should be research based | |
| • A state policy should have clear expectations<br>• At minimum there needs to be checks and balances<br>• A policy should have clear responsibility for who does what | • Policy should indicate specific reporting and monitoring proformas<br>• Policy should indicate specific accountability measures |
| • Regular evaluation is important in a policy | |
| • Autonomy is important in a policy | |
| • A policy should put student wellbeing at the centre<br>• Student feedback is important in policy | • Policy should include support for G & T Students<br>• Policy should indicate specific funding for G & T |
| • The current policy doesn't say anything about G&T.<br>• A state policy would have to be a lot better | • Clearer definitions of G & T<br>• Policy should have clearer identification processes |
| • A policy should be implemented from the margins of what a learner is rather than from a mythical middle | |
| • Flexibility to cater for individual regions is important in a policy | |

**Interviewer -** *Do you feel it is necessary to have a specific state policy addressing the needs of gifted and talented students, including those in science?*

**Expert Educator** - *It would need to have clear expectations of what a policy should have in it. Clear responsibilities for who does what, minimalistic checks and balances but also feedback from students, constant evaluation of the policy and how it is working. There would need to be a lot of autonomy built into the policy that allows the schools the flexibility to interpret it in their context because Coonabarabran with Aboriginal kids is going to have very different kids to Aloysius Milsons Point. So, a minimalist policy that is flexible and real.*

*When a teacher or parent looks at it, it is in plain English. Explicit to what needs to be done, putting the child's wellbeing at the centre of the policy and my quote that you should use "is a policy that is implemented from the margins of what a learner is rather than from a mythical middle".*

*Assertion 10*

*Expert Educators and Teachers agree about the characteristics of what would make a good policy for G & T education. Expert Educators are more inclined to describe these characteristics broadly whereas Teachers are more specific about the requirements.*

### *4.1.7 Aspect 2G - Expert Educators Thoughts About the Use of Gagné's Model for G & T Education in NSW*

Expert Educators (*N*=9) were asked their thoughts and opinions of the use of Gagné's Model for G & T education in NSW. Three themes were emergent from their responses: 1. Positive aspects of Gagné's model, 2. Negative aspects Gagné's model, and 3. General comments about models. Table 4.16 provides comments and a summary of each of these themes with example excerpts included.

**Table 4.16**

*Expert Educators' Thoughts and Opinions of the Use of Gagné's Model for G & T Education in NSW*

| Theme and Summary | Excerpts |
|---|---|
| **Positive aspects of Gagné's Model**<br>• Gagné's model is clear and concise<br>• Gagné's model is more useful than the policy document<br>• Gagné's visual model is more detailed than the policy<br>• Gagné's model identifies the catalysts to move from gifted to displaying talent<br>• There is a lot that comes into gifted to talented - the model shows this<br>• What is the point of being gifted if you do not do anything about it - useful in the model?<br>• Gagné's definitions are useful<br>• Gagné's definitions link with my thinking of G & T<br>• Gagné's model is a good guideline to start | • *I certainly find this a lot more useful than the policy document because it does explain and give examples of what you'd actually be looking for in a clear and concise way. I think that's quite good. I'm not sure what the chance thing is and how that all works. but in The actual definitions, I think that is very useful. The interactions, I don't know. I find that one person's visualisation of things can be useful but often doesn't fit what everyone else or other individuals think.*<br>• *When it is referring here to what gifted and talented is think this diagram has more detail and it's also talking about obviously the transfer from one to the other.*<br>• *They talk about natural abilities and then giftedness is in the top 10% and then they talk about systematically developed skills which I probably referred to before, in terms of talent. I can see that that probably links with my thinking there* |
| **Negative aspects of Gagné's Model**<br>• Chance is confusing<br>• Chance is over quantifying how gifted becomes talent.<br>• Gagné's model is a system's approach<br>• Gagné's model is too complex<br>• The values are arbitrary e.g., 10%<br>• Gagné's model needs more detail and examples<br>• How the interactions work in the policy is unclear<br>• Underachieving and disabilities do not factor into giftedness. (Stephen Hawking example). Either you have it together to be gifted or you do not. | • *I think just by looking at it, it's too complex, it's a system's approach...*<br>• *But to say top 10% or something like that I just I find the numbers to be arbitrary, really.*<br>• *I think it needs detail, examples, it needs links it needs suggestions and they also need to be KLA specific as well.*<br>• *I think that chance is interesting. How many times do you hear people talk about the chance meeting, of themselves with someone who inspired them or did something that actually led them to develop in a particular way. I think that's probably useful but I get a bit annoyed with trying to over quantify things a little bit too much.*<br>• *I think even having the gifted population of students who are underachieving and who have disabilities I don't think this factors into it what-so-ever.* |
| **General comments about models**<br>• G & T is highly individual and without expertise students are boxed/categorised<br>• Any model with boxes there is a tendency to go to the box and not the individual<br>• Each child is individual so models are not always appropriate | • *My feeling about it is the one I've always had a bit of a problem with that gifts, talents are highly individual. Any of these policies tends to lead people who haven't had more training or haven't interacted with kids to try to categorise them. Try to put them into one of the boxes and no kid fits in the box well. It's a good guideline to start with but each child has to be looked at individually and there's a tendency, as there is with* |

| | |
|---|---|
| • How we manage gifted students is more important than identifying them<br>• Most teachers can identify gifted students quickly<br>• Identifying gifted people is the least important thing<br>• If you are gifted you can still be at cohort level in others<br>• it is very hard to have one model that would suit everybody<br>• Talent development is a developmental process - highlighted by the model.<br>• A model needs to be KLA specific | *any model like this where there are boxes, for people to just go to the box model and not look at the individual.*<br>• *That's where most of the effort should lie, what are we going to do with them not on trying to spot them. I think most teachers can spot fairly gifted kids pretty quickly.*<br>• *I think it is very hard to have one model that would suit everybody. I think there are certainly things in this model that are appropriate. I think identifying them is one thing but it's the least most important thing. The most important thing is now that we have identified them, what are we going to do with them.*<br>• *I suppose he is thinking or saying that you can be gifted or have talent in numerous areas and be pretty much at your sort of normal cohort level at others* |

The Expert Educators gave their nuanced responses that were meaningful without collating further or counting codes. It should be noted that there were approximately equal numbers of comments in each theme.

*Assertion 11*

*Expert Educators recognise that G & T students are individual in their needs and gifts. Therefore, no single model will suffice.*

#### *4.1.8 Aspect 2H - Expert Educators' Perceptions Regarding the General Emerging Broader Educational Policies to Provide Direction for G & T Students*

Expert Educators (N=9) were asked if they thought the general emerging broader educational policies provide sufficient direction and support for the gifted students. Syllabus reform and emphasis on inquiry-based science were given as examples by the interviewer. Table 4.17 provides a summary and a sample excerpt. Perceptions about what is needed to improve gifted education within a school is presented with sub research question 3. Improvements for policy are presented in Table 4.18. Samples excerpts providing participant voice are given.

**Table 4.17**

*Current Conditions Present, Regarding Policy and Structure, that Meet the Educational Needs of Gifted Students According to Expert Educators*

| Theme and Summary | Excerpt |
|---|---|
| **Policy**<br>Having a policy is good as it acknowledges that G & T students have needs that are unique. A policy means issues should be addressed regardless of inadequate knowledge or personal feelings. A policy helps to generate awareness. | • *I think that if there is greater awareness and if that comes through policy then terrific. The greater the awareness of the need the better things will be. One would hope that the policy increases the awareness. It makes it something people have to address regardless of their personal feelings about it or lack of knowledge.* |

**Table 4.18**

*Policy Improvements Required in Gifted Education*

| Theme and Summary | Excerpts |
|---|---|
| **Policy**<br>The current policy is seen as responsibilities.<br>Good supporting documents are required and inquiry-based science should be embedded. Strategies would be better than a policy.<br>Flexible timetables are needed to accelerate whole subjects<br>The education system needs a philosophy of education to assist with an alignment of principles (NESA). Our philosophy of education is not known.<br>Educators need to work together with their different ideas rather than argue<br>A theory of action needs to be developed to support teachers.<br>Solving problems surrounding G & T is not going to be a quick fix, nor will it be fast enough. | • *If we are talking about this policy it doesn't address inquiry-based science or syllabus reform, it doesn't address any of those. It doesn't give you any direction. It's actually wasted piece of paper.*<br>• *I would lean towards the side of have a strategy moving forward.*<br>• *It said the Principal is responsible. I mean is that enough of a policy? What are the supporting documents to make sure that this policy can be lived and successfully implemented? So maybe that's an option to change our thinking.*<br>• *It's great that it acknowledges gifted and talented students. I think from a leadership perspective and trying to move whole systems which has lots and lots of teachers teaching in lots of classrooms. Because of that scale it is about how do you use the levers that we do have?... it is probably going to be not as quick as we need it to be.*<br>• *So that's going to be a long-term project. One of the reasons that I said yes to looking after this is because that need is so desperate.*<br>• *NESA needs a philosophy of education....*<br>• *A lot of people don't like each other in their faculty and I say to them that is because some people's philosophy of education is, I am here to teach to the test, that's what the parents want. And that's a philosophy of education they are allowed to have. However, they sit next to someone who says I'm educating kids to create a sustainable world, to be creative individuals who dance in the field and play flute music and bring up a tribe of kids. So those two people sometimes argue. What I ask the head teacher to do is sit everybody down to discuss what their philosophy of education is and to see if they can work together in the canoe and both get high marks but have those people who want to dance in the fields. Can we do both things together? The answer is yes.* |

**Interviewer –** *Do you feel that the general emerging broader educational policies provide sufficient direction for the gifted students? (These include syllabus reform, emphasis on inquiry-based science)*

**Expert Educator 1** - *That's the big clanger of curriculum change that will move NESA ahead when people realise you don't have to tell everybody what to do at every second of the way. However, it's going to cause mayhem for textbook writers, mayhem for tutoring colleges. There will be push back from the haves, the big sandstone schools in Sydney that are at the top of the pecking order, or the selective high schools that have worked out the system. Because when you change the system there's going to be a lot of push back in the near future but there's guys like me and others around and we just have to stand our ground for the gifted kids otherwise we go back to the mythical middle teaching to the mythical middle not the margins.*

**Expert Educator 1** - *I don't know if we need to separate them out and say you're in a high performing class or you're in an opportunity class or something like that. It just says to me that if we have to do that, then what does that say about our other classes - You're in the non-opportunity class, little opportunity in here sort of stuff. I'm thinking that and particularly from our perspective here where we say diversity is the norm, that we just need to be thinking about that all the time.*

**Expert Educator 3** - *With each change it needs to be measured. I feel one thing in in education there are too many policies coming out or there are too many directives handed down. There are too many kinds of politically influenced changes that it happens too fast to gain any real traction. That is really a bit of a blanket statement. I would lean towards the side of have a strategy moving forward.*

*Assertion 12*

*Expert Educators acknowledge that the general policies that are emerging are heading in the right direction but more is still needed to ensure gifted students are catered for adequately.*

*Assertion 13*

*A common philosophy is needed for G & T education with enough flexibility to allow individual teacher input and perspective.*


## 4.2 Sub Research Question 3 - School Policy for Education

This question was answered in two parts:

a. What are educators' perceptions of the appropriateness of their school policy for G & T education?

b. Where school policy does not exist; what is the rationale given for the absence of a policy?

The data was collected from Expert Educators' interview responses, and responses from teacher and parent questionnaires. Responses were divided into Aspects in a similar way to sub research question 2 as the data obtained was rich, when participants had knowledge of school policies. Aspects contributing to answering sub research question 3 were:

3A. Expert Educators' awareness of school policies for G & T education

3B. Expert Educators' rationale for absence or unawareness of school policy G & T education

3C. Expert Educators perceptions of appropriateness of known school G & T policy

3D. Teachers' awareness of the presence of a school policy for G & T education

3E. Teachers' rationale for absence or unawareness of school G & T policy

3F. Requirements for gifted education other than pedagogy and provisions

### *4.2.1 Aspect 3A - Expert Educators' Awareness of School Policies for G & T Education*

Expert Educators (*N*=9) were asked if they were aware of a G & T policy in their current workplace. If they were unaware, they were asked to comment on a policy they had seen in a former workplace. Of the nine Expert Educators, only one could say for certain that there was an enacted G & T policy in their place of work. Table 4.19 displays the responses to an awareness of a policy for G & T education. As participants were able to comment on current and former workplaces, the total number of responses does not add to nine. Some participants commented on school G & T policy in general, these were not included as a workplace but considered for later analysis.

**Table 4.19**

*Expert Educators' Awareness of a Policy for G & T Education in Their Workplace*

| Policy for G & T Education in the Workplace | Number of Responses |
|---|---|
| No policy in current workplace | 5 |
| Unaware of a policy | 3 |
| Yes, in current workplace | 1 |
| Yes, in former workplace | 1 |

*Assertion 14*

*Expert Educators are unaware of G & T policies in their current workplace.*

*Assertion 15*

*One reason that G & T education is not a priority in schools may be because there is insufficient awareness of G & T policy.*

### *4.2.2 Aspect 3B - Expert Educators' Rationale for Absence or Unawareness of School G & T Policy*

Where there was no formal policy for G & T education, participants were asked to comment on rationale behind the absence of a policy. An interesting excerpt is presented in the excerpt box. Table 4.20 presents the rationale by Expert Educators for the absence of a school G &T policy. The responses were randomly numbered with each representing the perspective of one Expert Educator.

**Interviewer** – *Do you have a school G & T policy? Particularly when thinking about Science Education.*

**Expert Educator** – *No, it is an argument I have been having for over 13 years now.*

**Interviewer** – *Why is this the case?*

**Expert Educator** – *This school, the primary teachers who encourage their kids in year 6 and 5 to come to the various schools, up until the last 2 years have been encouraging them to go elsewhere. The children they've been encouraging to come here are the children with special needs, so our cohort for Year 7 2019 is 1/4 high special needs. Consequently, the demands, the weight that that places on the staff, the curriculum is enormous and all the energy is drawn there, and again that this philosophy that these kids can look after themselves.*

*Note.* This is not a special needs school but a school in a lower socio-economic area.

**Table 4.20**

*Rationale for Absence or Unawareness of Policy for G & T Education*

| Response | Rationale | Sample Quotes |
|---|---|---|
| **1** | There is a statement on learning but not specifically for G & T | • None relevant |
| **2** | Nothing in current system and not aware of reasons for this | • *In terms of the system I'm working with at the moment I don't think that we have a policy across the system as such.* |
| **3** | Not aware of a policy as this was not discussed during employment induction. | • *We do want to push everyone as much as we can but we don't have anything concrete on gifted and talented.* |
| **4** | Not aware of a system policy but different schools have different structures in place. | • *Certainly, different schools have different policies or rather different structures in place. I think again, it's all well and good to have a policy but it's better to have the structure in place and be doing something with it. I don't know if those school who have those structures have a policy, but they certainly have structures so they are doing something with it.* |
| **5** | Gifted students are encouraged in Years 5 and 6 to choose a different high school. Those with learning needs have been encouraged to come to "our" school. The gifted students in the school are thought to be able to look after themselves. | • *...again that this philosophy that these kids can look after themselves.* |
| **6** | No reason given for unawareness. There are many policies that are there which have not been used or needed. Possibly this is due to lack of confidence in those who create the policy.<br><br>Opportunities were provided outside a known policy for G & T. | • *A policy written down? I don't know, I don't know I'm not sure. But if I wanted to check I would go to policy central.*<br>• *In my experience working in primary schools, I know that we focus on the pedagogy of numeracy for example to be able to provide that hard thinking. I guess provide opportunities for students to really push and all of that.*<br>• *I think there are many policies that haven't been brought to my attention. Even starting in my current role in the system I'm still learning about the tools, processes and uncovering the processes that haven't got any kind of authoritative or a well thought backbone.*<br>• *I have always kind of accepted that this is a policy that's been created by people, who I'm assuming, know what they're doing. Then in my own understandings of assimilating new knowledge from this, how can I how* |

| | | |
|---|---|---|
| | | *can I give any credence to the policy with in the whole work of everything that I'm doing in a school* |
| **7** | There is nothing that is useful in terms of a policy for G & T students. It is hard to have a G &T policy in our current system that wants to standardise everyone. | • *And in terms of gifted and talented the answer is no I can't see it anywhere. We just want standardised questions.*<br>• *Everybody wants to teach the middle. The whole system is set up for the cookie cutter you're talking about different cookies they don't fit and that's why they get rejected, because they just don't fit the model.*<br>• *There are policies, bureaucratic speak but there is nothing that really helps them at all, in fact they (policies) are a pain in the neck.* |
| **8** | Unaware of details of policies other than what is in the syllabus about differentiation. | • *I presume there are but I don't know, other than what's in the syllabus. I know that in all of the syllabuses there are statements about differentiation but I don't know that there is enough clarity around how to do that.* |

*Assertion 16*

*The rationale by Expert Educators for absence of a school G & T includes:*

- *a standardised system is not suitable for G & T students*
- *a lack of overall confidence in policies*
- *misconceptions about giftedness*
- *a lack of awareness about giftedness.*

### *4.2.3 Aspect 3C - Expert Educators Perceptions of Appropriateness of Known School G & T Policy*

Expert Educators were asked their perceptions of their school G & T policy (*N*=1) and of policies they had seen in previous workplaces or school (*N*=8). Only one participant was aware of a formal policy. This participant's comments have been presented below in an excerpt box.

**Expert Educator** – *We have policies that say the teachers are expected to differentiate the work to the different levels and we put differentiation within the programs. This would be a case by case program much like writing a life skills program and you can't have a generic one for all life skills students, it has to be for that specific student. It's the same as you have some kids who are highly numerate and others are highly literate and others are both when it comes to their ability to respond and their creativity and the different ways that they can express themselves.*

**Interviewer** – *What are your feelings and perspective around this policy at your school? Do you feel it is enough, is it appropriate and what would you change?*

**Expert Educator** – *The policy itself is alright. I think with the level of change we've had in the school I think it's more of a case of we need to stick with a policy that's going to go over multiple years which then would actually give the teacher's an opportunity to actually reflect, refine, improve, and resource because that's been one of the limiting factors. This is instead of teachers changing things before they actually know if it worked in the first place.*

The Expert Educator who commented on their workplace G & T policy, displayed in the excerpt box, discussed that differentiation is expected, on a case by case and "as needed" basis. While not ideal, they indicated that it is important to continue with what has been implemented to improve, rather than have perpetual change as seen in their school.

Other Expert Educators gave responses about their former, school or system, G & T policies. The themes that emerged from their responses were: advice based on policies they had seen, difficulties with known policies, strategies seen enacted from policy, comments about the education system, and general comments. Table 4.21 presents these themes with example excerpts excluding the Expert Educator whose excerpt is presented above.

**Table 4.21**

*Expert Educators' Perceptions of Known School G & T Polices*

| Theme and Summary | Excerpts |
|---|---|
| **Advice based on known polices**<br>A G & T policy should not put ceilings on students nor should they be limited by the teachers' abilities.<br>Structures are better than policy as they are usually followed and used. Policies are good but something needs to be done with them, not tokenistic.<br>Education needs to be flexible and allow for individuality, not narrowed for the HSC or ATAR. | • *We narrow things down by the time you get to year 12, students have to be doing this subject or that one.*<br>• *.....We have a great role in the education of kids but we have to make sure that we don't put ceilings on kids because we can't take them there. We don't need to take them everywhere, we sometimes need to lift the ceiling off and let them go, but sometimes we get scared to do that.*<br>• *It's a really good structure but it still needs really good pedagogy. It still needs the teachers to start with problems and get the students to think because it's not about, and it shouldn't be about, regurgitating. It should be about thought processes and how to solve problems.*<br>• *Certainly, different schools have different policies or rather different structures in place. I think again, it's all well and good to have a policy but it's better to have the structure in place and be doing something with it. I don't know if those schools who have those structures have a policy, but they certainly have structures so they are doing something with it.*<br>• *About agile classrooms - Where there is a lot more freedom students will start to navigate and orientate themselves to other people they can work with. They will make the most of asking questions.*<br>• *For students who want to take something to a deeper level we need more flexibility to be able to do that.*<br>• *To develop that curiosity, to rejoice in that curiosity, that is what we have to do for that development of those children along the paths that they need to take* |
| **Difficulties with known policies**<br>One Expert Educator believes that gifted students generally emerge in late primary to early secondary. This causes difficulties because the focus is on them and the pressure becomes too much leading to feelings of being an outsider with peers.<br>Teachers can be scared to let students reach their potential as they themselves do not have the ability to extend them. | • *The problem is they emerge, I believe, in late primary early secondary school then they realise that the focus is on them and the pressure is on. A lot of them decide to opt-out and give up and leave school totally because they don't like being the odd one out.*<br>• *....if school isn't flexible enough to assess where students are, and sometimes we think as teachers that we have an overinflated sense of where we are.....* |

Another commented that teachers can have an over inflated sense of their ability to assess and provide for gifted students.

**Strategies seen enacted from policies**

**Identification**

Identification was listed as a strength but process of that identification was a weakness.

One Expert Educator commented that they are not sure it is possible to identify gifted students as testing regimes are not sufficient.

Policies were in place to identify gifted students but no action taken.

**Acceleration**

Acceleration was not always seen to be an advantage as it can make it difficult for other/new students to come into that class later. It also requires commitment and identification from the beginning or students fall behind.

Acceleration was sometimes something to do rather than to really benefit the students.

Whole subject acceleration is seen as a purposeful strategy. This so that students can focus on extension subjects in their last school year.

**Differentiation**

Many schools have statements around differentiation in their policy. Differentiation is also built into programs that are teacher driven. This differentiation is also built into the syllabuses.

Differentiation is case by case, similar to life skills.

Differentiation comes with the additional opportunities for students.

However, differentiation needs to be individualised.

**General Comments about strategies**

Pedagogy for G &T students had a focus on hard thinking

Strategies and the needs of G & T are addressed as the need arises

There were strategies for Mathematics but not Science**.**

- *The strengths of the policy were that the students could be identified. The weaknesses of the policy were that they were identified not on their gift or talent just on the fact that they could answer questions that other students couldn't answer....*
- *In my last school there was gifted and talented policy trying to identify particular gifted and talented students but there was nothing done to then further those students.*
- *I think that works really well (Acceleration). It would be very hard for students to join that school. That would be one of the disadvantages. If you are not recognised or identified early or if you choose not to work and therefore miss the cut I guess to say then it's very hard to jump back in when maturity kicks in and you say well I actually want to do that program because they (the other students) are a long way in front of you.*
- *I know that we focus on the pedagogy of numeracy for example to be able to provide that hard thinking. I guess provide opportunities for students to really push and all of that.*
- *So, it's only when the need arises or only when I have a gifted and talented student. It's the best time to act on that otherwise we'll be acting and going nowhere.*

- *I know that in all of the syllabuses there are statements about differentiation but, I don't know that there is enough clarity around how to do that.*
- *...there needs to be a lot of differentiation and a lot of more personalised learning.*

- *We would like to start with a problem and the students try to solve that problem, not the teacher telling them how to do things and then they regurgitate it a thousand times. Regurgitation isn't gifted even if you can do that really well that's not being gifted*

| | |
|---|---|
| **Syllabus statements**<br><br>The syllabus contains statements about differentiation but not clarity about how that looks when enacted. | • *A lot of schools, not a lot but some schools are doing acceleration in mathematics* |
| **Comments about the education system**<br><br>The system is not set up for G & T students.<br><br>Gifted science students are not choosing science subjects because they are "playing the ATAR game" and will be disadvantaged if they do choose science.<br><br>We want standardised questions which makes it difficult for G & T to be seen.<br><br>The system is set up to teach to the middle not the gifted students.<br><br>The system is not suitable for many students as it a one size fits all approach.<br><br>Our system needs to be more flexible and not caught up so much on grades. | • *....because everybody wants to teach the middle. The whole system is set up for the cookie cutter you're talking about different cookies they don't fit and that's why they get rejected, because they just don't fit the model....*<br>• *...It is disappointing because we are losing our best and I know we don't have our best doing physics and chemistry they are doing other things to play the ATAR game. The game we have set up...*<br>• *If we do have students with different, as it says here "natural abilities" or we have students who have possess or learn at a faster rate; We are we so caught up on grades, I mean year grades to acknowledge that. You know we (educators) talk about Vygotsky all the time and about this zone of proximal development. What does that look like if we had students from different areas, different ages, different backgrounds? What are the implications there for a gifted and talented student?* |
| **General comments**<br><br>Separating students was said to undermine the principles of equity. It was thought that all students should have the chance for best known practice.<br><br>A rationale given for having a G & T policy was so that students are not lost to other schools. Many are tokenistic and in place to look like something is enacted for gifted students. | • *....this undermines basic equity principles for me. When they talk about their X strategy, I think, are you really going down that road around G & T or are you just doing it because you want to make sure you don't lose students to the state schools in your area that are saying they are for gifted kids and stuff like that?*<br>• *.....recently I heard a teacher talking about her X class and things like that and I was thinking why aren't you doing that for your normal class? Why isn't every kid getting that opportunity? Why isn't every kid getting that opportunity around that inquiry and those sorts of things?* |

An excerpt box provides participant voice to clarify the purpose of separating students from their main cohort.

**Interviewer** – *So you are not a fan of separating out the students into groups. What about the bottom end?*

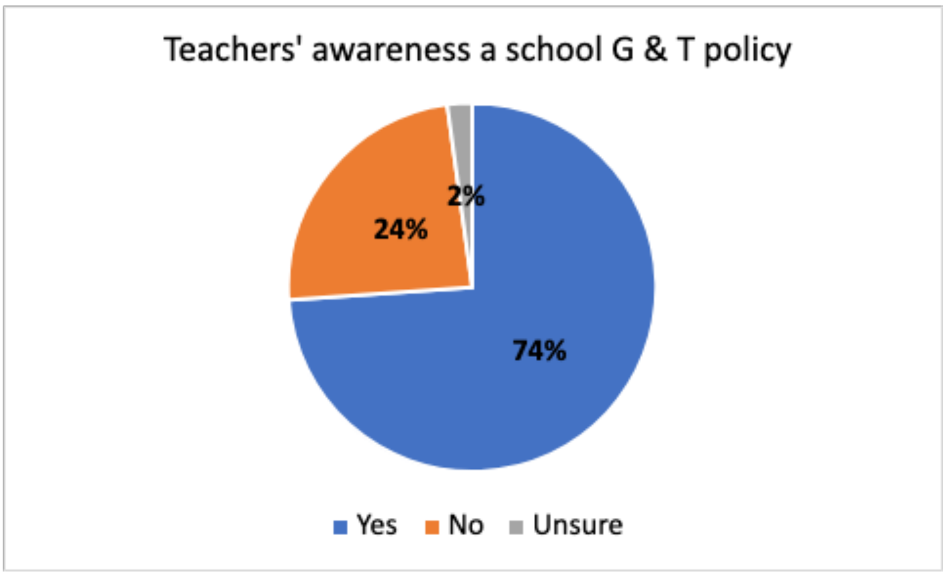
**Expert Educator** – *Like I mean I am an advocate for intervention but intervention is targeted for a short period of time. It's not we're going to take you out and you are not clever enough to sit in this classroom. It's about these particular maths skills that we need to work on with you so for the next 10 weeks we are going spend 2 hours a week working on those particular identified skills so that you can be successful with your peers in your classroom. That's what I mean by intervention. It's not withdrawal where we say you're not good enough to be in our class and I think we should look after you by putting you in the corner where you can sit there and colour in. It's for a particular period of time with a definite identified aim around learning so that they can be successful in the classroom. Successfulness of the intervention is how quickly the students can be successful in their normal classroom environment. And I am thinking the same thing, if our classroom environment doesn't extend and allow for giftedness to show out, then I think that's a massive problem.*

### *4.2.4 Aspect 3D - Teachers' Awareness of the Presence of a School Policy for G & T Education*

Teachers were asked if they were aware of a school gifted and talented policy. Of those who responded *(N*=46), 34 were aware of a policy for G & T students in their school, 11 were not aware, and one was unsure. A Fisher's exact test demonstrated there is no significant association between the sector and a teacher's awareness of a school policy. Therefore, these results are displayed for all teachers combined. Figure 4.16 shows the teachers' awareness of school G & T policy by percentage.

**Figure 4.16**

*Teachers' (N=46) awareness of a policy for G & T education in their school*



### 4.2.5 Aspect 3E - Teachers' Rationale for Absence or Unawareness of School G & T Policy

When asked about the presence of school G & T policy, most teachers did not provide a comment or elaborate on their response. However, the few comments received fit into two themes, general comments on school G & T policy, and reasons suggested for the absence of a school G & T policy. Table 4.22 provides the responses received about school policies.

**Table 4.22**

*Teachers Comments and Rationale for the Absence of a School G & T Policy*

| Theme and Summary | Excerpts |
|---|---|
| **General comments on G & T school policy**<br>Teachers comments indicate there are difficulties around locating policy, implementation, time, and teacher training.<br>Schools have strategies and philosophies. | • *Successful implementation needs proper training. The policy is basically there because it needs to be. No-one has the time or ability to make it work.*<br>• *We have a philosophy and specific programs in place, but not an overall cohesive policy. There are 2 staff in high school and 1 in junior school responsible for specific programs but in class, there is no 'policy' to implement*<br>• *If I have been handed a printout I don't know of its current location. Furthermore, I am unable to find an electronic copy on quickly looking. There has been talk about how to excel students, in fact there is a streamed class to help move academically gifted students forward. That being said, I am unaware of anything in particularly being done for sporting or social excellence apart from the standard competitions and events that schools run/participate in.* |
| **Rationale for the absence of a G & T policy**<br>According to Teachers, the reasons for not having a school G & T policy are: the focus is on students who have learning difficulties, language issues, or low SES.<br>One teacher commented that there are no G & T students to cater for in their school. | • *There has been a big focus on the learning support of students with special needs as we have a fair number of students from ESL backgrounds, and those with learning difficulties. I don't know whether we have had any gifted and talented students to cater for in the past.*<br>• *I think the school wants to push more towards the academic but are willing to help students move in whatever direction students are going.*<br>• *It's not a main focus. School has limited resources. We haven't gotten around to it yet.*<br>• *Low SES*<br>• *It is a relatively new concept at our school that is only in the early stages of development* |

*Assertion 17*

*The rationale, by Teachers for schools not having a G & T policy includes:*

- *Difficulties locating policy and /or a lack of overall confidence in policy rf overall*
- *misconceptions about giftedness*
- *a lack of awareness about giftedness.*
- *Priority is given to students who have learning difficulties or low SES.*

#### *4.2.6 Aspect 3F - Requirements for Gifted Education Other Than Pedagogy and Provisions*

The data for Aspect F was obtained from survey and interview responses. Parents (*N* = 75) were asked directly what is needed to further support the education of G & T students. Associated data emerged from Teachers (*N*=6) and Expert Educators (*N*=9) responses to other questions. The common responses were categorised into six themes: assessment, performance, social/emotional, beliefs, education system, and culture. Expert Educators had two unique themes: difficulties and policy. Parents had three unique themes: support other than aptitude, characteristics, and attributes, and twice exceptional.

The data in the themes common to all three participant groups are presented in Figures 4.17 (assessment, performance, and social/emotional) and 4.18 (beliefs, education system, and culture). Although themes have been presented in two figures, there are overlapping ideas, e.g., assessment and education system. Table 4.23 presents Parents' perspectives. Figure 4.19 that displays the percentage of responses in each theme for Parents.

In Figure 4.17 and 4.18 the coloured boxes show the key ideas from Expert Educators (purple), Teachers (blue), and Parents (green). A black border is placed around linked ideas. Ideas are considered linked when they are similar or opposing. Excerpts are presented to provide participant voice.

**Excerpts**

**Expert Educators**

- *That kid who knows everything or knows an awful lot when they are coming into year 7, what kind of honest growth are we getting out of them outside of the fact they are getting As?*
- *There are a lot of exam questions that don't give really bright kids the opportunity to show how they're thinking. So, what we favouring the moment is the regurgitation of information. We need to give kids the opportunity to show what they think, how they think, how they explain themselves, and justify rather than say you are going to get top marks if you can do a graph nicely.*

**Teachers**

- *What does gifted really mean? It certainly doesn't equate with success at school.*
- *Being a good, polite student who memorises the work is not G & T, though this is what current OC (opportunity classes) and other G & T programs select for.*
- *Access to talent programs can be difficult due to isolation of the school and funding for staffing or release.*

**Parents**

- *Standardised academic tests like NAPLAN and other academic tests are poor indicators of gifted children.*
- *My daughter is identified as gifted but was not accepted into gifted programs as she does not test well and her gifts are not always apparent in these situations.*
- *Gifted children need recognition that giftedness does not necessarily mean high achieving. Teachers need to recognise that correct answers will not necessarily be the scripted answers.*

*Assertion 18*

*G & T programs are performance based with school systems pressured towards assessment. However, it is acknowledged by Expert Educators, Teachers, and Parents that G & T student success does not align with school success.*

**Figure 4.17**

*Comparison of Expert Educators', Teachers', and Parents' Requirements to Further the Education of G & T Students in Themes, Assessment, Performance, and Social/Emotional*

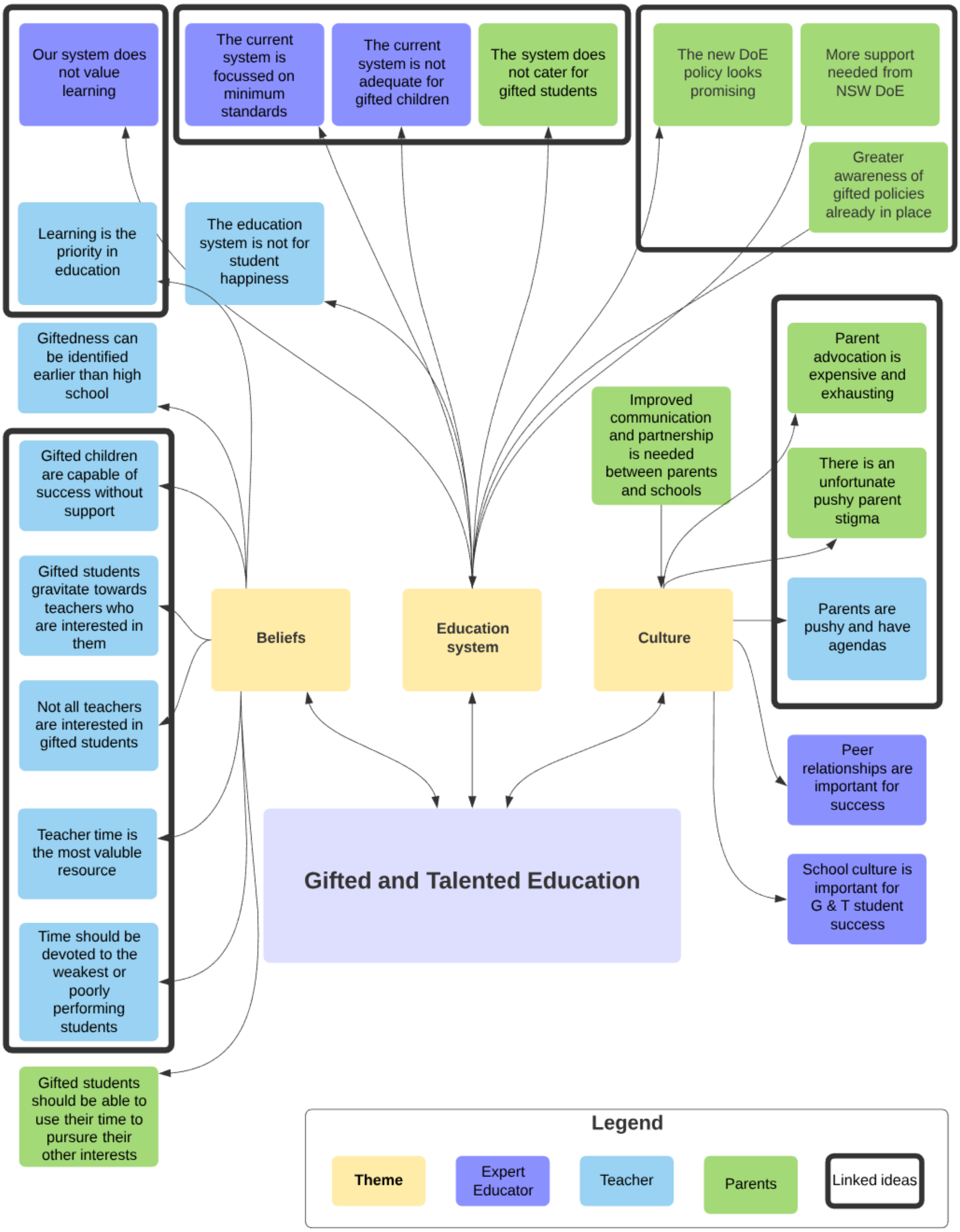
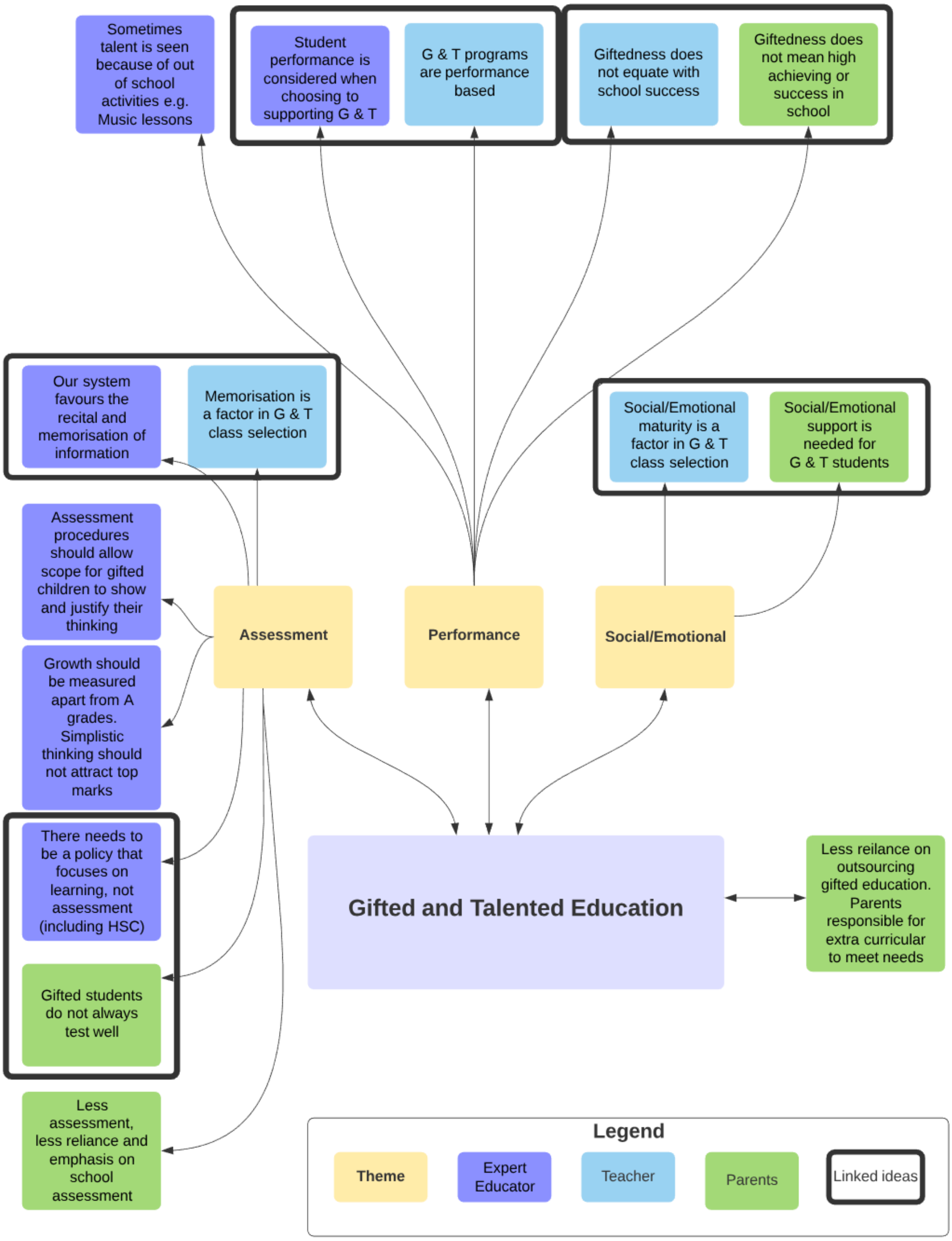


**Figure 4.18**

*Comparison of Expert Educators', Teachers', and Parents' Requirements to Further the Education of G & T Students in Themes, Beliefs, Education System, Culture*



**Excerpts**

**Expert Educators**

- *In our system, learning doesn't matter.*
- *I think that educators spend so much time at bottom end and ensuring that everyone's meeting a minimum standard, because that really is the focus. We must meet a minimum standard. There is virtually no discussion at the top end apart from when HSC results come out and they discuss the selective schools.*

**Teachers**

- *I'm not a fan of G to T...as educators more time, time and above all time, should be devoted to the weakest or most poorly performing of our students. Talented and able students are by definition capable of navigating through to tertiary level with less hogging of the single most important resource to a practicing teacher, time.*
- *I think giftedness in science can be identified at an earlier age. I teach years 7 -12. They gravitate towards teachers that will indulge their curiosity and love of learning. Unfortunately, this is not all teachers.*

**Parents**

- *....the system is not designed for them. I was advised to homeschool by the XXX system G&T section and that's just not good enough....*
- *The principal and G & T coordinator had not even read the XXX system policy on G & T. They had never even seen the document. Schools have no idea.*
- *To listen to the parents and not to dismiss us as "bragging parents".*
- *Removal of the 'pushy parent' stigma.*
- *PG (Profoundly Gifted) kids like mine have no chance at all the way things are and advocating for them is expensive and exhausting. It doesn't have to be that way*
- *At the moment 2E kids are slipping through the cracks because the system is designed to meet the needs of average to bright kids.*

*Assertion 19*

*Expert Educators, and Parents agree that the school system does not cater adequately for G & T students, although different reasons were provided. Some teachers have negative feelings towards G & T students and their parents who advocate for them.*

**Table 4.23**

*Further Requirements for G & T Education – Perceptions of Parents*

| Theme and Summary | Excerpts |
|---|---|
| **Support for concerns other than the area of giftedness**<br><br>Parents identified support for wellbeing as an important factor missing in G & T education. Types of support include<br><br>• Encouraging strengths<br>• Flexibility with approaches in education<br>• Improved/more understanding of disruptive behaviours<br>• Mental Health support<br>• Mixed age socialising<br>• Promoting and recognising importance of peer relationships<br>• Recognition of disability and gifts<br>• Recognition of identification from registered professionals<br>• Recognition that gifted children still need assistance<br>• Social-emotional support<br>• The right not to use gifts<br>• Understanding individuality<br>• System | • *Recognition that a student needs support for their disabilities and their gifts.*<br>• *... chance of meeting with peers*<br>• *Teacher awareness of how differently gifted children can present, that it doesn't automatically mean 'amazing at everything'.... More care for the unique mental health needs of gifted children. Stopping the promotion of the work of Jo Boaler and others who deny the existence of giftedness.*<br>• *Social skill support.*<br>• *....not to lose sight of the amazing things she is capable of. Think of her as a whole child, a child with high abilities who is still a child and wants to play, but her play is a little different from others.* |
| **Characteristics and attributes**<br><br>Parents recognised that gifted children often have asynchronous learning and they would like improved understanding and support for this characteristic. | • *More recognition for the asynchronous development that occurs in gifted children.*<br>• *Ability to cope with my child's asynchronous development and emotional regulation issues and to not label her a problem from the start*<br>• *...understanding that being gifted doesn't mean the child won't have a bad day, that asynchronicity will be at play etc.*<br>• *All teachers have gifted training particularly in the areas of.......asynchronous development.*<br>• *A child who can read and does maths & science several beyond their age peers, might not be advanced in their writing skills.* |
| **Twice exceptional**<br><br>Parents request more support for the gifted children who are twice exceptional.<br><br>Parents indicate twice exceptional children are not catered for adequately and are not achieving their potential. | • *More support for gifted and twice exceptional students.*<br>• *At the moment 2E kids are slipping through the cracks*<br>• *Recognition that gifted children are susceptible to unique social and emotional issues that needs support to avoid underachieving.*<br>• *Generally, teachers need more training not just in identification but then also in actually providing* |

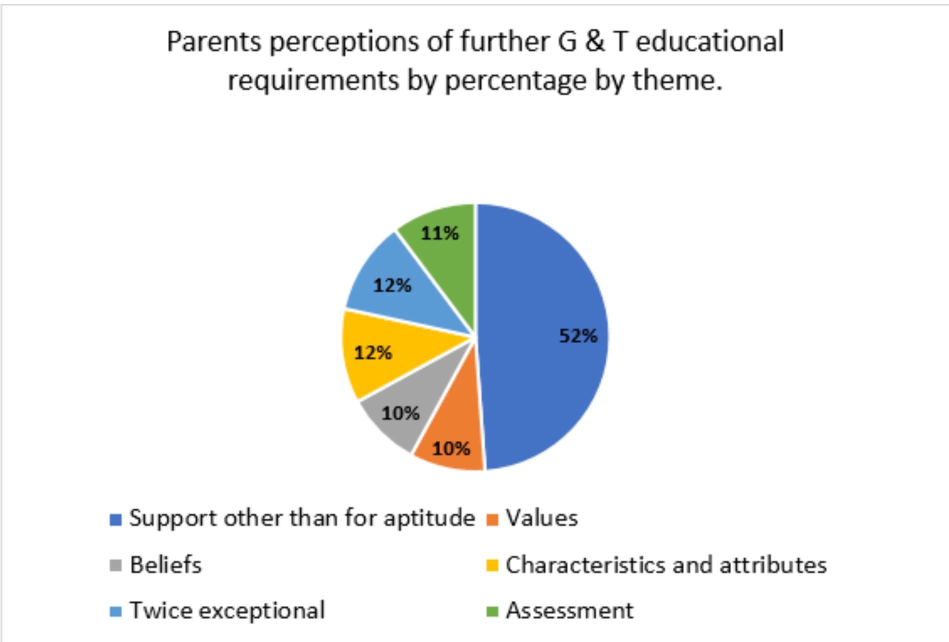
| | |
|---|---|
| Parents would like greater understanding of and teacher training around underachievement.<br><br>Parents acknowledge that there is a great diversity amongst gifted children, including those who are twice exceptional. | *evidence-based services to gifted and 2E children.... Ideally, it would be wonderful to have access to specific schools or units within schools that can cater effectively to 2E children modelled on places like Bridges Academy in the USA, as highly gifted 2E children can be just too diverse in their needs even for a well-trained and capable teacher to manage within a mainstream school.* |

*Assertion 20*

*Parents uniquely emphasise the importance of supporting asynchronous learning of gifted children. They uniquely acknowledge the special needs of gifted children who are twice exceptional.*

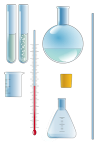
**Figure 4.19**

*Requirements for G & T education according to Parents displayed by percentage of responses in each theme*



*Assertion 21*

*Parents identify that non-academic issues must be addressed to provide adequately for G & T students. The greatest needs identified are those that impact mental health, social-emotional needs, and peer relationships. Expert Educators acknowledge that school culture and peer relationships are important for the success of G & T students.*



## 4.3 With Provisions Defined As Resources, What Provisions are Available and Used by Each School for G &T Students in the Context of Science?

This question was answered by using data collected from Expert Educators' interview responses, and responses from teacher and parent surveys. Responses were divided into Aspects in a similar way to sub research question 2 and 3. Aspects contributing to answering sub research question 4 were

4A. Provisions available for teachers to use for science education
4B. Use of the provisions for G & T students in science
4C. Expert Educators awareness of provisions for G & T science education
4D. Provisions required to support G & T science students

i. Expert Educators perceptions
ii. Teachers perceptions
iii. Parents

### *4.3.1 Aspect 4A - Provisions Available for Teachers to Use for Science Education*

Teachers (*N*=24) were asked what provisions they had available to use for science students. Their responses were selected from a predetermined list with the option to include their own individual response, as marked with an asterix*. The overall responses have been displayed in Table 4.24 as a percentage of teachers who have these resources available. Laboratory consumables referred to items such as gloves and chemicals etc., laboratory equipment referred to items such as distillation apparatus, Bunsen burners and glassware etc.

**Table 4.24**

*Provisions Available to Teachers for Their Science Students (N=24)*

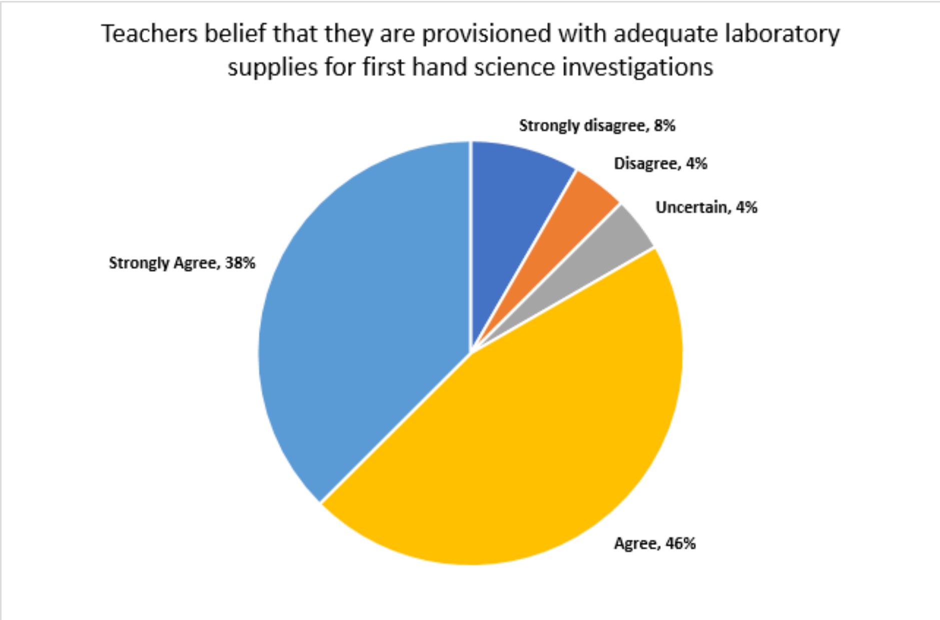
| Provision | Number with Availability | Percentage % |
|---|---|---|
| Laboratory consumables e.g. gloves | 21 | 88 |
| Laboratory equipment | 21 | 88 |
| Reliable internet | 21 | 88 |
| Excursions | 20 | 83 |
| Laboratory technician/assistant | 20 | 83 |
| Incursions | 18 | 75 |
| Electronic textbooks | 16 | 67 |
| Access to Journals | 9 | 38 |
| Guest speakers | 8 | 33 |
| Science Clubs | 4 | 21 |
| Other technology | 5 | 17 |
| *STEM 3D printers | 1 | 4 |
| *Modified Text book work | 1 | 4 |

*Notes: * Teachers' own comments.*

Teachers ($N$=24) were asked using a Likert scale question if their school provides adequate laboratory supplies (equipment and consumables) to perform first hand science investigations in science. Of the responses received, 84% of teachers agreed or strongly agreed that they have sufficient supplies, 12% disagreed or strongly disagreed. Figure 4.20 displays their responses in a pie chart.

**Figure 4.20**

*Teachers' (N=24) Belief That They are Provisioned with Adequate Laboratory Supplies for Science Investigations*




| |
|---|
| *Assertion 22*<br><br>*The majority (84%) of Teachers state they are provisioned with adequate laboratory supplies for first hand science investigations* |

| |
|---|
| *Assertion 23*<br><br>*Although the majority of Teachers have adequate laboratory equipment, they are lacking other provisions such as guest speakers, access to journals, and science clubs. These provisions may assist the education of all science students, in particular those who are gifted.* |

### *4.3.2 Aspect 4B - Use of the Provisions for G & T Students in Science*

Teachers (*N*=16) were asked if the science provisions they did have were used differently for G & T students. Not all teachers responded to this question. Questionnaire excerpts are provided.

**Questionnaire Excerpts – Teachers**

**Are there any differences in the way provisions are used for G&T students?**

- *Only time to design and implement a differentiated program.*
- *Where students express or show further interest, we encourage students to follow on with their interest in a scientific manner, not just an activity.*
- *No, equally shared amongst other science classes. There are too many classes to be accommodated.*
- *Resources are available to all students; however, G & T students have more confidence using specialised resources and are more likely to use them in their depth studies. e.g., a G & T student asked me if he could use the colorimeter, whereas a lower ability student wouldn't even consider using a colorimeter.*

*Assertion 24*

*Resources are not used differently for G & T students unless this is initiated by the student.*

### *4.3.3 Aspect 4C - Expert Educators Awareness of Provisions for G & T Science Education*

Expert Educators (*N*=9) were asked what provisions they were aware of that are made available to assist G & T science students. Two main themes emerged: provisions available, and provisions needed.

In this question, time and teacher education were considered provisions. Of the nine responses four (44%) stated that they were not aware of any provisions specifically for G & T students. Five (56%) indicated that teacher initiatives, including self-education, were the specific provisions for G & T students. Provisions that are available for all students include: internet connection, textbooks, and the Science Extension course. Most responses related to what Expert Educators believe is required. Table 4.25 presents some comments from the Expert Educator responses.

**Table 4.25**

*Interesting Comments from Expert Educators Regarding Provisions Available for G & T Students in Science*

| **Type of Comment** | **Excerpts** |
|---|---|
| Nothing specifically | • *No – no one sees a need for it to happen.*<br>• *In terms of extra allocations for gifted and talented, I haven't been made aware of any* |
| Teacher Directed | • *I run peer tutoring classes for those students who are quite gifted, that is something I do after school. But apart from that, there is no specific initiative.*<br>• *Only individualised which is an incredible drain on teacher preparation. We can be preparing 2 or 3 additional lessons per lesson to accommodate them.*<br>• *I don't think providing for G &T students is about playing with extra equipment. I think it is about having teachers who are sufficiently aware of the needs of these students so that they are able to guide them in the student's pursuits* |
| Science Extension | • *If I was to identify G & T students, I would look at the Science Extension students. This brings a lot of them out of the woodwork. These students could be previously non-identified G & T students.* |
| The Internet | • *I think the internet it is going to be the major source. It assists with being self-directed; it has to be I want to find out more about A, B or C. If there are resources provided for one year but then the next year three or four kids come along who are gifted and they don't want those resources they want something totally different. I think that's going to be a big part of it.* |

*Assertion 25*

*Expert Educators identify that teacher initiatives are what provides for G & T science students.*

### *4.3.4 Aspect 4D - Provisions Required to Support G & T Science Students*

Expert Educators, Teachers, and Parents commented on the provisions required to support the development of science students in particular, identified G & T students.

**4.3.4.1 Expert Educators.** Expert Educators (*N*=9) provided nuanced responses regarding provisions that are required for G & T science students. The interesting responses have been presented as excerpts.

**What provisions are still required for G & T science students?**

**Expert Educator** - *I have another person who is marvelous at this, just needs confidence. And I've seen her do it in another department but falls back to a default position because she's not confidence in this department. It's just building that confidence to go out and do these things she knows how to do from her other department. Transfer her learning she already has that deep learning, let's transfer that now.*

***Summary – Teachers need support to be confident in their ability to teach G & T science students.***

**Expert Educator** - *That is why the text books are 3000 pages long because they are trying to shove everything in it. The teachers then teach to the textbook and say the syllabus is too long. No it's the text book is too dense the syllabus isn't so then you find out the teachers are teaching to text books for compliance which is another thing because they are under the thumb and they are worried about their job and all they do is comply rather than teach form the heart.*

***Summary - Teachers need to understand the difference between a syllabus and textbook in order to teach all science students for learning rather than compliance.***

**Expert Educator -** *I've been co-ordinator for 15 years and my budget last year was almost half of what I started with 15 years ago. And the budget was never big to start with. In 2004 it was $11K and the last couple of years it has been about $6K.*

***Summary – Teachers need adequate monetary funding to provide for science students.***

**What provisions are still required for G & T science students?**

**Expert Educator** -*.....in my time in the last decade in the office there's probably been half a dozen of those (G & T) kids. Now if we had a systemic approach, I don't think Principals would be calling me asking for what can be done. It would be a process to go through.*

**Interviewer -** *Do you think that's necessary for half a dozen students?*

**Expert Educator** - *It probably is, because for those 10 that have been identified there is probably equally and a whole lot of other kids that weren't. I wonder how many there would have been. Over our rollout of the maths assessment interview, just in the Mathematics, some kids were starting to get flagged but there were kids in other* *schools where that instrument wasn't available and they just would have kept going through. Their kindy lesson would have been today we're doing "the number 5"*

***Summary –A well thought out system approach is required so that all children are identified and there is a clear pathway for their development***

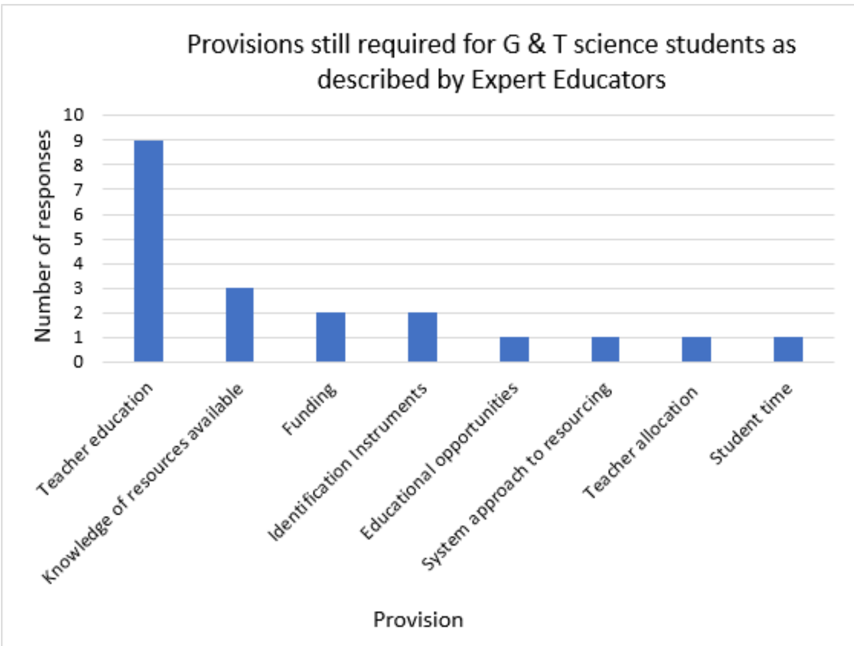
*Assertion 26*

*A system approach for science is required that includes teachers support, teacher education, funding, and clear procedures for G & T development*

The responses given by Expert Educators (*N*=9) regarding the provisions required to support G & T science students were analysed and placed into eight themes. These are Teacher education, knowledge of resources available, funding, identification instruments, education opportunities for the students, a system approach to resourcing, teacher allocation and student time. Expert Educators could choose more than one response. Each response indicates one Expert Educator's response, e.g., Nine (100%) Expert Educators state that teacher education is required and two (22%) state funding is required. Their responses are displayed visually in Figure 4.21.

**Figure 4.21**

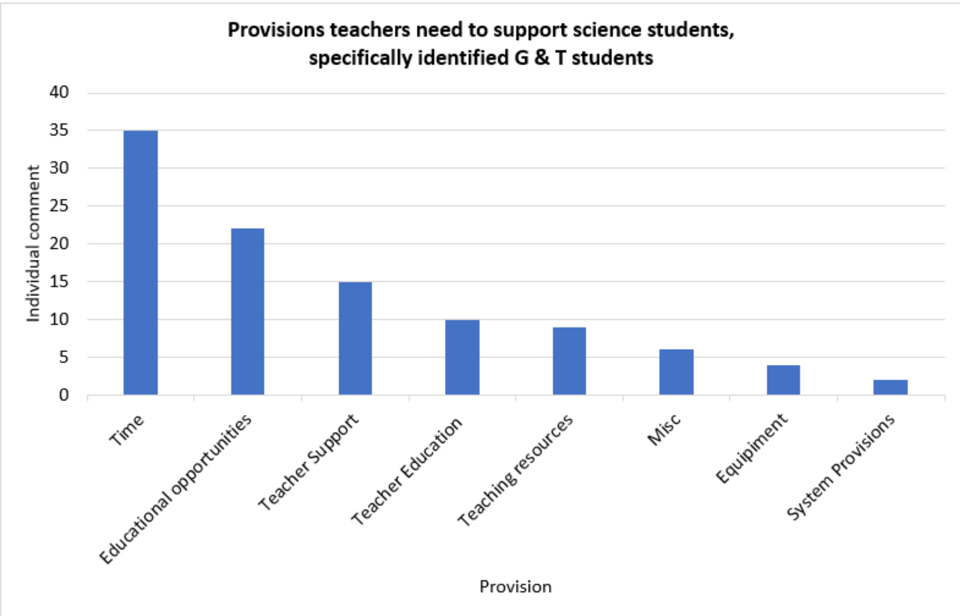
*Provisions Still Required for G & T Science Students According to Expert Educators (N=9)*



**4.3.4.2 Teachers.** Teachers ($N$=12) responded to an open response questionnaire asking what provisions were needed to better support the development of science students, in particular identified G & T students. A checkbox style question, with an option for a free response, was posed in a second online survey ($N$=33). A total, 45 participants responded. More than one option could be selected. Therefore, the number of responses does not equal the number of participants. The responses are presented in Figure 4.22.

**Figure 4.22**

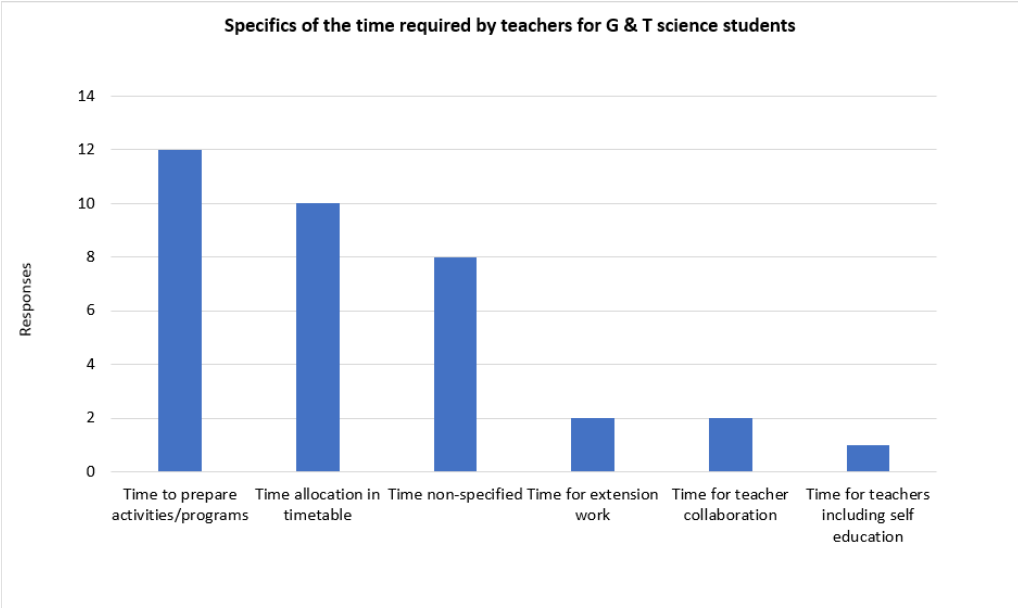
*Teachers' Stated Provisions Required to Support Science Students, Including G & T Science Students (N=45 Teachers)*




The provision of time was further divided into themes and is presented in Figure 4.23.

**Figure 4.23**

*Teachers Time Provisions Separated into Specific Areas of Need (N=35 Comments for Time)*

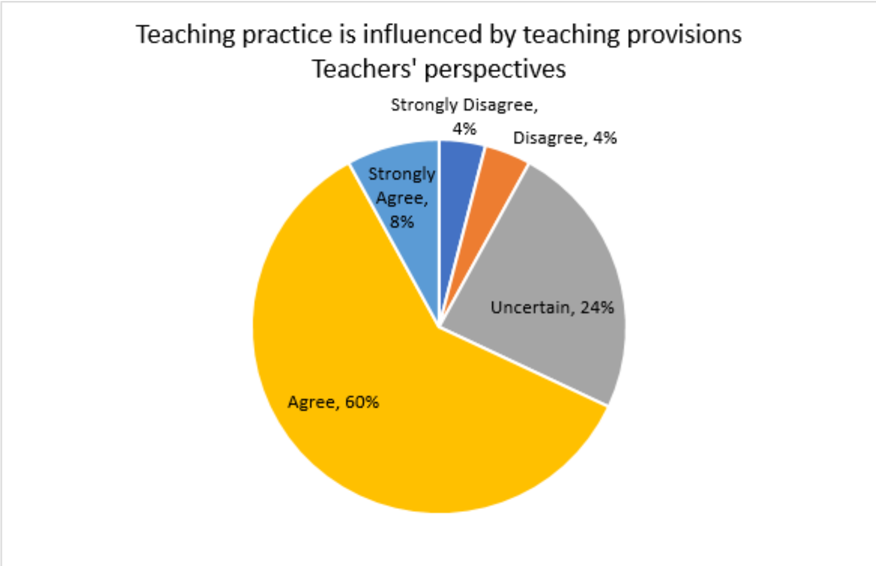



> *Assertion 27*
>
> *Teachers identify time as the most important provision required to better serve the education of G & T students in science. This links with Assertion 25 where teachers' own initiatives, that require their time, are what primarily provides for G & T students.*

Teachers (*N*=25) were asked, using a Likert-scale question, if their teaching practice was influenced by their teaching provisions. Their responses are displayed in Figure 4.24.

**Figure 4.24**

*Teaching Practice is Influenced by Teaching Provisions, the Perspective of Teachers (N=17)*




Of the 25 teachers who responded 68% (*N*=17) strongly agreed or agreed that their teaching practice is influenced by their teaching provisions. More teachers were uncertain than those who disagreed or strongly disagreed.

| |
|---|
| *Assertion 28* |
| *Teachers believe that their teaching practice is influenced by their teaching provisions. This links with Assertion 27 and 25.* |

**4.3.4.3 Parents.** Parents (*N*=76) were asked what they would like in the educational system to support G & T students. Teacher education was the most indicated need. Other requirements included system provisions. Themes are presented in Table 4.26. Parents' responses are displayed by theme and percentage in Figure 4.25.

**Table 4.26**

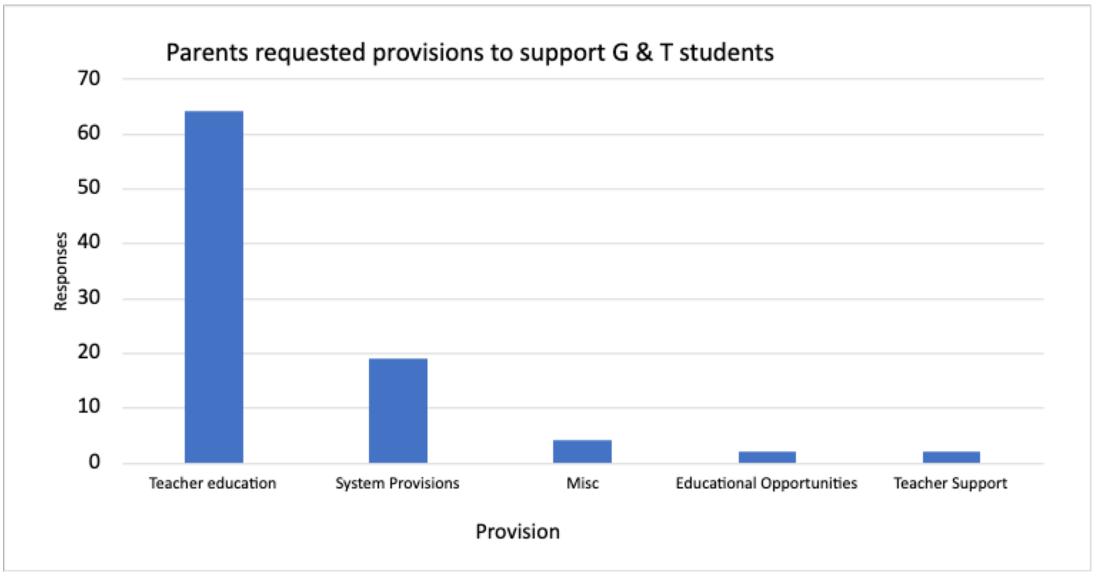
*Parents' Requirements for the Educational System to Better Support G & T Students*

| Theme and summary | Excerpts |
|---|---|
| **Teacher education**<br><br>The responses for teacher education predominantly mentioned education for understanding and awareness of the non-academic aspects of G & T students/children.<br><br>Asynchronous development and Twice exceptional were areas that Parents believed that teachers were not educated.<br><br>Teacher education is displayed by subtheme in Figure 4.26 and Table 4.27 for axis labels. | • *Generally, teachers need more training not just in identification, also in actually providing evidence-based services to gifted and 2E children.*<br>• *I would like teachers (and principals) to know what gifted kids are, to know the difference between gifted and bright, to support gifted kids, to follow through with educational options an IEP's. Mostly, to think flexibly. Oh, and it would be nice if the education system offered some support rather than none.*<br>• *A greater understanding of what giftedness actually is and its implications, i.e., not just 'smart'. Better differentiation and individual learning plans.*<br>• *All teachers should have gifted training, particularly in the areas of 2E, underachieving, and asynchronous development.*<br>• *We need more recognition for the asynchronous development that occurs in gifted children.*<br>• *The systems need the ability to cope with my child's asynchronous development and emotional regulation issues. She should not be labelled a problem from the start and lose sight of the amazing things she is capable of.*<br>• *Understanding and compassion instead of perceiving gifted children as the lucky ones who don't need assistance. Teachers need training to understand the very real difficulties they face, including boredom, fitting in with peers, emotional lability, mental health issues etc.* |
| **System provisions**<br><br>System provisions are displayed by subtheme in Figure 4.27. System provisions were the next most common provision after teacher training. and was the predominantly mentioned provision other than those for direct academic needs. | • *Administrators also need to improve their understanding and acceptance of acceleration (including radical acceleration for those who need it), so that their teaching staff can then be free to implement viable programs for the children that they identify.*<br>• *A child with dyslexia is catered for in the educational system, yet it's currently acceptable for gifted children to have their educational needs actively denied.*<br>• *More care for the unique mental health needs of gifted children.*<br>• *In a nutshell, flexibility and understanding.*<br>• *Flexibility because just as not every child learns the same way, not every gifted child is the same.* |

| | |
|---|---|
| | • *Individual planning for all children that is flexible goal driven and assessment and outcome based.*<br>• *More flexibility with acceleration and other personalisation tools to engage these kids. A one-size-fits-all approach to education does not work for anyone.* |
| **Miscellaneous**<br>Miscellaneous responses included monetary funding, resources and support for rural families and schools. | • *Support for rural students to attend schools that will meet their needs. Families are forced to pay expensive costs for boarding school with no financial help. They are not eligible for isolated children's payment. These children and families are being socially segregated.*<br>• *Scott Morrison said just after being elected every child and family should have a choice for public or private education, where is our choice???? (rural education)*<br>• *... more funding, more resources,...* |
| **Educational opportunities**<br>The two responses that mentioned educational opportunities were for exposure to research or universities, and out of school opportunities. | • *Exposure to post graduate tutors involving them in the Undergraduate Research Centre (URC), research projects like happens in Tel Aviv* |
| **Teacher support**<br>One response received stated teacher support is required for successful gifted education<br>Traditionally one response is not a theme but it has been included to provide a voice to show that parents acknowledge teachers need support. | • *Continuous support to teachers to help them with how to support different gifted kids* |

**Figure 4.25**

*Provisions required by Parents (N=76) Support G & T Students*




*Note.* The number of responses does not equal the number of participants

#### 4.3.4.4 Teacher Education

Teacher education (*N*=64) was the most commonly identified provision required. Teacher education further analysed to understand what type of teacher education Parents require. These responses are displayed in Figure 4.26 with the data labels presented in Table 4.27

**Figure 4.26**

*Teacher Education Needs to Support the Education of G & T students, as Perceived by Parents*

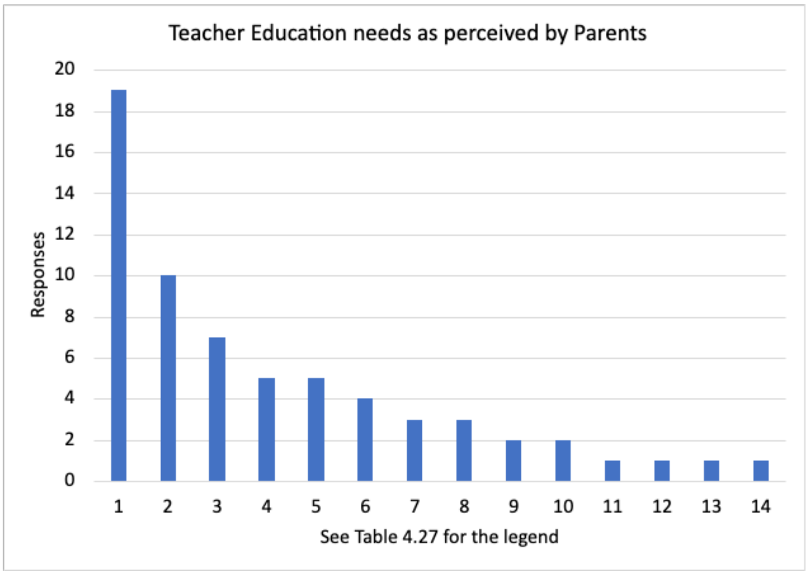


**Table 4.27**

*Data Labels for Figure 4.26 Teacher Education Needs to Support the Education of G & T Students, as Perceived by Parents*

| Number | Label |
|---|---|
| **1** | Teacher education not specified |
| **2** | Education to improve perceptions/understanding of giftedness |
| **3** | Education to understanding individuality |
| **4** | Education to improve understanding and support asynchronous learning and development |
| **5** | Education in identification processes |
| **6** | Education to differentiate successfully |
| **7** | 2E education strategies and awareness |
| **8** | Educators to recognise levels of giftedness |
| **9** | Improved/more understanding of disruptive behaviours |
| **10** | Education to understanding underachievement |
| **11** | Education to recognise disability and gifts |
| **12** | Education to understand and respect identification from registered professionals |
| **13** | Education to understand that gifted children still need assistance |
| **14** | Education to understand that gifted children have the right not to use gifts |

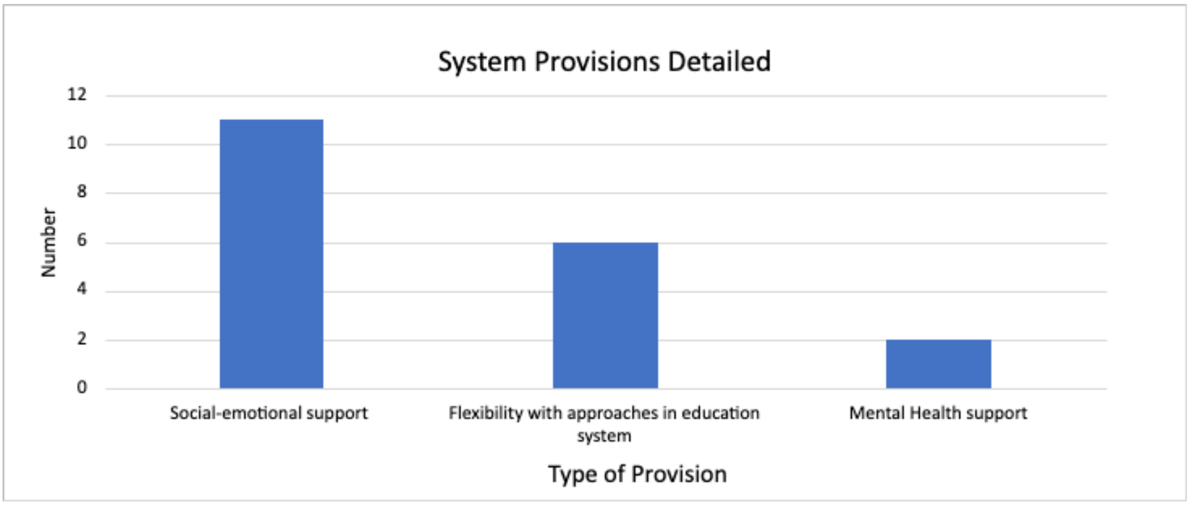
The labels indicated by the numbers 2, 3, 4, 8, 9, 10, 11, 12, 13, and 14 were added together to give a total for teacher education for understanding and awareness of the traits and needs of gifted students. These accounted for 33 of the 64 (52%) of the responses.

19 (30%) of the other responses were unspecified education, and 12 (19%) were for identification, differentiation, or 2E education strategies and awareness. 2E education strategies and awareness were considered more about student learning rather than awareness.

**4.3.4.5 System Provisions.** Parents indicated a need for system provisions (*N*=19). These were divided into three themes within system provisions: Socio-emotional support, flexibility with approaches in the education system, and mental health support and are displayed visually in Figure 4.27.

**Figure 4.27**

*System Provisions Needed According to Parents, Displayed by Theme*




Similar to the responses about teacher education for understanding giftedness, the system provisions were support for the G & T student other than academic education. Some excerpts of comments that contained responses for teacher education, system provisions and other identified themes are presented in Table 4.26.

*Assertion 29*

*Parents state that teacher education is the most needed provision to support G & T students. The greatest need is for teacher education to improve awareness of the traits of gifted children and an understanding needs of their needs. Teacher education is followed by the need for a systems approach to support G & T students.*


### 4.4 With Practices Defined as Teaching Strategies, or Pedagogy, What Practices are Enacted by Individual Teachers for G & T Students in the Context of Science?

This question was answered by using data collected from Expert Educators' interview responses, and responses from teacher and parent questionnaires. Responses were divided into Aspects in a similar way to sub research question 2, 3, and 4. Aspects contributing to answering sub research question 5 were

5A. Pedagogy teachers find useful to support G & T science students

5B. Expert Educators support for those who teach G & T students

5C. Educators beliefs about the status quo of the pedagogy for G & T science students

  i. Pedagogy required for G & T science students

5D. Do teachers alter their pedagogy for G & T science students? If so, how?

Many of the responses received related to provisions rather than pedagogy. This was similar to when teachers were asked about provisions, they responded with comments about pedagogy. It is unclear why this occurred, given that both pedagogy and provisions were defined in the question. Teachers may not distinguish between provisions and pedagogy, provisions and pedagogy may be intertwined for teachers, or teachers may have used the opportunity to comment in either question as their ideas came to mind. There are some elements that are difficult to place discretely in provisions or pedagogy only. For example, time, teacher education, acceleration, and the syllabuses. In this research, the former two elements were categorised as provisions, and the latter two, pedagogy. However, other educators may categorise them differently. For this reason, some excerpts may include elements from both provisions and pedagogy.

*Assertion 30*

*Some teachers do not correctly separate provisions and pedagogy. Although, it is noted that some elements are not clearly one or the other.*

*Hypothesis 1*

*Learning and achievements of G & T students will improve if specific and structured pedagogical approaches are implemented.*

*(This may be supported through professional learning for educators).*

#### ***4.4.1 Aspect 5A - Pedagogy Teachers Find Useful to Support G & T Science Students***

Teachers (*N*=33) were asked using an online questionnaire what pedagogies they found useful to support G & T students in science. Only one theme was emerged with smaller sub components, Student driven and directed learning (*N*=11). Specific pedagogies that were mentioned more than once were inquiry-based learning (*N*=4), project-based learning (*N*=3), acceleration (*N*=2), and thorough training in basic skills e.g., writing scientific reports (*N*=2). Other comments related to provisions. Student driven and directed learning is presented in more detail in Table 4.28.

**Table 4.28**

*A Student Driven and Self-Directed Pedagogies are Useful to Support G & T Science Students*

| Theme and Summary | Excerpts |
|---|---|
| **Student driven and directed learning**<br>Teacher comments indicated that the new Science Extension syllabus and the Depth Studies in the others allow for students to explore and drive their learning within their areas of interest.<br>Teachers stated that independent projects and individual learning are important and helpful for gifted students. | • *..this allows for self-differentiation. Science Extension course is hitting the mark for the brightest students in year 12. Stage 6 syllabuses have been rewritten and the inclusion of depth studies should take these students to the next level.*<br>• *A master and apprentice pairing such as used for honours or PhD, with an expert available for discussions that enable the students to drive and direct learning.*<br>• *Constructivist learning, self-guided through a multitude of scaffolded high order tasks.* |

> *Assertion 31*
>
> *Teachers believe that student driven and directed pedagogy is useful for G & T science students. In particular, the Depth Studies and Science Extension Syllabus for Stage 6 (Year 11 and 12) are suitable to do this.*

### *4.4.2 Aspect 5B – Expert Educators support for those who teach G & T Students*

Expert Educators (*N*=9) were asked what they are planning to do, or currently do, to support teachers with G & T science students. The themes that emerged were syllabus/curriculum, leadership, and assessment. Table 4.29 presents a summary of the identified themes and excerpts.

**Table 4.29**

*Support Provided by Expert Educators for Teachers of G & T Science*

| Theme and Summary | • Excerpts |
|---|---|
| **Syllabus/curriculum**<br>Expert Educators acknowledge that the new science syllabuses, including Science Extension and the depth studies, are an important pedagogy. These syllabuses have an inquiry-based science pedagogy embedded using inquiry questions rather than the previous dot point syllabus strategy.<br>Problem solving pedagogy can be used more easily in the new syllabuses and allow the students flexibility and freedom to learn rather than remember. The syllabuses are open for interpretation.<br>One comment stated the importance of using these syllabuses to let the students go further. | • *From a system perspective I think some of our levers are new syllabuses. These initiatives are starting to break open space and allow students a bit of freedom.*<br>• *The new science syllabuses give space for that sort of development and the opportunity for differentiation along the spectrum.*<br>• *NESA has developed syllabuses that are open for interpretation by teachers. A lot of them (teachers) hate it but once they understand, they are empowered the to make decisions.* |
| **Leadership**<br>Co-teaching and leadership support were noted as an important teaching strategy. Leaders encourage more than one teacher in the classroom so that administration can be managed without the teaching and learning taking second place. The leaders can see the good questions to ask students when they are not distracted.<br>Expert Educators acknowledge the hard work that teachers are putting in to prepare for their classes. | • *I think in the lessons where you are observer it's a lot easier for you to come up with those questions. In my role in leadership sometimes I'm co-teaching and the other teacher in the room is a lot more focused on the day to day today grind e.g. marking of the roll, making sure everyone is on task, that everything is working. Where my role, and it certainly is some classes, has been to ask those really nice questions, to get that student to take them (their thinking) to the next level. They are they're doing the work; they're understanding the work and then I ask them that question it's going to really test their knowledge. If all teachers can do that that would be the optimum, but all the day today running a classroom gets in the way of that and I can understand that too.* |
| **Assessment**<br>Expert Educators acknowledge that learning should not be for assessment and are encouraging teachers to see this.<br>Similarly, when students spend time making models and dioramas in science classes this takes away from the learning the science and true research/individual work. | • *I think allowing students to take a little bit of control and to be able to take something that they've observed, turn it into something they can actually inquire into without the over restriction of "yes, but you have to learn this for the test".*<br>• *I have heard science teachers talk about student individual research projects and they say "the syllabus says we only have to one each stage so that's all we do. We don't do more than that, just one each stage because where do you put them all? There's not enough room, if they all do dioramas or models". That's because the practice is that everyone has to do the same thing at the same time.* |
| **Miscellaneous**<br>One Expert Educator acknowledged that luck sometimes helps you find the right strategy. | • Expert Educator told personal story – withheld for brevity and anonymity. |

*Assertion 32*

*Expert Educators*

- *are encouraging inquiry-based teaching strategies science in classrooms. This is partly through the new science syllabuses*
- *model good teaching pedagogies for teachers*
- *are discouraging learning for assessment only*
- *acknowledge that teachers and leadership need assistance to support G &T students.*

*Assertion 33*

*Expert Educators and Teachers encourage individual research that is student driven and directed, to support and further the education of G & T students in science.*

*Assertion 34*

*NSW Science Syllabuses, K-6 and Stage 6, have an embedded inquiry-based pedagogy. These syllabuses allow for gifted students to go into depth with "depth studies" and the science extension syllabus.*

### *4.4.3 Aspect 5C - Educators Beliefs About Appropriateness of Current Pedagogies G & T Science Students*

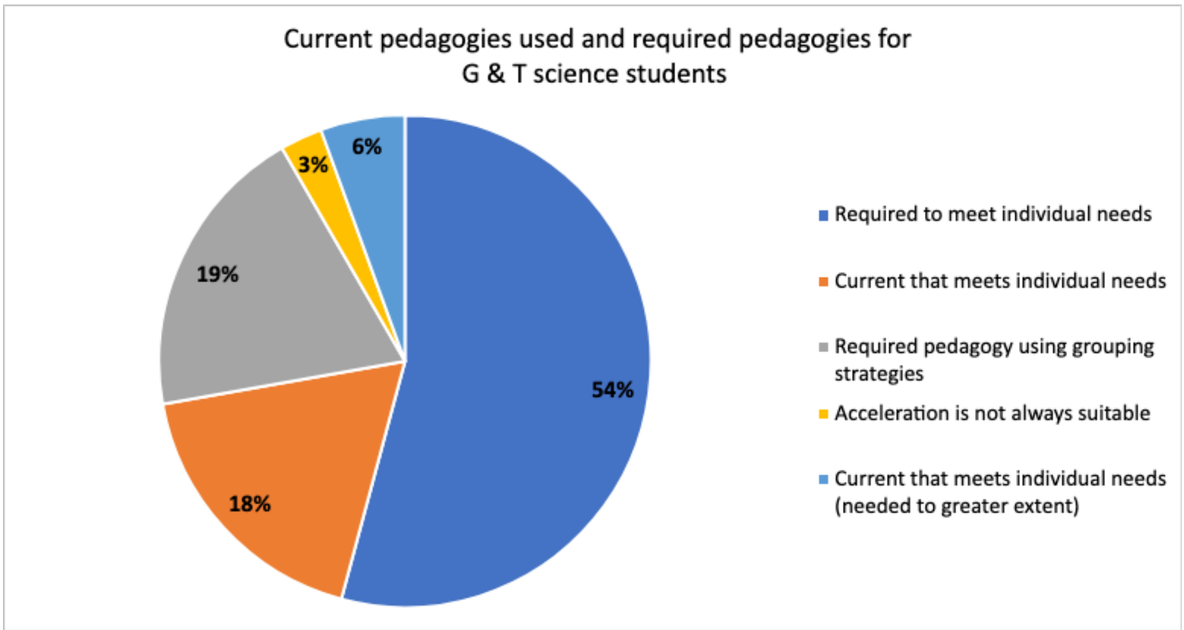
**4.4.3.1 Expert Educators and Teachers Beliefs About Appropriate Pedagogies.** Two themes emerged regarding educators' (*N*=67) beliefs about the pedagogies used, or that are available for G & T science students. Individual student pedagogies and pedagogies based on grouping strategies. To further define the themes, individual student pedagogies can be used for multiple students within a class, or can be used for the whole class. However, they are not about separating and grouping gifted students. Pedagogies based on grouping strategies are for selected groups of gifted students and include separate gifted or extension classes.

Individual student pedagogies were divided into three sub-themes, current individual pedagogies, required individual pedagogies, current individual pedagogies needed to a greater extent. There were no sub-themes for pedagogies based on grouping strategies.

Some educators commented on more than one pedagogy so the data presented are based on the number of times there was a response in each theme, not the number of educators responding. These data are visually displayed in Figure 4.28

**Figure 4.28**

*Status Quo of Science Pedagogy According to Educators, Grouped by Type, Individual or Group Strategies, and Current or Required Pedagogy*



As presented in Figure 4.28, 79 % (54%, 19%, 6%) of the comments by educators, Expert Educators and Teachers, were about pedagogies that are required for G & T students. Current pedagogies for individuals comprised 18% of comments. It was noted that (*N*=4, 3%) that acceleration is not always suitable. 19% of comments were about pedagogies required that using grouping strategies.

Table 4.30 provides excerpts from Expert Educators and a summary of their beliefs about some of the pedagogies that are used. Table 4.31 provides examples of the current pedagogies based on meeting individual needs, and those based on grouping strategies and grouped. The pedagogies required to meet the needs of an individual student will be addressed alongside the beliefs of Parents.

**Table 4.30**

*Expert Educators Comments on Pedagogies Used for G & T Students*

| Theme and Summary | Excerpts |
|---|---|
| **Acceleration** They noted that the accelerated classes are important but they need to be based on academic ability and very specific. They flagged that G & T programs do not always work well. | • *I agree with it (acceleration) but it really has to be specific.*<br>• *I think after seeing the accelerated classes they are not really aimed at gifted and talented students.*<br>• *I just don't think you can go to a school and choose the 10 smartest kids and say they need to be accelerated. I think it's a very specific argument for a very specific issue. You could have a school that could have quite a few (G & T students), you go to selective school they may have half a dozen that you could accelerate very easily, you go to another school and they may have only one in every 10 years.* |
| **Syllabus**<br>The new science syllabus incorporates depth studies which allow for individual learning, interest, and in-depth studies. Science Extension is providing opportunities for gifted students to take their learning further and showcase their ability. These two opportunities allow teachers and students to come up with their own learning plans. The mathematics syllabus is separated into 5.3, 5.2, and 5.1 to allow for ability differences. This should be incorporated into the science syllabuses. | • *I think the way things have gone, particularly in terms of the syllabuses for the senior sciences is good. I think things like the depth studies and certainly extension provide for that individuality*<br>• *And what's depth look like for each kid because it's going to look different isn't it? For some students, depth is still going to be surface for another kid. Whereas another kid is going to do something that is going to get them a Nobel prize or something eventually.*<br>• *One of the things I really would love in the science syllabus is, similar to maths where students can study levels such as the 5.3, 5.2 and 5.1 Syllabuses.* |
| **General**<br>Expert Educators acknowledged that depth is going to look very different for each student and teachers need to move away from teaching the content. Content is something that students can access on their own. Application of the content and making meaning is a better use of time.<br>Expert Educators acknowledge they still need assistance to support G & T students.<br>Science pedagogies should spark curiosity in students. They should be based on asking good questions. Inquiry-based learning. | • *Differentiation is really important for those students who are G & T. To be able to push them is really important because they can keep going. Last year I had a chemistry student who had higher abilities than me, and I knew this from the way his mind worked. Being able to help those students and find out what they want to do is something I am trying to do now but I would like to do more in the future. If I could get some support in that it would be great. Probably more specific in terms of like the extension science course that we have at the moment, that is leaning in the direction where they can do their own research and follow their own interests. That is something more tailored for the individual, that is more specific and students can follow through with that.* |

| | |
|---|---|
| Expert Educators acknowledge that some teachers need further support to understand effective science teaching that sparks the curiosity of students.<br><br>It was noted that the pedagogies are moving in the right direction with problem and project-based learning starting to become more prevalent. | • *We have one person whose whole way of teaching science is to put up over heads, projection up and kids copy that. Well I don't know how you expect kids to learn from that or what you expect kids to learn from that but it's not science, it's not anything really. So, it's working with them as people, as educators to understand learning. How children learn and what are the roadblocks to their learning and the door openers to their learning.*<br>• *It's about activating their curiosity with good questions. All education is about good questions, in the sciences it's probably more so. Setting up those good questions where the students have to think about answers and then change the initial situation on them so giving them a different situation to mix it up. It's got to be about that spark in their curiosity to look into things more deeply.*<br>• *I think maybe not so much the syllabus, a lot of the syllabus', but more so the pedagogy the teachers are trying to put in place going in the right direction, heading in the right direction.*<br>• *I think that that is something that is "happening" across the board. Project based learning in it's coming in and, problem-based learning in mathematics.*<br>. |

**Table 4.31**

*Examples of the Current Pedagogies used to Meet Individual Student Needs, and Those Based on Grouping Strategies. Expert Educators and Teachers*

| Pedagogies to Meet Individual Student Needs | Pedagogy Based on Grouping Strategies |
|---|---|
| **Current pedagogies** | |
| • Additional videos | |
| • Encourage to have own goals | |
| • Extra/additional work | |
| • Extra work for greater understanding | |
| • Puzzles and quizzes for self-assessment | |
| • Students to map own learning for one term | |
| • Acceleration is not always suitable | |
| **Current pedagogies used but needed to a greater extent** | |
| • Good questions to activate curiosity | • Extension classes |
| • Good teacher preparation | • Specific classes for gifted students |
| • Prepared extending prompts | |
| • Inquiry-based learning | |
| • Acceleration/ Grade skipping | |

**4.4.3.2 Pedagogy Required for G & T Science Students According to Educators and Parents.** Three themes emerged when Parents (*N*=76) were asked about the pedagogies required for G & T science students. These were assessment, grouping strategies, and pedagogies to meet individual learning needs. These have been visually displayed in Figure 4.29 and 4.30 to show the percentage of responses in each theme for Parents and Expert Educators respectively.

**Figure 4.29**

*Perceptions of Parents (N=76) Beliefs About Required Pedagogies to Support G & T Students by Individual Learning Needs, Grouping Strategies, and Assessment*

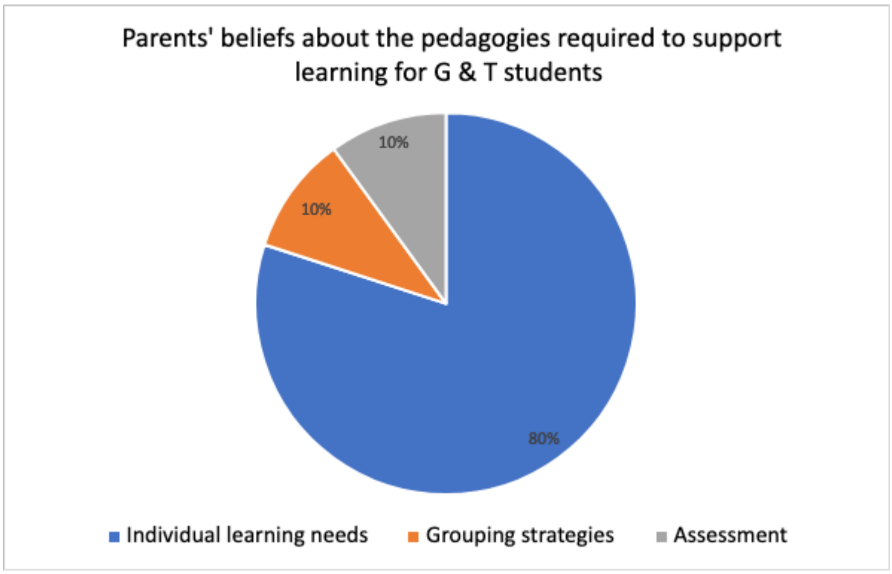
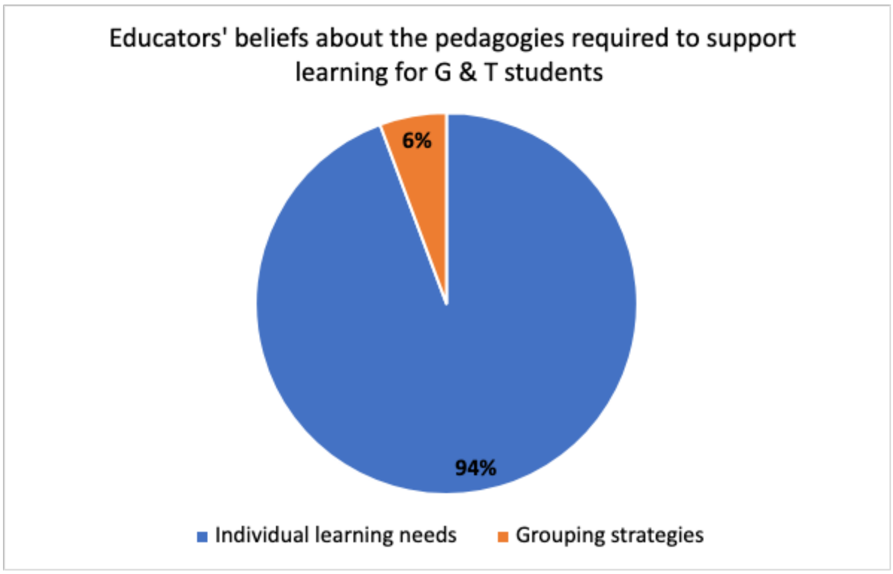



**Figure 4.30**

*Perceptions of Educators (N=67) Beliefs About the Pedagogies Still Required to Support G & T Students by Individual Learning Needs and Grouping Strategies*




Educators and Parents believe that pedagogies that address individual learning needs are required more than grouping strategies. As noted by Parents, current assessment practices are not suitable for G & T students. Reasons for this include that gifted students do not always test to their ability. In Aspect 5B (section 4.4.2), Expert Educators state that assessment is an area that they would like to support. The specific pedagogies that are required for G & T students are presented in Table 4.32.

**Table 4.32**

*Specific Pedagogies That Educators and Parents State are Required for G & T Students*

| Educator | Parents |
|---|---|
| **Individual strategies** | |
| • Challenging learning, work, and environment<br>• Exposure to research/universities<br>• Individual learning<br>• Project based learning<br>• Acceleration<br>• Extension<br>• Grade skipping<br>• Accelerated curriculum, off curriculum extension<br>• Alternative pathway for disengaged students<br>• G&T need support for higher order thinking not more material at higher level<br>• Inquiry Based learning<br>• Learning at school should replicate life - different depth for different people at different times and different rates<br>• Learning opportunities with no ceiling<br>• One on one interaction is important<br>• Teachers not dictating what students must learn<br>• Students:<br>    • can be more advanced than the teachers - need self-directed learning strategies<br>    • drive and direct learning<br>    • need a reason for what they are learning<br>    • need opportunity to break away from scaffolds<br>    • need to be able to take responsibility for their own learning.<br>    • should be allowed to progress at different rates - we do this poorly | • Challenging learning, work, and environment<br>• Exposure to research/universities<br>• Individual learning<br>• Project based learning<br>• Acceleration<br>• Extension<br>• Grade skipping<br>• Differentiation<br>• Options for upper end<br>• Earlier extension/enrichment programs/acceleration<br>• Extension from kindergarten |
| **Grouping strategies** | |
| • Specific classes for gifted students | • Multi-age classes (ability based)<br>• General grouping strategies<br>• Selective upper primary |
| **Assessment** | |
| | • Less assessment, reliance, emphasis on school assessment<br>• Gifted students do not always test well |

*Assertion 35*

*Educators and Parents with Others believe that pedagogies based on the individual student are required more than pedagogies involving grouping strategies to support the educational needs of G & T science students.*

*Assertion 36*

*Expert Educators and Teachers make comments regarding, going further, going deeper, solving problems. However, many of the pedagogies mentioned require student motivation and self-management, amongst other traits. There is no mention how, or when, these skills are specifically taught and practiced. It is implied that they are inherent in gifted students.*

*Assertion 37*

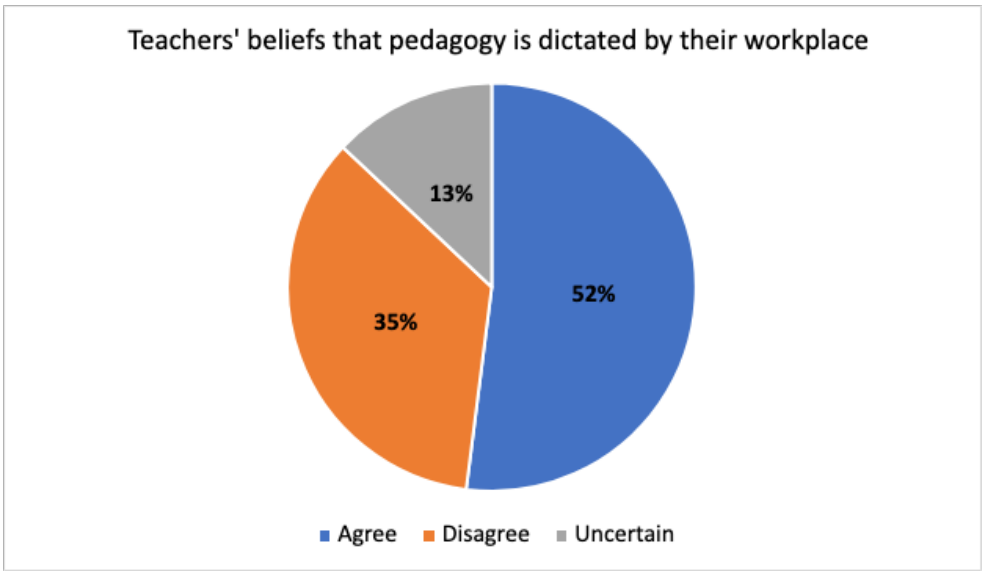
*Expert Educators believe that acceleration should be a very specific option for specific reasons, not a strategy that is used without careful consideration.*

### ***4.4.4 Aspect 5D - Do Teachers Alter Their Pedagogy for G & T Science Students? If So, How?***

Using an array-style question, Teachers (*N*=23) were asked and if their workplace dictated the pedagogies they use in the classroom. Their responses are displayed by percentage in Figure 4.31.

**Figure 4.31**

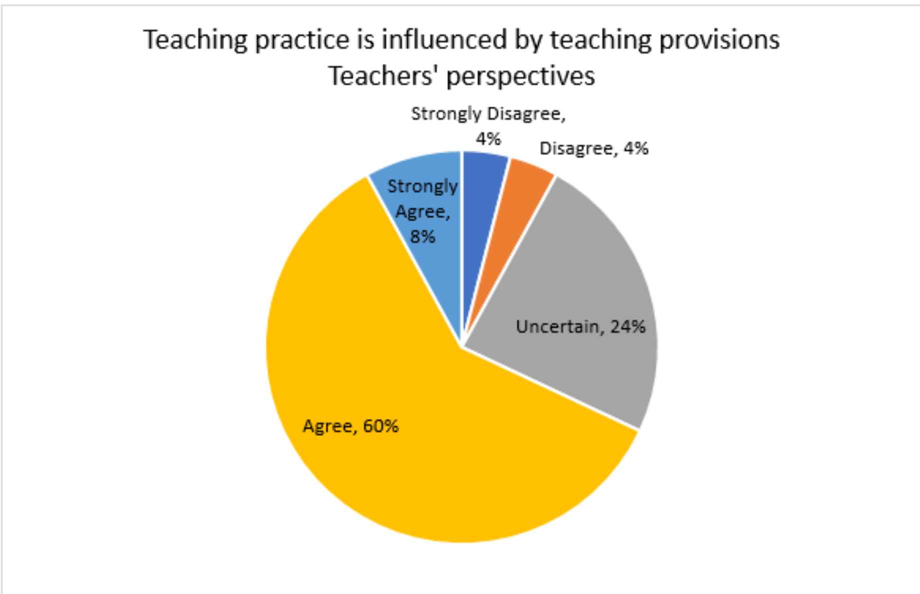
*Teachers (N=23) Who Believe That Their Pedagogy is Dictated by the School Where They Work*




Slightly more than half of the Teachers (52%) indicated that their pedagogies are dictated by the school where they work, 13% were uncertain, and 35% disagreed. There were no reasons given for these beliefs. However, as shown in Figure 4.32, 68% of teachers believe that their provisions influence their pedagogy and from sub research question 4, more time is needed to better serve the educational needs of G & T students.

**Figure 4.32**

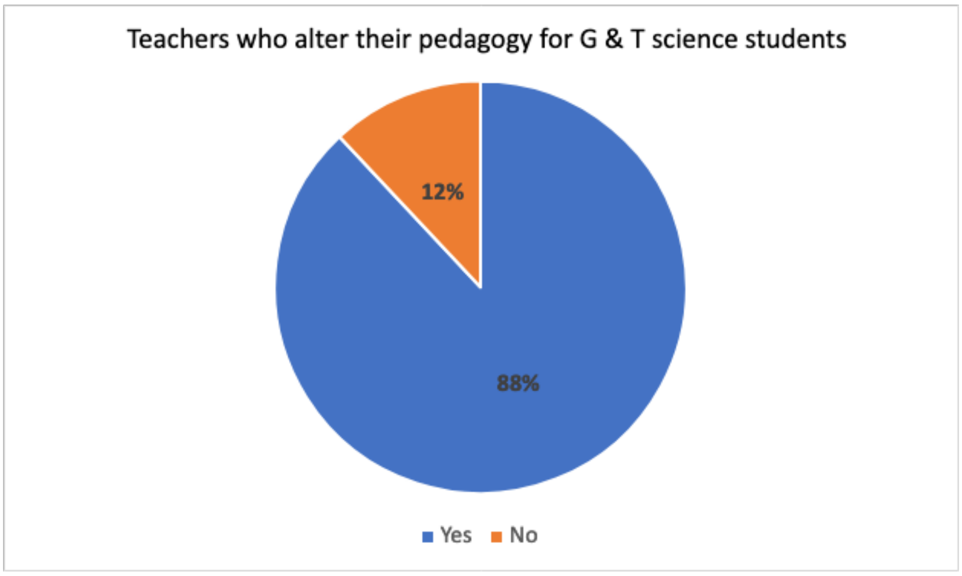
*Teaching Practice is Influenced by Teaching Provisions, the Perspective of Teachers (N=17)*



Again, using an array-style question, Teachers (*N*=25) were asked if they altered their pedagogy for G & T students. If their pedagogies were altered, they provided comments how they were altered. If they did not alter their pedagogies, they provided reasons for this. Figure 4.33 displays their responses by percentage

**Figure 4.33**

*Teachers Who Alter Their Pedagogy for G & T Science Students (N=25)*




Most Teachers (88%) indicate that they alter their pedagogies for G & T science students. The way that Teachers alter their pedagogy has been presented in Table 4.33. Two categories are used. Pedagogies that are used for the individual and pedagogies that may benefit the whole class

**Table 4.33**

*Teachers Changes in Pedagogy for G & T Students*

**Teachers' Changes in Pedagogies for G & T Students**

**Teachers alter their pedagogies to suit an individual**

Teachers alter their pedagogy using strategies that are individualised for the gifted student. These include:

- Additional enrichment
- Additional excursions
- Alternative content
- Encourage to achieve at a higher level
- Extension of concepts and vocabulary
- Faster pace
- Focus on higher order thinking
- Good planning with lessons that have scope for extension
- Independent work
- Individual extension
- Less scaffolding
- More depth
- More engaging and/or enriching tasks
- Problem solving
- Students planning own experiments

**Teachers alter their pedagogy that may benefit the whole class**

Teachers alter their pedagogy using strategies that would typically benefit the whole class. Flipped classroom pedagogy is rarely used for one student employs a whole class participation. Similarly, good questions would be posed to the class, including the individuals who are determined to be gifted.

- Good questions
- Flipped classroom
- More research tasks

When teachers do not alter their pedagogies for G & T science students, they state reasons such as: behaviour, student engagement, no resources, and no time for additional pedagogies.

**Questionnaire Quotes - Teachers**

- *I find it difficult to teach GAT students. This wasn't covered at university, and most of my strategies are based on trial, error and experience. I'm trying to find PL courses that target GAT teaching strategies, but there doesn't seem to be a lot around.*
- *I think the aim is to have planned class activities that have a scope for extension of students who are excelling in Science but often this can become difficult when there are time pressures.*
- *I do believe that all students would benefit from GAT teaching strategies (modified for lower ability) and will achieve higher than what they could have before using traditional pedagogy.*
- *I don't believe they are modified as effectively as they could be*

*Assertion 38*

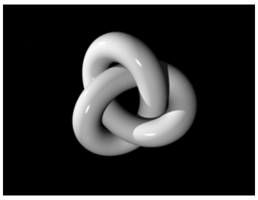
*Most teachers state that they alter their pedagogies, on an individual student basis, for G & T science students*

*Assertion 39*

*The strategies that Teachers indicate they would like to use to a greater extent require time and resources.*

*Hypothesis 2*

*Teachers would enact more effective pedagogies for G & T students if they were allocated more time and resources.*



## 4.5 When Presented With Alternative Models for G & T Education, What are Educators' Perceptions of Their Appropriateness for Science Education?

This question was answered by using data collected from Expert Educators' interview responses, and responses from Teacher, and Parent and Others surveys. Responses were divided into aspects in a similar way to sub research question 2, 3, 4, and 5. Aspects contributing to answering sub research question 6 were:

6A. Expert Educators believe Renzulli's Model for giftedness is the most appropriate
6B. Creating policy elements for gifted education, Expert Educators and Teachers – four parts
6C. The purpose of gifted education according to Teachers and Parents
6D. Underperforming G & T and gifted programs
6E. The age that giftedness presents may affect policy

### *4.5.1 Aspect 6A – Expert Educators Believe Renzulli's Three Ring Model for Giftedness is the Most Appropriate*

Expert Educators were presented with four G &T models, Gardner's models of multiple intelligences (Gardener, 1989), The Munich Model (Heller et al, 2005), Renzulli's Three Ring Model (Renzulli, 1894) and the current model for G & T education, Gagné's DMGT (Gagné, 2013). Expert Educators were asked to comment, with reasons, which model or models they believed to be the most appropriate. Of the eight responses, six (75%) Expert Educators selected Renzulli's three ring model as the most appropriate giving the reason that it was simple and clear. It was noted that there is a lot of content that can be unpacked. Two Expert Educators chose other models. Their reasoning and comments on the models are presented in Table 4.34.

**Table 4.34**

*Expert Educators Perceptions About Models for Giftedness*

| **Model** | **Paraphrased Responses** |
|---|---|
| **Renzulli Three Ring Model**<br><br>(Six Expert Educators selected as most appropriate) | **Positive**<br>• There is simplicity but also there is a fair bit in it.<br>• Task commitment is important because without it you have underperformance.<br>• Creativity is not replicating someone else's work. It is bringing something new to the table<br>• Scientists who have broken new ground are those who have gone out on a limb. A step beyond the current approach. A willingness to be creative and think differently<br>• Educators need to be able to address the things that distract from task commitment and look at the outside factors.<br>• It highlights that we need to support G & T and ask why if they do not have task commitment<br>**General**<br>• How do we as educators have an impact on areas of creativity? What are we doing differently than 100 years ago?<br>• Creativity and task commitment without ability does not always produce successful outcomes<br>**Negative**<br>• Renzulli's model is not good as it talks about task commitment and many gifted students do not have this. |
| **Munich Model**<br><br>(One Expert Educator selected as most appropriate) | **Positive**<br>• The Munich model takes into account that they have to perform (do something) which means they need the opportunity to show they are gifted or to develop this. |
| **Gardner's Multiple Intelligences**<br><br>(One Expert Educator selected as most appropriate) | **Positive**<br>• This model reflects the domains where students have ability<br>• There will be gifted students across many areas but to say a child is advanced across all areas is not right.<br>**Negative**<br>• Gardner's model illustrates the way we learn but is not about G & T |
| Gagné's DMGT | **Positive**<br>• Gagné's model makes sense in that talent is developed. Gagné's model feels like there is room for growth. |
| **General Comments** | • The model is not important, it should be a case of what are we going to do now they are identified.<br>• Models should be subject/domain specific |

*Assertion 40*

*The majority of Expert Educators agree that a simple, understandable model is needed to guide G & T education.*

*Assertion 41*

*Renzulli's Three Ring model was preferred by 75% of Expert Educators.*

*Hypothesis 3*

*Many educators view the other aspects of G & T models e.g., motivation, creativity, performance, as an intrinsic part of giftedness, in the same way they view ability and IQ.*

### *4.5.2 Aspect 6B – Creating Policy Elements for Gifted Education*

Educators were asked to create policy elements for G & T education in Australia to address the needs of G & T science students. Expert Educators were interviewed and had the opportunity to verbally elaborate on their responses. They could also use diagrams and pictures. Teachers provided their responses through an online survey and some provide written elaborations.

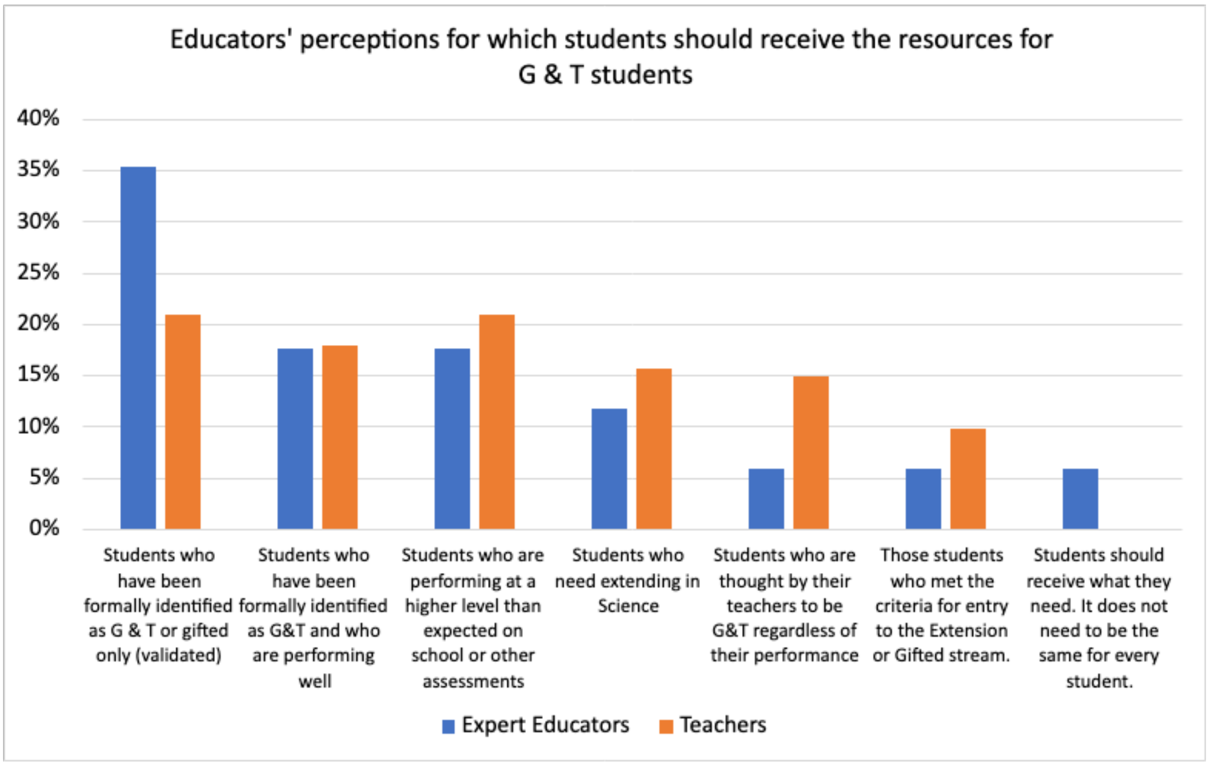
The four questions asked were based on the literature presented in Chapter 1. These questions were:

1. Which students should receive the resources?
2. Who should administer and provide the resources?
3. How should the resources be delivered?
4. Under what conditions should the resources be delivered?

**4.5.2.1 Who Should Receive the Resources for Allocated Gifted and Talented Students?** Expert Educators' (*N*=9) and Teachers' (*N* =46) belief about who should receive the resources for G & T students were selected from the provided options, or one of their own. More than one option could be selected. Therefore, the number of responses does not add to the number of educators. These data have been displayed by percentage in Figure 4.34 for comparison between Expert Educators and Teachers. An excerpt box is provided.

**Figure 4.34**

*Educators Perceptions for Which Students Should Receive the Resources for G & T Students*




The response most often selected by Expert Educators (35%) was "Students who have been formally identified as G & T or gifted only". The response most often selected by Teachers (21%) was "Students who are performing at a higher level than expected on school or other assessments".

Seven of the nine (78%) Expert Educators and 35 out of 46 (76%) Teachers indicated that students who receive the resources for G & T should be formally tested and identified as G & T or gifted. These were the first two options as presented in Figure 4.34. This is displayed visually by participant group in Figures 4.35 and 4.36

**Figure 4.35**

*Expert Educators' Belief That Those Who Receive the Resources for G & T Students Should be Formally Tested and Found to be Gifted*

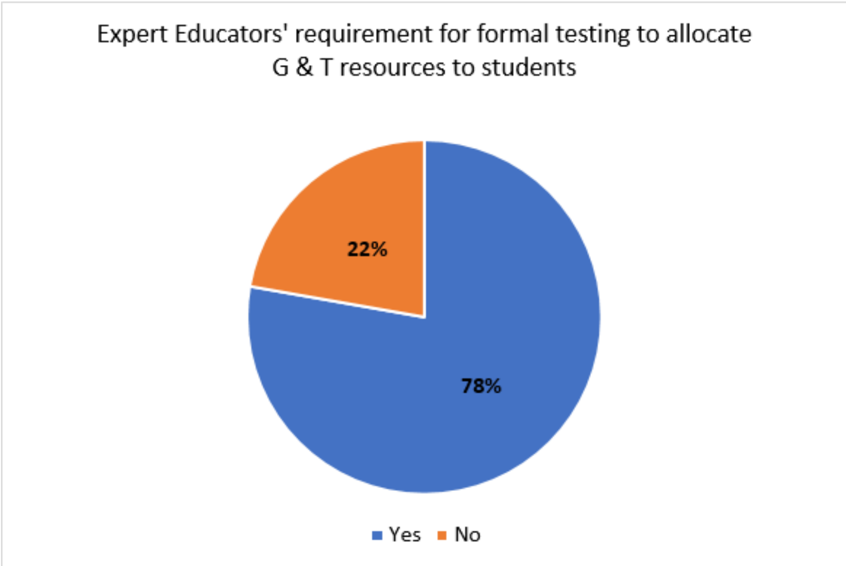
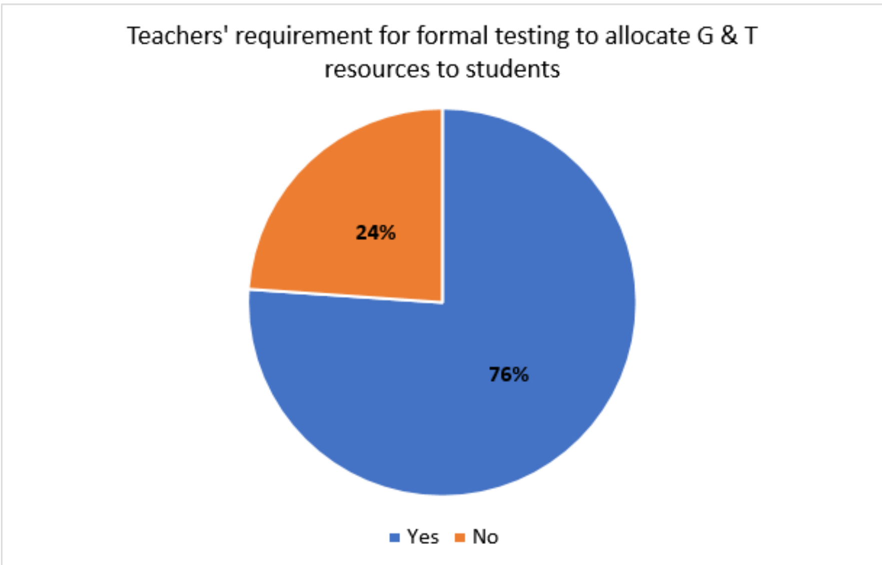



**Figure 4.36**

*Teachers' Belief That Those Who Receive the Resources for G & T Students Should be Formally Tested and Found to be Gifted*




While these data indicate the belief for formal testing, no educators stated they opposed testing. The two Expert Educators who did not indicate that they believe formal testing was required did not specifically choose any provided responses, but rather described their response. Following is an excerpt from a response.

**Interviewer** - *Who should receive the resources allocated for gifted and talented students?*

**Expert Educator** - *There is going to be a massive range. I'd probably say that that whatever that resourcing, in terms of equity, not only do kids get what they need not so much that everyone gets the same, but the kids actually get what they need. You can imagine that even within our system that, let's use the word gifted, that the same sort of student in Area A as compared to Area B. Which one am I going to get the resources to? Probably going to give the to the kid in Area A because I know that the kid in Area B has probably access to other resources as well. We still want to make sure that their school identifies them and does all of those sorts of things but in terms of the amount I think that the student in Area B has probably got less access to resources outside of the school than the kid in Area A does.*

There were no educators (0%) that thought that parents should ensure that their children can access the G & T resources, without other factors in place. Following is an excerpt from an Expert Educator.

**Interviewer** - *Who should receive the resources allocated for gifted and talented students?*

**Expert Educator** - *They (the parents) will make the noise, you know what I mean? They will the ones whining to principles. "But my child got 100% and he only got 98% so my child should be in it and not him". No!! I think the students whose parents wish them to be gifted, or think those their child is are gifted will unfortunately make a fuss.*

**Questionnaire Quotes - Teachers**

- *All have to contribute*
- *Students who are judged as G & T by teachers according to definition*
- *Difficult to ascertain as some gifted or high potential students do not reach their potential regardless of time and effort given to them*
- *Students who show interest. Some students do not test G & T but remove academic tasks and provide a creative stimulating student driven project and there is huge growth.*

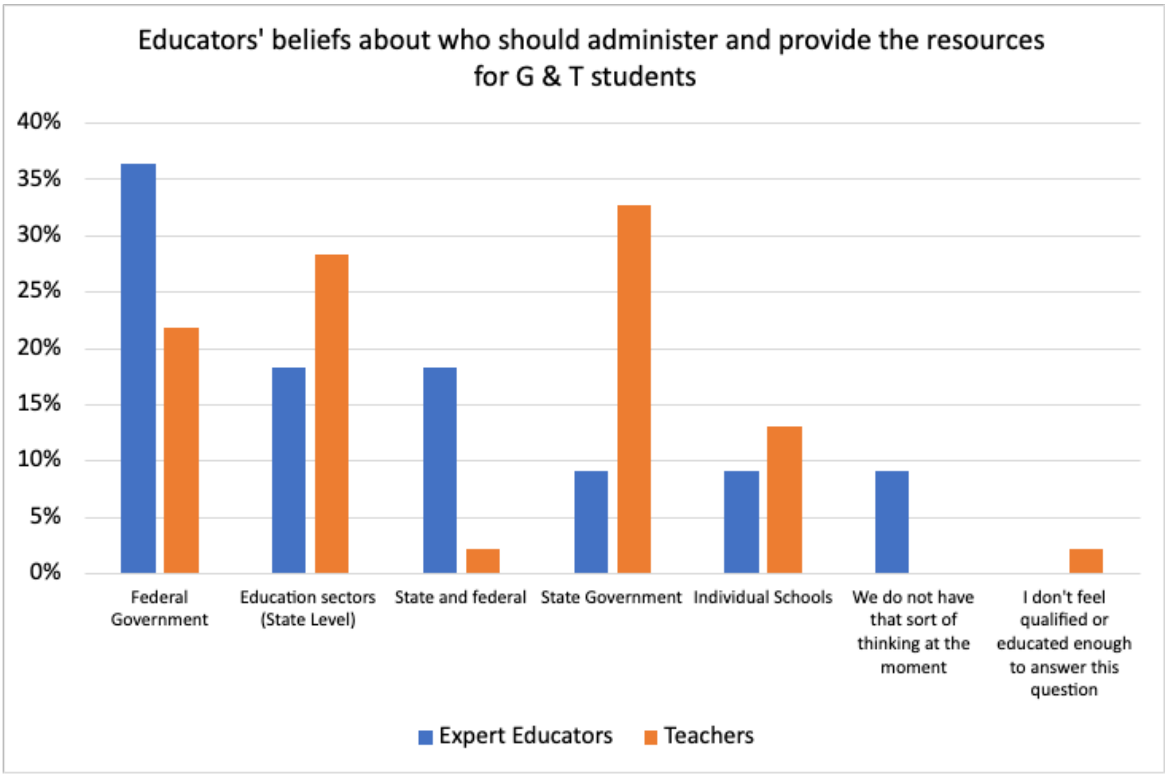
*Assertion 42*

*The majority of educators believe formally identified G & T students should receive the allocated G & T resources. High performance of the gifted person is not required.*

**4.5.2.2 Who Should Administer and Provide the Resources?** Expert Educators' (*N* =9) and Teachers'(*N*=46) beliefs about who should administer the resources for G & T students were selected from the options provided in the question or one of their own. Educators could select more than one option, only one Expert Educator chose to do so. They provided three. The percentages presented in Assertion 43 have been calculated to account for these three responses. Figure 4.37 visually displays the responses from educators. Excerpt boxes are provided.

**Figure 4.37**

*Educators Beliefs About Who Should Administer and Provide the Resources for G & T Students by Expert Educators (N=9) and Teachers (N=46)*




Expert Educators (36%) believe that the Federal Government should been entirely responsible for administering and providing the resources for G & T students. This was their most common response When combined with the response "State and Federal", six (55%) of Expert Educators believe that the Federal Government should have some responsibility for providing resources.

Teachers (33%) believe that the State government should be entirely responsible for administering and providing the resources for G & T students. This was their most common response. When combined with the response “State and Federal”, 16 (35%) of Teachers believe that the State Government should have some responsibility for providing resources.

**Interviewer** - *Who should administer and provide the resources for G & T students?*

**Expert Educator** - *I think given that our education is essentially governed by the State Government, the main funding needs come from the State Government. There could be some supplement through the Federal Government, because the upper echelons of the educational sector, those kids who are really going to be our high flyers, are going to benefit the nation. It doesn't matter what state you happen to be living in. I think that they're there has to be some federal input or oversight.*

The most common response from Teachers (35%) indicated that provision of resources should be the responsibility of the State Government. Teachers did not elaborate on their choices.

*Assertion 43*

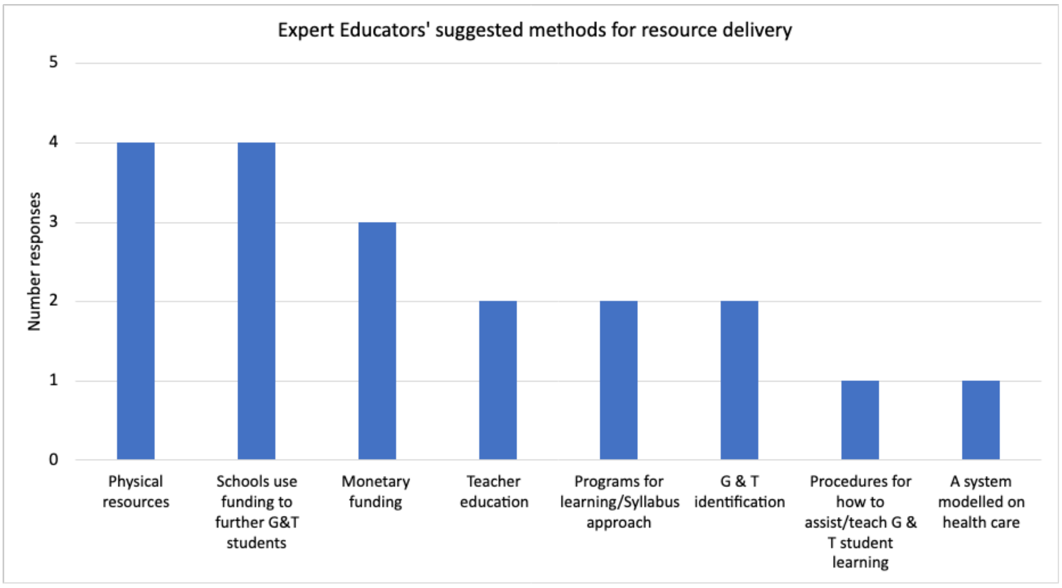
*The majority of Expert Educators (67%) believe that the Federal Government should be responsible for administering and providing the resources for G & T students.*

*The State Government was the most common response from Teachers (35%) with regard to who should be responsible for administering and providing resources for G & T students.*

**4.5.2.3 How Should the Resources be Delivered?** Expert Educators' (*N*=7) and Teachers'(*N*=46) perceptions of how the resources for G & T should be delivered from the options provided in the question or one of their own. Teachers selected one response only while Expert Educators selected as many as they found applicable. Therefore, the number of responses does not add to the number of Expert Educators. Expert Educators provided more nuanced responses and so these did not fit neatly into themes. To retain the integrity of both participant groups' responses, they were not compared. Expert Educator and Teachers responses have been displayed in Figures 4.38 and 4.39 respectively. An interesting comment from an Expert Educator has been provided in the excerpt box.

**Figure 4.38**

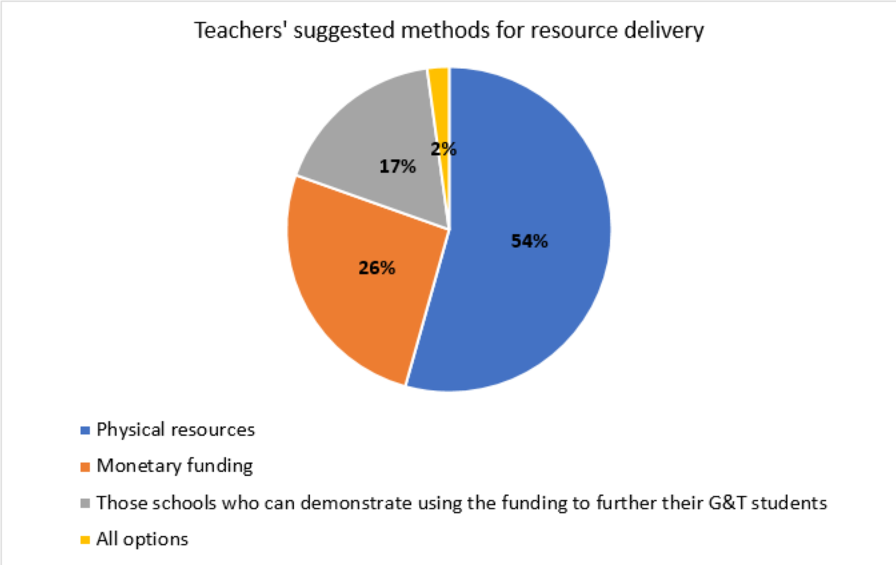
*Expert Educators (N=7) Suggested Methods for Resource Delivery*




*Note.* The label "schools use funding to further G & T students" is the abbreviation to fit into the graph. The full label is Schools who can demonstrate using the funding to further their G & T students.

**Figure 4.39**

*Teachers (N=46) Suggested Methods for Resource Delivery*




*Note.* Only one response per Teacher was received.

Over half of Expert Educators (57%) and (54%) Teachers believe that provisions should be delivered by way of physical resources. In addition, over half (57%) of Expert Educators and 17% of Teachers, also believe resources should be provided to those schools who can demonstrate they are using the funding to further the education of their G & T students. Expert Educators (42%) and Teachers (26%) believe provisions should be monetary.

**Interviewer - How should the resources for G & T students be delivered?**

**Expert Educator** *(paraphrased for clarity) - Health administration is superbly done in Australia. What we need is the legislation and policy at the national level, after identifying what the needs are of the nation as a whole. This means a model where there is serious control of the overview and provision of resources.*

*With regard to resources, we should model on the health system using a similar model to the PBS where there are subsidies. Resources could be subsidised and therefore can be accessed more easily.*

*We should then develop the programs because that is what is missing. There is so much waste with schools reinventing the wheel. Nationally, we need specialist programs developed that can be adapted by the states and then the individual schools.*

*It is the programs that are the hold up, it's because they involve people understanding. So you are either going to have to train up a whole lot of people to a high degree or you provide them with programs where they only need a moderate amount of training and therefore, they can adapt those to their state system of learning and to the individual school.*

*Justification for these programs and resources could be through a testing system that everyone has access to, rather than everyone developing their own.*

**Interviewer - Programs - means programs for learning?**

**Expert Educator -** *Yes, because that's where things fall over isn't it? Because people have money and don't know what to do with it. Money gets wasted or if it does not get used and people assume it was not needed.*

*How do we go about educating these kids? How do we go about getting them to be curious about the world, getting them involved in their own education, getting them to make their own decisions around their education, getting them to engage? How do we do that?*

*Those sorts of programs can then be adapted so, I hesitate to use the word, but almost a syllabus type of approach.*

One Expert Educator suggested a model where resources are subsidised, and template programs are developed. These could then be adapted by the individual states and schools. According to this Expert Educator this would eliminate unnecessary duplication of tools but still allow for adjustments based on individual needs. Other Expert Educators acknowledged the need for programs, a syllabus approach, and identification.

*Assertion 44*

*The majority of educators suggest that resources for G & T students should be delivered in the form of physical resources. This conflicts with their previous requirement for resources which indicated that there no need for more physical resources. (See Assertion 25, 27 and 28).*

**4.5.2.4 Under What Conditions Should the Resources be Delivered?** Expert Educators (*N*=8), and Teachers (*N*=46) responded to the question; Under what conditions should the resources be delivered? Expert responses fit into three themes, per student, per school regardless of identified students, and other. These are displayed in Table 4.35 and visually in Figure 4.40.

**Figure 4.40**

*Expert Educators (N=8) Responses to the Question; Under What Conditions Should the Resources be Delivered? By Theme and Percentage*

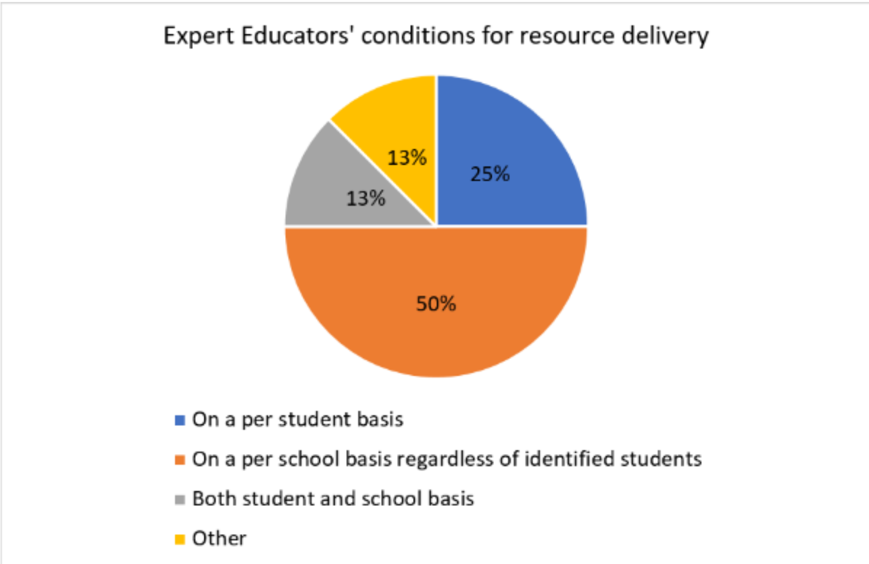


**Table 4.35**

*Expert Educators (N=8) Responses by Theme to the Question; Under What Conditions Should the Resources be Delivered?*

| Theme and Summary | Excerpts |
|---|---|
| **Per student**<br>Two of the eight Expert Educators (25%) responded, on a per student basis only.<br>One (12.5%) responded, both a student and school basis regardless of identified students.<br>The responses in this theme were not extensively explained. | • *The reason for a per student basis is to prevent funding shifting from one area to another based on the school rather than the student needs (e.g. photocopying)* |
| **Per school regardless of identified students**<br>Four of the eight Expert Educators (50%) responded, on a per student basis only.<br>One (12.5%) responded on both a student and school basis regardless of identified students.<br>Explanations included:<br>An economy of scale with purchasing resources like subscriptions.<br>Encouraging schools and students to excel.<br>Funding students outside the norm using norms does not work. | • *Some schools will have less students, particularly in the lower SES areas but many needs are based on subscriptions so the cost so this is not economical with a few students.*<br>• *A lot of things don't have an economy of scale to them. If we're going on a per student basis, you can miss out.*<br>• *Those schools who receive the money should demonstrate how they are using their funding, and that funding is going towards gifted and talented students.*<br>• *If on a school basis you are encouraging all schools, whether students are necessarily gifted and talented. I'm thinking of a school in a very poor socioeconomic background that that may not have anyone there who is theoretically identified as G & T but they are in their school. They need that funding for lots of reasons but mainly for the aspiration of those other kids so it is seen as something that all schools and all students should be aspiring to.*<br>• *I think you have to look at schools as you do kids individually. And I think, I think the need is going to be there in every kid. Forget identified kids because it's going to be around those kids that aren't identified. If we look at Eddison, even Stephen Hawking and his journey, Bill Gates and all of those people who didn't fit. We are saying fund kids who are outside the norm of the school by using norms. I don't think that works.* |
| **Other** | • *There has to be someone in each school who has some expertise because if you just give it to the school and you don't know what you are doing with it* |

| | |
|---|---|
| One of the eight Expert Educators (12.5%) did not select either on a student or school basis.<br><br>Money and resources will be wasted without expertise to use the funds appropriately. The biggest resource will be the expert teachers. | *it's wasted. Once you've got someone there who's able to say what's going on then you get that you get (A) happening. You can't just say regardless of identified students because if a school doesn't have any expertise to determine how that funding is going to be used there's no point in having it. You have a certain amount of expertise to determine how much you need and what you are going to need it for and then once you do that. I think that's the biggest resource expert teachers.* |

**Interviewer - How should the resources be delivered?**

**Expert Educator –** *From the perspective of promoting science, the schooling systems themselves need to change. If you were to analyse the key learning area backgrounds of leaders in NSW, I am sure the percentage that are coming from Religion, English, Maths or HSIE background would be disproportionate to those coming from Music, PE, Science. Therefore, when you go to them and they say "I don't understand science and I failed it at school", the people that you are going to try and get resourcing from are already switching off. The system goal is good NAPLAN results so they want leadership to support the literacy and numeracy, not science.*

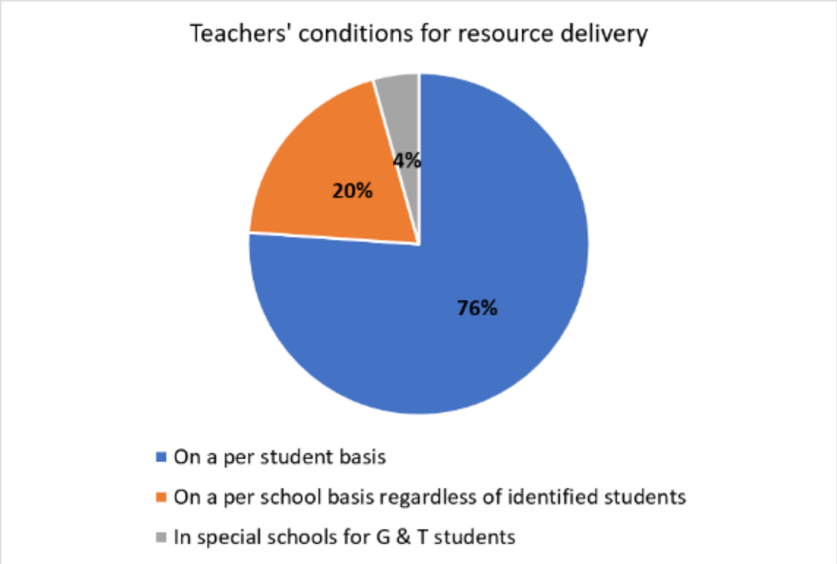
*Assertion 45*

*Half (50%) of Expert Educators believe that funding for G & T students should be on a school basis. This will ensure equity, economy of scale, and encourage excellence. It is important to ensure that funding is used for the G & T student/s and not for other school needs.*

Teachers selected their responses from the provided options with most not elaborating or commenting on their response. The responses provided by the Teachers are displayed by percentage in Figure 4.41.

**Figure 4.41**

*Teachers (N=46) Responses to the Question; Under What Conditions Should the Resources be Delivered? By Percentage*




| **Questionnaire Excerpts - Teachers** |
|---|
| • *Applying for the resources for individual students will add to the already full workload of teachers.*<br>• *IQ testing of students to justify giftedness will lead to many students just not being identified as parents or schools may not be able to afford testing. Plus, I feel that many teachers are quite astute at identifying those who are likely G&T, but certainly not all.*<br>• *I know most independent schools have a G&T coordinator who can help with most of this, but I'm uncertain about public schools* |

The majority of the teachers (76%) believe that the resources should be delivered on an individual student basis. Only 2% indicated that G & T students should receive resources in special schools for gifted students. The reasons for delivering resources on a per school basis echoed some of the reasons given by Expert Educators. Teachers are concerned about an added workload and equity for students whose school or parents cannot afford formal testing. The reasons for and against delivery of resources on a school and student basis are summarised in Table 4.36

**Table 4.36**

*Reasons For and Against Delivery of Resources and Funding on a School and Student Basis*

| For delivery on a school basis | Against delivery on a school basis |
|---|---|
| • Ensures economy of scale. e.g. some resources are shared and need multiple students to afford.<br>• Encourages excellence in all students.<br>• Reduces workload. | • More upper school leaders should have a science background. Without understanding of science then gifted science students may miss out. |
| **For delivery on an individual student basis** | **Against delivery on an individual student basis** |
| • Funding is used for the G & T student not for other school needs. | • Increased workload for teachers with application<br>• If based on IQ then some students miss out if testing cannot be afforded. |

*Hypothesis 4*

*G & T students would benefit from identification, funded by either the state or federal government*

*Assertion 46*

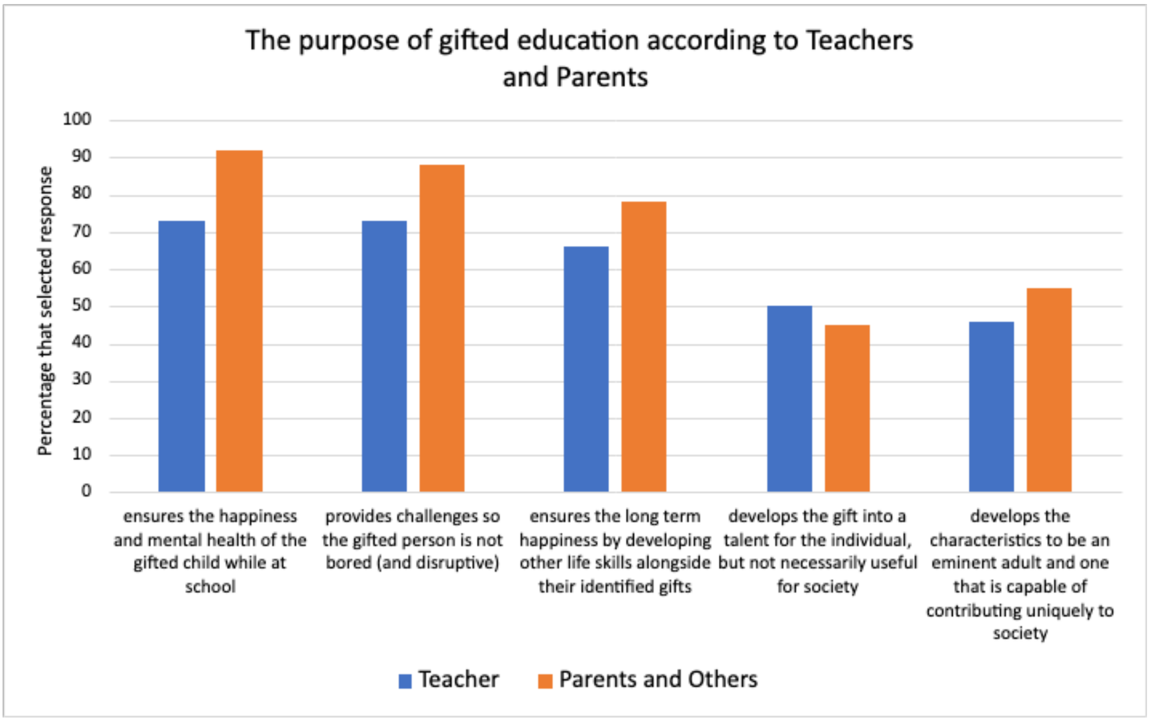
*The majority of the teachers (76%) believe that they believe that the resources should be delivered on an individual student basis. However, they are concerned about an adding to their workload and inequity in identification processes.*

### 4.5.3 Aspect 6C - The Purpose of Gifted Education According to Teachers and Parents

Teachers (*N*=26) and Parents (*N*=76) were asked the purpose of gifted education. The responses were selected from given options, as many as applied, including the option for their own. In total, the 26 Teachers selected 80 options and the 76 Parents selected 272 options. The responses common to both participant groups are displayed by percentage for comparison in Figure 4.42.

**Figure 4.42**

*Common Responses From Teachers and Parents Regarding the Purpose of Gifted Education.*




Teachers (73%) and Parents (92%) believe that the foremost purpose for gifted education is to ensure the happiness and mental health of the gifted child while at school. Secondly the purpose is to provide challenges so that the gifted person is not bored and disruptive, Teachers 73% and Parents, 88%. The least common response from Teachers (46%) was to develop the characteristics to be an eminent adult and one that is capable to contributing uniquely to society. Parents selected more responses each than Teachers, as is seen by the greater percentages in the Parent responses.

Responses were grouped into two themes, those that expressed the purpose of gifted education was solely for the gifted individual or those that include a benefit for others as well. These two themes are displayed in Figures 4.43 and 4.44 for Teachers and Parents, respectively.

**Figure 4.43**

*Teachers' Beliefs Regarding the Beneficiary of Gifted Education*

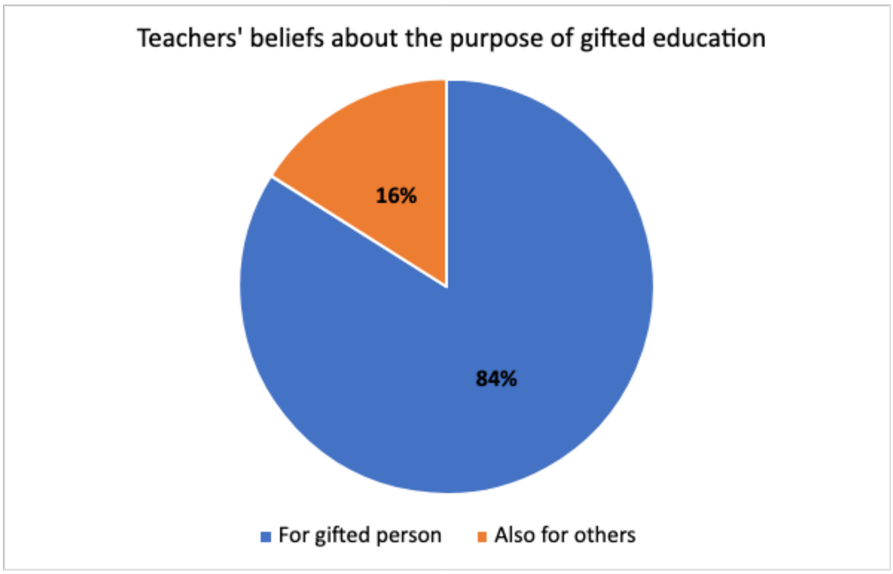
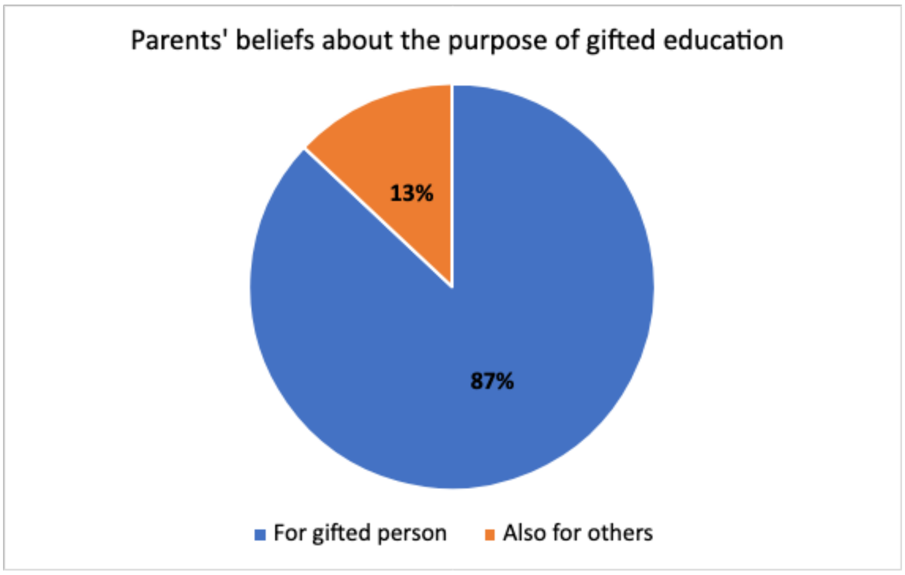



**Figure 4.44**

*Parents' Beliefs Regarding the Beneficiary of Gifted Education*




Figures 4.43 and 4.44 show that Teachers, and Parents agree that the beneficiary of gifted education should be the individual gifted person. It is acknowledged that there were more provided options to select for the gifted individual. However, Teachers and Parents with

others provided unique comments that predominately support the assertion that there is a belief that gifted education is foremost for the individual. These unique responses from Teachers and Parents are displayed in excerpt boxes.

**Questionnaire Excerpts – Teachers**

**Belief about the purpose of gifted education**

- *I meet few truly gifted children and find that though they have individual needs, these are not necessarily more pressing than the needs of other children. That is, all students need to be treated as unique individuals with their individual requirements satisfied to support their learning and wellbeing.*
- *fosters grit in the student to continue pushing through with steeper learning curves*

**Questionnaire Excerpts – Parents**

**Belief about the purpose of gifted education**

- *gives the child the confidence they need to believe in themselves*
- *helping the gifted child to learn independently so that they are able to develop skills without the need to wait/be too demanding of a teacher with limited time*
- *puts the child in contact with like-minded gifted persons of all ages*
- *draws out from child their interest, not just pour knowledge in*
- *is flexible to the needs of the whole child*
- *nurtures their curiosity and sense of wonder allowing them to continue to seek knowledge and being lifelong learners*

*Assertion 47*

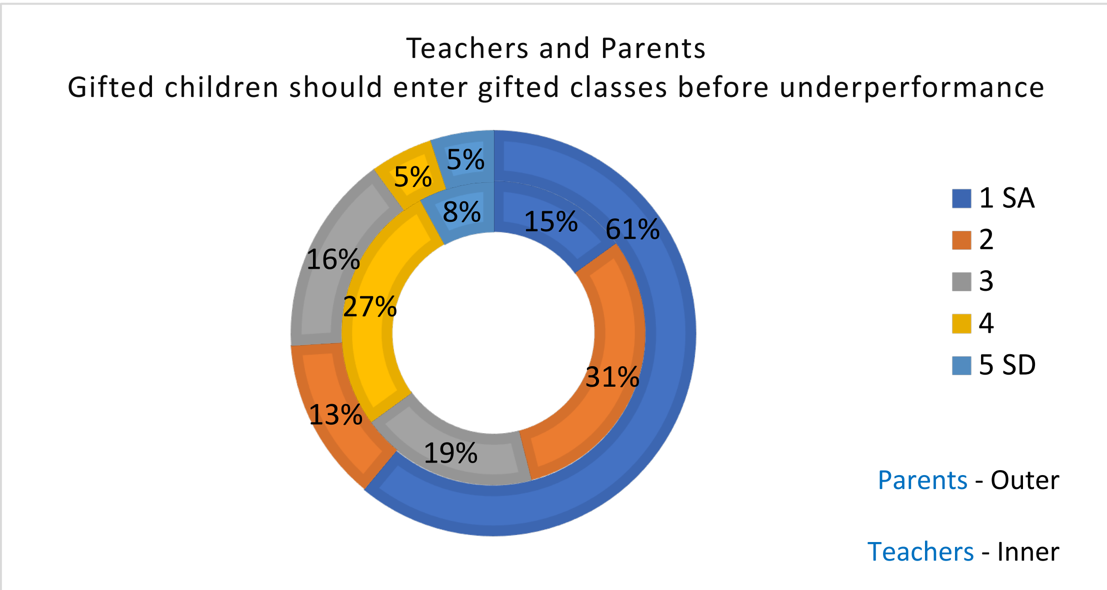
*In the opinion of Teachers and Parents, the most important purpose of gifted education is to benefit the individual gifted person. This is for academic reasons and for wellbeing.*

### *4.5.4 Aspect 6D – Underperforming G & T and Gifted Programs*

Teachers (*N*=26) and Parents (*N*=76) responded to a Likert Scale question where 1 represented strongly agree (SA) and 5 represented strongly disagree (SD). They were asked if the gifted child should be allowed to enter the gifted program before the reasons of underperformance are addressed. In the question, examples were provided for underperformance including, mental health, learning disabilities, or behaviour issues. Only one response could be selected per participant. The responses of Teachers, and Parents are displayed in Figure 4.45.

**Figure 4.45**

*Teachers, and Parents' Belief That Identified Gifted Children Should Be Allowed to Enter Gifted Classes Before the Reasons for Underperformance (Mental Health, Learning Disability, Behaviour etc.) Are Addressed*




The majority of Parents strongly agree (61%) or agree (13%) that children who are identified as gifted should be allowed to enter the gifted programs before their reasons for underperformance are addressed. Fewer Teachers strongly agree (15%) with the same statement. 10% of Parents disagree or strongly disagree, indicating that they believe identified gifted children should not be allowed into the classes before their issues of underperformance are addressed. Teachers are almost as likely to agree (31%) as they do disagree (27%). A Chi-square statistic was performed to test if the results obtained were significant. Two categories created from combining strongly agree and agree, and strongly disagree and disagree. The number of responses in each category by participant groups are presented are presented in Table 4.37, including the Chi-square statistic.

**Table 4.37**

*Likert Scale Responses to the Statement; Children Who Are Officially Identified As Gifted and Who Are Not Performing Should Allowed to Enter a Typical Gifted Program Before the Reasons for Underperformance Are Addressed*

| Category | Teachers | Parents |
|---|---|---|
| Strongly agree and agree | 12 | 56 |
| Strongly disagree and disagree | 9 | 8 |

The chi-square statistic is 9.1071. The *p*-value is .002546. The result is significant at $p < .01$.

There is a significant relationship between the two variables. Teachers are more likely than Parents require that issues such as mental health, learning disabilities and behaviour be addressed before gifted students enter a gifted program, $X^2$ (1, $N$ = 85) = 9.1071, $p < .01$.

*Assertion 48*

*Teachers are statistically (p<.01) more likely than Parents to require that issues such as mental health, learning disabilities and behaviour should be addressed before a gifted student enters a gifted program.*

Comments were provided by some but not most participants for this question. More comments were provided by Parents who selected strongly agree or agree than those who selected strongly disagree or disagree. Samples of these comments are presented as excerpts in Table 4.38 and 4.39 respectively. The converse was true for Teachers, who provided more comments when selecting strongly disagree or disagree, than then did for strongly agree or agree.

**Table 4.38**

*Reasons Given By Participants Who Strongly Agreed or Agreed with the Statement; Children Who Are Officially Identified As Gifted and Who Are Not Performing Should Be Allowed To Enter a Typical Gifted Program Before the Reasons For Underperformance Are Addressed*

| Participant Group and Summary | Excerpts |
|---|---|
| **Teachers** | |
| Teachers comments were categorised into three themes positives, issues, and rights.<br>**Positives**<br>Challenges can improve performance, and that gifted programs can more easily assess the issues of gifted children.<br>**Issues**<br>Gifted programs are for those who can perform but not necessarily gifted students. Lack of stimulation is often the cause of bad behaviour.<br>**Rights**<br>All students have the right to be educated to their ability regardless of motivation or performance. One participant commented that being identified as gifted is a "ridiculous premise" and that if a student wants to be in a gifted program then they should be. | • *All students have the right to be taught at their level, regardless of motivation or ability to demonstrate that level*<br>• *Often lack of stimulation is the cause of poor behaviour*<br>• *Many of the gifted programs also only cater for students who are not truly gifted and talented because they cater for students who are all-rounders and not asynchronous learners. This can lead to under-performance due to how students are perceived and the fostering of only one portion of their education needs.*<br>• *The gifted program may be the only way this student feels engaged or challenged. It's worth aiming higher and then if necessary, addressing an underlying problem if it remains.*<br>• *Identify as gifted is a ridiculous premise, so, yes, just let them enter.* |
| **Parents** | |
| Parents' comments were categorised into five themes, 2E, issues, positives, rights, and structure of programs.<br>**2E**<br>Only one parent comment mentioned 2E, stating that her 2E child did not test well so was not accepted into gifted programs. | • F*ocusing on developing their strengths rather than 'fixing' weaknesses is a great way to lift a child up to reach their potential.*<br>• *I strongly agree with this statement however the child will most likely need emotional and educational support to fill gaps and rebuild confidence in the school system.* |
| **Issues**<br>There are Current difficulties with gifted programs, delay in assessing issues, and further problems for the gifted student who is not accepted into the correct program.<br>Underperformance can be due to disengagement that may be addressed if the child was interested. Parents | • *If they have been identified as gifted, then the potential is clearly there.*<br>• *Entering a gifted program allows their needs to be catered for, while other issues are addressed.*<br>• *Gifted children definitely need appropriate challenge and that should never be withheld, and often addressing the lack of challenge will go some way to addressing the reasons for the underperformance,* |

| | |
|---|---|
| indicated that gifted programs were for bright but not gifted students.<br><br>While they should be allowed into the programs, the underlying causes issues do need to be addressed without assuming the gifted program is a magic fix.<br><br>**Positive**<br><br>Programs can focus on strengths that assist children and improve self-esteem. Positive reinforcement can help child reach their potential, and challenges can improve performance.<br><br>**Rights**<br><br>All gifted children should have these provisions and the challenges should not be withheld. Gifted children should be in an appropriate setting and have the correct opportunities. Without exposure, their ability may never be realised.<br><br>**Structure of programs**<br><br>Structures need to be implemented for who has other issues. These structures include scaffolds, withdrawal if unsuccessful or anxious, and early intervention. There should be gifted programs should support underachievement. | *however necessary supports and scaffolds should also be provided.*<br>• *The gifted program should be designed to accommodate children with challenges, and they should be supported while participating in the program.*<br>• *Without exposure to opportunity ability may never be revealed.*<br>• *Everyone should have the opportunity if it's right for them.*<br>• *Investigating reasons for underperformance can be done alongside extension programs, but should not be used as a delay tactic for not addressing the learning needs of a gifted child*<br>• *Assessing reasons for underperformance can be done in either setting, so put the child in the appropriate setting and then investigate underperformance.*<br>• *It should be trialled but if unsuccessful other needs addressed as indicated* |

**Table 4.39**

*Reasons Given By Participants Who Strongly Disagreed or Disagreed With the statement; Children Who Are Officially Identified As Gifted and Who Are Not Performing Should Be Allowed To Enter a Typical Gifted Program Before the Reasons For Underperformance Are Addressed*

| Participant group – Summary of responses | Excerpts |
|---|---|
| **Teachers** | |
| Teachers comments were categorised into three themes, reasons for the child, reasons for others, and other.<br>**Reasons for the child**<br>Gifted children are not likely to perform spontaneously if their issues are not addressed and if their issues are not adequately addressed then they may get worse, affecting their future.<br>**Reasons for others**<br>Reasons for the theme others are that having children with issues takes away from a truly gifted class. It was also noted that gifted children with issues may be disruptive and affect others.<br>**Other comments**<br>Other comments included that entering a gifted class should be on a case by case basis. One comment stated that a child cannot be gifted if they are not performing. | • *They need to be able to perform or others will suffer with managing their special needs.*<br>• *A gifted, underperforming child whose lack of performance is not understood is unlikely to spontaneously perform just because they are put in a class of performing gifted students. They are more likely to feel worse about their lack of performance compared to the others, they are more likely to be disruptive, making the job of the teacher, and the other students, much harder; and the time taken to manage the situation will subtract from the goals and objectives of running a truly gifted class.*<br>• *Essential to identify reasons for underperformance - or at least to dismiss major concerns.*<br>• *I am struggling to understand how a student could be officially identified as gifted if they ARE NOT performing above the level of their peers.*<br>• *It needs to be on a case by case basis with the emphasis on the wellbeing of the student - and the student alone.* |
| **Parents** | |
| Parents who strongly disagreed did not provide comments. Comments from those who disagreed were from one theme only, reasons for the child.<br>**Reasons for the child**<br>Issues should not be overlooked, and careful consideration needs to be given to factors including their emotional wellbeing and writing needs. The qualifications of the gifted teachers need to be considered. | • *Education may not be the only reason for underperformance, which is why I put 4 instead of 5, because other factors such as 2e, mental health issues, SES etc, family, culture should not be overlooked. Also is the gifted program suitable for the child? How much competition is there? How much writing is there? Are the teachers properly educated in gifted education?*<br>• *If a child is underperforming from disengagement, then there is a risk that they might experience overwhelm if suddenly thrust into a more challenging environment.* |

*Assertion 49*

*The reasons for gifted students addressing their issues prior to entering gifted classes.*

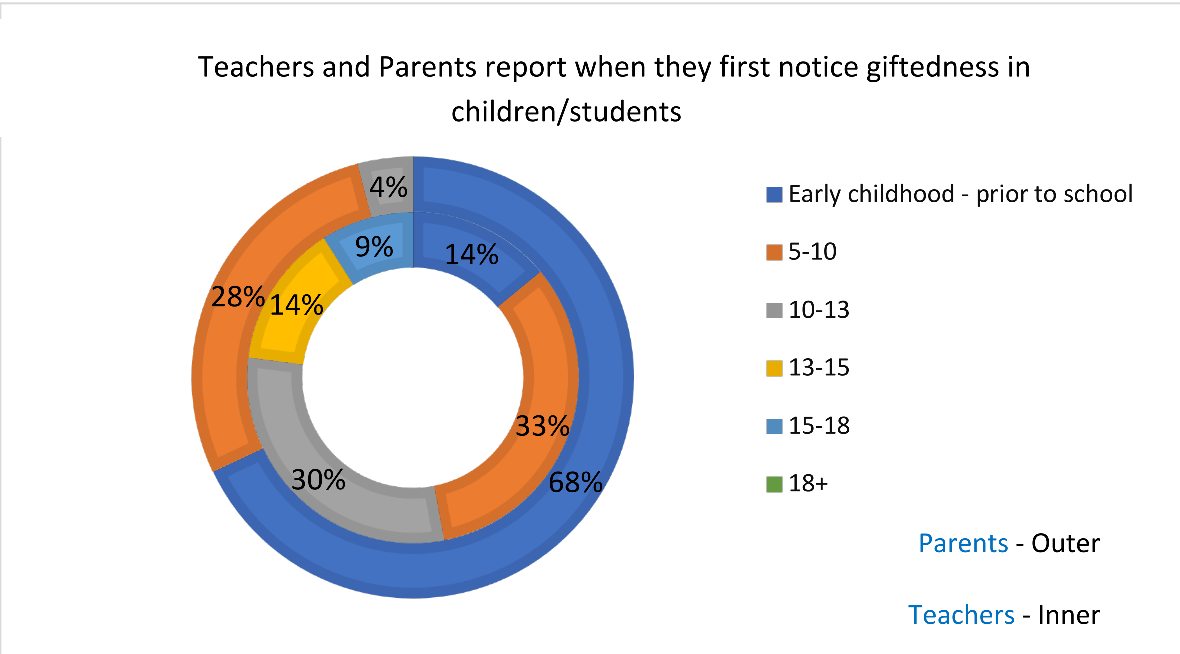
- *Parents – for the benefit of the child only.*
- *Teachers – for the benefit of the gifted child and other gifted students who may be impacted by the presence of an underperforming student.*

#### 4.5.5 Aspect 6E - The Age That Giftedness Presents May Affect Policy

Teachers (*N*=43) and Parents (*N*=81) were asked what age they typically see giftedness in children. In the question an age ranges could be selected or there was the option to include their own response. Parents were more specific about the age and provided their own response. Teachers selected from the options. Figure 4.46 displays the responses from both participant groups. Teachers' responses are displayed on the inside circle, Parents' responses are displayed on the outside circle.

**Figure 4.46**

*Teachers and Parents Report When They First Recognised Giftedness in Children/Students*



Parents stated that they first noticed giftedness as young as 6 months, but no older than 11 years. Teachers reported giftedness in the prior to school bracket but were not explicit with precise age. The median age bracket for identification as reported by Teachers was 10-13 (30% of responses in this category). The median age bracket for identification as reported by Parents was prior to school (68% responses in this category).

Further research is needed to identify the reasons for the significantly different responses between the two participant groups sampled. This may be legitimate finding or an artifact of the populations sampled.

*Assertion 50*

*Teachers and Parents report different ages for typically seeing giftedness. It is not clear if these results are legitimate, or an artifact of the population sampled. Further research is necessary.*

*Assertion 51*

*It is essential to ensure that Parents are included in G &T policy development, including the implementation of the policy.*

*Hypothesis 5*

*Teachers do not recognise giftedness as early or as quickly as Parents*

## 4.6 Aspect 6F – Giftedness in Science According to Teachers

Teachers (*N*=26) were asked questions to determine their beliefs about the characteristics of gifted science students, success in science, and the relationship between children and adults who are gifted in science. Teachers could select from predetermined options or provide one of their own. Multiple answers could be given.

These results will be presented in three subsections: Indicators and characteristics of gifted science students, strengths apart from an aptitude required to be successful and considered as gifted in science at school, and characteristics of children and adults who are gifted in science.

When answering the question regarding specific indicators and characteristics of gifted science students, Teachers selected one or more responses from given traits, or provided one of their own. The most common responses are displayed visually in Figure 4.47 using Table 4.40 for the legend.

**Figure 4.47**

*Indicators and Characteristics of a Gifted Science Student According to Teachers (N=26)*

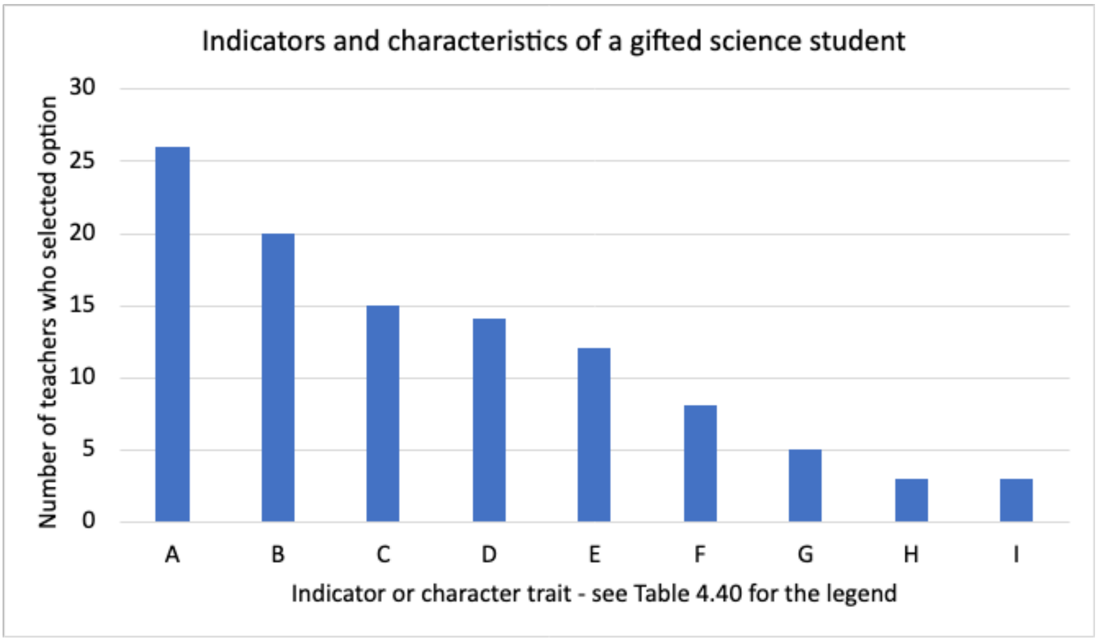


**Table 4.40**

*Legend for Figure 4.47. Indicators and Characteristics of Gifted Science Students According to Teachers (N=26)*

| | **Indicator or Characteristic** |
|---|---|
| A | Comprehension of abstract concepts |
| B | Demonstrates extensive knowledge base in science and can relate that knowledge base to new problems and topics |
| C | Aptitude in mathematical thinking |
| D | Keen interest in science and the scientific processes |
| E | Understands and applies scientific vocabulary |
| F | Possesses a good memory |
| G | Ability to remove emotion from decisions with presented evidence |
| H | Mastery of practical tasks |
| I | High grades in school-based science exams and assessments |

*Assertion 52*

*According to teachers, the most common attribute of gifted science students is comprehension of abstract concepts. The least common attribute is high grades in school-based science exams and assessments*

### 4.7 Strengths Apart From an Aptitude Required to be Successful and Considered as Gifted in Science at School

Teachers selected one or more responses from given traits, or provided one of their own. The most common responses are displayed visually in Figure 4.48 using Table 4.41 for a legend.

**Figure 4.48**

*Strengths Apart From Scientific Aptitude Required For a Gifted Science Student According to Teachers (N=26)*

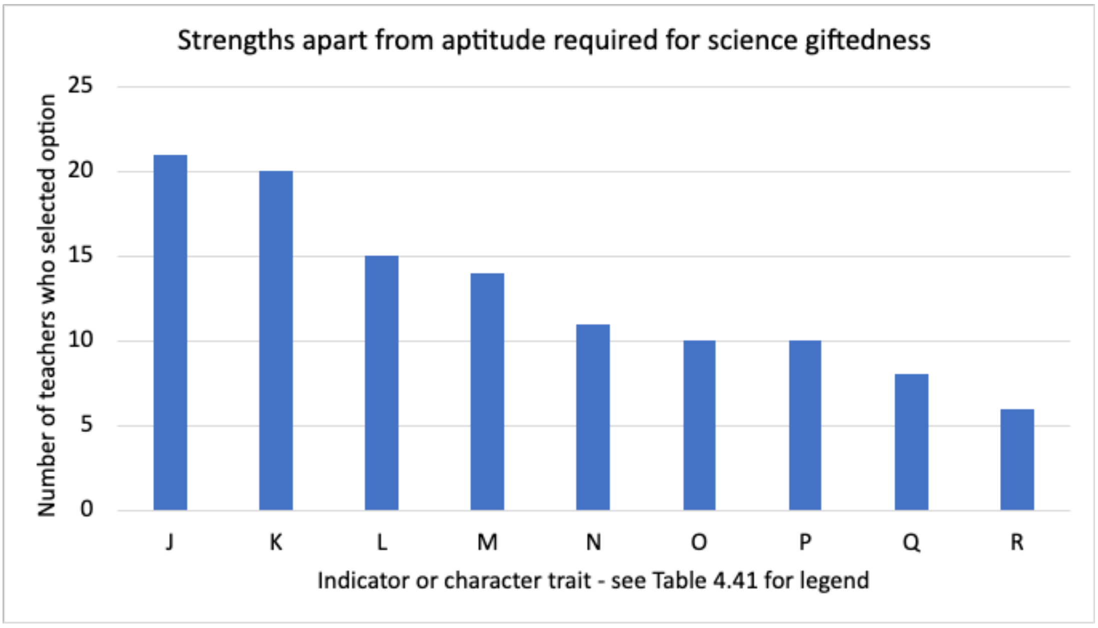



**Table 4.41**

*Legend for Figure 4.48 Strengths Apart From Scientific Aptitude Required For a Gifted Science Student According to Teachers (N=26)*

| | Indicator or Characteristic |
|---|---|
| J | personal ownership for learning, self-direction, and motivation |
| K | skills to cope with setbacks and perceived failures |
| L | emotional strength and ability to seek out assistance to compensate for weaknesses |
| M | commitment to deliberate learning and/or practice |
| N | aptitude with general language |
| O | coping skills for anxiety |
| P | ability to identify own weaknesses |
| Q | mathematical aptitude |
| R | emotional regulation to delay gratification evidence |

*Assertion 53*

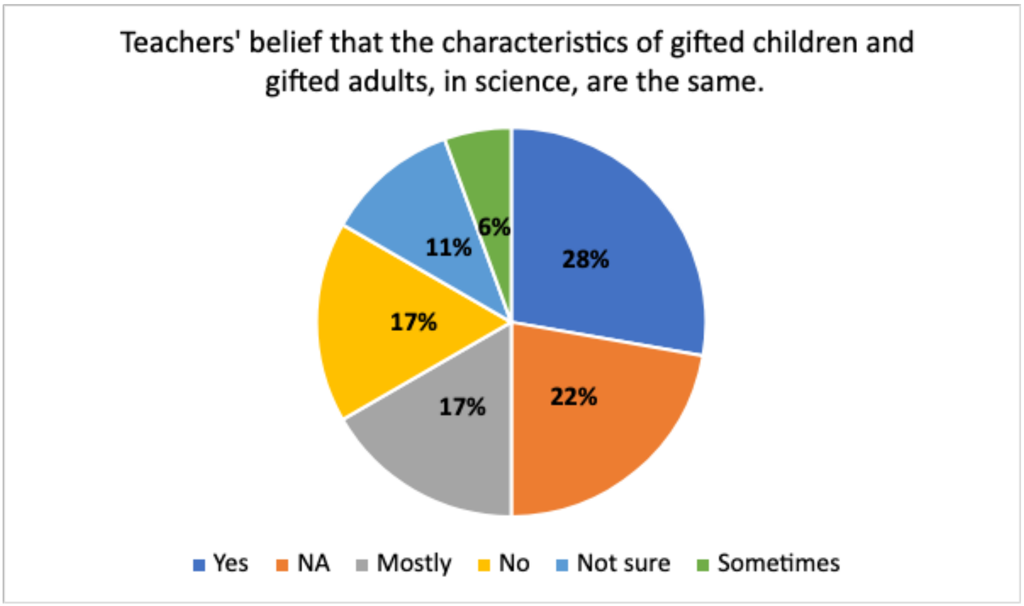
*According to teachers, the most common strengths apart from scientific aptitude required for the success of a gifted science student are personal ownership for learning and skills to cope with setbacks and perceived failures.*

### *4.7.1 Characteristics of Gifted Children and Gifted Adults, According to Teachers*

Teachers (*N*=18) were asked to provide a free comment to answer the question if the same traits are required for both children and adults to be gifted in science. Their responses are displayed visually in Figure 4.49.

**Figure 4.49**

*Teachers' (N=18) Belief That the Characteristics of Gifted Children and Gifted Adults, in Science, Are the Same. Displayed By Percentage*




Almost one third (28%) of Teachers believe that children and adults who are gifted in science have the same traits. If the responses "mostly" (17%) and "sometimes" (6%), are included, half (51%) of Teachers believe the traits of gifted adults and children are similar or the same. Just under one fifth (17%) of Teachers indicate that gifted children and gifted adults do not have the same traits or characteristics. Sample comments are provided in the excerpt box.

**Questionnaire Excerpts – Teachers**

**Belief that adults who are gifted in science have the same traits as children who are gifted in science**

- *(NOT SURE) We judge adults by different standards. Adults have to do something special but children who are seen as gifted can replicate what we know.*
- *(YES) Gifted adults are less likely to be hamstrung by anxiety. Otherwise the listed characteristics are indeed relevant.*
- *(YES) Yes, why would they be different? It is just that as an adult, the other "areas of giftedness" will develop, but without the core competencies above the innate talent will wither.*
- *(NO) These are characteristics that are ideally taught in childhood*

*Assertion 54*

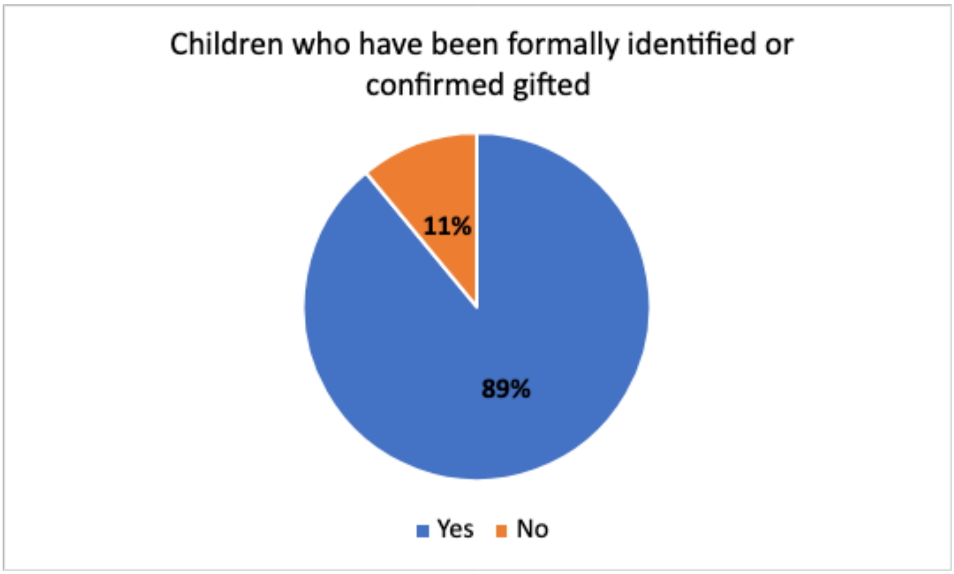
*When surveying Teachers, there is no agreement if children and adults who are gifted in science have or should have the same traits. Further research is needed, first with a larger sample size.*

### *4.7.2 Aspect 6G – Traits of Gifted Children*

Parents ($N$=76) were asked if their child had been formally identified or confirmed as gifted. Those children who were not formally identified or confirmed were still thought to be gifted by their parents, some were currently in the process of formal testing. The percentage of formally identified gifted children is displayed in Figure 4.50.

**Figure 4.50**

*Children Who Have Been Formally Identified or Confirmed as Gifted From the 76 Surveyed Parents*




### *4.7.3 Areas of Giftedness as Reported*

Characteristics, traits, and giftedness that are reported by Parents will be referred to as though that reporting is factual. For example, reported giftedness will be referred to as giftedness.

Parents (*N*=76) were asked which areas their children were considered gifted and could choose more than one response. Responses for 76 children are displayed in Table 4.42.

**Table 4.42**

*Areas of Giftedness For 76 Children*

| Area of Giftedness | Number | Area of Giftedness | Number |
|---|---|---|---|
| Language reading | 58 | Emotional intelligence | 1 |
| Language spoken | 53 | Sophisticated wit and humour | 1 |
| Logic and reasoning | 52 | Social | 1 |
| Mathematics | 51 | Synthesis of information | 1 |
| Science | 44 | Art | 1 |
| Language writing | 23 | Computer gaming and technology | 1 |
| Emotional control | 9 | Spatial awareness | 1 |
| Music | 4 | Creativity | 1 |
| Performing Arts | 2 | | |

The responses were further analysed on an individual student/child basis. Of the 76 children reported on, 55 children were gifted in science or mathematics.

The co-existing area giftedness of these children were collated to compile profiles and to determine if there were other areas of giftedness common to those who are gifted in science. The combinations examined were:

Science, mathematics, and logical reasoning,

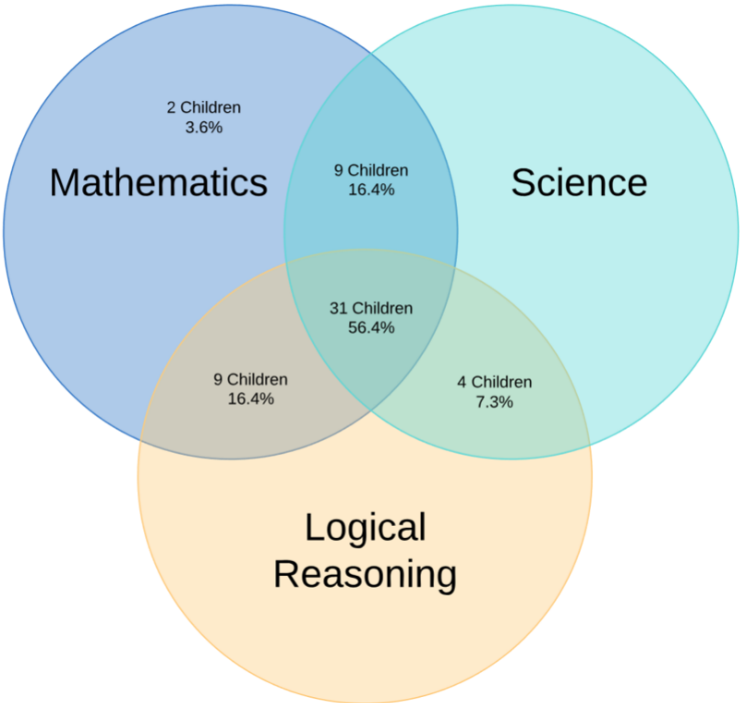
Science, mathematics, reading, and writing, and

Science, reading, spoken language, and writing.

**4.7.3.1 Science, Mathematics, and Logical Reasoning Trait Combinations.** The trait combinations of children (*N*=55) were analysed for combinations of science, mathematics, and logical reasoning. A Venn diagram (Figure 4.51) was used to show these overlapping areas of giftedness.

**Figure 4.51**

*Venn Diagram Showing the Intersection of Co-existing Traits, Science, Mathematics, and Logical Reasoning of 55 Children. Incidence of Trait Combinations Are Displayed by Percentage and Absolute Number*




Of the 55 children, 31 (56.4%) were gifted in science, mathematics, and logical reasoning. No children were gifted in science or logical reasoning and not mathematics. However, two children were gifted in Mathematics but not science or logical reasoning. All children (*N*=44) who were gifted in science were also gifted in mathematics or logical reasoning.

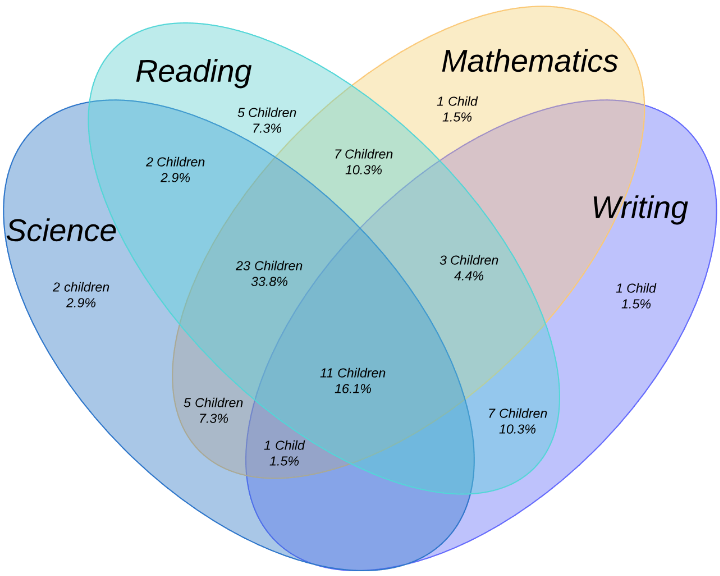
*Assertion 55*

*It is common that children who are gifted in science are also gifted in mathematics or logical reasoning.*

*It is also likely that children who are gifted in mathematics are also gifted in science or logical reasoning.*

**4.7.3.2 Science, Mathematics, Reading, and Writing.** The trait combinations of children (*N*=68) were analysed for combinations of science, mathematics, reading and writing. Spoken language was omitted for purposes of displaying the analysis was not possible to accurately show the relevant intersections. In addition, schools in Australia typically consider reading and writing as the core literacy skills. Spoken language, while important is not always given the same emphasis, particularly in terms of class work and high stakes examinations, such as the Higher School Certificate. These results are displayed in a Venn diagram in Figure 4.52.

**Figure 4.52** *Venn Diagram Showing the Intersection of Co-existing Traits, Science, Mathematics, Reading, and Writing of 68 Children. Incidence of Trait Combinations are Displayed by Percentage and Absolute Number*




The Venn diagram shown in Figure 4.52 presents gifted populations and their intersections. The populations are children who are gifted in science (*N*=44), mathematics (*N*=51), and language (*N*=60). The four children who are gifted in science, but not mathematics are the same children seen in Figure 4.51 that are reported to have giftedness in logical reasoning, two of these children are gifted in language reading. There were 34 (50%) children who displayed traits in science, mathematics, and either language reading or language writing.

*Assertion 56*

*It is less common to be gifted in all three areas of science, mathematics, and language (reading and writing) than science and mathematics only.*

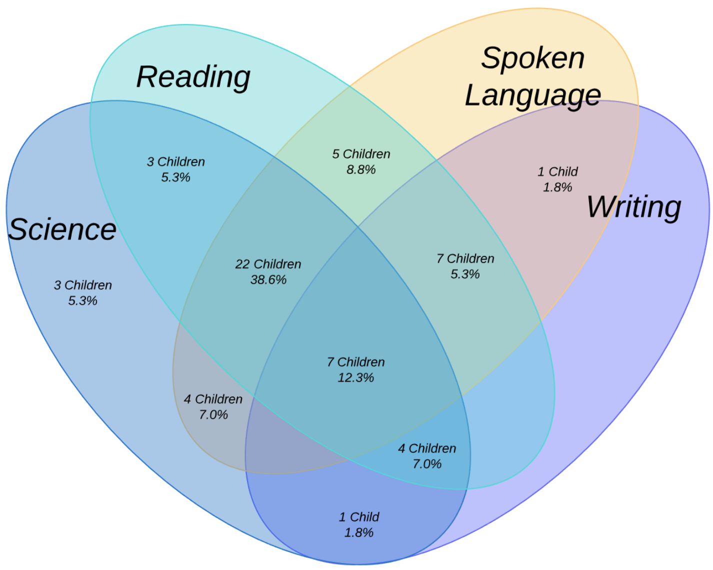
**4.7.3.3 Science, Reading, Spoken Language, and Writing.** Children with giftedness in science were considered for giftedness in language reading, spoken, or written and the intersection of these traits displayed in a Venn diagram. The analysis included the gifted traits of 57 children, 44 who were gifted in science. Figure 4.53 displays these intersections.

Of the children who were gifted in science (*N*=44), 41 (93%) were gifted in at least one language area with three (7%) not being gifted in any language area. These percentages are calculated on gifted science students, not all students displayed in the diagram. A Fisher-Exact test showed that these results are not significant.

Of those children who were reported to be gifted in science 36 (82%) were gifted in reading, and 33 (75%) spoken language. A Fisher Exact test showed that these results are not significant. The traits of giftedness in science and language writing applied to 12 children. (27%). A Fisher exact test showed that children who are gifted in science are statistically not likely to be gifted at writing ($p<.05$)

**Figure 4.53**

*Venn Diagram Showing the Intersection of Co-existing Traits, Science, Reading, Spoken Language, and Written Language of 57 Children. Incidence of Trait Combinations are Displayed by Percentage and Absolute Number*



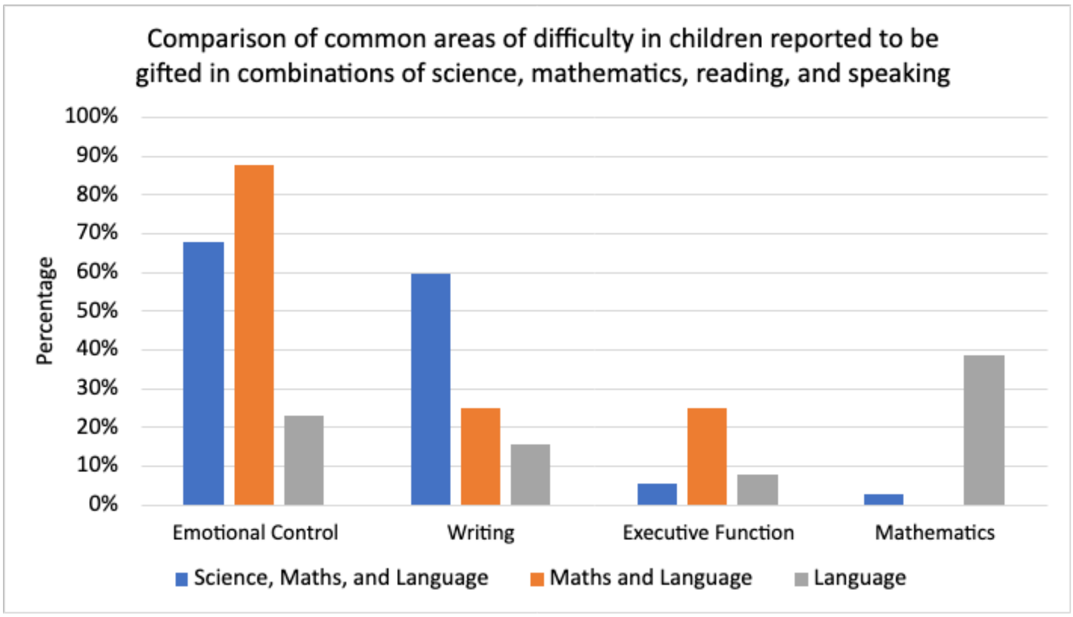

| |
|---|
| *Assertion 57*<br><br>*Children who are gifted in science are commonly gifted in at least on language area, reading, writing, or speaking.* |

| |
|---|
| *Assertion 58*<br><br>*Children who are gifted in science are not likely to be gifted in writing (p<.05).* |

**4.7.3.4 Aspect 6H – Weaknesses of Children Gifted Children.** Weakness and difficulties that are reported by Parents will be referred to as though that reporting is factual. Parents (*N*=76) were asked what they perceived to be the weaknesses of their gifted children. There were 61 responses received, 37 for children gifted in science, mathematics, reading, and spoken language (SML) (one child was not gifted in mathematics but included in this group rather than alone), 11 in mathematics, reading, and spoken language (ML), and 13 in reading and spoken language (L) only. Four were common themes emerged, emotional control, written language, executive function, and mathematics. These are displayed for comparison by percentage in Figure 4.54.

**Figure 4.54**

*Comparison of Areas of Difficulty in Children (N=51) to be Reported to be Gifted in Science, Mathematics, Reading, Spoken Language, and Combinations of These*




The common areas of difficulty for gifted children were emotional control, written language, executive function, and mathematics. These will be addressed in turn using the abbreviations SML, ML, and L for the grouped areas of giftedness.

Chi-square tests using a 2x3 contingency tables were performed to compare the groups by the themes, emotional control, language writing, and executive function. As the mathematics theme had a zero value, a Fisher Exact Test was used.

**4.7.3.5 Emotional Control.** Children who were gifted in L only were the least likely to have difficulty with emotional control when compared to children gifted in SML or ML significant at p <.05, ( $X^2$ (1, $N$ = 51) = 8.0013, $p$ < .05.).

Children gifted in SML were less likely than children gifted in ML to have difficulty with emotional control. However, this difference is not significant.

**4.7.3.6 Written Language.** Children gifted in SML are more likely to have difficulties with writing than children gifted in ML or L. This is significant at p <.01, ($X^2$ (1, $N$ = 51) = 10.9195, $p$ < .01.). This is links to Assertion 58. Children who are gifted in science are not are reported to be gifted in writing.

Children gifted in ML were more likely to experience difficulties with writing than children who are gifted in L. However, this is not significant.

**4.7.3.7 Executive Function.** The difference reported in executive function between SML, ML, and L in this study are not significant.

**4.7.3.8 Mathematics.** The differences reported between SML and ML are not significant. The differences between SML and L and ML and L are significant at p < .05 with a statistic value 0.0031 and 0.0411 respectively. This will not be presented as an assertion as the findings do not add information about gifted science students.

*Assertion 59*

*Children who are gifted in science or mathematics, and language are statistically more likely to have difficulties with emotional control than children who are gifted in languages but not science or mathematics (p < .05).*

*Assertion 60*

*Children who are gifted in science, mathematics, and language are statistically more likely to have difficulties with writing than children who are gifted in ML or L ($p < .01$).*

*This is affirmed by Assertion 58 where Parents have stated areas of giftedness. Those who were gifted in science were statistically not likely to be gifted in writing ($p<.05$).*

*Assertion 61*

*There is no significant difference in executive control between SML, ML, and L gifted children.*

### *4.7.4 Aspect 6I – Early Traits of Gifted Children as Reported by Parents*

There were 68 relevant responses received, when Parents (*N*=76) were asked the early traits they witnessed that indicated giftedness. These traits are referred to as traits, rather than reported traits. Thematic analysis revealed eight key early traits/themes; language, memory and processing, character traits, mathematics, issues, or problems, other, testing and others, and physical. Examples of the individual traits in the themes are presented in Table 4.43.

The excerpt box is provided to show examples of Parent and Others' responses. These elaborate on the examples provided in Table 4.43.

**Survey Excerpts – Parents**

**Early traits of gifted science students**

- *Speaking at 6 months, walking at 7 months, reading at 2 years, basic mathematics at 3 years, amazing motor skills. Taught herself algebra and calculus at 12 in 3 weeks, read Kant and Crime and Punishment around that time as well. Basically, a lot of precociousness and surprisingly deep thinking/connections made.*
- *Heightened awareness of environment around them. Ability to reason and conceptualise beyond peer group, quick to grasp new ideas and be creative. Superior memory, mature humour. Boredom at school.*
- *We didn't identify our child as gifted. This was identified during psychometric testing for ADHD.*
- *Frustration/tantrums, understood adult conversation, amazing memory, mature play for their age, clear complex sentences at 2.*

**Table 4.43**

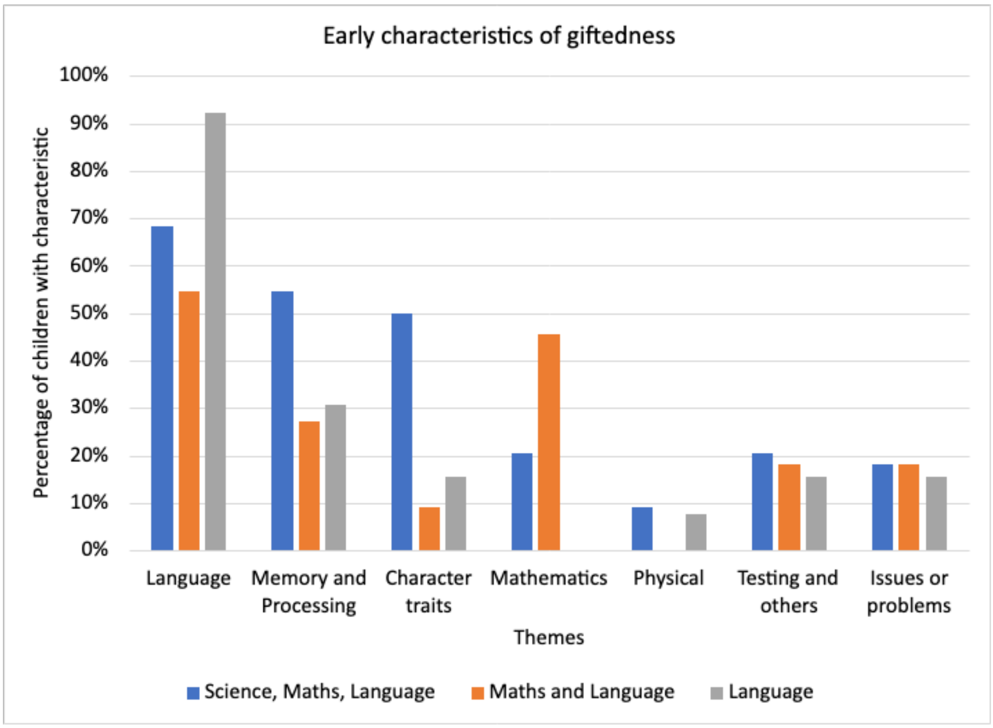
*Early Traits of Gifted Children Reported by Parents Arranged by Theme*

| Theme and Examples of Traits | |
|---|---|
| **Language** | |
| • Advanced/Early reading ability (often self-taught)<br>• Advanced large vocabulary | • Advanced verbal language |
| **Memory and processing** | |
| • Ability to understand complex and/or abstract concepts<br>• Advanced/Early logic, problem solving, and/or reasoning<br>• Connections made between concepts<br>• Deeply philosophical | • Depth of thinking or inquiry<br>• Early alertness<br>• Exceptional memory<br>• Fast processing<br>• Heightened awareness |
| **Character traits** | |
| • Creative<br>• Concentration/Focus<br>• Curiosity<br>• Early questioning, (complex or large concepts)<br>• Empathetic<br>• Thirst for knowledge | • Imagination<br>• Intense interests<br>• Keen/sophisticated observer<br>• Motivation<br>• Precociousness<br>• Sense of humour (mature) |
| **Mathematics** | |
| • Advanced multiplicative thinking<br>• Early pattern recognition | • Love of numbers and mathematics<br>• Quick to solve complicated mathematics |
| **Issues or problems** | |
| • Absent minded<br>• Antisocial behaviour<br>• Bored<br>• Developed tics<br>• Did not put things in mouth as a baby | • Different/not fitting in with peers<br>• Not sleeping<br>• Quirks<br>• Rage |
| **Other** | |
| • Ahead of peers<br>• Early milestones<br>• Early high achieving in school<br>• Early eye contact | • Sensory seeking<br>• Socially comfortable with adults<br>• Well behaved |
| **Testing and others** | |
| • During Autism testing<br>• Gifts emerged with early intervention<br>• Others comments/reactions (including school)<br>• School noted "out of the box" | • Tested for giftedness<br>• Testing for ADHD<br>• Unaware at first of giftedness |
| **Physical** | |
| • Amazing motor skills<br>• Early Walking | • Great coordination |

The children reported on by the Parents, were arranged into the same groups as section 4.7.3.4, SML (*N*=44), ML (*N*=11), and L (*N*=13). The number children displaying traits in the theme presented in Table 4.43 are displayed by percentage in Figure 4.45. For example, 68% of children who are gifted in science, maths, and language (blue bar) had at least one gifted trait in the theme language (x-axis).

**Figure 4.55**

*Early Traits of Gifted Children Compared by Gifted Groups, Science, Mathematics, and Language (N=44), Mathematics and Language (N=11), and Language (N=13)*




The statistical significance between the gifted groups, SML, ML, and L, will be addressed in turn by theme. The themes are language, memory and processing, character traits, mathematics, and physical. Details regarding these can be found in Figure 4.43. Chi-square tests using a 2x3 contingency tables were performed for the themes: language, memory and processing, and character traits. Fisher Exact Tests were performed for mathematics, and physical. Statistical tests were not performed for issues or problems, and testing and others.

**4.7.4.1 Language.** The difference reported in language traits between SML, ML, and L in this study, are not significant.

**4.7.4.2 Memory and Processing.** The difference reported memory and processing traits between SML, ML, and L in this study, are not significant.

**4.7.4.3 Character Traits.** Children who are gifted in SML are more likely to have the character traits shown in Table 4.43 than children who are gifted in ML or L. This is significant at p <.01, ($X^2$ (1, $N$ = 68) =9.495, $p$ < .01.).

**4.7.4.4 Mathematics.** The difference reported mathematical traits between SML and ML, and SML and L in this study, are not significant.

Children who are gifted in ML are more likely to have the mathematical traits shown in Table 4.43 than children who are gifted in L. This is significant at p <.05.

**4.7.4.5 Physical.** The difference reported in physical traits between SML, ML, and L in this study, are not significant.

*Assertion 62*

*When examining the early indicators of giftedness in SML, ML, and L gifted children, there are no significant differences in language, memory and processing, or physical traits.*

*There are no significant differences in mathematical traits between SML and ML gifted children.*

*Assertion 63*

*Children gifted in SML are more likely to have the character traits shown in Table 4.43 than children who are gifted in ML or L. This is significant at p <.01.*

| |
|---|
| *Assertion 64*<br>*Children who are gifted in ML are more likely mathematical traits shown in Table 4.43 than children who are gifted in L. This is significant at p <.05.* |

#### *4.7.5 Aspect I – Expert Educators' Perceptions of the Implication of Not Supporting and Encouraging Excellence in G & T Science*

Of the nine Expert Educators interviewed, eight responded. All eight (100%) mentioned that not supporting and encouraging excellence would have a negative impact on the gifted person, four (50%) stated that there would be an impact on others and society. Three participants commented on assessment. The themes presented from their responses are, Impact on the gifted person, impact on society, HSC and assessment, requirements to retain gifted students at school. Table 4.44 presents these themes with sample excerpts.

**Table 4.44**

*Expert Educator's Opinion of the Effect of Not Supporting and Encouraging Excellence in G & T for Science*

| Theme and Summary | Sample Excerpts |
|---|---|
| **Impact on the gifted person**<br>• Disenchanted<br>• Disenfranchised<br>• Gifted kids get bored quickly if not challenged<br>• Gifted students aren't catered for until they are mucking up<br>• Preferential option for the poor means attention to those who struggle academically. Gifted are left out as they are not seen as poor.<br>• Students will perceive school to be a waste of time<br>• Students will say school is irrelevant<br>• The students don't enjoy subjects that are not challenging<br>• They become lazy if they don't have the opportunity<br>• They become unmotivated<br>• They cruise along<br>• They don't reach their potential | • *That they realise when we say diversity is the norm, most people see that as code for you know that in our classrooms, we're going to have some kids that are operating at a lower rate than most of the class (Interviewer - rather than at a higher rate too?) Yeah!! and so that is just the natural response of people. You can see it in terms of why we have that from a religious perspective too because one of our critical things is a preferential option for the poor. So obviously that means if you're not well off etc. By extension it means that you can be poor in lots of ways and so that's what leads are often our attention to go to the kids who are struggling. So having systems or frameworks or policies that help frame our thinking is useful because otherwise we get stuck in one way thinking in and we actually don't get out of it. We get stuck in it and so having the thing that jogs your thinking. It is not until those kids start come and knock on the door or mucking up in your class because it's so boring. It's not until those things happen.*<br>• *If you don't identify them and you don't give them the opportunity to extend themselves, they become lazy, they come disenchanted, disenfranchised. Not to recognise them would make them a very clever person to disrupt the class and not perform at their best and not really care about the subject.* |
| **Impact on society**<br>• We lose our top scientists to other countries where they can progress<br>• We need the gifted to solve problems<br>• Science is suffering with low numbers in school and university | • *The drain we have at the moment in science. First of all, the poor numbers we have in the senior school, the lack of preparedness for that because they are not thinking and challenging themselves around that. The next step is the lack of numbers in university and the dramatic effect that that has across our nation in terms of our progress forward. The drain to America some of our top scientists at the moment working in cancer treatment working at Johns Hopkins and doing amazing things - well, why aren't they here?* |
| **Impact on the gifted person and society**<br>• Gifted students will pursue other options and leave school<br>• Students will leave early<br>• They can become disruptive | • *You'll have more kids leave early. They will say school is irrelevant. Why am I wasting my time here? School is irrelevant.* |
| **HSC and assessment** | • *We probably promote it because we're going to spend all this time looking at HSC data. That is useful at a whole* |

| | |
|---|---|
| • Gifted students are wanted in the system for their marks not to educate them for later<br>• Teachers need professional learning about how science education is to think scientifically - not good grades<br>• Academic achievements in high school, do not correlate to success that they have achieved in their life at all<br>• Narrow mentality about the importance of the HSC<br>• Too much HSC analysis promotes an overemphasis on the HSC exam<br>• HSC should be about workplace success<br>• HSC should be about opening doors | *system level to help focus our professional learning for teachers but that will just be one part of it. The aim is not to get good HSC marks, the aim should be to get kids who can think scientifically and argue a problem and do those sorts of things and have doors open to them to do further study or to go into the workplace and be able to analyse and pull things apart and then wonder if and why.* |
| **Requirements to retain gifted students at school**<br>• Diversity is interpreted as catering for the lower end<br>• If we're not going to encourage it (excellence) then what's the point of Education<br>• It is almost abuse not catering for them<br>• What we ask kids to do now can be done on a phone in 5 minutes<br>• Selective schools ensure that students do not see what it is like to be academically successful<br>• Constant refinement of how we teach for all capabilities<br>• Extension science caters as it provides high levels that can be seen<br>• Gifted education does not necessarily have to be attainable by all but it must be visible<br>• Motives need to be aspirational to encourage excellence<br>• Students need to see a peak to aim for<br>• We need to change our focus and cater for gifted as well<br>• We need to consider the standard for future generations<br>• We need to progress students and ask them harder questions<br>• We need transformation not an improvement agenda | • *.... transformation as opposed to the improvement agenda which is how do we just do the same things but do it better. Doing the same things but better I think is just going to lead it to the kids saying that this is irrelevant and I don't need to do it. Half of what used to be said in classrooms, kids could find on their phone in 5 min.*<br>• *So you know it's diabolical, that's a strong word to use but it's almost abuse that these kids are being squashed, and sat on by our system, not being able to flower, a not being able to flower so many mixed metaphors.*<br>• *If we're not going to encourage it (excellence) then what's the point of education. You know you've got to have something to aim for and in fact this is one of the reasons why I don't like selective schools because what you're doing is taking out the cream, putting them somewhere else so that everyone else doesn't get to see what that's like. I think that in talented and gifted education it has to be visible, and not necessarily attainable, but visible so that other students, and teachers, can see what is possible.* |

*Assertion 65*

*Expert Educators unanimously agree that there is a negative effect on the gifted person if they are not properly catered for and encouraged in excellence during their education. This impact is immediate and long term.*

*Assertion 66*

*There are negative effects for society, for not encouraging excellence in G & T science students which may also negatively affect the gifted person*

*Assertion 67*

*To improve retention of gifted students in schools, and to support those who do remain, educational institutions need reform and change. This includes creating aspirational goals, transparent and visible achievement, by way of a transformation agenda, not improving on what is already there.*

# 5 CHAPTER 5: DISCUSSION

Chapter 4 presented the data collected for Phase 2 sub research questions 2, 3, 4, 5, and 6. These were organised into aspects and a similar format will be used in Chapter 5. The major Aspects contributing to the discussion will be referred to within the heading. This is to assist the reader in locating the associated findings.

In this chapter, the findings are critically discussed in relation to the literature presented in Chapter 1 and Chapter 2 and where relevant recommendations for G & T education and research will be presented. Table 5.1 provides a summary of the participant groups for reorientation purposes. The participant group names are capitalised to differentiate between teachers in general and the Teachers who participated. When the term educators is used, this refers to all educators, not a specific participant group.

**Table 5.1**

*Summary of Participant Groups*

| Participant Group | Summary |
|---|---|
| Expert Educators (*N*=9) | Participated in semi-structured interviews (50-90min).<br>Seven of the experts held positions of responsibility or leadership at an educational system level or higher, two participants at a school level.<br>Sectors – Catholic, Independent, Educational Organisations. |
| Teachers (*N*=191)<br>From five questionnaires | Completed questionnaires that were distributed electronically to schools or social media sites. Not all participants completed every questionnaire. |
| Parents<br>(*N*=106)<br>From two questionnaires | Completed questionnaires that were distributed electronically to social media sites. Not all participants completed every questionnaire. |

**Sub Research Question 2**

## 5.1 What Are Educators' Perceptions of the Appropriateness of the NSW DoE Policy for G & T Education?

Prior to determining educators' perceptions of the appropriateness of the NSW DoE policy for gifted education, understanding about key definitions were probed.

### *5.1.1 Educators' Understanding About Key Definitions of G & T Students (Aspect 2A and 2B)*

Educators were asked to provide definitions in their own words of the terms gifted and talented. This question was open ended to determine educators' understanding without the influence of predetermined options.

Educators do not separate the terms gifted and talented. Instead, they provide definitions that recognise either ability or performance, but not both. As such, they do not express that talent is a developmental process like Gagné (2013) and Heller (2005) describe. Teachers included characteristics of gifted people in their definition. Characteristics included traits such as empathy and social awareness. Their responses were typically descriptive of how they viewed a gifted person, rather than a definition.

It was unexpected that educators do not separate the terms gifted and talented. This lack of distinction has implications for gifted and talented education. Implications for not separating these terms may lead to educators viewing giftedness as a fixed state, rather than a developmental process, whereby students require initial experiences to recognise their gift, then further experience and practice to progress. It also leads to the false belief that students are performing academically and are therefore gifted, or not performing and therefore not gifted. It ignores the difficulties, challenges, and obstacles that can be present. Secondly, without clear definitions of the basic terms gifted and talented, the construct of, and concepts within gifted education become obscure and ambiguous. Consequently, strategies and measures to support gifted individuals may be haphazardly or inconsistently enacted. They are most likely arbitrated by individual teachers who use their perceptions to guide what they believe is required. Chapter 1 described the purpose of policy and the essential elements for it to be effective. Elements include explicit statements and key definitions (Nakamura, 1987; Northeastern University, 2017; Taylor et al, 1997; University of Colorado, 2018). At the most basic level, well communicated definitions and understandings of gifted individuals are required for any efficient intervention or support to occur. This is a component of the definition provided in section 1.3.3.

Another implication for gifted education, and general education, is the lack of familiarity with policy, as demonstrated by these findings. This is not the self-reported familiarity with the policy that will be discussed in section 5.1.2. Gagné's separate definitions of G & T have been prevalent in Australian G & T policies for almost 30 years. Each iteration from 1991, including the current and the new HPGE for implementation in 2021, separates these terms. These policy definitions were presented in Table 1.2, Chapter 1. The inability to separate the terms gifted and talented, as is written in the policy, may indicate that educators do not read policies, do not understand what they have read, or that they have forgotten the specifics of the policy. It similarly indicates a lack of formal awareness, education, and training in gifted education. The University of NSW provides a free, self-directed, self-paced, and online learning package for teachers in gifted education. The package, available since 2004, uses Gagné's definitions, clearly separating the terms gifted and talented.

In addition to educators not separating the terms gifted and talented, there is no overarching consensus of what it means to be gifted, and what it means to be talented. This study confirms the assertion by Koshy and Pinheiro-Torres (2013), that teachers do not use the terms development, gifts, and talent, well or consistently. Merrotsy (2017) draws attention to the lack of language consistency between publications, policies, and websites. He even notes that within websites, terms such as "gifted", "talented", and "natural" are not used consistently. A New Zealand study published after the collection of the data for this research found similar inconsistencies in gifted education terminology interpretation (Wong, 2020). This lack of agreement is presented as a definition on the Australian curriculum, assessment, and reporting authority (ACARA) website. They too claim "no universally accepted definition" (ACARA, n.d.). This is most likely attributable to two leading Australian educational bodies, ACARA and NSW DoE, providing vastly different information on the same topic. Thus, this lack of consensus between teachers, and confusion with use of terms, may be understandable.

Despite lacking clarity with the terminology, every respondent had a familiarity with, some understanding of, or acknowledged key concepts, ideas about, or the qualities of gifted people that are commonly found in the literature. As this was not in a uniform or consistent manner, it was not possible to derive a common definition and a shared understanding. It is time for this to change. Australian educators, academics, and governments need to agree on a definition, working together rather than educators, sectors, and linked government bodies creating their own interpretations of the literature. In the absence of shared meanings, catering for gifted students becomes even more challenging. This must be addressed as the first step to providing for these students.

**Recommendations**

Explicit and evidence-based definitions provided by Australian research academics and relevant government bodies would greatly benefit educators. Once agreed upon, these definitions should contain consistent information and be widely published and disseminated to educational institutions. This would assist to form the basis for a common ground upon which to build good policy.

### *5.1.2 Insights Into Educators' Engagement With NSW DoE G & T Policy - Self-Reported Familiarity with NSW G & T Policy (Aspect 2C)*

Most Expert Educators were not aware of the NSW DoE G & T policy (78%). The Expert Educators who were aware were not familiar with the detail of the policy. Conversely, only 33% of Teachers were not aware of the policy. A Fisher exact statistical test was performed using the variables, "aware of" or "not aware of". The reason for choosing these two categories, rather than including familiarity, was that it was difficult to gauge a level of familiarity, even if the participant selected familiar. For some participants, familiarity may have indicated that they had seen the policy, for others it may have indicated they understood and could refer to the policy. This was a limitation of the question and an aspect that would be changed if the questionnaire was administered again. Also, since only seven of the 34 participants separated the terms gifted and talented, as documented in the policy, it was unlikely that the reported familiarity was comprehensive. This has been discussed in depth. It was more precise to compare "aware of", or "not aware of" the NSW DoE G & T policy. Using these variables, the Fisher Exact Test demonstrated that there was no statistical difference between the two participant groups, Expert Educators and Teachers, despite the seemingly different percentage familiarity. Teachers from NSW DoE were statistically more likely to be aware of the NSW DoE policy than Teachers from other sectors. Thus, in the absence of a policy analysis from each independent or Catholic school, these findings only demonstrate that the NSW DoE G & T policy is not adopted by the other sectors. It also shows that the influence of the NSW DoE policy outside of the NSW DoE may be limited. Chapter 1, 1.4 The NSW school system, explained that NESA is responsible for all schools and ensures compliance, registration, and accreditation. Catholic Schools are separated into Dioceses and have an overarching administration for each. However, Independent schools in NSW have no overarching administration, and each school is responsible for meeting governance and compliance requirements. As such, the sectors are relatively separate, so greater awareness of NSW DoE G & T policy by NSW DoE Teachers was expected.

The implications of this disconnect between sectors are serious for G & T education. Like the absence of common definitions for G & T, the absence of shared understanding and aligned strategy with policy will impact student learning. Alignment in an educational context can be best described as the degree to which expectations and perceptions are in agreement, and work together to achieve optimal educational outcomes (Martone & Sireci, 2009). It is recognised that alignment between educational stakeholders is key to supporting strong implementation of standards, curriculum, and assessment (Penuel, Fisherman, Gallagher, Korbak & Lopez-Prado, 2009). ACARA provides national Australian curriculum for learning for all sectors in all states, although NSW is unique in that it implements the Australian curriculum through syllabi. Yet there is no national policy for gifted education, despite this national curriculum. Policy and curriculum are not in alignment if the policy is left to the individual sectors while the curriculum is separately mandated. This has further-reaching consequences than a single malalignment between the sectors. Independent schools, while accountable to NESA for compliance and registration, are responsible for their own policies and strategic management of the school according to their own ethos. They are not considered a sector for this reason. This means that there is no common policy for independent schools. Conversely, the NSW DoE has a policy for all government schools and provides consistent information to the schools in the sector.

There is widespread use of the terms 21st century learning and 21st century education in school environments. It is now time for 21st century collaboration and communication in Australian education. It is essential that ACARA provide a national level statement on gifted and talented education, including defining key terms, ensuring that the country is working towards the same goals.

In the last 40 years, enrolments in independent and Catholic schools have seen steady growth that outpaces that of the average growth in government schools (Independent schools council of Australia, 2019). Thus, a policy for NSW DoE schools and students is reaching proportionately fewer students. It is not known what policy is implemented in the other sectors or if that policy is in alignment with the government system for education. One possible solution is to provide a national directive that influences sectors equally and removes the individual school and sector accountability for policy making.

Investigating alignment between stakeholders was outside the scope of this research, but indirect findings have shown that there is a misalignment in our education system between the sectors. Prior research into G & T education has not presented the voice and perceptions of teachers and school leaders specific to this area of research, nor has it investigated the importance of alignment as it pertains to the directives of leaders regarding the implementation of a G & T policy, specifically science policy, and the subsequent translation of that policy into classroom practice by teachers. This alignment is concerned with the degree of agreement between expectations and perceptions of individuals, in this case, between government, sectors, educational leaders, and teachers of G & T students. Previous studies have demonstrated that success in educational facilitation occurs when formal organisational mechanisms are in alignment with the informal social structure of the school (Martone & Sireci, 2009; Penuel, Riel, Joshi, Pearlman, Kim, & Frank, 2010). Martone and Sireci (2009) highlight that shared goals and expectations increase the probability that educators can improve teaching practice and achieve defined objectives.

A lack of familiarity with the NSW DoE policy, as found in Expert Educators and Teachers from sectors other than NSW DoE, does not indicate that G & T policy is absent. It can only demonstrate that these teachers are not familiar with the NSW DoE policy, and most likely not enacting or using the same information to formulate their own policies. Similarly, an awareness of the NSW DoE policy does not indicate that it is implemented in schools nor does it indicate that the implementation is effective. Implementation of the policy is a separate but equally important issue. Examination of this begins with determining the existence and perceptions of school G & T policy.

**Recommendations**

A recommendation for future research is to determine what policy is available in individual schools. It would be beneficial to then ascertain how the policy is enacted by individual teachers within that school. Policy interrogation, and links to research within the policy, would form a part of the research. This would include establishing any similarity to sector published or recommended policy.

This was part of the proposed research that unfortunately did not have sufficient participation. Recommendations to enable the progression of this research include methodological changes such as a case study approach.

### *5.1.3 Perceptions of the NSW DoE G & T Policy (Aspect 2D)*

Expert Educators and Teachers responded with unexpected overwhelming negativity about the policy when asked their thoughts. Participants indicated that they were pleased that there was a policy. However, most participants indicated that it was not useful and therefore a burden to teachers if they were expected to implement policy that was substandard in relation to directly informing practice.

Most of the comments from the Expert Educators were negative (89%). The sentiment was that there was a policy because there should be a policy, but it is not useful nor is it one that can be enacted. Participants believed that there is not enough information to be able to use the policy and that it is “another document written by bureaucracy that is satisfying its own needs and not really the needs of the gifted and talented kids or their ”. Teachers were more positive about the policy than Expert Educators. However, Teachers were asked specifically for strengths and limitations, so may have felt compelled to provide positive and negative responses. Hence the greater number of positive responses for Teachers when compared to Expert Educators. As the questions were not the same, it was inappropriate to perform statistical analysis with these results.

### *5.1.4 Characteristics of a Good Policy with Reference to the NSW DoE G & T Policy (Aspect 2D and Aspect 2F)*

In general, Teachers commented more specifically than the Expert Educators about the characteristics of a good policy for G & T education. For example, Expert Educators stated that “At minimum there needs to be checks and balances” while Teachers stated “Policy should indicate specific reporting and monitoring proformas”. The Expert Educators’ comments could be considered the overarching requirements. The Teachers’ comments were more procedural and specific to what they would need to enact a policy. There were some comments from both participant groups that were aligned. For example, Expert Educators stated that “A policy should be explicit” and the Teachers’ comments reflected the need for “More substance”. These two comments expressed the same idea.

The manner in which teachers were highly specific about what they need demonstrates that they want to know and understand exactly what is required. This supports what Du Plessis (2020) refers to as “comfortableness” where teachers have a sense of self-confidence in their knowledge and ability. Conversely, when teachers do not have “comfortableness” they feel unease and anxiety when teaching out of field, or teaching those who require special differentiation. In the case of many teachers, this applies to gifted education. Practice for gifted education requires greater depth and breadth of knowledge in their own field, including additional pedagogy (Gagné, 2011; Moon, 2009; Subotnik et al., 2011). Du Plessis (2020) recommends that any school implementing a new or revised policy should recognise the additional time needed for teachers to deliver good educational outcomes and maintain their self-confidence. The process of timely feedback and support is essential.

This need for “comfortableness” is demonstrated by the feedback given about the NSW DoE G &T policy. They are asking for more detailed explanations and characterisations to feel confident in their understanding of the requirements of the policy. According to educators, aspects of the policy that need addressing are:

- Definitions of G & T need to be better elaborated and explained. This is in alignment with the findings discussed in section 5.1.1. Educators do not have a unified understanding or definition of gifted students, or the terms gifted and talented. Subjective and qualitative definitions, similar to those presented in the new NSW DoE HPGE policy, are not helpful.
- The policy needs clear procedures and information about how to use it, not just information about gifted children. Educators believe that the document is complex but does not provide useful information. It is also not clear which components are mandated. Given the evidence presented in this research, it is not likely that policy or procedures are enforced.
- The policy needs to contain practical information rather than a document outlining accountability and responsibility. The NSW DoE policy does not state what provisions are required, funding amounts and method for allocation, nor measures of impact.

In summary, educators are asking for answers to Gallagher's four questions that were outlined in Chapter 1 (section 1.7). Gallagher (2015) suggests that these action statements culminate in quality support systems and infrastructure similar to that of healthcare and the military. Many participants expressed concern about identification; concern that this was the responsibility of teachers who may have limited expertise and experience. Gallagher (2015) raised this issue and included it in his four questions "Who receives the resources?" (p. 77).

According to educators, the NSW G & T policy is missing many elements. These elements are requested to create a policy that is useful for teachers and their G & T students. The elements are:

- Be broad and not only cater for the "average" gifted child
- Be clear and understandable to all stakeholders
- Be flexible to cater for individual schools
- Be explicit
- Clearly define the population, G & T students
- Clearly indicate provisions of time, resources, training, and classroom support
- Contain reporting and monitoring proformas
- Indicate specific accountability
- Include access to experts for identifying gifted students
- Include an identification process

**Recommendations**

Recommendations include creating a policy that adopts the above elements. Recommendations for future research have been derived from questions posed by the educators in the questionnaires and interviews. It would be beneficial if answers to these questions could be clarified as part of a gifted education policy.

- How are gifted students identified?
- Who is responsible for identifying, or providing resources to identify, gifted students in NSW?
- How are the directives in the policy assessable and measurable?

### *5.1.5 Perceptions for the Necessity of a State Policy (Aspect 2E)*

Overall, most educators believe that a state G & T policy is necessary. Our school award and assessment systems (HSC, ROSA, and NAPLAN) are the same for government, independent, and Catholic schools across the state so it is not surprising that most educators would like to see common policies. This includes a G & T education policy.

From the findings presented in section 4.1.4 and discussion in section 5.1.3 educators are generally not satisfied with the current NSW DoE policy. A

state policy may provide the opportunity to overhaul and reform this policy. Teachers have expressed that a state policy is required to ensure that all schools have access to provisions and support for gifted students.

Interestingly, when this data was separated based on sector, teachers from NSW DoE schools were more likely than teachers from Independent Schools to believe a state policy is necessary. No reasons were given, even though there was an opportunity to comment. Given that independent schools receive significant amounts of their funding from non-government sources, they may feel that their financially privileged position could be compromised. It may also be true that they believe that their policies are superior to the government policies and that a mandated policy would remove their freedom to implement policies that resonate with their religious or cultural affiliations, or other special needs.

It should also be noted elite and privileged education occurs within the sectors and between the sectors (Maxwell & Aggleton, 2016). Independent schools provide more than single-sex and academically selective education, they also cater specifically for the intellectually disabled, physically disabled, and minority groups such as Aboriginal and Torres Strait Islander people. Prior to mandating any policy, if deemed necessary, further research should be conducted as to the unique requirements of some schools (Maxwell & Aggleton, 2016).

Expert Educators expressed that a state G & T policy would close the gaps between schools. Possibly illustrating a similar sentiment as teachers from NSW DoE schools. They qualified their responses with explanations that a state G & T policy would shift the focus from the lower end of ability, and minimum standards, to the top end. At the same time, it was acknowledged that teachers are time poor and that there is significant work at the lower end of ability, so actually implementing a policy may prove to be difficult.

It is interesting that Expert Educators recognise it may be problematic to cater for gifted students due to this additional burden on teachers who are already working hard for those who are less able. Moon (2009) discussed that it is easier for educators to believe that gifted students do not suffer from challenges and hardships, rather than acknowledge the complex issues that some are challenged with. He asserts that the emphasis on improving the lower end leaves the teacher little time for students who are gifted; a perception reiterated by Expert Educators in this study.

### *5.1.6 Using Gagné's Model for G & T Education in NSW (Aspect 2G)*

Gagné's model was well received by Expert Educators. They were asked for their thoughts on Gagné's model, not to compare for suitability with other models. Most Expert Educators were not familiar with the model prior to the interview. However, Gagné's model is seen by some Expert Educators to define G & T well and to be more useful than the NSW DoE G & T policy. They commented that it provides the substance they stated was lacking in the NSW DoE G & T policy and they believe that it is a good starting point to help guide teachers with assisting students to develop their gifts into talents.

Some negative aspects were mentioned. Gagné's model is seen by some Expert Educators to be too complex and confusing to use, requiring more examples of how the interactions work. Gagné's component "chance" was confusing for some Expert Educators. This reiterates the need for clear procedures and documents on how to implement policy and theoretical models. Gagné (2015) provides extensive information on academic talent development (ATD) and answers the question "How would ATD programming look like in a typical school system, and where can we find existing examples of the DMGT-based ATD model?" (p. 291). He states that there are examples of where the DMGT and ADT model is implemented well, but they are few. This type of information should be provided in conjunction with a policy that cites or uses Gagné's work.

Although a small sample size, the participant's responses were similar to each other. Recall that five of the nine Expert Educators stated that the NSW DoE policy needed clearer definitions (see Table 4.11 and Figure 4.7). When discussing Gagné's model, one Expert Educator commented, "*They talk about natural abilities and then giftedness is in the top 10% and then they talk about systematically developed skills which I probably referred to before, in terms of talent. I can see that that probably links with my thinking there*". Despite seeing the definition in the NSW DoE G & T policy, the Expert Educator's thinking was not consolidated until they viewed Gagné's original definition. This most likely indicates that Expert Educators could not clearly identify that it was Gagné's definitions that were used within the NSW DoE G & T policy without seeing them explicitly.

As Merrotsy (2017) argued, Gagné's model is not adopted nor is it appropriately used in G & T policy in Australia. Gagné (2015) also states that there are few examples where his model is enacted and that there is a total absence in elementary and middle schools. This study would support Merrotsy's claim regarding implementation in NSW, and go one step further. It is also unlikely that Gagné's definitions are used correctly. It is not possible to use a model or definitions correctly when they are presented incorrectly, in outdated forms, or using a piecemeal approach.

Expert Educators' general comments about models were rich and informative. They provided insight into our current methods for assisting students. The emergent message from Expert Educators was that models are only useful to a point, and as G & T students are individual, no one model will suffice. Expert Educators commented that Gagné's model and the NSW DoE policy do not cater for the gifted students who are underachieving or disabled. Stephen Hawking, a theoretical physicist, was given as an example of a disabled gifted person who would not have found benefit from Gagné's model, or our current policy. A point made clear by Wellisch (2016) and Wellisch and Brown (2012). They promote awareness for underachieving gifted students and provide an alternative inclusive identification and progression model. Expert Educators acknowledged that gifted students may present asynchronously and that a model for gifted education should take this into account. However, the term asynchronous was not used by Expert Educators showing a lack of familiarity with key terms in gifted education. Although they are aware that gifted students are not necessarily in sync, it is likely they have not had the education or training to assist students who present this way. Asynchronous presentation, including the persistence into adulthood, is well discussed in the literature (for example, Columbus group, 1991; Silverman 1997). Expert Educators recognise the need for expertise in gifted education. It is encouraging that they do not want to "box" gifted students and are wary of models that do so. Expert Educators acknowledge that it is important to have a policy, even one that is not perfect, as it generates awareness and theoretically ensures that measures are implemented, regardless of the personal feelings of educators. This finding demonstrates that Expert Educators are aware that teachers' attitudes influence classroom practice (Geake & Gross, 2008; Gross, 1997b; Lassig, 2003). However, actioning a model and policy that caters for individuality is a different matter from understanding that all students are unique. This is where the challenge becomes apparent. Clear, precise, and evidence-based procedures are essential. These will allow educators to action the educational and well-being interventions with confidence and competence.

### *5.1.7 General Educational Policy for G & T Students (Aspect 2H)*

Expert Educators were asked if the general emerging educational policies only were sufficient for G & T students. As described in section 1.1.3 Policy*,* the policy provides broad guidelines to steer individuals in their conduct to meet the goals of an organisation. However, Expert Educator participants suggested the use of strategies, rather than policy. Strategy is defined in the Cambridge dictionary online (2020), as “a detailed plan for achieving success in situations such as war, politics, business, industry, or sport”. Potentially Education could be included in such a list. Educators need detailed guidelines and instruction when working outside their expertise. This provides clarity with understanding and interpreting the documents; thus, educators can work towards the same end. This supports a policy enacted with integrity as clarity can aide in communication and collaboration processes. Stakeholders may find they discuss and solve problems solve more effectively when they are aware they are managing the same issue.

Educators have requested greater elaboration, more comprehensive guidance, and greater precision when providing their evaluation of the current NSW DoE policy. Strategies interchangeably used with the term procedures, provide the requested more specific and comprehensive guidelines. Thus, the suggestion to implement a strategy or strategies, anchored to an evidenced-based policy, may be beneficial for educators and their gifted students.

Expert Educators have articulated that there is a long and difficult task ahead if the problems within gifted education are to be solved. A transformation to this degree will require whole systems to shift and this takes considerable time and planning. This requires that individuals work together rather than argue with each other. Again, the alignment of goals, and a co-operative approach are essential.

NESA does not provide an overarching educational philosophy. The NSW DoE policies for gifted education are similarly lacking a clearly documented vision and defined goals. Thus, it is difficult for educators to align their principles and become curious, rather than critical about their differences. Educators need a clear but flexible educational philosophy that guides their direction and allows for personal input and perspective.

**Recommendations**

Recommendations include providing clear, precise, and comprehensive strategies. These strategies could then be attached to an evidence-based policy. An overarching philosophy for NSW education with clear goals and aims articulated would be useful in a policy for G & T education. In addition, a separate philosophy for gifted education is recommended. This may be delivered as a national level statement from ACARA alongside the Australian Curriculum.

### *5.1.8 Summary of Sub Research Question 2*

Educators' do not generally believe that the NSW DoE policy is appropriate for G & T education. They have key concerns around the identification of gifted children and the lack of expertise and resources available to them. Educators use and are familiar with, discrete language aspects and terms found in the literature for G & T people, and their education. However, their definitions of G & T do not typically indicate the belief that talent development is a process, and as such, they do not use Gagné's definitions correctly. In addition, there is no consensus for definitions of gifted and talented. In the absence of a shared definitions and understanding of G & T people, gifted students may not be catered for adequately. Expert Educators thought highly of Gagné's model, expressing it was more useful than the NSW DoE G & T policy. Their comments supported the claims of Merrotsy that Gagné's DMGT is not adopted in NSW educational institutions. This study revealed that Gagné's definitions are not known to Teachers and Expert Educators, despite being used in the NSW DoE G & T policies for more than 30 years.

Most educators believe that a state G & T policy is necessary. However, when analysed by sector these beliefs differ. Reasons for the differing beliefs warrant further research and may help to create a policy that is useful in different contexts. Expert Educators acknowledge that a state policy would close the gaps but at the same time state that implementation would be difficult due to the focus on lower ability students.

NSW has introduced a new HPGE policy for implementation in 2021. However, the policy reform processes, literature review, and consultation process provided by NSW DoE did not follow the policy cycle described by Althaus et al. (2012). There has been no evidence presented of an evaluation demonstrating that the NSW DoE G & T 2016 policy update was effective. Yet, the NSW HPGE policy is not vastly different to the NSW DoE G & T policy, albeit more complex.

This research provides evidence that a federal policy may be beneficial to various stakeholders. To do so would alleviate the confusion about what is provided and where accurate information can be accessed. Based on this sample, Educators do not have a clear understanding of what is available for gifted education in NSW, Australia, with regards to policy, definitions, and support. This is compounded by conflicting information provided by government organisations responsible for education in NSW and Australia.


## 5.2 Sub Research Question 3 - School Policy for Education

***a. What are Educators' Perceptions of the Appropriateness of Their School Policy for G & T Education?***

***b. Where School Policy Does Not Exist; What is the Rationale Given for the Absence of a Policy?***

### *5.2.1 Expert Educators and School Policy for G & T Education (Aspect 3A and 3B)*

None of the Expert Educators had encountered science specific G & T policies over the duration of their career. Only one Expert Educator was aware of a G & T policy in their work place. This Expert Educator's observations will be discussed shortly.

Eight of the 9 Expert Educators were asked if they knew why there was no policy in their work place. The responses received were perceptions or suppositions, rather than factual reasons. As such, there were no responses that gave a conclusive reason why there was no policy for G & T education. Some of the responses appeared to be justifications for why they were unaware of the policy. However, most Expert Educators had not considered the absence of policy. An interpretation of this finding is that gifted education is not a priority for leaders in Education. This interpretation is supported by the findings from sub research question 2, where Expert Educators express the need for a state G & T policy to shift the focus from the lower end of ability. There were four reasons provided by Expert Educators for the absence of policy: Misconceptions about giftedness, a standardised system is not suitable for G & T students, lack of confidence in policies, and a lack of awareness about giftedness. These will be discussed in turn.

***Misconceptions about giftedness* -** One Expert Educator, trained in gifted education, stated they had been advocating for gifted students and requesting a policy for years with no success. The rationale given was that higher leadership thought that gifted students were able to look after themselves and did not need special intervention. It is well documented in the literature that gifted students require suitable opportunities, challenging environments, and resources that cater for their unique needs (Gagné, 2011; Moon, 2019; Muratori & Smith, 2015 & Tannenbaum, 2003). The misconception of self-sufficiency in gifted students continues, even when educators who are trained in gifted education are advocating for them.

***A standardised system is not suitable for G & T students*** - It was acknowledged that it is difficult to have a policy in our current educational system when standardised testing and learning are commonplace. Expert Educators claimed that the system goals are to produce a uniform or consistent "product" and that, beyond the diversity statements in the syllabus, there is a limited focus on differentiation and giftedness in science. In sub research question 2, it was discussed that while individuality is acknowledged, implementing suitable teaching and learning strategies for individuals is not commonplace. In NSW the outcomes and content in the syllabus clearly dictate what students are to learn at each stage, and to what standard. They also provide information about what a typical student can do at the end of each stage. There is no information about moving students beyond their stage, even if they have the capability to do so. This type of system creates increasingly prescriptive programs and assessment regimes that remove the ability for educators to cater for the advanced, and individual needs, of gifted students who are developing a talent in science.

***Lack of awareness about giftedness*** – Most of the Expert Educators did not have specialist training in gifted education. Those who did not have training or a special interest provided responses indicating it was something that they had not thought about. They want to ensure that students achieve their potential but have not specifically considered those who are gifted. Gifted education is not a high priority. This aligns with the misconceptions of giftedness and a standardised system approach to learning.

***Lack of confidence in policies*** –Expert Educators' indicated a lack of confidence in policies. The policies they had encountered were either not useful or contradicted what the educator knew to be true. It was acknowledged that many processes and top-down directives are not well thought out, nor do they have "backbone". The word backbone was used to indicate that the processes and directives were not evidence-based.

There is limited literature reporting on the lack of confidence in Australian educational policies. However, as discussed in Chapter 2, Merrotsy (2017) has openly claimed that Gagné's work cited in Australian G & T policy documents is inconsistent, misrepresents Gagné, and draws attention to the lack of scholarly practice in official publications. These claims, discussed in Chapter 1, are supported by this research. Expert Educators have described similar problems with other policy, leading to mistrust around education policy in general.

Chapter 1, has provided additional evidence and discussion in the context of NSW G & T policy, and policy history, that supports this work by Merrotsy. In Chapter 2, it was discussed that his critique was met with opposition by Henderson (2018) in a response article in which she states, "It is deeply disappointing that Merrotsy would write such a divisive paper" p. 62. This researcher does not find Merrotsy's comments or premise divisive, but instead timely. The researcher is of the view that Henderson's (2018) claims that he is critical of those "who are advocating for and actively working on behalf of gifted students, their families, their teachers, and other professionals who support them." is misconstrued (p. 62). My interpretation is rather that his assertions are a caution and forewarning that the system in place to support gifted children, is broken.

### *5.2.2 Strengths and Limitations of Known School G & T Policies (Aspect 3C)*

All of the Expert Educators had previously worked or currently work as a classroom teacher. Therefore, they were able to comment on policies they had seen enacted. The Expert Educator who stated they were aware of a current school G & T policy, explained that the policy was a directive to differentiate for gifted students on a case-by-case basis. They described the policy as "alright" but expressed the importance of using the same policy long enough to measure the outcomes. This included time for refinement and reflection. There were no other details known about the policy. Perhaps this indicates a lack of confidence in the "alright" policy. If the educator believed the policy was necessary, useful, and evidence based, they may have had a better understanding of the policy details, and how it has assisted students in their school. Another Expert Educator noted that G & T policies are in place only to be seen to cater for G & T students, or for internal compliance. Again, this indicates there are policy confidence issues.

Structures and strategies are used more often than policy. However, not consistently. This aligns with the discussion in sub research question 2 where a suggestion was made that specific strategies may be more useful than a less detailed policy. Teachers want evidence-based structures, strategy, and policy. In addition, their comments indicate that they want to ensure that what is enacted is in place long enough to make a difference and to measure that difference.

Strategies that teachers had seen enacted from policies included identification, acceleration, and differentiation. Identification of gifted students is considered a positive consequence of having G & T policies. However, educators suggest that in schools, the process of identification is flawed. It was noted that gifted students are often identified because they answer questions posed in school assessments better than their peers, not because they are gifted. Although Expert Educators had seen identification strategies in place, this did not ensure that these students were supported or that there were changes made in response to identification.

### *5.2.3 Classroom Practices*

Although the questions were regarding policy, Expert Educators commented on classroom practices. It was interesting that the interview conversations often strayed back to the practical aspects of education, rather than the overarching picture that is created by policies. These practical aspects will be discussed briefly, as it may be useful to consider these in the context of a G & T policy.

Expert Educators noted that any policy for G & T education must allow freedom, flexibility, and remove the limits imposed on students. Sometimes these limits were imposed because teachers were not confident in their ability to extend a gifted student, or because they had an inflated sense of their own capabilities and omitted to seek assistance. Gifted students need the freedom to their own intellectual questions and develop curiosity (Heller, 2007; Watters & Diezmann, 2003). This type of learning does not require the teacher to "know all the answers" but rather the process of learning.

Providing experiences to solve problems was recognised as necessary by the Expert Educators, as giftedness is not repeating or "regurgitating" information. Creativity, as described by Renzulli (1978), includes the capacity to solve problems elegantly and uniquely. Watters and Diezmann (2003) state good school science should be presented in this way.

Differentiation is a common word used by Expert Educators to indicate a personalised approach to learning for G & T students. However, this research shows that it is mostly at the discretion of the teacher as to who this is for, and how this is enacted. It is on an as needed or "just in time" basis, in the words of one Expert Educator. Chapter 2 discussed enrichment; a term often interchangeably used for differentiation. The literature showed that gifted students need structured and planned differentiation not impromptu approaches to learning (MacLeod, 2004). Most teachers do not have specialist training in gifted education and so may not understand the special requirements of gifted children. This study has demonstrated that educators recommend G & T policy in Australia provide procedures and structure to assist educators in creating suitable and coherent student experiences. The experiences and differentiation provided for gifted children must be well thought out and planned. This may be improved by improving awareness, providing professional development, and through clear and accessible school policy.

**Summary**

Similar to the definitions provided for the terms gifted and talented, there is no consistent awareness by Expert Educators of the G & T policies in schools. Where policy was enacted it was on an "as needed basis", and usually through differentiation by individual educators to meet the immediate needs of gifted students.

When Expert Educators were aware of policy in a workplace, it was limited and incomplete. This was demonstrated by each Expert Educator discussing different aspects of policies. It would have been useful to obtain different perspectives on the same aspects of policy but without coaching and extending the already long interview, this was not possible. However, it was advantageous to have nuanced discussions with each Expert Educator.

**Recommendations**

This area of G & T education is greatly under explored and findings from this research have provided direction for further study. It is recommended that future studies explore the reasons for the lack of confidence in policy in more depth. As recommended in the discussion for sub research question 2, more research is needed to understand how G & T policy is enacted in a wide variety of schools.

### *5.2.4 Teachers and School Policy for G & T Education (Aspect 3D and 3E)*

Most Teachers (74%) stated they were aware of a school G & T policy. However, it is not possible to determine if these were used, nor the specifics of the policy. The initial research proposal intended to explore policy specifics in individual schools but uptake from participants was too low. From the comments provided, it appears that Teachers, like Expert Educators, have a lack of confidence in policy. They state that the G & T policies are only implemented for compliance and appearance "*The policy is basically there because it needs to be*". Other comments indicated that policy was difficult to locate, and if it could be found, there was not enough time to implement it.

Teachers directly stated that gifted education is not a focus in schools but rather, the priority was for students with English as a second dialect (EALD), low SES, and those with learning difficulties. It is not clear why educators prioritise this type of intervention but do not have time to enact a policy for gifted students. It is possible that educators do not perceive, or are not aware of, the effect of the difficulties that many gifted students experience. They may deem that gifted students already have more than many others, as they score highly on school assessments. Lassig (2003) suggests that teachers view equity in education as equal outcomes, not equal opportunities. This study supports this suggestion.

Teachers indicated that a lack of resources was the reason they did not implement the school G & T policy. The resources that Teachers have and what they require will be discussed in sub research question 4.

### *5.2.5 Assessment, Performance, and Social/Emotional Considerations for School Policy (Aspect 3F)*

Assessment, performance, and social/emotional considerations are presented in Figure 4.17 comparing the beliefs and perceptions of the three participant groups, Expert Educators, Teachers, and Parents. The data was presented in this way because a table format was cumbersome, and did not clearly show how the different considerations were linked.

Teachers and Parents stated that gifted students do not always test well. They acknowledge that giftedness does not imply that a student will be successful in school. This finding is well supported by the literature whereby gifted students may lack the organisation to coherently express their ideas or their ability is masked by their twice exceptionality (Lovecky, 1994; Watters & Diezmann, 2003; Wellisch, 2016). In addition, section 5.5.9 discusses findings from this research demonstrating supporting this claim. Unfortunately, student performance is the preferred method for selection into G & T programs or opportunities. Furthermore, educators state they are aware that using performance criteria does not ensure that gifted students are included in these opportunities. IQ or potential was not mentioned as a selection mechanism.

This study provides evidence that educators persist with methods to select students for G & T programs or ability classes that they know are not accurate. Fifteen years ago, Merrick and Targett (2005) noted that there were inadequate identification strategies and support for gifted students in schools. It is not known if educators now have reliable and valid tools to use, or if they are still not available to schools. Regardless of the reason, IQ testing remains an accurate, reliable, and valid means of identifying potential and schools must have access to funded IQ testing for their students. Currently, it is the responsibility of parents to organise and pay for this testing, a cost many most likely cannot afford. If funded testing is not provided as part of a G & T policy, student potential may not be known, acknowledged, and supported.

The use of performance-based criteria alone for acceptance to selective schools was discussed in section 2.10.2. Perhaps these selection methods have a flow-on effect as to how non-selective schools allocate their students to gifted opportunities. The strategy adopted by Renzulli (2005) in his SEM uses measures of potential and performance. This type of strategy should be adopted by NSW, and all Australian schools, if we want to ensure that our gifted children have the highest chance of being identified and supported. These findings were discovered during data analysis of the open-ended responses, they were not direct questions. Participants were able to voice their concerns and thoughts that otherwise would not have been heard. This is a strength of an exploratory study. Data was also obtained from surveys where participants were anonymous, thus follow up was not possible. This is one of the weaknesses of questionnaires where participants are anonymous to the researcher.

Confirming the work by Gross (1997), Teachers in this study voiced that selection into G & T classes is partially based on social and emotional factors. At the same time, Parents are requesting that schools provide more social and emotional support for gifted students. Gross found that gifted children who display socially inappropriate behaviours were often prevented from entering G & T classes. This study finds this discrimination persists 24 years later. Therefore, it must be addressed urgently. Gifted students should not be denied access to a suitable education based on social or emotional factors. Holistic support and adequate measures must be implemented to address these factors that affect some gifted individuals. A G & T policy must include a pathway, and resources, to address the social and emotional needs of gifted children.

**Recommendations**

This study has found that selection for G & T opportunities are based on a student's school performance. Recommendations include research to understand if and why identification strategies measuring both potential and performance are not in place in schools.

An equitable policy for G & T students should include provisions and pathways to address the social and emotional needs of G & T children.

### *5.2.6 Beliefs, Education System, and Cultural Considerations (Aspect 3F)*

Beliefs, education system, and cultural considerations are presented in Figure 4.18, comparing the three participant groups, Expert Educators, Teachers, and Parents. The data was presented in this way for the same reasons explained in section 5.2.5. Additional findings are presented in Table 4.21, *Expert Educators' perceptions of known school G & T polices.*

Expert Educators and Parents believe that the education system does not cater adequately for gifted students. It is a system where minimum standards and the average student is the focus. An exception is when the HSC results are released, and the focus shifts from minimum performance to high performance. It was noted that we are losing our best physics and chemistry students to other subjects where they can "play the ATAR game". As presented in Chapter 1, the rationale for selecting to research in Australian science education was our declining performance in TIMMS and PISA (ACER, 2020; OCS, 2016,) and a significant decrease in our school science subjects (Chubb, 2012: OCS, 2016). The Expert Educators in this research understand the situation and acknowledge that it is a "game we have set up."

Expert educators state that the system does not value learning. However, Teachers state that learning is the priority in education. When this response is linked to the assessment considerations presented in Figure 4.17 and discussed in section 5.2.5, it appears that assessment and performance is the priority. It would be helpful to further dissect educators' beliefs about learning, assessment, and the contribution each has to the other. However as this is not specific to gifted education policy, it will not be discussed further.

The findings in this study replicate the long-standing stigma of the "pushy parent". Gallagher et al. (2012) noted that teachers often had negative attitudes towards parents who advocated for their children. Negative attitudes are apparent in this study with teachers indicating that parents have "agendas". Parents acknowledged the stereotype they face and the enormous effort on their part to be heard. Parents assert that they want a better relationship with schools. A sound relationship between parents and schools is noted by Gallagher et al. (2012) to be helpful to gifted students' achievements. Chapter 2 discussed the importance of parent input and the accuracy with which parents could estimate their child's abilities (Worthington, 2001). This links to section 5.2.5 where inappropriate identification methods are used in schools, and with the knowledge by educators that they are inappropriate. Therefore, parents championing for their child is to be expected in a system that does not recognise their potential.

One of the most negative comments received in this study was received from a Teacher. This single response captures many of the stereotypical negative attitudes and misconceptions described in sections 2.6 and 2.23. It is unacceptable that there is such contempt for any student.

> "*I'm not a fan of G to T...as educators more time, time and above all time, should be devoted to the weakest or most poorly performing of our students. Talented and able students are by definition capable of navigating through to tertiary level with less hogging of the single most important resource to a practising (sic) teacher, time.*"

Not all teachers possess these attitudes as is proven by the word "unfortunately" in a teacher response stating that some teachers are not as interested in G & T students as others. It demonstrates that there are some teachers in our schools with negative attitudes towards and disinterest in gifted students and consequently, those gifted students may not be receiving an appropriate education.

**Recommendations**

While not a policy issue, improved communication, including partnership strategies, with parents and guardians of gifted children, may assist educators. A co-constructed G & T policy where all stakeholders, including parents, are represented would ensure a representative voice.

Some Teachers have outspoken negative attitudes towards gifted students, and others are disinterested. Professional development is recommended to reduce the negative attitudes and misconceptions regarding gifted people.

### *5.2.7 Additional Requirements of Parents (Aspect 3F)*

Parents identified that there is a lack of support and provisions for student well-being in gifted education. Our current policy is centred on assisting and provisioning G & T students within the boundaries of their gift, not holistically, provided that a child is performing. The new NSW HPGE policy and the current NSW DoE G & T policy do not include provisions for social, emotional, mental health, or behaviour considerations within the policy. Some of the terms are mentioned, such as wellbeing, but there is no elaboration or direction. Neither policy acknowledges underachievement or twice exceptional students. These are considerations emphasised by Parents, and must be addressed in a policy with more than a passing reference. Alongside academic experiences, other critical needs must be addressed before resources are depleted. Parents recommend that schools should have the capability and resources to provide support systems for the unique social, emotional, behavioural, mental health, and co-existing special needs of gifted students. Without this inclusion the gifted policies are incomplete.

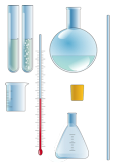
### *5.2.8 Summary of Sub Research Question 3*

This study has found that schools do not have science specific G & T policies. Generally, Expert Educators were unaware of general G & T policy and this was because it had not been considered. The four suggested reasons for the absence of policy related to misconceptions about giftedness, a standardised system is not suitable for G & T students, lack of confidence in policies, and a lack of awareness about giftedness.

Teachers, while more aware of school G & T polices than Expert Educators, similarly lack confidence in policies. Schools often lack resources for G & T students and prioritise those students who are typically considered disadvantaged (ESL, low SES, and those with learning difficulties).

Selection for gifted education programs and opportunities is predominantly performance based, ignoring the potential of gifted students in the absence of performance. Educators are aware of this injustice; however, the practice continues.

Gifted students need additional support for their unique social, emotional, and mental health needs. Consideration for reasons for underachievement and twice exceptionality need to be included. These provisions are limited or lacking in policy directives for NSW schools.



## 5.3 Sub Research Question 4 - With Provisions Defined as Resources, What Provisions Are Available and Used by Each School for G &T Students in the Context of Science?

### *5.3.1 Provisions Available for Teachers to Use for Science Education (Aspect 4A)*

Most Teachers believe that they have sufficient physical provisions to teach science. Provisions include laboratory equipment for practical or first-hand science investigations, reliable internet, excursions, and laboratory assistants. Most teachers do not have access to journals, guest speakers, or science clubs. Journals and science clubs are the type of resources that are desirable for students with a special interest or who are gifted in science.

Unfortunately, 12% of teachers do not have adequate supplies for their students to participate in first hand science investigations. This is a tragedy for all students, not just gifted science students. Without access to equipment and supplies, students are denied the opportunity to enact many first-hand scientific investigations and refine their thinking based on their own success or failure. Secondly, the information found in the NSW science syllabus states, practical hands-on activities must occupy a minimum of 50% of the course time in Stage 4 and 5 (Years 7-10), and approximately 30% in Stage 6 Sciences (Years 11-12). These syllabi can be accessed on the NESA website. Further research is needed to determine the reasons for the lack of resources reported, and the schools that are affected.

### *5.3.2 Use of Resources for G & T Students (Aspect 4B)*

Overwhelmingly, Teachers indicated or directly stated, that the provisions they have for science are not used differently for G & T students. Only two of 16 teachers stated that they use the resources differently for G & T students. These teachers used them to differentiate learning or to implement inquiry-based science activities. Teachers also noted that while they do not use the provisions differently, G & T students were more likely to take greater advantage of the resources or have greater confidence to use what is available. This indicates that G & T students initiate their own differentiation and seek out the use of the resources. How and to what extent G & T students take advantage of the resources is unknown as there was no opportunity to follow up anonymous questionnaires. It is possible that they use these resources for independent work, or work outside the scope of the regular curriculum. Task commitment, an element in Renzulli's (1978) TRM is a behaviour of some gifted children, usually performing gifted children. However, some gifted children do not exhibit this gifted behaviour. Relying on task commitment for self-differentiation, rather than providing structured appropriate learning, perpetuates the myth that gifted individuals do not need specific assistance and that they have the experience and knowledge to discover what is offered.

As discussed in sub research question 3, these findings contribute to the idea that gifted students are often thought to be self-sufficient. Resources are not used differently for gifted students and therefore, it is likely they are not presented with adequate challenges and opportunities for talent development. As presented, (above) schools do not have resources specifically for G & T students including access to journals and science clubs.

### *5.3.3 Expert Educators Awareness of Provisions for G & T Science Education (Aspect 4C)*

Expert Educators are unaware of special provisions (resourcing) made available for gifted students. Five Expert Educators provided short comments indicating initiatives were teacher-directed, the science extension course, and the internet. This supports the Teachers comments that resources are not used differently for G & T science students.

The internet was seen to assist gifted students. One Expert Educator commented that it allows them to be self-directed, stating that if schools purchase physical resources that are not needed by other students in the following years, they will be wasted. Again, there is evidence that educators do not believe that gifted students need structured programs and specific well-designed tasks. Assistance for gifted students is on an as needed and just in time basis, if at all. Gagné's catalysts of talent development are not evident in the responses received in this research (Gagné, 2011).

### *5.3.4 Provisions Required to Support G & T Science Students (Aspect 4D)*

Expert Educators, Teachers, and Parents provided responses regarding the provisions required to support the development of science students, in particular identified G & T students. These will be addressed individually by participant group.

#### 5.3.4.1 Expert Educators Require a Systems Approach to Gifted Education

Expert Educators expressed the need for a well thought out systems approach that provides teacher support, teacher education, funding, and a clear development pathway for gifted students.

Expert Educators identified teacher education as the most needed provision. Du Plessis (2020) has discussed the need for explicit and specific training for teachers who are assigned positions out of their field of expertise. Teachers, by way of class allocation, are expected to provide for all students in their classroom. This includes gifted students, students with learning disabilities, and students with emotional or behavioural difficulties. Training in gifted education is not part of the regular teacher education provided at an undergraduate level. This is recognised by Expert Educators. They state that teacher education should include leadership, identification of G & T students, and building capacity and confidence in science teaching. Expert Educators acknowledged that middle leaders in schools need assistance, not only classroom teachers.

The second most common need was knowledge of the resources available. This included knowledge for the teachers personally, and for system leaders and Expert Educators to direct teachers to what is available. If educators do not know what provisions are available for them, and leaders do not know where or how to direct teachers when asked, this may explain the disjointed and uncoordinated approach to gifted education. Recall the uncoordinated approach between ACARA and the NSW DoE to gifted education policy and definitions. The system of gifted education begins inconsistently and this is flowing through to the school and classroom level. Expert Educators are correct in expressing the need for well thought out systems. This finding links back to discussion, presented in section 5.2.1 and Assertion 15.

Other responses included the need for monetary funding, identification instruments, and a systems approach to resourcing. A systems approach to these three elements would assist with coordinating exemplary pedagogical approaches in gifted education. Additionally, it would alleviate the burden on each school for purchasing the same expensive equipment, that may be infrequently used.

**5.3.4.2 Teachers Require Intangible Provisions.** Intangible provisions were most requested by Teachers. “Time” was the greatest need. Other factors such as educational opportunities for G & T students, teacher support, and teacher education were also required. This aligns with the needs that Expert Educators identified. Miscellaneous provisions included rural support and more funding. Only three participants mentioned monetary funding. However, many of the intangible provisions rely on monetary funding so this is clearly required. Intangible provisions were commented on 84 times and tangible provisions 19 times. Systemic structures as provisions were included as intangible provisions. These were provisions such as flexibility and procedures to support gifted students.

Thirty-five comments were made about time. Time was needed to prepare specific activities and programs for G & T students (*N*=12) followed closely by specific allocation in the timetable for gifted programs or learning (*N*=10). Eight teachers responded “time”, with no further qualification as to how that time would be used. Teachers also require time to collaborate and for self-education.

Teachers use their own time and initiatives to prepare for and provide for gifted students. Expert Educators have indicated that lack of time is one factor contributing to inaction for gifted education. This was presented in section 5.1.5. It is also an element of what educators believe is needed in a good policy, clear indications of time provisions. Further information can be found in section 5.1.4. Teachers require time allocations specifically for gifted education and in areas where they are may be teaching out of field, or instructing beyond their current expertise. This is supported by the work of Du Plessis (2020).

**5.3.4.3 Parents Require Professional Development for Educators.** Parents indicate that teacher professional learning is the greatest need for gifted education. This need has also been identified by Expert Educators and Teachers. There were no studies found in the literature directly reporting on parents’ perceptions of the need for greater teacher education. This makes these findings new and novel in the field of gifted education in Australia.

Parents’ comments indicated that teachers and school leaders do not have the correct information nor do they have adequate knowledge to cater for gifted children. Parents’ elaborate that educators do not understand what it means to be gifted, and that they cannot separate bright children from gifted children. The discussion as presented in section 5.1.1

demonstrated that educators are not able to provide clear and succinct definitions for the terms gifted and talented. This supports their claim.

Parents identify that educators have little concept of the additional challenges that gifted children face including: mental health, fitting in socially, emotional lability, and boredom. This research provides evidence that educators have some awareness of these additional challenges as they were aware of the inadequate identification methods i.e., performance only and not potential, and social/emotional factors. However, evidence has been presented that demonstrates there are misconceptions about gifted students and self-sufficiency, appropriate strategies to differentiate, and a lack of awareness about giftedness.

Without including "Teacher education not specified", the top five teacher education requirements in order, according to Parents are:

1. Education to improve perceptions/understanding of giftedness
2. Education to understand individuality
3. Education to improve understanding of and support asynchronous learning and development
4. Education in identification processes
5. Education to differentiate successfully

These five requirements have already emerged throughout the study, and have been discussed in other sections. Thus, these are key areas that need to be addressed and included in any policy reform for gifted education. The Parents' first requirement is essential to addressing the other requirements. If educators have little understanding of giftedness then it is unlikely that they are aware of further specific considerations. This study has shown that negative perceptions or misconceptions about gifted students are prevalent among educators at all levels. Thus, gifted education must be included as a component of preservice university education. A basic understanding of the core aspects of giftedness is the minimum requirement for new teachers. This should include information about how to access additional support services.

Once working in the field, Teachers need specific and targeted training, or access to specialist teachers, that support them with the unique needs of gifted students. The NSW accreditation process requires that educators complete 100 hours of professional development over 5 years to reach proficient status. Accreditation is maintained by completing a further 100 hours every 5 years. One solution is to include professional development in gifted education within these mandatory hours. This should be provided by experts in the field who have correct and consistent information.

### *5.3.5 Summary Sub Research Question 4*

There are no special provisions for G & T science students, only what is provided by individual teachers' acting on their own initiative, and those that are student self-directed. Teachers and Expert Educators acknowledge that any additional support and use of provisions is at the discretion of the teacher and undertaken in their own time. As such, Teachers require the provision of time to assist G & T students. The two most important time requirements were for planning and a specific timetable allocation for G & T classes.

Expert Educators and Parents consider that teacher education is the most important provision required. This education should commence preservice at university and be expanded upon using the 100 mandatory professional development hours required in NSW to maintain accreditation.

Most teachers have adequate physical provisions, e.g., laboratory equipment, internet, and laboratory consumables. However, 12 % of teachers report inadequate provisions. This needs to be researched further for specific detail.


## 5.4 Sub Research Question 5- With Practices Defined as Teaching Strategies, or Pedagogy, What Practices are Enacted by Individual Teachers for G & T Students in the Context of Science?

The research aimed determine suitable model/s to guide policy reform and procedure development for gifted education policy in the context of science. In the previous sub research questions, educators have voiced that detailed strategies and procedural documents are more useful than less detailed policy. This section will describe educators' perceptions regarding useful pedagogy, pedagogy enacted, and pedagogies still required for G & T science students. Understanding the status quo is important for forming useful and detailed strategies and procedures.

As explained in the findings chapter, educators do not always correctly distinguish between provisions and pedagogy. This has two main implications for this research. First, this demonstrates that key terms used in education are not used consistently, nor are there consistent approaches to gifted education. As such, educators appear confused about what is available and what it is called. This issue has likely contributed to the lack of confidence in policy where educators do not have an agreed understanding of what is being presented. Secondly, when discussing these findings, the number of responses will not always be the same for each question as they have been separated according to provision or pedagogy, not necessarily which question the educator responded to.

### *5.4.1 Pedagogy Teachers Find Useful to Support G & T Science Students (Aspect 5A)*

Teachers believe that a student driven and directed pedagogy is useful for G & T science students. Specifically, Depth Studies in the new stage 6 science syllabi and the Science Extension course were mentioned. The embedded constructivist and inquiry-based learning were thought to assist with self-differentiation. Three points need to be considered with these responses.

First, these syllabi and syllabus elements are enacted for all students, not just gifted students. It is possible that Teachers believe them to be suitable for gifted science students, and students with an aptitude for science, since they likely outperform other students. Where in fact, if gifted students do not have accompanying factors preventing performance, they would most likely outperform non-gifted students regardless of the pedagogy used. Accompanying factors are those that have been previously discussed including, autism, dyslexia, and mental health issues. However, outperforming other students does not necessarily indicate that a gifted student is performing to their potential.

Secondly, their comments indicate that this type of pedagogy is self-guided, and independent, once again providing evidence that Teachers believe that gifted students need less support and guidance than other students. This was discussed in sub research question 3.

Finally, Chapter 2 presented literature demonstrating that there is no consistent meaning or shared understanding about how constructivist and inquiry-based learning is enacted, and what it looks like in practice (Mayer, 2004; Pedaste et al., 2015). Some educators use the terms to indicate complete discovery learning. A complete discovery approach is not useful for gifted students who need learning activities presented in a logical and structured manner. Furthermore, inquiry-based learning is the overarching approach, with many pedagogies weaved within this framework as it is appropriate to the task. For example, definitions do not need to be discovered but rather presented so that students experience their meaning. It is not suitable or relevant for students to derive the concept of gravity from first principles. Conversely, performing a first-hand investigation to understand acceleration can be achieved by students measuring the times taken for a ball to travel down an incline over one metre and then two metres (twice the distance). They will inquire and discover that it takes slightly less than half the time. Building on this, they could hypothesise and test the time taken for the ball to travel over three meters. These are two different teaching strategies or pedagogies that can be used under the framework of inquiry-based learning.

Expert Educators acknowledge that the inquiry-based framework embedded in the science syllabi is different from the former prescriptive content approach. The syllabi were designed to allow freedom and flexibility for teachers and students. Instead of teaching content for examination, the syllabi were created so that students could explore concepts and apply this to new and in a variety of situations. However, for this to be successful, teachers and students need to understand what inquiry-based science looks like when enacted. They need to understand that asking questions can reveal more about the students' learning milestones and achievements than selected facts recalled on paper.

Inquiry-based science has become more common place as it is embedded in the new NSW Science Syllabi. As such, educators need professional learning to enact the inquiry-based pedagogical approaches correctly.

### *5.4.2 How Expert Educators Provide Support for Those That Teach G & T Students (Aspect 5B)*

Expert Educators claim they provide support for Teachers of gifted students through co-teaching and supporting new leaders. They provide advice and support for authentic assessment. However, these were not specific strategies for gifted children but for all students. Their strategies do assist teachers of gifted children, but gifted children are not the reason that these supports are enacted.

Interestingly, an Expert Educator noticed that when they are co-teaching, administration tasks such as marking the roll take time away from the teacher asking their students good questions to promote deep thinking. This deep thinking can be absent from many lessons because of the time needed for the day-to-day running of a classroom, and classroom management. The Expert Educator has time to ask the questions, whereas in a classroom of mixed ability students it can be difficult for a single teacher to address each student's need individually. Teachers identified time as the most needed provision and once again it has emerged as a theme. They have also requested teacher support (section 5.5.4.2). If teachers were provided with time for preparation, and support on a regular basis, they may be able to ask the good questions that the Expert Educator has the freedom to do. Expert Educators believe that students should be allowed to ask their own questions and learn for reasons other than assessment. This requires time and additional management by already overburdened teachers.

While well intentioned the support strategies mentioned by Expert Educators are not sustainable. It is not possible to have a subject expert in every classroom every day to ask the good questions. What is suggested by Expert Educators as support strategies is modelling good teaching practice, in easier circumstances, and providing encouragement to use pedagogy and assessment practice that is useful for all students. As such, this study has found that there is nothing specifically provided by Expert Educators to support teachers of G & T students.

### *5.4.3 Beliefs About the Appropriateness of Current Pedagogies for G & T Science Students (Aspect 5C)*

Most educators commented on pedagogies they believe are required for G & T students, rather than the value of what is currently used. They also commented on how the current practices do not always meet the needs of gifted students. Expert Educators specifically commented on acceleration, the new syllabi, mathematics course structure, and general comments.

**5.4.3.1 Expert Educators.** Expert Educators believe that acceleration and special G & T programs do not always work well. An important point was made, "*you cannot choose the 10 smartest kids and say they need to be accelerated. I think it's a very specific argument for a very specific issue*". Gifted students need to be identified by reliable, valid, and accurate methods, such as IQ tests. Without proper measures of potential and performance students who are suitable may be overlooked. Selection methods are similarly important for streamed or in house gifted/extension classes. These classes usually consist of the top performing students in that year group, with their performance norm referenced against a relatively small cohort. Consideration is rarely given as to whether the student is truly gifted and suitable for these types of extension experiences. This finding links to the discussion of inadequate identification practices in sections 5.2.2 and 5.2.6 (sub research question 3 Aspect 3C and 3F). A further consequence of inappropriate selection is that gifted classes may become tokenistic, and thus not provide appropriate learning opportunities for a gifted student.

One Expert Educator stated that it is not necessary to separate gifted students from mainstream classes but to provide excellent opportunities that cater for diversity as though it is commonplace. "*It just says to me that if we have to do that, then what does that say about our other classes - You're in the non-opportunity class, little opportunity in here sort of stuff.*" Borland (2005) also argues that to remove gifted students from mainstream education is to imply that the education provided for most students is inappropriate. This mirrors the viewpoint of the Expert Educator. Borland (2005) recommends a "defensible" differentiated curriculum to remove the issue of defining giftedness. While a "defensible" differentiated curriculum may work for some gifted students, those that are profoundly gifted often need exceptional intervention for growth and appropriate intellectual stimulation (Gross, 2006). Lassig (2003) noted that teachers preferred an inclusive approach to education, a belief held by some educators in this study. In addition to preventing labelling issues or acting as intellectual stimulants for the other children (Lassig, 2003), this study shows that perceptions of what is offered in mainstream classes are a reason for not separating gifted children. Educators are concerned that everyone must achieve the same standard, and be provided with the same opportunities, regardless of their needs. This belief may be borne from the extensive information and requirements to meet the minimum standards in Australian education. Gifted children require different opportunities from their mainstream peers. Similarly, opportunities and experiences provided for gifted students may not be appropriate, relevant, or interesting for non-gifted students. If educators attempt to provide opportunities that are suitable for all, then these opportunities will most likely be suitable for the mythical middle, not the margins of a learner. Many classes, even those claiming to cater for gifted students, only move as fast as the average student in that class, according to Parents. They are not designed for the profoundly gifted, nor those who are twice exceptional "*the system is designed to meet the needs of average to bright kids".* Gross (2015) discusses the vastly different educational requirements for those students who have basic giftedness (115-129 IQ score) and those who are exceptionally (160-179 IQ score) or profoundly gifted (180+ IQ score). Those students who are exceptionally and profoundly gifted require substantially greater interventions that are not possible to deliver in mixed ability classrooms, including mixed ability gifted classrooms (Gross, 2015). If the curriculum or work provided is not advanced and suitable for the strongest gifted learner in the group then it not adequate for gifted learners (VanTassel-Baska 2017).

Acceleration was not always advantageous, according to one Expert Educator. It is likely given the nature of their comment that they were referring to streamed classes rather than acceleration of individuals. It was noted that an overall accelerated program may be useful for students who commenced the acceleration process early, but it can be difficult for students to catch up if they join an accelerated class later. This suggests that educators are still focussed on content-driven learning, where a certain number of facts must be memorised before progressing, consequential to the prescriptive nature of inputs-based programs and systems. Each student is required to achieve the same learning, by the same means, and to predetermined standards. If a mindset of inquiry learning was adopted then practical skills, thinking skills, reflective thinking, and application of knowledge would far outweigh the effects of missed content.

It was noted that the new Science Syllabi (Years K-6 and 11-12), including components within such as the Depth Studies, cater well for the gifted students. These syllabi are some of the first in Australia to include embedded student-centred learning and mandatory inquiry-based pedagogy. The Science Extension Syllabus (NESA, 2017d) addresses some of the concerns of Watters and Diezmann (2003). Students participate in a scientific apprenticeship that contributes solutions to scientific and world problems. Students collect first hand data or analyse existing publicly available data. The opportunity for genuine authentic experiences are addressed in these syllabi. Implementation is assured as each student submits a research report to NESA as part of their HSC assessment. This process ensures alignment between NESA, the syllabus, schools, teachers, and assessment. To provide a greater alignment with the intent of the syllabus, the online final exam should test the process of each student's individual research, rather than assessing knowledge through a series of questions that have predetermined answers. This course provides a robust opportunity for gifted science students beyond their teacher's knowledge or expertise.

The strategies for differentiation that occur in Mathematics, such as separate syllabi for ability levels, are perceived by educators to be successful. It was suggested that the current arrangement in mathematics, another STEM subject, could be applied to the science syllabi. Comments that some syllabi are better than others indicate that the Expert Educators are sometimes commenting on G & T education rather than science G & T education. Ability level syllabi would allow students to select an appropriate pathway based on their ability and interest. Gifted science students would be appropriately challenged and students who have a lesser aptitude would still be provided with experiences that are unique to science and scientific thinking.

**5.4.3.2 Teachers and Expert Educators.** In general, Expert Educators believe that the correct strategies are beginning to be enacted. However, from the responses received, it appears that there is nothing specifically enacted, nor are there streamlined and linked pedagogies provided for gifted students. It was stated that science pedagogies should spark curiosity and should be based on asking good questions, but there was no elaboration of which types of pedagogies could be used. Unfortunately, the pedagogies enacted for individual gifted students are typically those that provide more of the same work. These include puzzles and quizzes for self-assessment, encouragement to have their own goals, additional videos, and prepared extending prompts. All of these strategies fit with the concept that students achieve the same learning outcomes at the same time. This interpretation is supported by an Expert Educator comment "And what's depth look like for each kid because it's going to look different isn't it? For some students, depth is still going to be surface for another kid". The statement does not mean that students will achieve the outcome to the same level but they are going to be doing the same thing, at the same time, to different degrees. It is good that educators acknowledge that students differ in their ability and performance but the mindset of doing the same thing, but to different standards, needs to change. Gifted children need tasks that promote higher order thinking and aligned with their abilities (Gross, 2006, 2009; McLeod, 2004). In a later response, an educator acknowledged that the strategy of allowing students to progress at different rates is done poorly. This type of comment indicates that educators know what they should be doing but acknowledge that it is not enacted well**.**

### *5.4.4 Changes to Pedagogy to Meet the Needs of G & T Students (Aspect 5C and 5D).*

According to all three participant groups, change to pedagogy is required in two areas, grouping strategies and pedagogies to meet individual learning needs. Parents specifically added assessment strategies to this list.

The majority of the responses were for changes required to meet individual learning needs. Table 4.32 compared the responses by participant group, finding that educators and Parents recommend many of the same pedagogical improvements. These pedagogies include exposure to research-based tasks and universities for courses, resources and mentorship, individualised learning, project-based learning, acceleration, extension, and grade skipping, all of which are recommended options found in the literature and discussed in Chapter 2. Parents specifically see the need for multi-age classes, a form of acceleration, and selective upper primary schools. Chapter 2 discussed the provision of opportunity classes for primary schools; however, the number of placements is not sufficient for the number of applicants, with a success rate of 14% (NSW Government, 2020a). Providing more selective and opportunity classes is one way to meet the unique needs of gifted children, and selection for these classes should include more than academic performance.

Many of the additional pedagogical approaches suggested by educators require students to be motivated, have task commitment, be responsible for their learning, and have the skills to know how to drive their own learning. This belief, that gifted students can effortlessly learn, inherently have these skills because they are gifted, and that they are always motivated to learn, is false. Gifted students can lack motivation, executive function, self-regulation, psychological strength, and the non-cognitive skills to progress their own learning (Lovecky, 1994; Moon, 2009; Robinson, 2002). Subotnik et al. (2011) acknowledge that teaching these types of skills, in addition to the domain specific education and learning, is essential for outstanding performance. This has links to sections 5.25, 5.26, and 5.27 which discussed the need for policy to include guidance on the social, behavioural, emotional, mental health, and co-existing special needs of gifted children. Additionally, gifted education policy must include provisions for students that require assistance to develop executive function, self-regulation, and the other non-cognitive skills required for performance. These are the interpersonal catalysts present in Gagné's DMGT 2.0 (Gagné, 2008).

### *5.4.5 How and Do Teachers Alter Their Pedagogy for G & T Science Students?*

Most Teachers state that they alter their pedagogy for G & T science students using similar strategies to what they said was needed in section 5.2.3, Classroom Practices. Teachers additionally provided information about individual pedagogies that promote learning the current content in greater depth, or at a faster pace. Some pedagogies focused on improving skills such as higher-order thinking. Only one pedagogy was science specific, students planning their own experiments. Other strategies enacted that can benefit the individual and the whole class include flipped learning, asking good questions, and more research tasks. The type of "good questions" were not specified but examples of good questioning strategies include the use of Bloom's questions that stimulate thinking and responses at deeper levels (Bloom et al., 1956).

While 88% of teachers state they alter their pedagogy, half of the teachers believe the school dictates how they teach, and in a separate question 60% state that the availability of provisions affects their practice. This conflicting information is more consequential than what teachers say they enact. Given that teachers stated they used some of the strategies that G & T students require, it may be that they are reporting what they believe should be done, rather than what they actually do. Nederhof (1985) describes this as social desirability bias. Respondents can deceive themselves and others, to emphasise desirable traits and to deny those that are less favorable. It is clearly desirable to cater for all students, including gifted students. Further evidence of social desirability bias provided by this study is that educators report a lack of time and priority for G & T students. This lack of time for G & T students is used to support those who are considered disadvantaged or not meeting minimum standards. Some of the mentioned strategies are likely enacted from time to time, but the responses obtained do not provide evidence of consistent or sustained approaches to gifted education in mainstream classes. Additionally, many of the strategies that are described as enacted are individual tasks, where students work in isolation and are missing the important social and team problem-solving experiences required in real-world science.

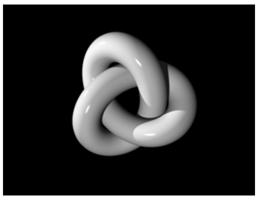
School dictated pedagogy, and pedagogy influenced by appropriate provisions, can be addressed at the policy level. Using a federally funded model, schools will have adequate provisions for their gifted students. As suggested by Parents, greater access to, and placements for, opportunity and selective schools would provide appropriate pedagogies in appropriate social settings. However, not every gifted student will be able to attend a specialist school so provisions are needed in mainstream schools. These include teacher support for behaviour management, resourcing, and time to enact and refine suitable pedagogies.

### *5.4.6 Summary of Sub Research Question 5*

It is unclear what pedagogies are used in mainstream classrooms for gifted students. Thus, it is not possible to provide recommendations for pedagogy, particularly changes required to pedagogy. Given that there are inconsistencies in reporting, likely due to social desirability bias, it would be unlikely that teachers are enacting regular, structured, or planned experiences to meet the advanced needs of gifted science students. Many of the reported pedagogies require students to be self-motivated and self-sufficient. To answer this question more accurately the use of case studies or observations is recommended, not questionnaires as used in this study.

**Recommendations**

Recommendations include providing funding for more opportunity classes and selective school placements. Selection for these classes should include both performance and potential, with pathways for students who are yet to perform. In addition to the intellectual stimulation provided, opportunities to learn and develop the non-cognitive attributes required for success should be provided.



## 5.5 Sub Research Question 6 - When Presented With Alternative Models for G & T Education, What are Educators' Perceptions of Their Appropriateness for Science Education?

### *5.5.1 Expert Educators Believe Renzulli's Three Ring Model for Giftedness is the Most Appropriate (Aspect 6A)*

When presented with alternative models, Expert Educators selected Renzulli's TRM as the most appropriate for gifted education in the Science context. Two main reasons were given, the simplicity of the model and the inclusion elements other than ability (task commitment and creativity). The comments presented in Table 4.34 indicate that Expert Educators recognise the need for a model that is simple enough for educators to understand. Many of the current models require expertise, or professional learning, to interpret the meanings and nuances within the models. Gagné's model is visually more complex than Renzulli's model. However, the elements of the models and complexities in interpretation are similar. Gagné's model presents the information up front, whereas Renzulli's model provides a scaffold that is later expanded upon. Thus, it may be helpful to educators if a simpler visualisation of Gagné's model was available prior to introducing the detail.

Chapter 2 discussed Renzulli's TRM as one that represents gifted behaviour, rather than a talent development model. Expert Educators' used the model to ask questions about why students do not have task commitment or how educators can impact creativity giving the impression that they perceive these aspects can be learned. Expert Educators discussed the meaning of the term creativity, suggesting that it is going beyond the current status quo and having a willingness to think differently to others. Many of the Expert Educators see creativity as an essential element, alongside task commitment when gifted students are successful and performing.

One Expert Educator commented that the inclusion of task commitment in Renzulli's TRM is a negative aspect of his model. This is interesting when considering the data presented in sub research questions 4 and 5. Here evidence was provided that educators believe that student driven and self-directed pedagogies are useful to support gifted students.

When these two reasons are considered simultaneously, it provides reason to question if the Expert Educator was implying that gifted students either have task commitment or they do not and it is not something that can be learned. As discussed in section 2.8 Subotnik et al. (2011) propose that these types of skills can be learned, and are not inherent in all gifted students. Due to the small sample size, further research is important as there are implications for gifted education. If educators do not believe that teaching these skills is necessary then it may partly explain the academic underperformance of some gifted students. Further research would provide more specific information about what supports are needed for gifted students and their teachers, consequently informing professional development.

Although Expert Educators selected Renzulli's model as the most favoured, their choice was for aesthetic reasons. It was not because the information or direction was superior to Gagné's model. Gagné's model includes the aspects of motivation and other non-cognitive attributes highlighted as favourable by Expert Educators in Renzulli's TRM. As stated, a simpler visualisation of Gagné's models may make it more accessible to educators.

**Recommendations**

Educators prefer visually simple models. While Gagné's model contains many of the elements that educators identified as requirements in a successful talent development, their engagement with the model suggests a simplified visual overview may be beneficial. The fullness of the model can gradually be unpacked for educators along a continuum of learning in the area of gifted and talented education.

Further research is recommended to understand educators' beliefs about aspects of giftedness other than cognitive ability. This research could include their belief about which traits are intrinsic and which can be learned. These findings would then inform professional development.

### *5.5.2 Creating Policy Elements for Gifted Education (Aspect 6B)*

**5.5.2.1 Who Should Receive the Resources?** Expert Educators and Teachers responses to Gallagher's four questions (Gallagher, 2015) were used to create policy elements for gifted education. The first question was "Who receives the resources?" The majority of educators believe that students who have been formally tested as gifted (such as IQ testing), regardless of performance, should be the students who receive the resources provided for gifted education. One Expert Educator pointed out that gifted students do not all need the same support. This is because some students already have family support and finances, and therefore have greater opportunities than a student who does not have these provisions.

As discussed in sub research question 3, there are complications, and equity issues that arise from performance only identification. More than 75% of educators agree that an identification system based on potential should be implemented as it would begin to solve some of the issues of inequity for placement in selective schools and opportunity classes, and mainstream school based gifted classes. Ideally, there would be enough resources for all gifted students, including gifted students who have other special needs, but is it is likely that resources and funding would not be in surplus. Therefore, it is still essential that the limited funding is used for gifted students who embrace the opportunities presented. This may be determined using criteria developed in consultation with researchers, gifted education specialists, general educators, sector representatives, and parents.

**5.5.2.2 Who Provides the Funding and Resources?** The second question asked was "Who delivers the resources?". As discussed in Chapter 1, there is no federally funded system or programs for gifted students. There are also no longer NSW state-based gifted education units. In NSW federal and state government funding for gifted students is provided through selective schools and opportunity classes through the department of education. This question was adapted in meaning to suit the context of the Australian Educational system taking a step back to who was providing the funding for resources.

Expert Educators and Teachers differ in who they believe should provide the resources for G & T students. However, in both participant groups, the most common response was government funding, either federal or state respectively. Expert Educators asserted that there is a need for a federally funded system. They stated that there should be a national interest in G & T people as these students are an investment for the country. It was also noted that each state has different wealth. Therefore, a federally funded system may be fairer. A similar rationale was given for not selecting individual school systems or sectors to supply the funding. Given that the NSW government has not provided for gifted education and G & T students in the latest funding increase, ideally, a federal system used to allocate funds would resolve some financial constraints and inequities and reinforce gifted education as a national priority.

In October 2020, Premier Gladys Berejiklian announced a $50 million funding increase for 2000 NSW public schools in the form of a Resource Allocation Model (RAM). There is no mention for provisions for gifted students on the announcement web page (NSW Govt, Oct 2020) or the web page that provides further information (NSW Govt, Dec 2020). This NSW government website states that this funding is to be used for increasing the number of teachers, literacy and numeracy programs, teacher training, overhauling the NSW curriculum, and providing schools flexibility for low SES, Aboriginal students, students with disability, and students with English language proficiency deficits. Again, G & T students have not been allocated resources, despite the impending release of the HPGE policy in 2021.

**5.5.2.3 What are the Resources to be Delivered?** The third question asked was "What are the resources to be delivered?" Responses to this question conflicted with those received for sub research question 4. Sub research question 4 provided evidence that educators, Expert Educators and Teachers, do not require more physical or tangible provisions. Instead, they require time and teacher education.

In this question, more than half of the educators stated that resources should be provided as physical resources and not time. It is not clear why these two questions were answered so differently. It is possible that the term "resources" was interpreted as a tangible provision, whereas the term provision used in the other question indicated something different. It may also be possible that when answering this question, it is possible that some educators were providing responses from a theoretical point of view rather than what is needed to supplement what is already in place. If educators were provided with information about what teachers currently have and what they currently need, as presented in sub research question 4, their responses may have been different. Additionally, this question may be better suited to educators who are trained in gifted education, specifically science gifted education.

One Expert Educator provided valuable insight into how the provisions should be used. They discussed a model similar to health care where the money is used collectively and co-operatively. It was suggested that learning programs are not reinvented multiple times but are created by national specialists and subsequently adapted by the states or schools to suit individual contexts. This type of approach would allow the funding to be used wisely, for tiered professional development, and provide expertise so that the money is used appropriately.

**5.5.2.4 What are the Conditions Under Which the Resources are Delivered?**

Expert Educators and Teachers had different perspectives on how the resources should be delivered. The majority of Expert Educators would like to see the resources delivered on a per school basis regardless of identified students, whereas most Teachers believe that delivery on a per student basis is best. The Expert Educators and Teachers appear to be answering from different positions. Expert Educators provide perspectives from an overarching position, and Teachers provide perspectives on a more individual student basis. This is to be expected given the difference in roles.

Additional comments brought to light some key considerations for future funding allocation. These are presented in Table 4.36. Many of the issues could be addressed in a policy, such as funded IQ testing. Other issues may be more complex, including how to deliver a minimum amount of funding to ensure economy of scale. Resources such as access to journals could be commonplace, provided on enrolment in a similar manner that they are provided for university students. As an aside, teachers should also have access to the latest peer reviewed research. Many concerns, including time for teachers to prepare gifted student applications for funding, can be addressed by implementing streamlined processes that are governed by sector or regionally defined bodies. The Catholic school system is divided by dioceses, a similar approach could be taken to divide administration processes by regions for government schools.

**Recommendations**

This research finds that a G & T policy should include elements that define who receives the resources. For academic placements, it is worth considering a potential-based measure i.e., IQ testing, and include criteria that ensure a willingness to participate in the opportunities presented.

It is recommended that G & T education should be funded by the federal government. This will ensure a basic level of equity between and within sectors.

A collective and collaborative approach is needed to share resources for G & T students. This includes common programs that can be adapted to individual teaching contexts. However, further research is needed to determine with certainty what provisions are required by educators as conflicting results have been found in this area of the research.

Funding for G & T students and education should be on a per school basis to ensure economy of scale but directed for the use of an individual student. Other students may find resources such as journals and other subscriptions useful but the resources should be used for the development and education of the funded gifted student. A nationwide funding allocation should be provided for IQ testing, with criteria for this negotiated between stakeholders. This should form part of the policy document.

### *5.5.3 The Purpose of Gifted Education According to Teachers and Parents (Aspect 6C)*

Chapter 2, section 2.9 presented literature on the emergence of talented adults from gifted children. This included the purpose of education and discussed various viewpoints. Although not part of the original research design, indications that participants had strong opinions on this matter led to additional questions being posed to Teachers and Parents. This became apparent after Expert Educator interviews were finalised so it was not possible to obtain their opinions.

Teachers and Parents believe that the purpose of gifted education is primarily for the benefit of the individual, rather than others or society. This is in opposition to Winner's (2000) claims regarding the outcomes of giftedness. Chapter 2 discussed this in depth; briefly, she proposes that the purpose of gifted education is ultimately to serve society and to pay back on the investment made. Benefits to the individual are secondary to their contribution to society. The outcome of gifted education is viewed by Winner (2000) as unsuccessful unless there is a clear and worthwhile contribution to the world. Conversely, the most common responses from both participant groups regarding the purpose of gifted education were:

1. to ensure the happiness and mental health of the gifted child while at school; and
2. to provide challenges so that the gifted person is not bored and disruptive.

The least common responses were to develop the gift into a talent for the individual (Parents) and to develop characteristics of eminent adults (Teachers).

Although these responses suggest the benefit should be for the individual, they focus on the purpose of gifted education in the present. It appears that there is less thought about the outcome and long-term purpose of gifted education. If participants were probed further this may not be the situation. Thus, their responses shed light on the current state of gifted education, where educators do not project their thinking forward to the longer-term goals, but instead are contending with other more immediate needs. Some of these needs have been identified in this study, such as inadequate time for teachers, parents advocating for current changes, lack of understanding about available resources, lack of federal funding and recognition, inappropriate selection methods, and inconsistent pedagogy.

### *5.5.4 Underperforming G & T and Gifted Programs (Aspect 6D)*

Teachers are statistically more likely than Parents to recommend that issues such as mental health, learning disabilities, and behaviour be addressed before a gifted student enters a gifted program. As mentioned in the findings, most of the free comments from Teachers were given when they strongly disagreed or disagreed. Parents provided more comments when they strongly agreed or agreed. This difference shows that Teachers may feel that they need to justify why they will not allow students to enter classes, while Parents feel that they need to convince the school or Teachers why their child should be allowed in a gifted class.

The question was not specific to the type of problem the gifted child faced but free comments provided some insight. Gross (1997) asserted that the social idiosyncrasies of gifted children influence placement into gifted classes. Teachers did not mention the social aspects specifically, but they did refer to the difficulty experienced when managing gifted children who are different. They commented on the impact that this would have on another gifted student's learning and how this would "*subtract from the goals and objectives of running a truly gifted class*." Again, a participant explained "*They need to be able to perform or others will suffer with managing their special needs".* Teachers require performance to enter gifted classes even if the child is identified as gifted. They require mainstream behaviour and clear-cut attributes for students to be considered *"truly gifted"*.

These types of responses provide evidence for several points found in the literature. Gagné (2007) used a metric system to differentiate levels of giftedness, yet educators who believe that those who have problems will disrupt goals and objectives of gifted classes, cannot understand the range of giftedness, heterogenicity of gifted children, and the concept of underachievement. Parents also noted that school leaders do not understand the differences and levels of giftedness. This was discussed in sub research question 4. The incidence of a child with an IQ of 165 is 0.001%, yet a mildly gifted child presents an IQ of 120 with an incidence of 10%. There is an enormous difference between the needs and abilities of both examples of gifted children.

Wellisch (2016) advocates for underachieving gifted children who should not be dismissed because of their special needs. Unless there is an alternative evidence-based pathway for underachieving gifted children then to deny them entry into gifted classes because of mental health, behaviour, performance, or any other consideration, unless it is based on the welfare of that child, is inequitable and discriminatory. Thus, in the absence of these types of pathways we must cater for these children with additional support that allows them to either address and manage their issues first, or manage them in conjunction with their gifted learning needs. More information can be found in Chapter 2, 2.5, and 2.17.

Some teachers believe that gifted students are not likely to spontaneously perform because they are moved to a gifted class. They feel that their issues should be addressed so that their issues do not become more severe or impact their future. Parents have similar reasons for addressing reasons for underperformance first where the welfare of the gifted child is considered foremost, including the suitability of the specific gifted program offered. This will depend on whether the issues are due to inappropriate educational environments and should be assessed on a case-by-case basis.

Most Parents believed that gifted children should have the reasons for their underperformance addressed alongside their strengths and that gifted programs should cater for these types of situations. One comment stressed the point that underperformance can be addressed in either setting, gifted or mainstream, so the gifted child should not be denied the opportunity to access a suitable education in other respects. This is in alignment with the model developed by Wellisch and Brown (2012) who propose a Model of Inclusive Gifted Identification and Progression. This was presented in Chapter 2. This model is inclusive as there are diverging and converging pathways that lead to varying degrees of gifted education provisions alongside remedial and therapeutic interventions. These findings reinforce the need for individual options, pathways, and additional support for gifted students who do not fit into the conventional gifted performance models.

Reasons given by Teachers that students should not have to address their issues prior to entry into gifted classes, were again due to underperformance and asynchronous development. They believe that gifted classes are not necessarily set up for gifted students, but rather all-round bright students who are performing. Discussions and comments about gifted students suggest that underperformance in some areas is normal or commonplace for gifted students, and should not be interpreted as a problem. Given that many gifted children develop asynchronously, this gives merit to an argument for domain specific gifted education.

Subotnik et al. (2011) discuss the developmental differences and performance trajectories between domain specialisations. They state that some domain specialties require maturity and the development of skills before giftedness is recognised. Science is one domain where specific knowledge and skills are required and therefore require specialist intervention for giftedness to be recognised. This does not indicate that a separate model is required for each domain, but that the components, timing, and opportunities provided within the model or models should be flexible to cater for the different ages that gifts initially present, peak, and mature. In science, mentorship is highly appropriate to help develop the thinking and inquiry skills that come from deep conversations and individual research problems (MacLeod, 2004). The NSW Science Extension syllabus provides opportunities for these types of experiences and is noted by educators to be a strength in our current system.

Interestingly, one participant commented on the “ridiculous premise” of giftedness and said that students should be allowed in whatever class they choose. Whether this comment can be considered positive for those who want to enter gifted classes is questionable. The ambivalent attitude may indicate that gifted students and their parents do not have to provide evidence that they are suitable for these classes. Conversely, it may replicate the comments of other educators who state that “gifted classes” are not really for gifted children. Either way, it is necessary to ensure that gifted classes are meeting the needs of those who are gifted and not token attempts or superficially constructed for reasons of school compliance.

In summary, most Parents believe that issues of underperformance should be addressed prior to entry to gifted classes and programs to best serve the needs of the individual gifted students. Whereas, Teachers believe they should be addressed to ensure that classes are not disturbed and other gifted students are not impacted.

**Recommendations**

A model for giftedness should meet the needs of those students who are performing. This should include pathways and options for gifted students who are yet to discover their area of giftedness or yet to develop the maturity to access opportunities. Gagné's EMTD includes two developmental components. One prior to the recognition of a gift, and the second during the development of a gift to talents (Gagné, 2013). These pathways and additional opportunities may be integrated within the model or occur concurrently alongside those who are suitable for a performance model of giftedness. Ultimately, gifted children who are not performing for any reason must be given opportunities to meet their potential. This is the hallmark right of all education in Australia (Australian Human Rights Commission, 2019).

### *5.5.5 Recognising Giftedness Early Should be an Aspect of Policy (Aspect 6E)*

The age that giftedness is first recognised differs between Teachers, and Parents. Sixty-eight percent of Parents recognised giftedness prior to school and 96% recognise giftedness before the age of 10 years old. While these data show that teachers do not recognise giftedness prior to school this does not indicate that they are not attentive and missing cues that are obvious to Parents. The educators who have participated in this research are thought to be mostly high school teachers, and therefore would not normally have had the opportunity to see these children at a younger age. The participants were anonymous so this cannot be confirmed.

What is relevant to this study is that some Teachers are not recognising giftedness in their own students until the age 15-18 years bracket with a mean recognition age in the 10-13 age bracket, much later than any Parent and Other recognised giftedness. This may indicate that schools and educators are not providing appropriate opportunities until a much later age, or for a significant period of time. In addition, given that Teachers are not as prompt with recognising gifted children, compared to Parents, it is reasonable and appropriate that parents are advocating for their gifted child, albeit with much frustration. Gallagher et al. (2012) note the importance of parent involvement in gifted children's education. The findings in this study provide evidence that this may be of particular importance when children move from primary to secondary schooling. Parents are often highly knowledgeable about gifted education and the external resources available and have been actively involved since their child was young. Sub research question 3 and sub research question 4 provided discussions regarding the requirements of Parents in gifted education. Two areas are relevant to this discussion, teacher education to understand giftedness and better relationships with schools. If these two areas of need were addressed then educators may be more inclined to work with parents more collaboratively.

These findings are presented with caution and it would not be appropriate to suggest further implications as there are factors missing and limitations to the collected data. Hence, the interpretation is speculative. However, will only be of benefit to improve parent and teacher relationships, and an advantage for teachers if they receive professional development in giftedness and gifted education. Additionally, parents are likely aware of their child's giftedness earlier than educators as they are often their only caregiver prior to school. Merrick and Targett (2005) have discussed this in detail stating that it is likely that parents underestimate their child's ability. Preliminary findings show that there is a large age difference between when Parents recognise gifted children and when Teachers do. Further research is necessary to provide more accurate information and to study the impact of this situation in context. Finally, regardless of whether Teachers are identifying gifted children, Parent and Others are recognising their children are gifted at a very early age and make accurate estimates regarding their performance and ability (Worthington, 2001). Therefore, it is important to include them in policy development and implementation as they are a valuable source of information.

**Recommendations**

Recommendations include improving the transition processes for student progression from primary to high school settings where information about giftedness and ability is paramount to providing appropriate opportunities.

Teachers and Parents become aware of giftedness at different ages. This is in part due to the amount of exposure parents have in the early years. Thus, parents are a valuable source of information about their children and should be included more formally in the processes and provisions required for gifted education. This includes policy making, identification provisions, and advising schools.

### *5.5.6 Giftedness in Science According to Teachers (Aspect 6F)*

**5.5.6.1 Indicators and Characteristics of Gifted Science Students.** As discussed in Chapter 2, Heller (2007) describes the traits of people who have scientific ability and creativity. These traits, alongside other emergent traits from this study, were used to compile questions that probed Teachers beliefs about the indicators of the gifted science students they had encountered. Teachers were also given the opportunity to provide their own response, however most selected from the provided responses. This question may have contributed greater insight if the provided responses acted as the stimulus for them to provide their own thoughts, as only five teachers took the opportunity to provided expanded responses.

Teachers selected comprehension of abstract concepts as the most common attribute for gifted science students. This was followed by demonstrating an extensive knowledge base in science, and the ability to relate that knowledge base to new problems and topics. This aligns with the aptitude traits adapted from Focquaert (2007) and Heller (2007) presented in Chapter 2. These findings demonstrate that Teachers do recognise the traits of gifted science students as presented in some of the literature. Further probing and research is needed with a larger sample group to replicate these findings. Additionally, further research regarding if and how these traits, and others, might be fostered or taught, may help to encourage performance in underperforming gifted science students.

Aside from the single individual responses provided, high grades on school-based science exams and assessment were selected least by Teachers. It should be noted that this response was selected by three out of twenty-six Teachers. With reference to the discussion in Chapter 2, and Chapter 5 (Aspect 3F), it was acknowledged that gifted students do not always test well in school assessments (Lovecky, 1994; Watters & Diezmann, 2003; Wellisch, 2016). Yet, this is an indicator of giftedness according to some teachers. It should be noted that comments regarding gifted students not testing well, does not mean that all gifted students do not score well on any assessment. This is more a comment that assessment results on school-based tasks are not reliable indicators of ability or potential. This finding is supported by Mellati and Khademi (2018) who report the vast differences in classroom practices between those educators who are assessment literate and those who are considered assessment illiterate. They describe the importance of providing training so that educators have sound knowledge of assessment administration, interpretation, and communication. This follows on to interpretation of student achievement, reporting to students and parents, and deciding suitable interventions for students based on assessment.

**5.5.6.2 Strengths Apart from Aptitude Required to be Successful and Considered as Gifted in Science at School.** According to Teachers, the most common strengths, apart from scientific aptitude required for the success of a gifted science student are personal ownership for learning and skills to cope with setbacks and perceived failures. To assist Teachers and ensure shared understanding, these traits were presented to Teachers in language that was more descriptive than the single terms used in the research literature. The terms used replicated the type of language that can be seen in school documents. The selected traits were similar to what is found in three of the presented models: the DMGT (Gagné, 2013), the TRM (Renzulli 2005), and the MMG (Heller et al., 2007). They can be likened to traits such as task commitment (Renzulli, 2005), awareness, motivation, and volition (Gagné, 2013), and achievement motivation, learning, and working strategies, and control expectations (Heller et al., 2005). This study shows that Teachers recognise the non-cognitive traits, or interpersonal catalysts (Gagné, 2008), required for gifted students to be successful.

Sub research question 5 discussed the pedagogy used for gifted students by educators. These pedagogies typically relied upon students inherently possessing the traits described above, yet no provisions were made to explicitly teach, improve, or cultivate these attributes. Thus, given that these attributes are recognised by Teachers as those required for success, it highlights the requirement for specific learning strategies. This is not without challenge. It is and will continue to be a difficult task for educators not trained in psychology to analyse and coach students regarding their psychological disposition (Colangelo & Wood, 2015). Colangelo and Wood (2015) emphasise the need for cooperation and dialogue between educators and counsellors to guide the social and emotional development of gifted students. These students must contend with the regular challenges and problems, and the unique needs brought about by asynchronous development, heightened awareness, or underperformance (Lovecky, 1994; Moon, 2009, Robinson, 2002; Song & Porath, 2006). It is therefore recommended that gifted programs monitor and provide support for the non-cognitive traits that Teachers recognise in successful gifted students. This should be managed by specialist psychologists who work alongside educators and schools.

**Recommendations**

Gifted students and their teachers need access to psychologists trained specifically in gifted education. A cooperative approach needs to be implemented to support the non-cognitive aspects of development in gifted students. This should include specialist psychologists and gifted education specialists who can assist these students and their general teachers with navigating the usual challenges in life, and those that are unique to gifted people.

### *5.5.7 Characteristics of Gifted Children and Gifted Adults, According to Teachers*

Teachers were asked if the same traits could be used to describe both children and adults who were gifted in science. This question is important for educational settings because if we are looking at developing gifted scientists then we must be intentional in our teaching and learning strategies, providing experiences that support the continuation of science in the adult world.

This study has demonstrated that only half of Teachers believe that the traits for gifted science students are the same as those required for gifted adult scientists, with approximately one fifth directly stating they are not the same. Free response comments similarly indicate that Teachers do not actively view school science in the same light as real-world science. Some indicate they believe they are teaching a different subject, school science vs real-world science, while others view school science as a stepping stone. The differences observed in their reasoning provide evidence that there is a lack of agreement about how school science should be delivered and the purpose of school science.

Watters and Diezmann (2003) noted the differences between real-world science and school science, stating that the experiences provided to students have resulted in a decline of interest in science. They typically rely on structured activity with extrinsic motivators such as good grades. Fitzgerald et al. (2015) suggests that students are more likely be intrinsically motivated when learning is linked to their direct experience. When there is policy reform for science it must include procedures to alter how science is practiced in the classroom so that it provides foundations and experiences appropriate to science as a discipline. These should be evidenced-based, custom-designed for science, and aligned with best practice science pedagogies.

**Recommendations**

Currently, there are mixed views about the purpose of school science. Therefore, a unified approach to school science would benefit the educators and students. Practically, there may be several approaches that are dependent on individual circumstances. This may be determined through policy reform or by using the approach for mathematics where the advanced classes prepare students for higher level study and the less rigorous courses prepare students for general mathematics literacy.

Additionally, and as proposed in section 5.17, this must begin with an overarching philosophical statement regarding the purpose of education. Further specific statements would be needed for branches and aspects of education, i.e., gifted education vs the education of intellectually impaired people.

### *5.5.8 Traits of Gifted Children According to Parents (Aspect 6G)*

Chapter 4, section 4.7.2 presented the overall profile for the children that will be discussed in this section. Their attributes will be discussed according to their current areas of giftedness in combinations of

- Science, mathematics, and logical reasoning
- Science, mathematics, reading, and writing, and
- Science, reading, spoken language, and writing.

These findings are reported from Parents' perspectives. It has been discussed that parents are a reliable source of information about their children's abilities, and underestimate rather than over estimate (Merrick & Targett, 2005; Worthington, 2001).

From the combinations examined, it is common that children who are gifted in science are also gifted in mathematics, logical reasoning, or both. The same is true for mathematics giftedness, where children are also commonly gifted in science and logical reasoning. The most significant finding provided evidence that children who are gifted in science are statistically not likely ($p<.05$) to be gifted in writing. This is an important finding given that many school assessments, including the HSC, rely on students' ability to coherently express their knowledge in written examinations. Additionally, it is uncommon to be gifted in science, mathematics, and language (reading and writing). These significant and commonly observed findings may serve as indicators for identifying underperformance in science. Notwithstanding, this should be interpreted with caution. Parents are reporting on science as a single discipline rather than reporting giftedness in the different areas of science. Additionally, it is not clear which aspects of science they are reporting on and what measure they are using to gauge giftedness.

### *5.5.9 Weaknesses of Gifted Children (Aspect 6H)*

Examining and analysing the reported weakness of gifted children proved more informative than examining their additional strengths, or areas of giftedness as discussed in section 5.5.8. The commonly reported areas of difficulty experienced by gifted children were emotional control, writing, executive function, and mathematics. The combinations examined were children who were gifted in science, mathematics, and language, mathematics and language, and language only.

Two interesting findings have emerged from this study. Children who are gifted in science and mathematics, but not language, are significantly more likely to have difficulty with emotional control. Children who are gifted in science, mathematics, and language, but not mathematics and language or language only, are significantly more likely to have difficulty with writing. This confirms the discussion presented in section 5.5.8 where Parents do not report writing as a strength. Executive function differences were not notable or significant and those students who are not gifted in mathematics were statistically more likely to have difficulties in mathematics.

These findings are important when providing support measures for students who are gifted in science and mathematics. While they may be verbally articulate or avid readers, they are likely to have difficulty expressing their thoughts in the written form. When examining the literature, traits of gifted individuals generally include motivation, intense unusual interest, effective-problem solving, excellent memory, and logical reasoning, etc. (Frasier & Passow, 1994, Lovecky, 1994, Song & Porath). Exemplary writing skills have not been reported as a common trait. More information about traits thought to be common to gifted people can be found in Chapter 2, section 2.4.

There are some far-reaching consequences of these findings. In many schools, core subjects are defined as mathematics, English, and science and are often streamed by results in mathematics and/or English. Written skills are a key component of English studies and thus, including science in the core subjects for streaming purposes is inappropriate. If students who are gifted in science, are not placed in the top streamed class due to difficulty with writing, they may not be sufficiently challenged. This may go part way to explain their reported difficulty with emotional control as feelings of inadequacy, frustration, and boredom are more likely when students are unchallenged (Moon, 2009; Wagnsson et al., 2014; Wellisch & Brown, 2013). It is also likely that they may underperform in other subjects that require written skills. Thus, the requirement for support in written language skills should be considered for students who are recognised as gifted in science, possibly through using communication methods other than written text. This is another important reason to include the IQ tests in the provisions dictated by policy. Gifted students would then be identified on their potential, not on their performance in an area where they have difficulty such as writing.

**Recommendations**

Students who are gifted in science and mathematics may need additional support to improve their written skills. Timetabling arrangements should allow science classes to be streamed.

### *5.5.10 Early Traits of Gifted Children as Reported by Parents (Aspect 6I)*

Defining and categorising the traits of gifted individuals is a difficult task, particularly since key qualities and attributes of giftedness have not been agreed upon (Koshy & Pinheiro-Torres, 2013). Therefore, in the absence of a consensus, the literature presented in section 2.4 was influential in developing the six themes for his section, using the data provided by participants as relevant to this research. Parents provided free comments about the early traits witnessed in their gifted children. Themes and the specific traits allocated to each theme are presented in Table 4.43. The themes were language, memory and processing, character traits, mathematics, issues, or problems, and other. The literature also informed the placement of specific traits into these themes.

The combinations examined were the same as presented in section 5.5.9. These combinations were children who were gifted in science, mathematics, and language, mathematics and languages, and language only. Again, similar to section 5.5.9, two key discoveries have emerged.

Children who are gifted in science, mathematics, and languages are statistically more likely to exhibit specific traits in the theme “character traits” when compared to the children who are gifted in mathematics and language, or language only. The traits in this theme are consistent with those presented in Table 2.1 as adapted from Focquaert, (2007) and Heller (2007). With preliminary data only, it is difficult to interpret the meaning of these findings and how these qualities relate to the performance of gifted science students. This is because, in the absence of further questioning it is not known if parents have fostered these traits through early experiences or if the children presented this way without influence. Additionally, it is not clear if the children continue to possess these traits as school-aged students, or if the other children who are not gifted in science developed these traits later. Students who are gifted in science may present with these traits earlier. Should further research support that these traits are common, this may be one way to further recognise and support gifted individuals who go on to be gifted in science. Further research needs to be conducted including narrowing and focussing on trait themes, using greater participant numbers, and conducting longitudinal studies to follow the development of the traits in these students. Additional information and confirmation of these findings will allow for evidence-based recommendations.

### *5.5.11 Difficulties in Early Childhood for Gifted Children*

This research provides evidence that gifted children face issues and problems from early childhood and supports claims presented in the literature (Moon, 2009, Wellisch & Brown, 2012). However, the literature does not provide firm numbers or an indication of how many children have problems or issues. This is in part due to the lack of consistency in defining some of the key terms related to giftedness along with the gifted construct itself. For example, there is no agreed-upon definition of twice-exceptional in Australia and there is different information supplied in NSW for definitions of giftedness (ACARA, n.d.; NSW DoE, 2016). This was discussed in Chapter 2.

This research study finds that approximately 20% of gifted children have non-cognitive issues or problems. Additionally, there is no difference in the percentage experiencing difficulty and the areas or combinations of giftedness. Problems include antisocial behaviour, boredom, rage, and not sleeping. Again, these were issues and problems reported from early childhood and so should be interpreted with caution. These findings do not provide evidence if they have resolved over time, if the child required support to resolve the issue, or if the child presented with different problems as they further developed. Further research is required using information supplied by parents. Similar to the reasoning provided in section 5.5.10, additional information and confirmation of these findings will allow for evidence-based recommendations

### *5.5.12 Expert Educators' Perceptions of the Implication of Not Supporting and Encouraging Excellence in G & T Science (Aspect 6I)*

Expert Educators unanimously agree that there is a negative effect on the gifted person if they are not properly catered for and encouraged to achieve personal excellence during their education. They also recognised to a lesser degree, the impact on others in the class and for our society and country. Ways that society may be impacted include our top scientists being recruited overseas, and that we need our gifted students to solve problems.

Expert Educators acknowledged the role that gifted students fulfil in the classroom and for the schools they attend as being that they obtain high HSC results that then reflect well on the school. However, the earlier discussion brought to light that gifted students do not always test well in school situations. Additionally, it was noted that achievement in school does not equate to success in life. It is therefore important to shift the priority from grades and HSC marks, to learning and practising scientific skills and thinking. These comments, when taken together, indicate that our assessment system requires reform so that assessment becomes useful to improve learning. When gifted children cannot succeed in a system that does not test the abilities and skills required for real life, it is not surprising that they become disengaged and lack motivation for something that could be perceived as unimportant.

Therefore, recommendations from Expert Educators to improve the retention of gifted students in schools, and to support those who do remain is pertinent. Their suggestions include a reform and change throughout the educational system. This includes creating aspirational goals, transparent and visible achievement, by way of a transformation agenda, not a piecemeal approach to improving on what is already in place. The system needs to be redesigned and relevant successful elements positioned back in the context of the overall reform. It must not be a re-shift and reorganisation of the elements already in place.

### *5.5.13 Summary of Sub Research Question 6*

While Expert Educators selected Renzulli's TRM over Gagné's DMGT this was because they found the visual representation of the TRM appealing on first examination. When examining the intentions of the participants further it became clear that their initial response was superficial. This is one of the strengths of conducting interviews for complex matters and seeking clarification of early responses. From their responses, it was evident Gagné's model contained the elements that they require in a talent development model and a suitable as a foundation upon which to build a policy. Federal and State funding was the preferred option to provide resources to schools, gifted education programs, and gifted students. Evidence was presented that the state government has once again overlooked funding for G & T students, instead providing resources through an additional budget for those students who are falling behind.

Parents and Teachers recognise that underperformance should be addressed in gifted students with this study providing recommendations for a concurrent pathway for those students who require additional support to perform. This included more stream lined processes for the transition from primary school to high school in light of evidence that Teachers do not recognise giftedness in children as swiftly as parents do. This highlighted the importance of parent partnerships and solid relationships between parents, teachers, and gifted students.

Gifted students were profiled from information provided by Parents with evidence presented that students who are gifted in science statistically have a greater chance of having difficulty with writing. This has further reaching implications for examinations including the HSC if giftedness and aptitude in science are to be measured accurately.

## 5.6 Limitations

All research operates within limitations and under assumptions. The assumptions are presented prior to acknowledgement of limitations. The strengths and limitations of the research methodology, mixed-methods, is discussed in depth in Chapter 3.

### *5.6.1 Assumptions*

Assumptions are factors that are taken for granted within the research. Without these basic elements holding true, the research would not exist (Leedy & Ormrod, 2015).

The main assumptions made for this research are:

1. The participants have the information required and are qualified to provide responses.
2. The participants are able to understand the questions as intended by the researcher.
3. The process of answering the question does not change the beliefs, opinions, or behaviour of the participants.
4. Participants have the time to answer the questions to an appropriate degree and are not pressured by the interview process or overly long questionnaires.

### *5.6.2 Sample Size*

Sample sizes were small with nine interviewees and 225 questionnaire participants. Questionnaire participants did not answer all questions but instead answered smaller surveys between the 225 participants. This is detailed in Chapter 3, section 3.15.3.2 (Questionnaire administration strategy). While sample sizes were small, many questions were qualitative and so provided rich perspectives that would not have been obtained from quantitative questions, even with larger participant numbers. In some instances, there were sufficient responses to conduct statistical tests. Additionally, the nine interviewees provided rich and substantial information.

### *5.6.3 Participant Sampling*

Participant sampling was discussed in Chapter 3. Interview participants were convenience samples and did not include participants from NSW DoE schools. NSW DoE schools were asked to participate but declined.

Questionnaire participants were self-selecting, from social media platforms and predominately located in NSW. This may have limited the type of educator or parent who could access the survey. Older and more experienced educators may not have social media accounts, and if they do, they may not be members of teaching groups that traditionally provide support and advice. Thus, the responses from participants may not provide a representative sample. To obtain a representative sample, considerations should be given to factors such as participant recruitment methods, teacher gender, teaching experience and specialisation, school system, and SES of the school. Thus, the findings reported, recommendations, and future research suggestions may not be generalisable to other states or situations. Given that this study was exploratory, the results are valuable and provide insight into the areas where improvements can be made in our educational system. With awareness, these limitations can be addressed before replicating this research on a larger scale or for different geographical states.

Parent participants may have presented biased perspectives. As discussed, NESA seeks the support of parents when managing and creating opportunities for gifted students. Therefore, even if biased perspectives were included it is important to provide a voice to the parents of gifted children. Future confirmatory studies using a larger sample size may be useful.

Questionnaire participants were anonymous to the researcher; thus, the academic and teaching qualifications could not be validated nor could the researcher follow up for clarification or additional information. Thus, the assumptions 1, 2, and 4 were believed to hold true.

#### *5.6.4 Participant Responses*

At times, participant responses provided conflicting information. As discussed in Chapter 5 section 5.4.5, social desirability bias was evident in the responses provided for sub research question 5. Social desirability bias will not be discussed again here. There was also conflicting information obtained regarding the provisions required for teachers of G & T students. This conflicting information may be for two reasons. First, two different questionnaires were used to collect the majority of information that led to this observation. This may indicate that there were not enough participants surveyed to ensure generalisable views were obtained but it is not the most likely explanation. The interviewees and initial questionnaire participants, whose responses could be followed through, provided similar conflicting information. This leads to the more likely explanation that participants are replicating the misinformation and lack of order in mainstream gifted education, a conclusion supported by other evidence in this research. It would be beneficial to engage in further research using different methods to determine what provisions are available for teachers of G & T students, and what additional provisions are required. The responses may change if educators were provided with professional development and could make more informed decisions about what is required.

#### *5.6.5 Resource Limitations*

As with all doctoral studies, the process of learning to research and gaining the appropriate experience takes significant time. Yet, time is limited. Thus, discovering mistakes, correcting misunderstandings, and mitigating unforeseen personal, professional, and world problems can consume the time very quickly. Hence, while it would have been advantageous to spend more time recruiting participants, time considerations meant that only a limited sample of educators could be surveyed.

#### *5.6.6 Limitations of instruments*

Exploratory research is conducted about a problem or inquiry when there are limited or minimal previous studies. Using the literature, surveys were designed from an amalgamation of topics relevant to the research questions. As such, there were no previous validated instruments that were relevant or useful to the research and psychometric properties were not available. Confirmatory analysis should be conducted.

### *5.6.7 Interpretation of Data*

Chapter 3, Part 4 discussed the complexities with analysing and interpreting qualitative data. The data were analysed as it related to the research questions but included emergent ideas so that the voice of participants were captured and heard. This was a strength of this research. However, the comments and responses provided were assessed on face value, that is, the strength of the belief or the order in which the beliefs were presented did not change the weight of the comment. Each idea was counted equally, and once only. This method may not accurately reflect the importance of the beliefs held by some individuals when compared to those who are less certain but still provided a response. Without complex rating scales, and in the absence of validated survey tools, this was deemed the most suitable measure in an exploratory mixed methods research methodology.

### *5.6.8 Personal Biases.*

Two factors have been identified that may give rise to personal or researcher bias. These issues have been addressed throughout this thesis and will be briefly reiterated.

1. The findings were interpreted by a single researcher. “All field work done by a single field-worker invites the question; why should we believe it?” (Bosk, 2008, p. 167). Knowing this, I have ensured that I continually critique my interpretations, and important findings in this research. I have come to this research and doctorate with a mind open for learning. I seek and welcome the advice, opinions, and critiques of my supervisors and those with experience. Chapter 3, section 3.5 presents the issue of trustworthiness in more detail.
2. Some Expert Educators were known to the researcher in a professional capacity. The professional relationship may have prevented the participant from stating their true beliefs and thoughts, although this is deemed to be unlikely. The questions asked were not of a personal or sensitive nature. Participants were reassured that their responses would be used for the research purposes only and that they would not be identifiable. Given that most Expert Educators hold positions of leadership where they voice their perceptions on a regular basis, it was unlikely the process was intimidating. Thus, while important to recognise, it is likely their responses were honest. The professional

relationships have allowed high level leaders to be included in this important and under researched field.

## 5.7 Summary of Recommendations

These recommendations and future research suggestions have been presented with consideration to the limitations discussed. For ease of reading, some recommendations have been presented in dot point form as they have been discussed in context with the findings throughout this chapter.

### *5.7.1 Models*

- A simpler visual version of Gagné's model is recommended before presenting the details and specifics in his model. This is thought to make the concepts of the model easier for teachers to access, and may improve rates of policy uptake if teachers are not initially overwhelmed.
- Pathways are needed for students who are yet to perform. These pathways include, meeting needs of G & T children in areas such as mental health, preventative counselling, social and emotional requirements, and skills to improve executive function.
- Models should include pathways for high performing students who are not gifted. The criteria are yet to be determined, but they should be flexible.

### *5.7.2 Policy and Procedures*

It is recommended from the findings of this research that policy or procedures should minimally include the following elements

- Cater for all levels of giftedness
- Be clear and understandable to all stakeholders
- Be flexible to cater for individual schools
- Be explicit
- Clearly define the population of G & T students including areas of giftedness
- Clearly indicate provisions of time, monetary funding, resources, training, and classroom support
- Contain reporting and monitoring proforma

- Contain best practice science education pedagogy advice, revised as new evidence-based research is published.
- Indicate specific accountabilities
- Include access to experts for identifying gifted students
- Include an identification process
- Regular formal evaluation processes
- Procedures should be clear, precise, specific, and comprehensive procedures should be provided.
- Procedures can be referred to as strategies.
- The policy and procedures should be mandated with guidelines provided that are not mandatory.

#### *5.7.3 A Proposed Theoretical Model for Gifted Education and Gifted Student Development in NSW*

Figure 5.1 presents a proposed theoretical model for gifted education and gifted student development in NSW. Entry into the pathway begins with identification. A federally funded identification process is recommended for students who meet specific criteria. The criteria are still to be developed, and beyond the scope of this research. It is proposed that those students who do not meet the criteria are still eligible for funded tests if they are deemed to be gifted by approved and validated tests. This will allow parents who are confident about the ability of their child to access funding without burdening a system intended for gifted children.

Two pathway entry points are present, entry with no accompanying factors or entry with accompanying factors. Accompanying factors are considered to be any issue or problem that prevents a gifted child from accessing the opportunities that develop their potential. These factors may include but are not limited to the physical, mental, or emotional maturity to access domain specific education or activities. This is likely to be relevant in the domain of science where exposure to world science is currently limited (Watters & Diezmann, 2003). Further details for opportunities provided to enhance science and increase world science experience should be detailed in the procedures of the policy. Figure 5.2 provides some recommendations for a framework for these procedures.

The interventions located at the top of the proposed theoretical model for gifted education are provided to meet the additional and holistic needs of a gifted individual, including underperforming and twice exceptional students. Examples of the types of services and interventions that could be provided are specialist psychologists, support for learning disabilities (e.g., dyslexia, autism), or non-academic activities deemed to support the wellbeing of the gifted child.

Finally, the three boxes found on the lower row of the model indicate that all gifted children should have access to a regular school psychologist, activities, and opportunities to improve the non-cognitive aspects of success, and school strategies to improve the relationship and interaction with parents. These three items are essential for all students but have been identified in this research as lacking with respect to gifted education. They are presented in the model as they should be considered “non-negotiable” factors.

#### *5.7.4 Recommendations for a Policy Framework for Procedures or Strategies*

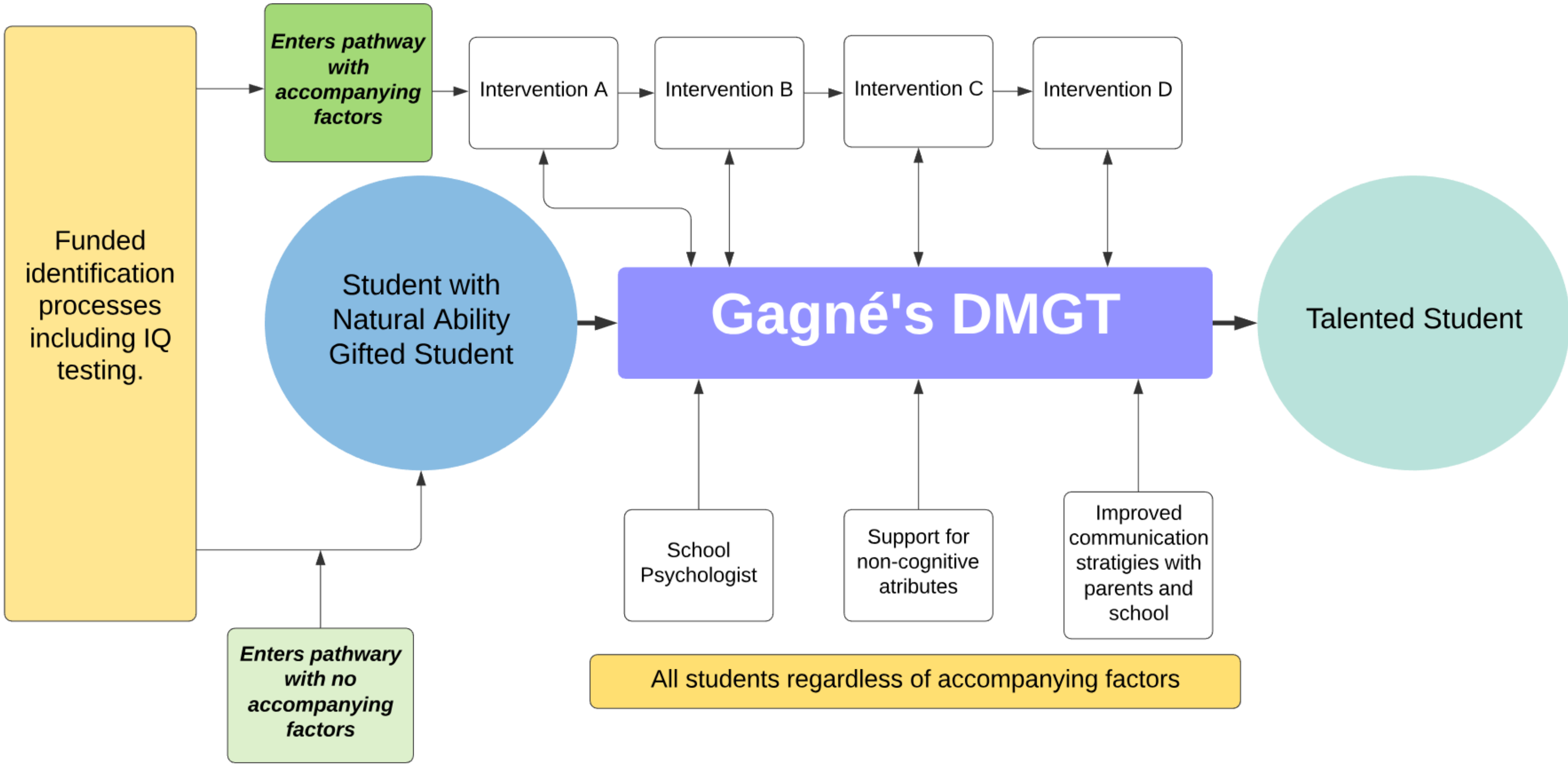
Figure 5.2 presents a simple visual model for a recommended policy framework for procedures or strategies. This has been developed using the findings from this research. The model begins with an evidence-based and evaluated model for gifted education. This was presented in Figure 5.1. This followed by an accompanying policy that should undergo regular evidence-based evaluation processes. From the policy procedures are split into areas of giftedness relevant procedures. Science is listed here separately and other areas of giftedness are represented as a single pathway. Other areas of giftedness would be separated as appropriate, but it is not within the scope of this research to suggest how this should occur. It is possible that science could be combined with other STEM subjects but this is to be determined.

Professional development is presented between the procedures for the domains to represent general gifted and talented professional development (Lassig, 2003, 2015). This may include subjects during initial teacher education and additional learning once teachers are professionally accredited.

The science domain procedures include elements that are supported by the literature and this research. They are world science experiences (Watters & Diezmann, 2003), best practice evidence-based pedagogies (Bailey, 2005, Bianchini & Colburn, 2000; Harlow et al., 2006; MacLeod, 2004; McDowell, 2017; Oliveria et al., 2012; Renzulli & Reis, 2010), shared resources and expertise, science specific professional development (Chalwell & Cumming, 2019; MacLeod, 2004), and other evidence-based practice.

**Figure 5.1**

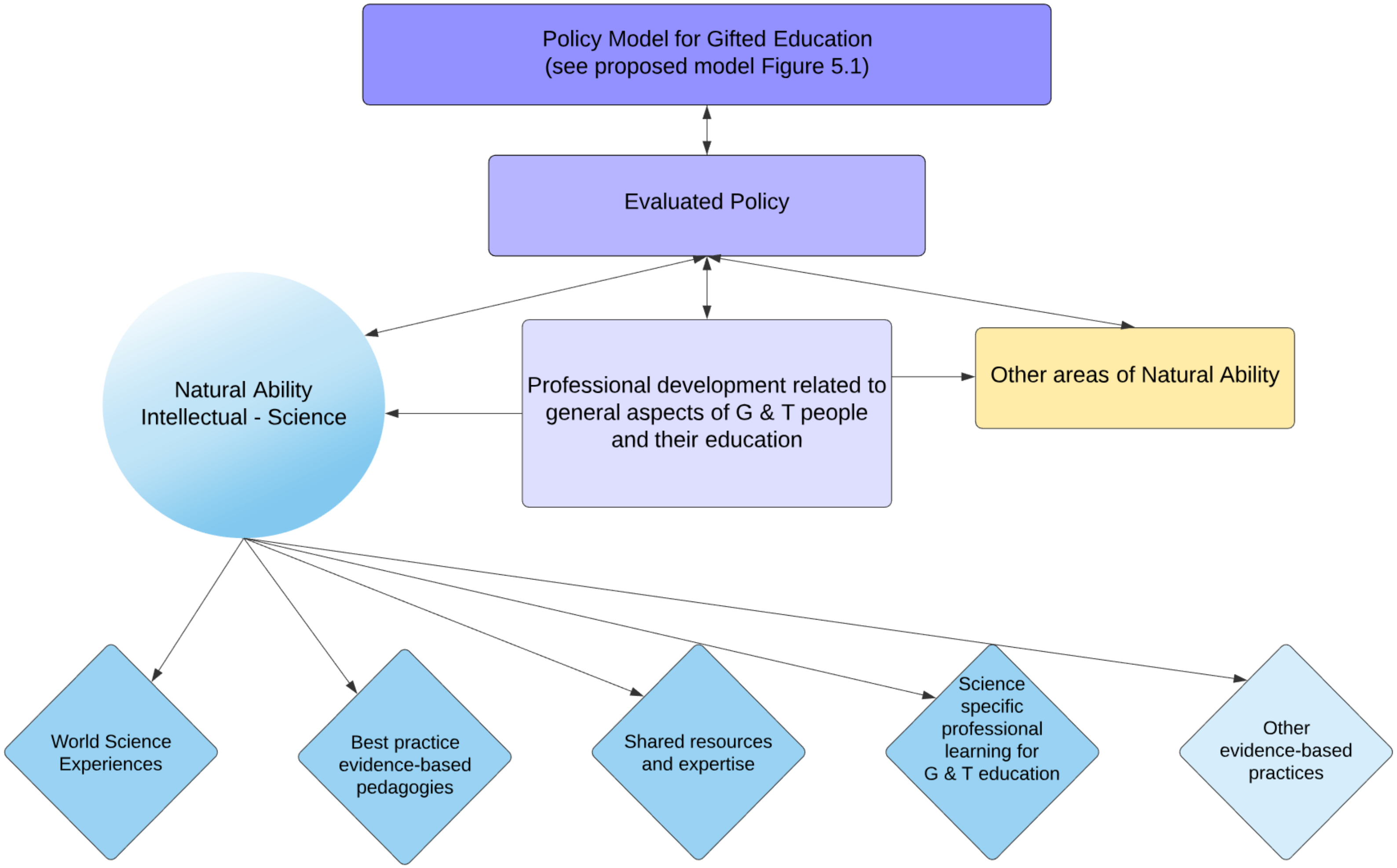
*Proposed Theoretical Model for Gifted Education and Gifted Student Development in NSW (Jawerth, 2021)*




Note: Interventions A, B, C, and D are provided based on student needs and may include, specialist psychologists, learning support for disabilities, or non-academic activities deemed to support the needs of a gifted child.

**Figure 5.2**

*Proposed Policy Framework for Procedures or Strategies (Jawerth, 2021)*



### *5.7.5 Provisions*

- Teachers require time for preparation, timetable allocations, and their own learning to support gifted students.
- A systems approach and co-operative sharing scheme is needed to provide specialised resources
- In addition to the intellectual stimulation provided, opportunities to learn and develop the non-cognitive attributes required for success should be provided. These aspects are included in the proposed theoretical model for gifted education and proposed policy framework for procedures and strategies presented in Figure5.1 and 5.2 respectively.

### *5.7.6 Practice*

Including science in the core subjects for streaming should be done with caution. It would be more beneficial for gifted science students if they were streamed separately from English or paired with mathematics only.

### *5.7.7 Professional Development*

Provisions should include professional development to:

- improve awareness and knowledge about giftedness, gifted education, and gifted people.
- improve teacher attitudes towards gifted students
- assist with preparation of strategic and structured programs for G & T students rather than unstructured modifications (McLeod, 2004).
- improve understanding of the differences between high performing students and gifted students. It is recommended that this includes differences between mildly gifted to profoundly gifted children.

### *5.7.8 Other*

- It is important to develop an overarching philosophy for education that is delivered at a national level. Another solution is to include a sub-philosophy for gifted education. To develop these philosophies, research and a consultation process should be undertaken so that the perspectives of the various stakeholders are considered.
- Greater funding is required to increase the number of places in selective schools and opportunity classes.

- Selection for selective schools and opportunity classes must be based on potential and performance.
- An improved process for the transition from primary to high school is required. In part, this is to ensure that relevant information is passed on and used well. It is an opportunity to consult with parents and build effective relationships.

## 5.8 Future Research

This research was exploratory and has highlighted some areas in the educational setting that warrant further explanation. Although they are outside the boundaries of this research they have been included so that readers may decide what is appropriate to their own contexts. These future research requirements are presented as a question where appropriate.

### *5.8.1 Policy*

- What G & T policies do individual schools have and how are they enacted?
- To what degree do educators have confidence in educational policies?
    - If lacking confidence, does this apply to all levels of educator or some levels? (e.g., system leaders, principals, classroom teachers)
    - Which polices do educators lack confidence in and why?

### *5.8.2 Practice*

- What strategies/tools are used to measure student potential?
- What strategies/tools are used to measure student performance?
- Why are these strategies used and in what proportions for selection to mainstream school gifted classes?
- What pedagogy is used for gifted students? Questionnaire research has not provided consistent answers to this question. Case study or observation methodologies are recommended.

### *5.8.3 Provisions*

What provisions are required by educators for the education of G & T science students? Conflicting results have been found in this study. Additional research using a different methodological approach is suggested.

### *5.8.4 Other*

What are educators' beliefs and understanding about the contributing attributes required for a gifted person to be successful?

With the recommendation to develop an overarching educational philosophy, further research is needed to establish a unified approach for the purpose of school science education. This may be a layered approach so that it is suitable for all levels of ability and interest. For example, the purpose of school science education may be to develop the next generation of scientists or to ensure that children grow into adults who are scientifically literate and can make evidenced based decisions. In addition, research into the feasibility and appropriateness of a tiered approach to science should be explored as it is unlikely that there is a single purpose for school science education. This could begin with an evaluation of a structure similar to the tiered approach currently used for mathematics in NSW.

### *5.8.5 Hypotheses*

In addition to the exploratory research questions, this research presents five hypotheses for confirmatory studies. These are:

**Hypothesis 1** - Learning and achievements of G & T students will improve if specific and structured pedagogical approaches are implemented. Professional learning for educators may support this endeavour.

**Hypothesis 2** - Teachers would enact more effective pedagogies for G & T students if they were allocated more time and resources.

**Hypothesis 3** - Many educators view the other aspects of G & T models e.g., motivation, creativity, performance, as an intrinsic part of giftedness, in the same way they view ability and IQ.

**Hypothesis 4** - G & T students would benefit from identification, funded by either the state or federal government

**Hypothesis 5** - Teachers do not recognise giftedness as early or as quickly as Parents.

## 5.9 Contribution to Theory and Practice

The contribution to theory and practice has been presented throughout the discussion in the form of recommendations. These were further elaborated in the preceding section. In summary, this research has contributed to theory, practice, and methodology for educational research. These three areas will be discussed.

### *5.9.1 Theory*

Two models have been presented for consideration. A Proposed theoretical model for gifted education and gifted student development in NSW (Figure 5.1) and a proposed policy framework for procedures or strategies (Figure 5.2). This research has demonstrated that Gagné's DMGT is suitable for G & T students who are performing to a high level. However, it does not cater for students who are twice exceptional, underperforming, or are yet to discover their area of giftedness. An evidenced based extended theoretical framework has been proposed that includes Gagné's DMGT, an identification element, and elements that address considerations for the success of G & T students.

Policy analyses and comparisons have been conducted for the NSW G & T policies from 1991 to the present, 2020, using an evidenced based inquiry approach. Additionally, the 2021 HPGE has been presented for consideration. Through this process and analysis of educators' perceptions, this research has revealed that there is no consistency between educators with regard to their understanding of G &T students and the methods by which they enact and implement policy. Furthermore, there is no evidence for current or previous science specific G & T policies in NSW schools.

### *5.9.2 Practice*

It can be difficult to separate theory and practice as they are intertwined. The way that policy is implemented is both theoretical and practical. There is no evidence that G & T policy, using the cited model of Gagné, is implemented consistently, with fidelity, and with integrity as Gagné intended in NSW schools. This too is noted by Gagné (2015) and was discussed in section 5.1.6.

Evidence has been provided that there is no educator agreed upon practice and pedagogy for G & T science students. Educators are burdened with a system that goes little beyond minimum standards and standardised assessment. Each student is required to meet the same learning intentions at the same time. Any changes for G & T students are at the discretion and by the efforts, of individual teachers. Thus, this research has demonstrated that a co-operative and consistent approach to science, particularly science for G & T students must be developed. Furthermore, agreed upon definitions, practices, and availability of provisions must be communicated to schools and educators.

### *5.9.3 Research*

Educators contend with content driven syllabi, competing administration, and behaviour management issues. Alongside this, they are expected to bring out the potential of every student in their class. This leaves little time for additional and non-essential tasks such as participating in educational research. This study has demonstrated that long questionnaires are not suitable for educators who are time poor. However, social media sites can be useful when conducting exploratory studies. Information can be obtained relatively quickly, although short questionnaires are needed. Requests for information should be delivered in forms that are easily accessible, no longer than five minutes in duration, and be delivered on easy to use platforms. This is useful when follow through of participant responses not required. This information may be beneficial if researchers are finding it difficult to obtain responses. Further information can be found in Chapter 3.

## 5.10 Conclusion

When this research commenced, I expected that I would have definite answers to the research questions that would shed light and provide direction to teachers of G & T students. I also expected to provide answers for science gifted education. This goal was very ambitious. This research has provided more questions than answers in a system where there is no consistent or evidence-based approach to gifted education. Furthermore, there are no specialised provisions made for those who are gifted in science.

Most educators, even those who claim they are familiar with the NSW DoE G & T policy, cannot provide the published definitions from the work of Gagné. They do not separate gifted and talented nor do they generally separate high performing students from bright students or gifted students. Thus, it has been demonstrated while there is a policy that incorporates a theoretical model, there is no evidence that this is enacted in schools and therefore cannot be practically evaluated for its appropriateness in NSW schools.

Most educators were unaware of Gagné's model prior to this research but on first impressions they believe that Gagné's model is suitable for gifted education for those students who are performing well. Gagné has suggested that those students who underperform are more suited to a separate pathway, while Wellisch advocates for an all-inclusive pathway. From the evidence gathered and analysed in this research, it is suggested that concurrent pathways would make better use of the, limited provisions and expertise available for gifted education. A model showing this was presented in Figure 5.1 and expanded upon in Figure 5.2. This belief stems from evidence that our current system, including the system for gifted education, is set up to reward those who perform, not necessarily those who have the potential to perform. It is not equally weighted to improve the educational needs for the whole spectrum of ability and potential. Instead, it is dedicated to improving learning for those who are not meeting the minimum standards, until such time as they do. Thus, it is evident that our current system needs a second approach to cater for all gifted children, not just those who perform to high standards.

However, creating models and proposing pathways for gifted students is not enough. The policy in NSW has not changed significantly in 30 years and many of the problems and issues discussed in the literature over 20 years ago have not been addressed. Thus, to recommend another model or a change in policy is unlikely to make a difference to the education and success of gifted students if it is once again shelved, interpreted without expertise, or not systemically implemented. Hence, a system for procedures and strategies must be collaboratively developed, widely publicised, and implemented with support. It is essential that these procedures address the non-cognitive and social aspects of education alongside opportunities to excel and develop in the domain of choice. Thus, they must be specific to the area of giftedness as presented in Figure 5.2.

As stated, the economics of implementation was not part of this research. However, funding is needed to implement policy, evaluate policy, and provide professional development for educators. This funding must be provided by the federal government with a system for sharing resources. We share other resources e.g., cars (Uber), houses (Airbnb), and books (libraries). Thus, a system for sharing specialised school resources is not beyond the scope of our society.

This research closes with this statement. The most appropriate model for gifted education in NSW begins with the one that is implemented correctly, and as intended by the author. It is not until we have widespread uptake of policy and the procedures that we can provide an evidence-based evaluation and make changes to suit our context here in Australia. As such, in 2020 moving into 2021, a simplified visualisation of Gagné's DMGT with the additional features of identification based on potential and provision for non-cognitive support pathways, is an appropriate model to begin to guide policy and procedure reform in NSW for G & T science students. It is not necessary nor economically viable to implement a completely different model for G & T education until there are confirmatory studies and the opinions sought from a greater number of educators.

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## Appendix 1

| Survey Method and Participant Group | Research Question 2<br><br>What are educators' perceptions of the appropriateness of the NSW DoE policy for G & T education? |
|---|---|
| Online Questionnaire Educators | • In your own words, what do the terms gifted and talented mean?<br>• Are you aware of a Gifted and Talented policy for your Educational Sector (Department, Catholic or Independent)?<br>• Do you feel it is necessary to have a specific state policy addressing the needs of gifted and talented students, including those in science?<br>• The success of a gifted education is one that (choose all that apply or one of your own) |
| Online Questionnaire Parents | • The success of a gifted education is one that (choose all that apply or one of your own)<br>• As a parent of a gifted child/ren, what would you like to see in our educational system to support them? |
| Interview Questions Expert Educators | • In your own words, describe or define the terms gifted and talented?<br>• Prior to the pre-reading how familiar were you with the Department of Education (DOE) gifted and talented policy?<br>• What are your thoughts on the NSW DoE policy currently used? (2019)<br>• Do you feel the current NSW DoE policy uses the most appropriate model for G & T education? If so why? If not, what would you change and why? (participants presented with DMGT)<br>• Do you feel it is necessary to have a specific state policy addressing the needs of gifted and talented students, including those in science?<br>• Do you feel that the general emerging broader educational policies provide sufficient direction for the gifted students? (These include syllabus reform, emphasis on inquiry-based science)<br>• What do you see are the implications for not supporting and encouraging excellence in gifted and talented science students? |
| Initial Questionnaire Educators | • With regard to the NSW DoE gifted and talented policy (select all that apply)<br>• If desired, please comment on the above response.<br>• What do you perceive to be the benefits and limitations of this policy?<br>• With regard to the NSW DoE gifted and talented policy you accessed; would you like to see anything else included?<br>• Do you distinguish between the terms gifted and talented?<br>• If you answered yes to distinguishing between gifted and talented which of these statements best capture your ideas?<br>• If you answered no to distinguishing between gifted and talented which of these statements best capture your ideas? |

| Survey Method and Participant Group | Research Question 3<br>School policy for G & T education<br>a) What are educators' perceptions of the appropriateness of their school policy for G & T education?<br>b) Where school policy for G & T does not exist; What is the rationale given for the absence of a policy? |
|---|---|
| Online Questionnaire Educators | • Are you aware of a School Gifted and Talented Policy?<br>• If you have no school G&T policy, can you suggest reasons why? |
| Online Questionnaire Parents | • As a parent of a gifted child/ren, what would you like to see in our educational system to support them? |
| Interview Questions Expert Educators | • Does your school have policies that help to address the needs of those who are gifted and talented in science?<br>• If you have no school G&T policy, can you suggest reasons why? |
| Initial Questionnaire Educators | • Does your school have its own gifted and talented policy?<br>• With regard to your school's gifted and talented policy (choose all that apply or one of your own) |

| Survey Method and Participant Group | Research Question 4<br>With provisions defined as resources, what provisions are available and used by each school for G & T students in the context of science? |
|---|---|
| Online Questionnaire Educators | • What provisions (resources) would you like to support gifted and talented science students?<br>• Which provisions do you have available for your science students?<br>• Which of these would you need more of to support the education of gifted students? (choose all that apply or one of your own)<br>• Are there any differences in the way these resources are used for G&T students? Reasons could include, time, quantity, additional resources.<br>• Please indicate your agreement with this statement. The school provides adequate laboratory equipment and support to perform first hand investigations. |
| Online Questionnaire Parents | • As a parent of a gifted child/ren, what would you like to see in our educational system to support them? |
| Interview Questions Expert Educators | • What provisions are you aware of that are made available to assist G&T Science students in your school?<br>• As a leader in education how do you support other educators in catering for the development of a gifted and talented student?<br>• What are your plans to support other educators? |
| Initial Questionnaire Educators | • Which provisions do you have available for your science students?<br>• Are there any differences in the way these resources are used for G&T students? Reasons could include, time, quantity, additional resources.<br>• Please indicate your agreement with this statement. The school provides adequate laboratory equipment and support to perform first hand investigations.<br>• What provisions are needed for you to better support the development of science students but in particular, identified G&T students?<br>• Please indicate your agreement with this statement. My teaching practice is influenced by my teaching provisions |

| Survey Method and Participant Group | Research Question 5<br>With practices defined as teaching strategies, what practices are enacted by individual teachers for G & T students in each school in the context of science? |
|---|---|
| Online Questionnaire Educators | • What pedagogy is useful to support gifted and talented science students?<br>• Please indicate your agreement with this statement. My teaching strategies are dictated by the school where I work<br>• My teaching strategies are altered for gifted and talented science students (Yes, No, Other)<br>• Please comment on why you do or do not alter your strategies. If yes, what do you do?<br>• Please indicate your agreement with this statement. My teaching practice is influenced by my teaching provisions |
| Online Questionnaire Parents | • As a parent of a gifted child/ren, what would you like to see in our educational system to support them ? |
| Interview Questions Expert Educators | • As a leader in education how do you support other educators in catering for the development of a gifted and talented student? What are your plans to support other educators?<br>• What practices, if any, do you use and prefer to assist those students who are G&T in science?<br>• Non-teaching - What strategies have you seen used that have been helpful/do you encourage or support for G&T science students? (tailored to role) |
| Initial Questionnaire Educators | • Please indicate your agreement with this statement. My teaching strategies are dictated by the school where I work<br>• My teaching strategies are altered for gifted and talented science students (Yes, No, Other).<br>• Please comment on why you do or do not alter your strategies. If yes, what do you do?<br>• Please indicate your agreement with this statement. My teaching practice is influenced by my teaching provisions |

| Survey Method and Participant Group | Research Question 6<br>When presented with alternative models for G & T education, what are educators' perceptions of their appropriateness for science education? |
|---|---|
| Online Questionnaire Educators | • Students who should receive the resources for G &T are those (select all that apply or one of your own)<br>• Who should be responsible for providing and delivering these resources? (select all that apply or one of your own)<br>• How should these resources be delivered? (select all that apply or one of your own)<br>• Under what conditions should these resources be delivered? (select all that apply or one of your own)<br>• The success of a gifted education is one that (select all that apply or one of your own)<br>• Level of agreement. Children who are officially identified as gifted and who are NOT performing SHOULD BE allowed to enter a typical gifted program BEFORE the reasons for underperformance are addressed (e.g. mental health, learning disabilities, behaviour issues).<br>• At what age do you typically see giftedness in science school students?<br>• What are the specific indicators/characteristics of a student who is gifted in Science? (select all that apply or one of your own)<br>• What particular strengths, apart from an aptitude, are required to succeed and be considered gifted in Science at school? (select all that apply or one of your own)<br>• Are the characteristics selected above the same as the characteristics to be considered gifted as an adult in Science? Please comment |
| Online Questionnaire Parents | • The success of a gifted education is one that (choose all that apply)<br>• Level of agreement. Children who are officially identified as gifted and who are NOT performing SHOULD BE allowed to enter a typical gifted program BEFORE the reasons for underperformance are addressed (eg. mental health, learning disabilities, behaviour issues).<br>• What age was your child when you thought they were gifted?<br>• Has your child been formally identified or had an educator confirm that they are gifted?<br>• Regardless of a formal identification of giftedness, in which areas do you perceive your child is gifted? (select all that apply or one of your own)<br>• For the same child, please indicate if there are any areas where the child is perceived to be below average. (select all that apply or one of your own)<br>• Please suggest some reasons why and how you noticed your child was gifted. What were/are their characteristics? |
| Interview Questions | • Which model do you feel is most appropriate overall and why? (participants provided with 3 theoretical models) |

| | |
|---|---|
| Expert Educators | • There is currently no overarching or governing body that is responsible for Gifted and talented education. Let us imagine we can create a policy to address the needs of these students (options presented, or participants own)<br>o Which students should receive the resources for G & T students?<br>o Who then administers those resources, who decides that and makes those decisions?<br>o How should the resources be delivered?<br>o Under what conditions should the resources be delivered? |

# Appendix 2

## Sample Question Analysis

### *Overview*

The analysis section contains general information regarding the thematic coding process. This appendix provides details and a sample of how the qualitative data sorted and analysed.

Numbered questionnaire and interview questions were sorted as they answered the sub research questions. This is presented in Appendix 1.

The process of coding began by developing a series of start codes. Examination and dissection the conceptual framework presented at the end of the literature review and the research questions generated the first codes. These start codes were categorized and broken down into relevant sub codes as themes emerged from the participants' responses (Leedy & Ormond, 2015). Questions were analysed in the same manner despite the difference in data sources, Expert Educators, Teachers, or Parents. That is, the participant comments were examined, or quantitative data collated, and then represented in thematic tables, quantitative graphs and tables, or both.

Microsoft Excel, desktop and online office 365 versions, were used to organize, sort, and display the data and resultant codes. Lucid Charts was used to create Venn diagrams. The participants' voices were presented using excerpts in thematic tables.

Meticulous records were kept for all coding decisions, analysis decisions, and presentation of relevant findings. Cross checking and strategical discussions occurred regularly throughout the process with supervisors and other professional people.

Examples of these processes are presented in detail using parts of the survey and interview questions.

### *Generating codes and themes*

To overcome the overwhelming task of analysing vast amounts of rich data, one question was selected to begin the coding process. The question selected was Survey Question 34 (SQ34); "As a parent of a gifted child/ren, what would you like to see in our educational system to support them?". This question was selected for the following reasons. 1) The question was open ended but directed, 2) the question had a good response rate (76 responses), 3) This question generated large amounts of data and a good quantity of codes to begin, 4) it was thought that the codes created from this question would be relevant to many of the other questions, 5) the responses to this question were within fairly defined boundaries, unlike many Expert Educators' responses that were more nuanced, and less likely to generate common codes.

Codes were created by placing entire comments into the second column of an excel spread sheet. Key words or phrases that reflected each idea were placed in the adjacent columns. These key words and phrases were placed in a second spreadsheet and sorted to consolidate analogous ideas. These codes were then grouped according to themes. Codes were then numbered with the prefix A to indicate this code was generated from qualitative survey data.

Analysis of the first question gave rise to the themes: Actions – other than support for aptitude, Pedagogy, Provisions, Values, Beliefs, Characteristics and Attributes, Models for giftedness, Twice Exceptional, and Assessment. Within some groups there were further sub-themes, for example, grouping strategies, a subtheme of pedagogy, were further divided into Acceleration, Extension, Grade Skipping, Multi-age classes, Accelerated curriculum/off curriculum extension, etc. This would allow the possibility for combinations or stand-alone codes when interpreting the data.

A second coder was used for inter-reliability as described in the main body of the thesis. As questions were analysed and new codes, groups, and themes generated, samples of were coded by a second coder. A sample of a part of this coding process is presented in

Table 1

**Table 1**

*A sample of how codes were altered using an excerpt from survey question 34 coding process.*

| Original Code # | New Code # | Original Code | Altered Code |
|---|---|---|---|
| A1 | A1 | Mental health | Mental health support |
| A2 | A2 | Peer relationships | Promoting and recognising importance of peer relationships |
| Added | A3 | | Mixed age socialising encouraged |
| A6 | None | Engaging and challenging environment | Removed – combined with A15 |
| A11 | A11 | Flexibility | Flexibility with approaches in education system |
| A15 | A14 | Challenging learning/work | Challenging learning, work, and environment |
| A25 | NIL | Extension to be commonplace | Removed combined with A19 |
| A46 | A45 | Teacher education | Teacher Education including further education |
| A47 | | Opportunities for further education | Removed combined with A46 |
| Added | A50 | | Recognise areas of giftedness |
| A51 | NIL | General and 2E | Removed - duplicate |
| A53 | A51 | Teacher support | Teacher support for matters of gifted education |
| A63 | A61 | Less assessment or reliance on assessment | Less assessment, reliance, emphasis on school assessment |
| A64 | NIL | Less reliance on in house testing for gifted classes | Removed – combined with A6 |

### *3.19.3 Applying codes to the participant comments*

Codes were then generated for Expert Educator comments. The codes were assigned to Interview Question 1 (InQ1) “In your own words what does gifted and talented mean?” and to Survey Question 2 (SQ2), “In your own words what is your definition of gifted and talented?”.

Codes labelled with the prefix A were generated from survey data and codes labelled with the prefix B were generated from Expert Educators’ interview data. This allowed a quick insight into the similarities and differences in the overall responses from each group of participants simply by looking at the code prefixes.

Table 2 demonstrates how the codes have been applied to a sample of the responses from the teacher participant group for SQ2. Table 3 shows how codes have been applied to a sample of the responses from the Expert Educators participant group for InQ1. Some of the codes used in these samples are presented in Table 4.

**Table 2**

*A sample of responses from Survey Question 2 with relevant codes applied*

| **Survey Question 2 responses** | **Codes applied to the response** | | | |
|---|---|---|---|---|
| *Capable students who have the potential to achieve better than their peers.* | AA99 | | | |
| *Gifted is having a natural ability to succeed (and exceed the expected level for their level of education) in an area, which may be small or large. Talented is being bright but working hard to be above the standard level of their peers. This tends to be wider ranging.* | AA105 | AA103 | AA107 | AA99 |
| *Displaying characteristics that are above and beyond average - for instance the ability to synthesise and evaluate information easily or the ability to create something new from information supplied.* | AA87 | AA119 | AA84 | AA109 |

**Table 3**

*A sample of responses from Interview Question 1 with relevant codes applied*

| Interview Question 1 responses | Codes applied to the response | | | |
|---|---|---|---|---|
| *I've worked with a lot of talented people in lots of different fields, um but gifted, like, I suppose I have seen people develop their talents over long periods of time and that sort of stuff but I've never really run across a person who understands things without any experience. And I don't know if that's what gifted is but you know I keep thinking it's the person who just walks up and can play the piano or the person who looks at a maths question and goes, wouldn't you just do that. There's sort of like, I haven't really come across that, whereas I have worked with lots and lots of talented people who are amazing but you can see what their development to that point has been. So, I don't really have a solid definition of what gifted is.* | A107 | B1 | B18 | |
| *Gifted and talented is those students who have a really good understanding, background understanding, even without lots of education can understand concepts quite well. They don't necessarily have to have gotten their formal education for them to be at the same level as other students might be, I would say gifted and talented students who if are directed or guided the right way can achieve quite a bit in their subjects and in my case be science.* | B1 | A83 | B7 | A115 |

Themes were created from the codes. For these two questions, InQ1 and SQ2, the themes included ability capability, characteristics, performance, characteristics of gifted students, and other. Three of these are shown in the sample codes presented in Table 4

**Table 4**

*Example of codes and the themes for Interview Question 1 and Survey Question 2*

| Code # | Theme | Code |
|---|---|---|
| A81 | Performance | Above school/state/national benchmarks |
| A99 | Ability Capability | Gifted = potential/capability for high achievement that is superior to peers |
| A115 | Performance | Understanding, processing and application of knowledge at outstanding level |
| A117 | Performance | Gifted students display high level thinking strategies/skills |
| B1 | Performance | Gifted students understand/perform without education or experience |
| B2 | Other | The bottom end is a priority so it is hard to progress once identified |

*Note.* The prefixes A and B indicate the codes generated from survey question and interview questions respectively.

Coding was an iterative process. In the example shown in for InQ1 and SQ2, there were initially six themes generated that were later narrowed to four themes that more accurately reflected the meanings across both groups. The “other” category combined categories that had very few codes or those were comments rather than directly answering the question. The code B2 in Table 4, is a good example of a comment related to the subject, but not relevant to the question asked. Comments were then displayed in tables that summarised the key findings for each of the participant groups including examples of participants’ responses.

Where appropriate data from questions were analysed in multiple ways. For example, these questions, InQ1 and SQ2, the responses were also assessed as to whether the participant separated the terms gifted and talented.

The participants’ voices have been presented in the findings using excerpts from their responses. The responses were altered to correct spelling and grammar. Repeat statements were removed to improve readability, provided that the meaning of the response was not changed. They have been termed excerpts, rather than quotes, for this reason. Table 5 gives an example a thematic table with participant voice shown using excerpts.

**Table 5**

*An example of a thematic table with presentation of excerpts to demonstrate participant voice*

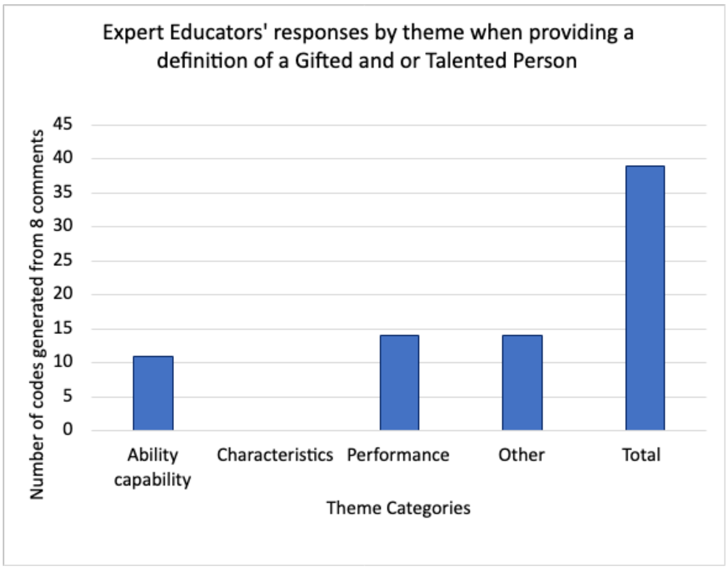
| **Theme and Summary** | **Excerpts** |
|---|---|
| **Ability/Capability**<br>Teachers recognised that gifted is the potential for high achievement that is superior to peers or an ability to understand what others find difficult. This potential was generally recognised as innate. Some teachers acknowledged the difference between being gifted and talented in a similar way to Gagne's definition. Teachers acknowledged that the ability could be seen in one or more areas of learning.<br>Few teachers noted the difference between ability and performance | *Gifted is having a natural ability to succeed (and exceed the expected level for their level of education) in an area, which may be small or large. Talented is being bright but working hard to be above the standard level of their peers. This tends to be wider ranging.*<br>*Above average abilities and able to easily understand ideas that others find difficult*<br>*A student with understanding and interest in an area of learning that far exceeds their peers*<br>*Talent = gifted + work. Talent is developed* |

***Content Analysis***

Following thematic analysis, content analysis was used to provide a quantitative perspective of the qualitative data. Participant groups were examined individually, as a whole group, and compared to each other. Firstly, the number of codes or individual comments in each theme were counted. Comments and codes were equally weighted, including the inferred emphasis sometimes found in words and punctuation within the response. If one participant's comment appeared particularly strong and another's more like a passing remark, they were both counted as one, that is, there was no weighting applied to comments based on position in the statement, apparent interpreted strength or belief, or ability to coherently express themselves. Figure 1 presents an example of one type of visual representation of by participant group.

**Figure 1**

*Expert Educators' comments by theme showing one visualisation used to represent the findings*




The most appropriate graphs were selected for presentation in the findings chapter. They included overall responses but also the comparison between participant groups. When deciding if it was relevant to present overall findings in graphs, consideration was given to the vastly different numbers in the different participant groups. This was to ensure that the graph actually represented the voices of all groups and groups with smaller numbers, were not drowned out by a much larger participant group.