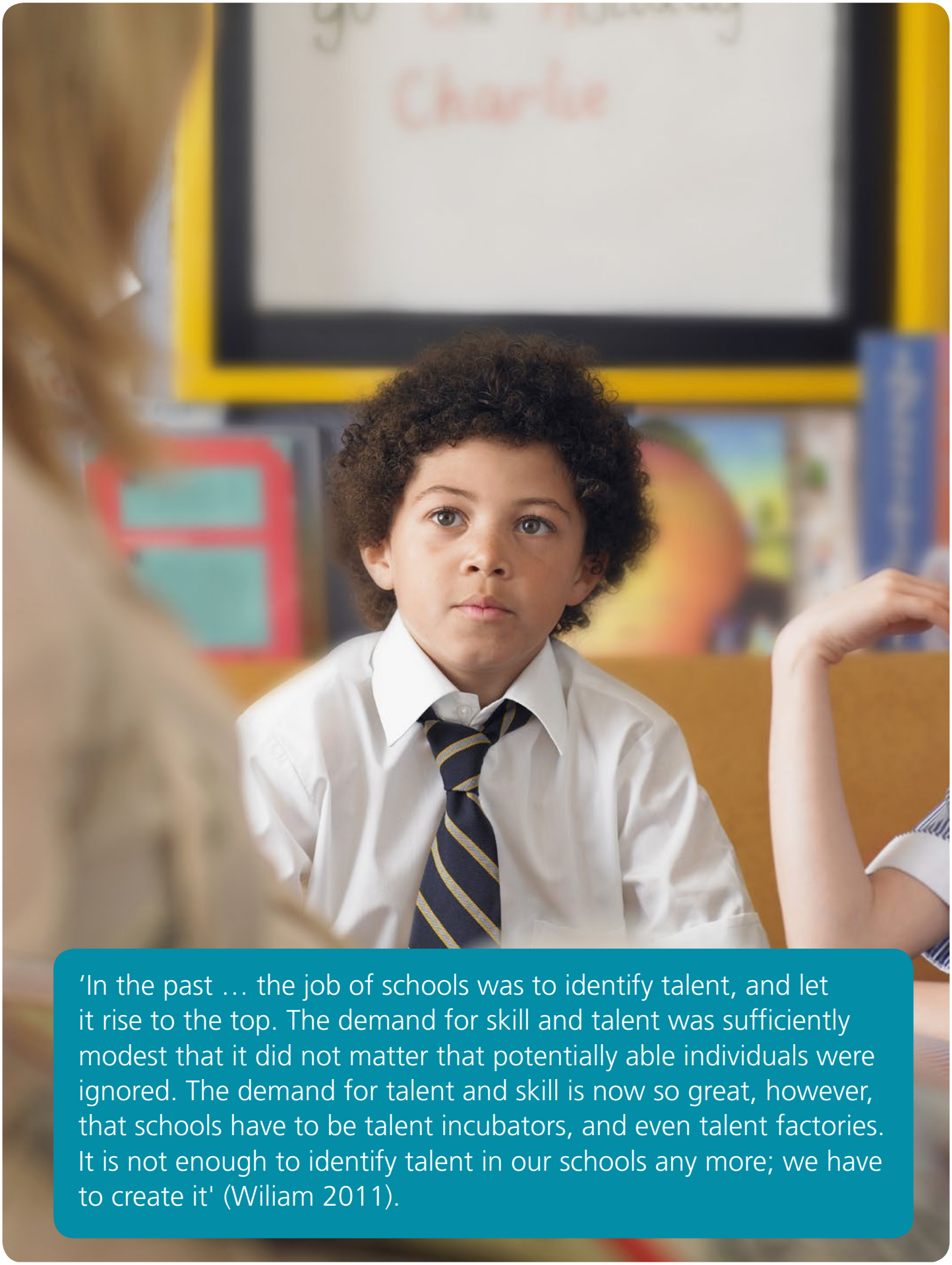
LITERATURE REVIEW

NSW GOVERNMENT

DEPARTMENT OF EDUCATION

Revisiting gifted education

Centre for Education Statistics and Evaluation



'In the past … the job of schools was to identify talent, and let it rise to the top. The demand for skill and talent was sufficiently modest that it did not matter that potentially able individuals were ignored. The demand for talent and skill is now so great, however, that schools have to be talent incubators, and even talent factories. It is not enough to identify talent in our schools any more; we have to create it' (Wiliam 2011).

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1. Introduction

Education should assist 'each child to achieve his or her educational potential' (Education Act NSW 1990). However, recent research and systemic student achievement data shows that many students with high potential are not reaching the full extent of their ability. Contemporary studies have shown that many high ability students from disadvantaged backgrounds miss out on access to advanced learning programs. As a result, there are significant achievement gaps for students from disadvantaged backgrounds when compared with other groups of students. Coupled with recent developments in gifted education and talent development research, this makes it timely to review the evidence base for teaching high potential, high achieving students.

It is now well understood that all learners need a supportive learning environment, and that all need to feel a sense of success, wellbeing and belonging in order to achieve. Like all students, advanced learners benefit from effective teaching strategies that have been shown to promote high levels of achievement growth and that are targeted at their level of readiness for learning (Kyriakides, Christoforou & Charalambous 2013). High expectations, explicit teaching strategies, formative assessment, and well-structured and sequenced learning experiences are just as important for gifted students as they are for all learners.

For students who have advanced learning capacity for their age, however, evidence shows that additional support is needed to ensure that they can reach the full extent of their educational potential (Gallagher 2004; Plucker, Burroughs & Song 2010). Many high potential learners significantly underachieve (Reis & McCoach 2000) and can be bored or under-challenged at school (Gallagher, Harradine & Coleman 2010; Cross & Cross 2017). In particular, gifted students from disadvantaged groups are less likely to achieve as highly as their more advantaged peers, which research suggests is directly attributable to fewer advanced learning opportunities, as well as social inequity (Goss & Sonnemann 2016; Henfield, Woo & Bang 2017).

Our understanding of what works best specifically for gifted students continues to improve, and is backed by a strengthening field of research on effective practice (Robinson, Shore & Enersen 2007; Plucker & Callahan 2014). There is a range of specific strategies and programs that can help schools meet the additional needs of gifted learners, which may otherwise be missed in a typical classroom (Steenbergen-Hu, Makel & Olszewski-Kubilius 2016). Critically, there is a link between the use of these strategies by teachers and improved academic and social outcomes for gifted students (Finn & Wright 2015; Benny & Blonder 2016).

This literature review synthesises the best available research evidence on the education of gifted and high potential students. It provides guidance on how schools and teachers can best ensure that all learners – regardless of their background – have the greatest opportunity to reach their educational potential.

2. Understanding giftedness and talent development

The word gifted is a traditional term that is often used interchangeably with others such as `high ability' or `advanced learners' (Gross 2004). Gifted students are those who have the potential for outstanding achievement that is above the expected level for students their age. These students are typically advanced in their development, and may demonstrate the capacity to think, learn, and work like students who are older (Ruthsatz et al. 2014; Leikin, Leikin & Waisman 2017). For example, a ten-year-old student who is gifted may have the potential to learn harder content, and skills that are expected of students aged twelve or fourteen. Additionally, some students may already be able to demonstrate achievement at or above their grade level at the start of a new school year (Peters et al. 2019). Newer research attributes these differences to brain development in gifted students that is advanced when compared to students the same age (Kalbfleisch 2008; Subotnik, Olszeski-Kubilius & Worrell 2011). Gifted students are found in all parts of society, and across diverse cultures and socioeconomic groups (Ford, Coleman & Davis 2014; Plucker & Peters 2016). The potential for gifted students to make highly significant contributions to our community and economy as a result of their development is well documented (McCann 2005; Park, Lubinski & Benbow 2007).

Estimates of giftedness within a population vary, and can depend on the specific definitions used (McBee & Mabel 2019). Prominent French-Canadian researcher Francoys Gagné (1998) suggests that gifted students comprise the top 10% of all students and can show talent across a range of domains, such as academic, creative, interpersonal, and physical fields of endeavour. Differences in learning needs exist within and across students in the gifted range, with more advanced students requiring greater learning support (Reis & Renzulli 2009). Highly (top <1%) gifted students are by definition less frequent and more significantly advanced when compared to their age peers (Gagné 1998), with greater learning needs as a result (Goldstein et al. 1999; Lubinski 2016). As these students are less common in an average school, it is statistically less likely that all teachers will encounter highly or exceptionally gifted students on a regular basis, and may encounter very few across the span of an entire teaching career (Gross 2004).

While the exact number or percentage of gifted students is still debated in research, it may be more important for schools to identify the learning needs of students with high potential and/or high achievement, no matter the number or percentage in their context. Sometimes referred to as 'bright' or 'advanced' students, many more students may benefit from additional challenge, extension, and enrichment to meet the needs of their high potential, even if they do not directly meet the traditional criteria or definition of giftedness (Peters 2016; Plucker, Hardesty & Burroughs 2013). While all students clearly benefit from learning tasks that provide them with an appropriate level of challenge and support to develop their full potential, more advanced interventions such as acceleration may not be suitable for all (Callahan 2009; Peters et al. 2014). Research shows the importance of using ongoing formative assessment to assess the current level of student mastery and skill development, as this can vary within students who are traditionally identified as gifted based on a point-in-time assessment. Thus, it is important not to think of students as 'gifted or not', but rather to view ability as a continuum where higher levels of ability and achievement will need more significant adjustments, interventions, and advanced learning experiences (Renzulli 1994; Gentry 2009).

The process of a student moving from high potential to high achievement is known as talent development (Gagné 2011). Talent development specifically refers to the process by which, over time, students develop through stages of competency to expertise and outstanding achievement in a field or domain (Olszewski-Kubilius, Subotnik & Worrell 2017). Depending on the field, talent can take many years to develop to a high level, and can go through phases of early and later specialisation. Research over the last decade has shifted from referring to 'gifted and talented students' to 'gifted education and talent development'. In Gagne's Differentiated Model of Giftedness and Talent (2009), giftedness is defined as the potential or raw materials, and talent is high achievement or the 'finished product'.

Competing theories exist about how gifted students develop their higher potential into high levels of achievement. It is likely that a combination of factors is involved (Lubinski 2016), such as deliberate practice (Ericsson et al. 1993), mindset or beliefs (Duckworth et al. 2007; Siegle, McCoach & Roberts 2017), and opportunities to learn (Ford & Antoinette 1997; Plucker & Peters 2016). Considerable research has been conducted across many fields to find the best ways to develop talent and high achievement (Gulbin et al. 2013; Jung & Evans 2016). Longitudinal research into the developmental trajectories of gifted children shows that many go on to achieve greatly throughout their adult lives, but that specific support and learning experiences were required to help this happen (Bloom 1985; Shurkin 1992).

Gagné's Differentiated Model of Giftedness and Talent (2009) provides a framework for understanding the internal and external drivers of talent development. In Gagné's model, the raw materials of potential and ability need development through explicit learning experiences, in order to reach an outstanding level of talent. A mix of formal and informal learning, as well as the practice of domain-related skills, form part of this developmental process. Gagné also identifies the role of internal and external forces on developing talent. Environmental catalysts, such as teachers, schools, and learning programs, can help to foster the development of talent. Likewise, internal forces, such as motivation, effort, and learning skills, also play important parts in the development of expertise. Without learning processes, support, and effort, Gagné argues that gifted students will not develop to become outstanding achievers by themselves.

Learning characteristics

Teachers have always known that some students are able to learn more challenging concepts and learn faster than other students the same age. Recent neuroscientific research can help us understand why this is so, and thus better understand the learning characteristics of gifted students (Leikin et al. 2017). Advances in brain imaging have helped to improve our understanding of how high potential and gifted learners differ in their cognitive development and learning. This in turn has improved our understanding of intelligence, ability and talent development (Willis, Dumont & Kaufman 2011; Subotnik, Olszeski-Kubilius & Worrell 2011).

Modern factor-analytic models of intelligence, such as the Cattell-Horn-Carroll model, incorporate fluid and crystallised intelligence as a general concept across broad and narrow abilities. These abilities include specific cognitive skills, such as processing speed, fluid reasoning, and quantitative skills, as well as physical, musical and creative abilities. Different levels of these broad and narrow skills contribute to a person's overall general ability and intelligence, and help to account for why two students with similar general ability may have different aptitudes for different subject areas.

Some key findings from research include:

- Gifted students' brains can have a similar level of operational function to older students (O'Boyle 2008; Geake 2009b; Leikin et al. 2017).
- Advanced neural development in the brains of students is associated with measures of intelligence and general ability (Andreason et al. 1993; Wilke et al. 2003; Shaw et al. 2006; Penke et al. 2012).
- Advanced brain development can include differences such as denser grey matter, greater surface area and neural activation, faster neural efficiency, and greater plasticity (Andreason et al. 1993; O'Boyle et al. 2005; Narr et al. 2007; Karama et al. 2011; Hoppe et al. 2011; Leikin, Leikin & Waisman 2017; Navas-Sanchez et al. 2017).
- Gifted students can often apply more cognitive resources to thinking and learning processes (Alexander, O'Boyle & Benbow 1996; O'Boyle et al. 2005; Geake 2009b; Hoppe et al. 2011).
- Gifted individuals can typically apply their advanced thinking and learning skills across a range of areas (Carroll 2003; Willis, Dumont & Kaufman 2011; Leikin et al. 2017).

These differences help to justify the need for advanced content, greater speed, and more complexity in learning tasks for gifted students when compared to students the same age. These differences are also associated with a number of learning characteristics typical of gifted students:

- The potential for greater analytical depth (Carson, Peterson & Higgins 2003; Geake & Dodson 2005; Gross 2009; Hoh 2014)
- The ability to process information, thought and learning in a faster or more efficient manner, requiring fewer repetitions for mastery (Haier et al. 1988; Haier & Benbow 1995; Geake 2006; O'Boyle 2008; Hoh 2014; Leikin, Leikin & Waisman 2017)
- Greater capability in a range of cognitive skills, such as fluid reasoning, creative thinking, memory and abstract reasoning (O'Boyle et al. 2005; Geake & Hansen 2005; Geake & Dodson 2005; Geake 2008, 2009b; Prescott et al. 2010; Desco et al. 2011; Hoppe et al. 2011; Navas-Sanchez et al. 2016)
- The ability to make inter-subject connections with relative ease and seek 'top-down' understanding when learning (Clark 1997, Kanevsky & Geake 2004; Geake & Dodson 2005).

Although gifted students may have an advanced capacity for learning and thinking skills that can be applied across a broad range of subjects, areas of personal interest and motivation are more likely to see the greatest growth and development (McCoach et al. 2017). These differences in learning characteristics can manifest across a range of domains, including academic, creative and performing arts, leadership, and sporting endeavours (Gagne 2009). However, further research is needed to help us understand the full applications of neuroscience to the classroom (Thomas, Ansari & Knowland 2019).

Recent research into cognitive load theory (Kirshner, Sweller & Clark 2006) has also improved our understanding of how gifted students learn. As working memory plays a critical part in learning new information, the greater processing capacity of students with higher intelligence (Engle et al. 1999; Vandervert 2009) can help them progress faster and with greater complexity (de Jong 2010; Baddeley 2010). Cognitive load-oriented teaching strategies, such as explicit instruction and worked examples, are just as necessary for gifted students to learn new skills and content as for all students (Carroll 1994). However, high ability students may be able to move through heavily-structured learning more quickly and can then go broader and deeper into concepts and topics. A learning effect known as the 'expertise reversal effect' shows us that over-scaffolding can be counter productive once students have gained expertise (Yeung, Jin & Sweller 1998; Leslie et al. 2012). Once the basics have been mastered, research suggests that it is better to transition to more independent problem-solving tasks in order to further learning (Pachman, Sweller & Kalyuga 2013).

Social and emotional characteristics

Differences in academic potential or achievement between gifted learners and their age peers, and mismatches between students and their learning environment, can contribute to gifted learners experiencing social and emotional challenges. This can have an impact on learning and achievement via boredom and disengagement, as well as cause personal distress and difficulty for some gifted students (Gallagher, Harradine & Coleman 1997; Eliyahu, Linnenbrink-Garcia & Putallaz 2017).

There is debate over the incidence and intensity of social and emotional distress experienced by gifted students in their development (Neihart 1999; Wiley & Hébert 2014). Gallucci, Middleton & Kline (1999) present a view that gifted students are at least as well-adjusted as their peers. This positive level of adjustment is particularly the case when gifted students have their personal and learning needs met and they are supported to flourish and achieve highly (Subotnik, Olszewski-Kubilius & Worrell 2011; Lubinski 2016). These findings differ from research conducted late last century that used samples of students who sought psychological support for their individual problems (Amini 2005; Prekel et al. 2015).

However, gifted students may face specific social and emotional challenges if their learning needs are not met. Boredom is a critical issue for gifted students as it has a strong negative effect on academic achievement (Pekrun et al. 2014), while engagement is correlated with mental wellbeing and positive personal adjustment in gifted students (Hoekman 2009).

A lack of suitable learning challenge can contribute strongly to feelings of tedium and disengagement, causing students to 'switch off' and potentially find other distractions (Sisk 1988; Gallagher, Harradine & Coleman 1997). Learning tasks or assignments that are too easy may also mean that students do not get the opportunity to develop the learning skills or academic resilience required to manage more complex and challenging tasks (Umbreit, Lane & Dejud 2004). Minimal appropriate challenge can contribute to a mindset where, based on their learning experiences to date, gifted learners feel that success should come easily (Dai, Moon & Feldhusen 2011; Dweck 2012). This may contribute to evidence that suggests there is a higher incidence of perfectionist learning behaviours amongst gifted individuals (Speirs-Neumeister 2016). While some perfectionist behaviours can be helpful for learning and achievement, others can be a concern if they begin to interfere with learning and wellbeing in a maladaptive way (Corson et al. 2018).

High-ability learners can also experience asynchronous development, where intellectual or talent capabilities develop faster and in a more advanced way than their physical, social, or emotional abilities (Hollingworth 1931; Roeper 1982). This may cause frustration when students can think of advanced ideas or concepts, such as a vision for a story or an artwork, but their skills are not yet sufficiently developed to achieve their vision (Grant & Piechowski 1999). The challenges of asynchronous development can be more profound with students of exceptional ability, for whom the gap between ideas and skills may be even greater (Gross 2004).

Gifted student achievement and underachievement

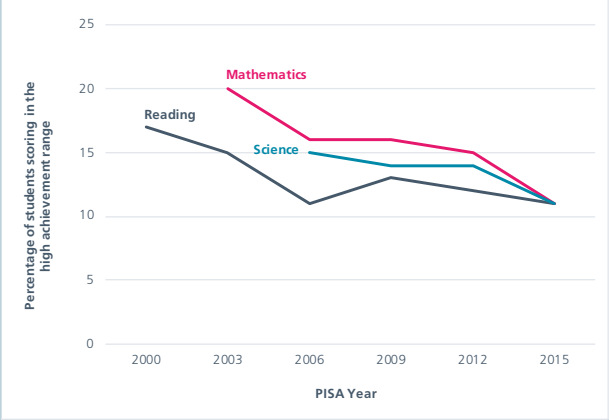
Underachievement is defined in the literature as a significant discrepancy between potential and performance (Ford 1998), and is one of the most significant and common problems faced by gifted students (Reis & McCoach 2000). Typical estimates of the percentage of significantly underachieving gifted students range from 10% (Wills & Munro 2001) to 40% (Seeley 1993), with some individual studies showing as high as 57% of gifted students not performing to their potential (Peterson & Colangelo 1996). Levels of underachievement can be much more pronounced amongst students from disadvantaged groups in society (Ford & Antoinette 1997). While underachievement crosses all social and cultural boundaries, the reasons for underachievement can vary greatly: the contributing causes of underachievement need to be identified in each context so that they can be addressed effectively (Cross et al. 2018). Further research is needed to understand the influence of specific individual and school factors that lead to underachievement (White, Graham & Blass, 2018).

As a result of underachievement, many gifted students do not subsequently contribute the full extent of their potential to their communities and the economy more broadly (Borland 1989; McCann 2005). Advanced achievement on major international tests has been shown to correlate with greater quantities of science innovation, economic output, Nobel prizes, rates of patent registration, and volume of high-technology product development exports, when adjusted for population size (Rindermann 2007; Rindermann & Thompson 2011). There is a clear opportunity cost for innovation in a future high-technology economy should current rates of high-level achievement continue to decline (Gallagher 2002).

Concerns exist over stagnating or falling rates of high achievement among Australian students. Recent national and international assessments have shown that the proportion of students in Australia achieving highly has either plateaued or declined over the past two decades on some measures. Figure 1 shows Australia's declining proportion of students achieving in the highest range on the Program for International Student Assessment (PISA) from 2000 to 2015. In a recent review of gifted education offerings in Australia, Walsh and Jolly (2018) stated 'that despite pockets of excellence, gifted education in Australia remains fragmented and inconsistent, reliant more on the goodwill of principals, and the efforts of a few dedicated teachers and parent advocates, rather than on a well-designed systematic approach' (p. 87).

Students whose underachievement may be attributed to inadequate provision of opportunity at school have been referred to as 'involuntary underachievers' (Siegle & McCoach 2002). Lack of challenge at school can be a major factor in underachievement, and can contribute to boredom and disengagement (Sisk 1988). Unchallenged gifted students may also become 'selective consumers', whereby students decide to disengage from school if they feel that their learning needs are not met, and instead seek stimulation and achievement elsewhere (Figg et al. 2012). In studies of exemplary teachers who supported high achieving students, it was found that expert content knowledge, feedback, supportive learning environments, and teacher enthusiasm were keys to gifted student motivation, learning and engagement (Ayres, Sawyer & Dinham 2004; Gentry et al. 2011).

Figure 1 – Australian high achievement in PISA over time, 2000-2015



Source: ACER PISA reports, 2000-2015.

3. Gifted students from diverse backgrounds

Gifted students come from all social and cultural backgrounds. Research shows, however, that students from minority populations tend to be proportionately under-represented in many international gifted education programs (Ford 1998; Card & Giuliano 2016a). Gifted students from disadvantaged groups are more likely to underachieve when compared to similar-ability peers (Olszewski-Kubilius et al. 2004). This difference in high-level achievement outcomes, or 'excellence gap' (Burroughs & Plucker 2014; Hardesty, McWilliams & Plucker 2014), often starts early and can widen as a student progresses through school (Morgan et al. 2016; Steenbergen-Hu & Olszewski-Kubilius 2017).

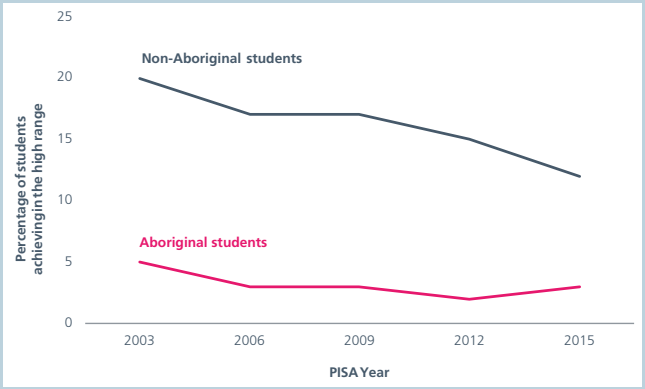
Differences in outcomes for gifted students from diverse backgrounds can be due to many causes, including under- or non-identification of ability, low expectations, socioeconomic disadvantage, or barriers to accessing programs (Dixson, Robertson & Worrell 2017; Kettler & Hurst 2017). Research shows that effective use of selected strategies can help gifted students from diverse backgrounds 'close the gap' through greater representation and more equitable outcomes (Tomlinson & Jarvis 2014; Card & Giuliano 2016b; Ecker-Lyster & Niileksela 2017). Earlier intervention by teachers and school programs can help to ensure that excellence gaps in achievement do not open up in the first place.

Gifted students with an Aboriginal background

Understandings of giftedness can vary between and within cultures (Callahan & McIntire 1994; Thraves & Bannister-Tyrell 2017). Aboriginal and Torres Strait Islander peoples can have a different and more complex cultural conception of giftedness. Interpersonal and spatial skills, independence and self-reliance, and cultural knowledge can be highly valued in this context (Vasilevska 2005; Bevan-Brown 2011). The cooperative nature of Aboriginal societies may mean that some students do not wish to 'show off' their intelligence or stand out above others (Vialle & Gibson 2007). It is important for teachers and students to use this cultural context as a point of reference in learning (Garvis 2006).

Research shows that gifted Aboriginal students experience achievement gaps in the high achievement range. For example, Figure 2 shows that a lower percentage of Aboriginal students achieve in the highest achievement range for mathematics in the international PISA assessments. Chaffey and colleagues (2003, 2011) suggest that the main reason behind Aboriginal underachievement is a lack of identification as these students are often 'invisible' underachievers, and may be mis-identified as average-ability by teachers (Merrotsy 2013). The use of more dynamic assessment methods (Chaffey, Bailey & Vine 2015) or non-verbal tests of ability, such as the visual-based Raven's Progressive Matrices (Pearson 2012) may support the assessment of Aboriginal students and help overcome language or cultural differences. Greater professional development on the identification and needs of high-ability Aboriginal students can also improve the practices of teachers in this regard (Chessman 2006).

Figure 2 – PISA Maths high achievement range for Aboriginal and non-Aboriginal students



Source: ACER PISA reports, 2000-2015.

Gifted students from diverse cultural and linguistic backgrounds

The experiences of gifted students from non-English speaking backgrounds are likely to differ significantly, depending not only on their level of English skills, but also on their particular cultural background, beliefs and socioeconomic status (Sriprakash, Proctor & Hu 2016; Ho 2017). Extensive research has shown that students from some cultural backgrounds are often under-represented in gifted education programs (Campbell et al. 2007; Ford et al. 2011) and that some cultural groups may experience greater levels of economic disadvantage (Goings & Ford 2018). The use of culturally-sensitive criteria when selecting English language learning students for gifted programs can assist with the issue of representation, as can specific English language support when in school (Lohman, Korb & Lakin 2008; Matthews & Farmer 2017).

Gifted students from non-English speaking backgrounds may experience specific challenges when learning English as an additional language or dialect at school (Blackburn, Cornish & Smith 2016). Students may experience frustration at feeling 'slow' when required to learn in a newly acquired language whilst adapting to a new culture and school system (Rance-Roney 2004). Language barriers may also impede verbal-based identification measures and teacher identification, which can contribute to problems of under-representation in gifted programs (Gonzalez 2002; Elhoweris et al. 2005). Care needs to be taken with the use of assessments for students who are learning English as their second language, especially those from disadvantaged backgrounds (Lohman, Korb & Lakin 2008).

Gifted students with disability

In an extensive review of the empirical evidence concerning gifted learners with disability, Foley-Nicpon and colleagues conclude 'that the research clearly demonstrates ... that gifted students can have a coexisting disability' (2011, p. 13), which may be a barrier to these students reaching their full potential. Gifted students with disability, also referred to in the field as twice-exceptional (or 2e) students, are defined as 'students who demonstrate the potential for high achievement or creative productivity ... [and] who manifest one or more disabilities as defined by federal or state eligibility criteria' (Reis, Baum & Burke 2014, p. 222). Nonetheless, conflicting attitudes or myth-based beliefs can be harmful to these students and their families (Vaughn 1989; Mayes & Moore 2016).

Recent research by Maddocks (2018) shows the need for gifted students with disability to be assessed and identified by using multiple methods and alternate assessments that can help to demonstrate the gap between their academic potential and their actual achievement. Gifted students with disability often underachieve due to lack of identification, a lack of appropriate educational programming and support, and lack of strategies in schools to meet their social and emotional needs (Wormald & Vialle 2011; Foley-Nicpon et al. 2011). Longitudinal studies of the school journey of gifted students with disability show clearly that support for both giftedness and disability is required to help these students achieve their best (Cain, Kaboski & Gilger 2019). Support for high-ability learners with disabilities can often focus only on ameliorating the disability, whereas strength-based and talent-focused approaches can be combined with adjustments and support for disability to foster achievement and talent development (Baum, Schader & Hebert 2014; Foley-Nicpon, Assouline & Fosenburg 2015).

Gifted students from a disadvantaged socioeconomic (SES) background

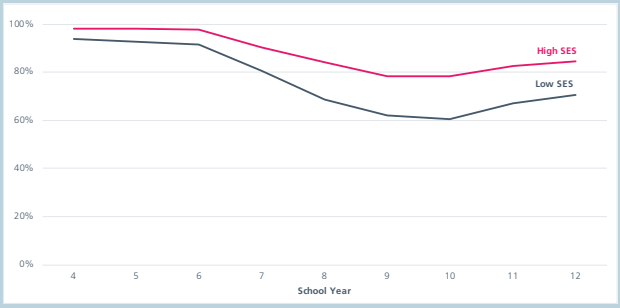
The under-representation and underachievement of socioeconomically disadvantaged students in gifted programs is a consistent problem internationally (Ford 1998; Olszewski-Kubilius & Thomson 2010). In general, research shows that high-ability students from low-SES backgrounds are more likely not to achieve their potential and are at greater risk of being left behind socially and economically (Dai & Worrell 2016; Plucker & Peters 2016). This includes a depressed achievement trajectory through school and a lower chance of graduation from school or university (Wyner, Bidgeland & Dilulio 2009; Hoxby & Avery 2013). Research shows that students in low-SES areas are less likely to have access to gifted education programs at their schools, such as extension classes or enrichment programs (Dai & Worrell 2016).

Problems with assessment and identification practices may lead to fewer low-SES students being identified and selected for gifted student programs (Hodges et al. 2018), meaning they miss out on the programs that may benefit them the most (Loveless 2014). A study by Hamilton et al. (2018) showed that bright but disadvantaged students in lower SES areas were less likely to be identified or nominated than similar students in more average schools.

Much of the excellence gap in achievement can be attributed to fewer opportunities to learn (Hardesty, McWilliams & Plucker 2014). Over time, this results in significant differences in rates of advanced achievement, where opportunity gaps lead directly to achievement gaps (Plucker & Peters 2014). The additional costs associated with advanced extracurricular activities outside of school can be a significant barrier for students from families with limited capacity to pay, and this may make families more reliant on public schools to provide necessary access to appropriate learning and talent development (Thompson & King 2015; Wai & Rindermann 2017). In some cases, lower expectations that teachers and schools may hold of low-SES students may also affect the level of content and curriculum taught in these schools (Attewell & Thurston 2008; Kelly & Carbonaro 2012). Figures 3 and 4 illustrate the different levels of expectation for success reported by low- and high-SES students in a recent NSW analysis.

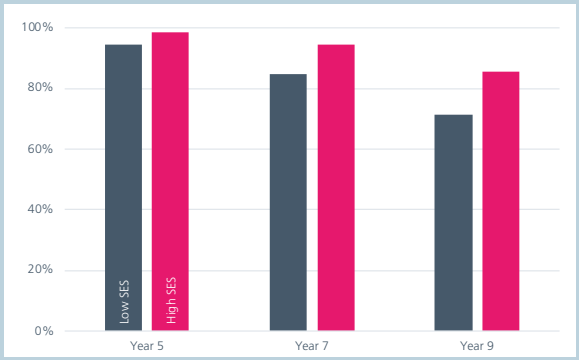
Specific programs that seek to identify and address the needs of underachieving and under-represented minority groups have been shown to produce positive outcomes that can help to close the achievement gap (Plucker & Peters 2016; Olszewski-Kubilius et al. 2017). Research by Turner and Juntune (2018) and Hebert (2018) shows the importance of high expectations plus school and family support to help gifted disadvantaged students achieve highly through school and beyond, including the use of mentoring programs that teach academic skills. Newer research on better, more flexible practices for assessment and grouping suggests that they may have significant benefits for gifted low-SES students (Loveless 2014; Card & Giuliano 2016a, 2016b).

Figure 3 – Proportion of students reporting high expectations for success, by SES quartile, NSW government students, 2017



Source: CESE 2017, Tell Them From Me Survey data

Figure 4 – Proportion of high-performing students reporting high expectations for success, by SES quartile, NSW government students, 2017



Source: CESE 2017, Tell Them From Me Survey data

Some students from disadvantaged backgrounds may miss out on regular enrichment activities such as excursions. An experimental study by Greene and colleagues (2018) examined the learning and social outcomes of rural students who saw a live theatre performance of the play they studied in class. Seeing the play as an enrichment activity had a significant and positive effect on learning and social outcomes when compared to the control group who did not attend the excursion. While an excursion to the theatre or a similar enrichment activity may be a relatively easy trip for some students and schools, factors such as distance, including associated logistics and costs, can make access to these learning activities much more challenging for gifted students from disadvantaged backgrounds.

Gifted students in rural and remote areas

Gifted students who do not live in metropolitan centres may require a different suite of options due to their isolated geographic location and smaller school size (Kettler, Puryear & Mullet 2016; Jung & Worrell 2017). These students may live a significant distance from other like-minded or similar-ability peers, which can contribute to feelings of social isolation and lack of opportunities for appropriate educational challenge (Woodward & Kalyan-Masih 1990). As these students and families may lack physical access to resources, educational support, jobs and appropriate mentors, some families may feel a need to move away from their community to seek a wider range of options (Howley et al. 1997; Lawrence 2009). It may also be necessary to address socioeconomic disadvantage factors that can contribute to achievement differences for gifted students in regional areas.

These barriers help explain differing patterns of enrolment and high achievement in rural areas (Hernandez-Torrano 2018). Due to the smaller numbers of students in some regional or remote schools, programs that rely on forms of whole class ability-grouping may not be practical (Gagnon & Mattingly 2016; VanTassel-Baska & Hubbard 2016). Instead, academic acceleration or curriculum differentiation may be better options for meeting the needs of smaller numbers of students (Howley et al. 2009; Callahan & Wu 2017). The use of online learning and virtual classrooms is one means of providing more advanced or accelerated learning, as well as connecting gifted learners with like-minded peers and mentors (Swan et al. 2015; Stoeger, Hopp & Ziegler 2017). This concept has been developed in New South Wales via Aurora College, an online-based academically selective school that uses virtual classroom technology to deliver extension lessons to gifted rural students, as well as professional learning to teachers in country schools. In a study by Potts (2019) of gifted rural US students attending virtual classrooms, while students saw little difference between physical and virtual classrooms and highly valued the access to advanced programs, they missed the 'in-person' social interactions.

Gifted students in early childhood

Like older gifted students, preschool-aged gifted children are characterised by developmental progression that is ahead of expected age norms (Gross 1999; Walsh et al. 2012). Particular differences in thinking, cognition, humour, and play may be evident from an early age (Roedell 1989; Harrison 2004). It is clear from the research evidence that it is possible to identify gifted students before entry to primary school (Terrassier 2011), but the process is challenging and complex (Robinson et al. 1997; Koshy & Robinson 2006).

Gifted and high-ability young children have a need to access developmentally appropriate learning that may be at a level typical of early primary school (Robinson et al. 2002; Maker & Schiever 2005). Unfortunately, research shows that high potential preschool students are often highly underserved and unrecognised (Hertzog 2014), with little extension or enrichment provided in many settings (Gross 2004; Kettler, Oveross & Salman 2017). Learning experiences that are challenging for gifted pre school children may not exist in some early childhood settings that are based on play alone, or in settings where the educational program quality is poor (Chamberlin et al. 2007; Coates et al. 2008).

Research supports the selected use of early entry to primary school for appropriate students (Gagne and Gagnier 2004) with a moderate positive effect size for academic and social outcomes (Rogers 2015). Extensive longitudinal studies of gifted children who enter school early show positive academic and social outcomes in the long term (Assouline et al. 2015). Like acceleration more broadly, however, early entry to school is not used frequently in practice, with social adjustment often cited as a reason for not accelerating a student (Rankin & Vialle 1996; Lupkowsi-Shoplik, Assouline & Colangelo 2015). Additional research is needed to assess the relative efficacy of other options for gifted children in early childhood settings (Kitano 1986; Walsh et al. 2012).

4. Effective strategies for gifted learners

Assessment of learning needs

Recent research has strengthened the case for why teachers need to use a range of assessment information to help target their teaching (Timperley 2009). Traditionally, research and policy have sought to identify or 'find' gifted students in order to provide appropriate learning experiences or place students in gifted education programs. There is now greater focus on assessing student learning needs and current levels of mastery so that learning can be made appropriately challenging (Südkamp, Kaiser & Möeller 2012; Peters 2016). Identifying a gifted student enables assessment of their learning potential. (Feldhusen, Asher & Hoover 1984; Richert 2003). However, for schools, assessment and identification can often be the most controversial aspect of gifted education (Moon 2012).

A broad range of assessment tools and measures can be used to help assess the level of student achievement and learning potential. These include ability tests, achievement tests, above-level assessments, rating scales, performance-based assessments, student portfolios, and dynamic assessments (Cao, Jung & Lee 2017). Importantly, the assessment processes used should align with the purpose of the learning programs that are provided (Hamilton et al. 2019). An initial assessment of student ability or potential by a teacher, parent, or school team can help to identify the learning needs of gifted students. Additionally, ongoing formative assessment can help individual teachers target their learning and identify students who need additional extension or challenge, especially if students can already demonstrate mastery at or above grade level (Peters et al. 2017). Concerns of teacher biases based on pre-conceived ideas of intelligence or culture have been raised in research (Siegle & Powell 2004; Bianco et al. 2011). Research does show that teachers can be significantly more effective and accurate in assessing gifted students – particularly those from disadvantaged groups – if they have been trained in gifted education (Gear 1978; Rowley 2012).

The representation of students from minority backgrounds is an important issue to consider in assessment (Hardway & Marek-Schroer 1992). Flawed identification and assessment practices are believed to contribute significantly to the under-representation and underachievement of students from minority and low-socioeconomic backgrounds, as well as gifted students with learning difficulties (McCoach et al. 2001). Some traditional assessment methods, especially those that rely on classroom achievement results alone, may mean that students from low socioeconomic backgrounds are less likely to be identified and selected for programs (Loveless 2014; Hamilton et al. 2018). The use of multiple methods, sometimes including non-traditional assessments of ability or performance, or additional consideration for disadvantage, is shown to help identify more students from disadvantaged backgrounds (Hodges et al. 2018). Comparing student achievement to that of other students with similar educational opportunities, characteristics, or backgrounds – also known as using 'local norms' – may help to identify more students from under-represented groups (Peters et al. 2019). Student participation in suitable enrichment and extension activities can be a way of `talent spotting' (Robinson et al. 2018).

Recent research has shown that universal screening measures, where all students participate in a screening process or test rather than only those nominated by adults, are significantly more likely to identify more students from minority backgrounds as gifted (Card & Giuliano 2016a; McBee, Peters & Miller 2016). This is because screening takes away problems with a two-stage process that rely on nominations by teachers or applications by families that may not capture all bright students for assessment in the first place (Grissom & Redding 2016; Goings & Ford 2018). Research in New South Wales (2018) showed significant differences in the characteristics of students who nominated or applied for academically selective programs, which was a major factor in accounting for differences in student representation.

Culturally sensitive instruments such as the Coolabah Dynamic Assessment (Chaffey & Bailey 2009) may assist with some student groups. While non-verbal measures, such as Raven's Progressive Matrices (2000) have been traditionally recommended, care needs to be taken with how these scores are used, especially with English language learners (Lohman, Korb & Lakin 2008). In addition, identification measures that target spatial and rotational ability, rather than verbal or mathematical capacities, or dynamic assessment models (Lidza & Macrineb 2001), may help to identify more lower-SES students (Wai & Worrell 2016).

Assessing more students for gifted education programs can help to increase the representation of students from disadvantaged educational backgrounds. In 2005, Broward County Public Schools in Florida, USA, replaced an `opt-in' application process that required teacher or parent nomination, with universal screening – a program where all students sat an assessment used to offer places in school gifted education classes. This change led to the identification of significantly more gifted students from diverse and disadvantaged backgrounds. Compared to the previous nomination-based system, the proportion of African-American students increased from 12% to 17%, Hispanic students increased from 16% to 27%, and economically-disadvantaged students increased from 20% to 35%. In total, this change led to a 180% increase in the numbers of disadvantaged students identified. While these proportions still fell short of the representations of students across the entire school district, this is an example of how school practices can help create more equitable outcomes for disadvantaged students (Card & Guiliano 2016a).

What does the evidence base recommend for assessing and identifying learning needs?

Assessing the learning needs of gifted students remains a complex and challenging area. The following list includes some general recommendations from research.

- Current best-practice in school-based identification and assessment is to use multiple measures – that is, a mix of qualitative, quantitative, objective, and observational methods – that have strong validity and reliability characteristics (Moon 2012; Acar et al. 2016) and to assess attributes and learning directly relevant to the gifted programs used (Hamilton et al., 2019).
- Relying on a single measure or method may miss students and create an imbalance in representation of students from disadvantaged backgrounds (Baker 2003; McBee, Peters & Waterman 2014). Research suggests that care needs to be taken with how the results from different assessments are combined, as expecting consistent high performance across all measures may eliminate more disadvantaged students (McBee, Peters & Waterman 2014).
- While ability tests can be useful to gauge a student's learning potential, achievement assessments can also help identify what students have already learned and where their mastery is at compared to the syllabus (Reis, Burns & Renzulli 1992). Combined with ongoing formative assessment, these assessments can inform teaching and learning programs to ensure that students are offered learning pitched at the right level and pace that challenges them.
- Different assessment and selection measures and criteria may need to be used to appropriately identify and assess students from disadvantaged backgrounds (Carman, Walther & Bartsch 2018; Olszewski-Kubilius & Corwith 2018) and students with disability (Maddocks 2018).
- Off-level assessments (tests or similar that are designed for older students) can provide a better way of assessing advanced abilities than assessments designed specifically for a student's age level (Subotnik, Olszeski-Kubilius & Worrell 2011; Borland 2014).
- Psychometric assessments and tests with a norm-referenced sample are important to help understand how advanced a student's potential is compared to their age peers (Südkamp, Kaiser & Möeller 2012; Wellisch 2017).
- Using 'local norms' – relating student ability or achievement measures to students from similar levels of advantage or with similar characteristics – can help to identify more gifted students from under-represented groups (Peters et al. 2019).
- The data from assessments should be reviewed and analysed regularly to track changing patterns of student representation, as well as used to inform teaching and learning (Black & Wiliam 2009; Sternberg 2018).
- It is important not to consider identification of giftedness as a binary issue with 'winners and losers': students with high potential that do not meet a strict criteria cut-off may still require additional extension in their regular learning (Callahan 2009; Peters 2016).

Ideally, as for all assessment processes, identifying a student's learning progress and level of mastery can then be used to inform further learning and curriculum differentiation. Formative assessment can have a strong positive effect on student learning outcomes (Black & Wiliam 1998, 2009; Bennett 2011). Teachers can use formative assessment as the starting point for planning challenging learning that will extend all learners, and will ensure that high potential learners get learning experiences that are challenging for their level, not just the average level of their peers (Smith 2015).

Acceleration and advanced progression

Acceleration allows students to progress to the next grade or stage of school earlier than is usual for a student of that age (Pressey 1949). This creates a closer match between student ability and the curriculum, potentially reducing boredom and increasing engagement for gifted students (Tannenbaum 1983). Acceleration also recognises the capacity of gifted students to potentially master new content and skills faster than their age peers (Geake 2009b). A student can be accelerated by advancing or 'skipping' an entire year across all subjects, a single subject, or by starting school or university at an age earlier than usual (Southern 2003; Assouline et al. 2015). For some exceptionally gifted students, acceleration by more than one year may be necessary and beneficial (Gross 1992; Jung & Gross 2015).

Acceleration is considered one of the most effective educational interventions available to gifted students (Rogers 2007, 2015). Repeated meta-analyses and systematic reviews of the research evidence on acceleration across a vast diversity of educational settings and contexts have shown that all forms of acceleration can offer significant learning benefits for gifted students (Steenbergen-Hu & Moon 2011; Warne 2017). The typical effect size of acceleration is between +0.42 and +1.62 standard deviations of learning growth, placing acceleration among the most effective educational practices (Steenbergen-Hu, Makel & Olszewski-Kubilius 2016). This research also confirms the lack of empirical evidence that acceleration results in negative academic or social outcomes for students. These findings have been consistent across students from diverse backgrounds (Lee et al. 2010). Early entry to school and radical acceleration are also supported by the literature (Gross 2006; Rogers 2015).

Acceleration can be more effective when it is used earlier in a student's schooling (Gross 1992, 2006; Gallagher et al. 2010; Rogers 2015). For students in the later years of school, access to post-school education can be vital to ensure continuing high levels of challenge. This can occur through models such as advanced placement or dual enrolment (completing university subjects as part of senior secondary years), or even early university entrance (Howley et al. 2013; Jung, Young & Gross 2015).

Research shows that many teachers and school leaders hold negative views on acceleration, with particular concern over social and emotional issues (Rambo & McCoach 2012; Dare, Smith & Nowicki 2016). These attitudes are much stronger amongst teachers who have not completed specialist training in gifted education (Missett et al. 2014). However, extensive research shows that these concerns are generally unfounded (Neihart 2007). Like all educational interventions, the quality of implementation of acceleration is the key to its success for gifted students.

Curriculum differentiation for gifted students

Curriculum differentiation occurs where teachers adapt the syllabus to meet the specific learning needs of a group of students. This may involve changes in the curriculum objectives, teaching methods, assessment methods, and/or resources and learning activities. Differentiation is typically called for when students with a diverse range of knowledge, skills and abilities are grouped together in the same classroom, but can also happen across different classrooms and programs (Firmender, Reis & Sweeny 2013). For gifted students, curriculum differentiation strategies aim to meet their advanced learning needs by increasing the level of challenge, complexity, depth and learning pace (Kaplan 2009; Warne 2017). Forms of differentiation such as curriculum acceleration, extension and enrichment, and formative assessment-informed learning experiences have strong potential for classroom use. Positive academic outcomes have been shown when learning experiences have been matched to the assessed advanced learning needs of gifted students (Gavin et al. 2007; Fischer, Frey & Hattie 2016).

Formative assessment and student achievement data are both important sources to inform effective differentiation (Sarason 1996). Teachers who use this information are able to strengthen differentiation practice to ensure that learning is made challenging and developmentally appropriate for gifted students, not simply different (Brimijoin, Marquisee & Tomlinson 2003). Assessment should be used to inform differentiation as part of a dynamic process to ensure that learning extends a student's level of understanding and skill through scaffolding and extension (Smith 2015). Use of formative assessment including strategies such as 'pre-testing' can help identify a student's the current state of mastery and learning expertise. This can help teachers use differentiation strategies such as curriculum compacting, where less time is spent on revising already-mastered content and more time is allocated to advanced learning tasks such as extension or enrichment activities. Research by Peters and colleagues (2017) in the US suggests that large numbers of students may start the school year already one year or more ahead of grade level, making them candidates for curriculum compacting and faster movement through learning programs. Using these strategies will help students avoid the boredom caused by excessive repetition or slow progression through a teaching program (Reis, Burns & Renzulli 1992).

Research suggests that curriculum differentiation can be challenging for teachers to implement successfully, especially without sufficient training and support (Brighton et al. 2005). The complexity of differentiation in highly diverse classrooms may require that teachers complete several tasks simultaneously, such as managing multiple groups working at different levels on different learning tasks (van Geel et al. 2019). Some studies of curriculum differentiation for gifted students have found limited effects because of the teacher skill and professional learning required (Ysseldyke & Tardrew 2007). A study by Freedberg and colleagues (2019) showed that many teachers of mixed-ability classrooms felt that they needed to set independent work for high-ability students when implementing differentiation so that they could focus classroom time on students who were experiencing greater difficulty. This may leave gifted students with less explicit teaching time than might be beneficial.

While the evidence base for aspects of differentiated teaching is growing, research provides us with some suggestions on how to best implement curriculum differentiation. Recent studies of differentiated mathematics programs (McCoach et al. 2014) and reading programs (Reis et al. 2011) suggest that chances of success can be optimised when learning activities and resources are pre-differentiated and targeted to specific learning needs, which also helps save time for teachers. It is important to evaluate curriculum differentiation to ensure that the impact on learning outcomes can be observed and that effective strategies are being implemented (Hamilton et al. 2019). Professional learning on strategies to implement curriculum differentiation may help teachers increase their range of skills and strategies (Wiggins 1998; Munro 2012). Further controlled studies are required to quantify the effectiveness of specific differentiation models on learning outcomes in mixed-ability settings, especially compared to the potential time and resource investment by teachers and schools (Adelson, McCoach & Gavin 2012; Bui, Craig & Imberman 2014).

The earlier belief (e.g. Berger 1991) that gifted students do not need as much structure or scaffolding in their learning has been dispelled by recent research. Instead, research in cognitive science fields indicates that gifted learners benefit from explicit teaching techniques such as worked examples, scaffolding, and well-sequenced learning tasks, especially in early stages of learning a new topic or skill (Martin 2016). Even when completing open-ended and complex tasks, a randomised-controlled trial conducted by Eysink, Gersen and Gijlers (2015) showed that even gifted students benefit more from external structure and guidance. Gifted students may then be able to move through earlier learning stages to guided enquiry and problem solving faster than other students (Rosenshine 2009).

Ability grouping for gifted programs

Grouping refers to the strategy of placing students of similar ability or achievement levels together for teaching and learning purposes (VanTassel-Baska 1992; Loveless 2013). Grouping can occur within a class or across classes, and can be a temporary or on-going arrangement to facilitate curriculum differentiation (Gamoran et al. 1995; Gentry & MacDougall 2008). Ability grouping for gifted students traditionally uses a model in which identified students are placed with other gifted students within a designated school, class, or small in-class group, so that they can undertake more challenging and developmentally-appropriate learning tasks than they may otherwise receive in a mixed-ability classroom (Feldhusen & Moon 1992; Brulles et al. 2010).

The use of grouping has attracted significant controversy and debate among educators and researchers for decades (Loveless 1999; Card & Giuliano 2014). This debate is partly philosophical but it may also be the result of inconsistencies and gaps in the evidence base. Betts (2011) has suggested that many studies of ability grouping rely on weak research designs or observational techniques, differing understandings of terms such as streaming or grouping, or use inconsistent definitions of ability in order to select or group students (Boaler, Wiliam & Brown 2010). Some studies and meta-analyses of streaming and grouping practices suffer from methodological problems, which creates a need for more rigourous controlled studies (Steenbergen-Hu, Makel & Olszewski-Kubilius 2016).

An assessment of existing research suggests that ability grouping for gifted students is an effective practice, provided there is appropriate curriculum differentiation and equitable assessment processes for the group placement. Steenbergen-Hu and colleagues (2016) found that specific ability-grouped programs for gifted students have a moderate and statistically significant effect on academic achievement ($g = 0.37$). Cross-grade subject grouping ($g = 0.42$) and within-class grouping ($0.19 \leq g \leq 0.30$) also had moderate significant effects. Similar positive effects were found for other types of ability grouping for gifted students, such as within- and across-school cluster grouping, where concentrations of students with similar ability levels are grouped within a mixed ability class, rather than being grouped exclusively in one setting (Brulles, Peters & Saunders 2012).

This positive significant finding for grouping for gifted students is consistent with other major meta-analyses and reviews (Tieso 2005; Rogers 2007). Even Slavin (1990), one of the stronger critics of ability grouping, conceded that ability grouping is justified when there is a 'true acceleration' program (p. 65) – that is, an advanced differentiated curriculum provided for gifted students. A well-implemented ability-grouped program for gifted students can be of great value with minimal impact on other learners in the same cohort (Collins & Gan 2013; Card & Guilliano 2016b).

However, simply sorting or streaming students in classes based on prior achievement may have little learning impact unless significant curriculum modification is employed at the same time (Boaler, Wiliam & Brown 2010; Steenbergen-Hu, Makel & Olszewski-Kubilius 2016). Rigid systems such as tracking, which can limit the access of students to further study or career pathways, may have a negative impact on some learners unless differentiation is used and expectations of all learners remain high (Burns & Mason 2002; Nomi 2010). As stated by Hattie (2009), 'for grouping to be maximally effective materials and teaching must be varied and made appropriately challenging to accommodate the needs of students at their differing levels of ability' (p. 95). Differentiated learning experiences and specialist-trained teachers in gifted grouped settings are shown to be important (Slavin 1987; Kulik & Kulik 1992; Lou et al. 1996; Rogers 1993, 2007).

The research literature offers mixed conclusions regarding the socio-affective outcomes of ability grouping (Neihart 2007). Some research describes positive effects on self-esteem or self-concept for all learners in gifted ability-grouped contexts, particularly where programs are in place to address any concerns with grouping (Ireson, Hallam & Plewis 2001; Gentry & MacDougall 2008). A recent study of US college students found higher levels of wellbeing and fewer students demonstrating psychological concerns among students in academically demanding honours programs when compared to a regular student group (Plominski & Burns 2018).

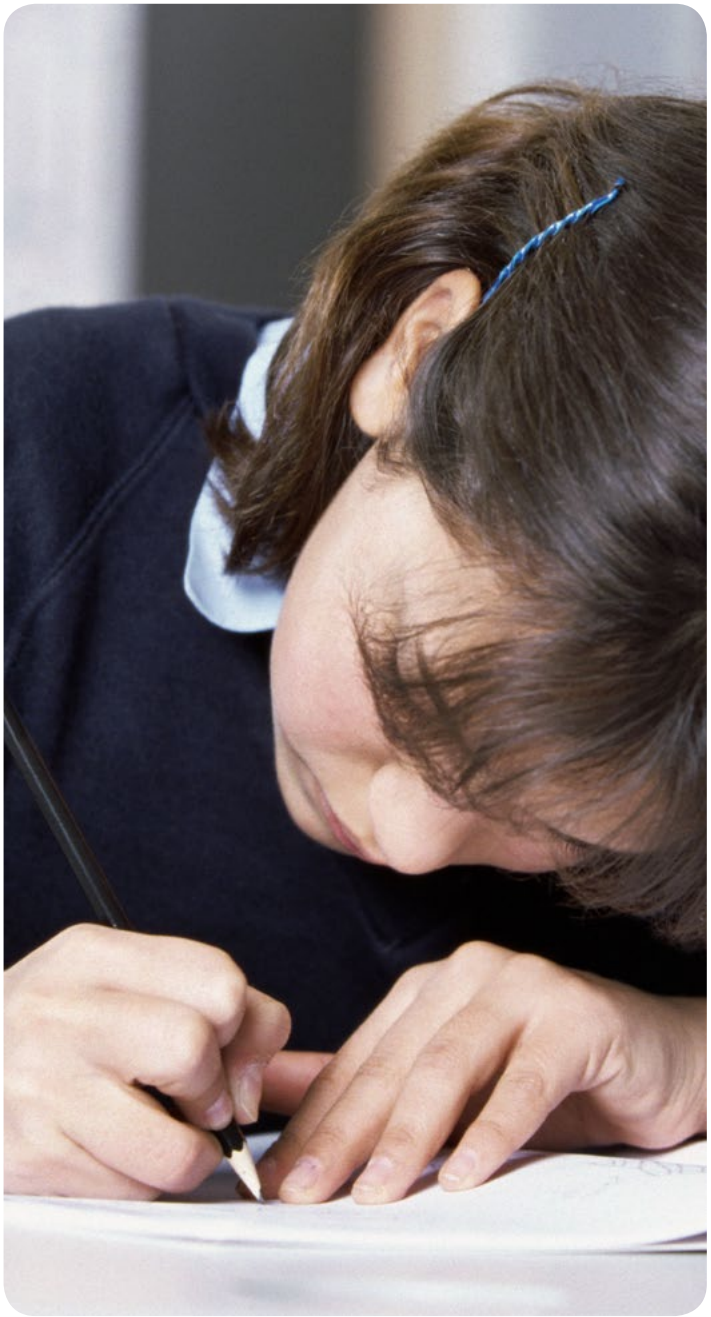
In contrast, other research suggests that grouping gifted learners together in classes can have effects on the academic self-concept of some gifted students as they are no longer the 'big fish in a little pond' (Marsh et al. 2015). Not all gifted learners may be affected by these peer-comparison effects (Makel et al. 2012; Trautwein et al. 2009). Gross (2001) found that some gifted learners could suffer a dip in their self-concept once placed in academically selective settings, but self-concept and esteem improved to healthy levels once students adapted to their new surroundings. While some gifted students may be suited to and enjoy an ability-grouped environment, it is possible that others may prefer to be the 'big fish'. A range of gifted programs and flexibility of student movement in groups can help to address this, as well as giving students and parents options. Rogers (1993), in an oft-cited quotation, concludes that: 'it is likely that there are many personal, environmental, family and other extraneous variables that affect self-esteem and socialisation more directly than the practice of grouping itself' (p. 11).

Enrichment and extracurricular programs

Enrichment and extension programs are a common feature of many gifted education programs in Australia. Extension programs typically seek to increase the depth and challenge of learning within the same year context, while enrichment programs seek to broaden the learning experience by applying learning to new and different contexts (Davis & Rimm 1989). These programs offer the opportunity for like-minded students to work together on challenging learning that may not be offered elsewhere in the regular school week (Renzulli 1997; Horak & Galluzo 2017). Extracurricular programs seek to support and augment classroom-based learning and may offer extension and enrichment in specific activities such as debating, student leadership, sport and technology programs.

Enrichment has been shown to be generally effective as an educational practice. Research by Wallace (1989) found that the experience and specialist training of teachers made a significant difference to the efficacy of enrichment programs – teachers with several years' experience and training in teaching gifted students had much greater effects (d = 0.88) than those with no or limited experience (d = -0.06). Some other learning benefits have been identified in controlled trials, where students participating in enrichment programs demonstrated greater creativity, creative thinking, and verbal fluency (Kolloff & Feldhusen 1984; Memmert 2007). Positive career and social outcomes have also been observed in short- and long-term studies (Moon, Feldhusen & Dillon 1994), with positive responses from parents and students (Herzog 2003; Olszewski-Kubilius & Lee 2004).

Extracurricular programs are a common feature of Australian gifted education programs. These programs can vary widely in their features and application, but generally seek to extend a student in an area of interest or talent that may lie outside the more traditional learning experiences of the classroom and curriculum. Research into the efficacy of extracurricular programs is generally limited. One Australian study on maths competitions and gifted students found that, if incorporated into a well-planned maths program, these competitions can extend and motivate gifted students by enhancing students' self-directed learning skills, team-building skills, and student self-satisfaction (Bicknell 2008). Recent research into enrichment competitions demonstrates the potential benefits and positive experiences for gifted students in terms of problem-solving, resilience, motivation, engagement, and social connections (Ozturk & Debelak 2008; Smith, North & Martin 2016).



5. Professional Learning

The quality of professional learning available for teachers is an important factor in supporting the talent development of high-ability learners. As gifted education is a highly technical area with a large research base, successful programs in schools need to be supported by specialised training (Rowley 2012; Jarvis & Henderson 2014). In particular, each of the demanding and challenging teaching practices involved with differentiation (Wiggins 1998; Dixon et al. 2014), assessment (Ysseldyke & Tardrew 2007), grouping (Tieso 2005), identification (Hodge & Kemp 2006; Siegle & Powell 2004) and acceleration (Geake & Gross 2008), has been shown by research to be implemented more effectively by teachers with specialist study in gifted education. These teachers also tend to hold higher expectations and their gifted students may achieve better results when compared to other teachers without similar training (Whitlock & DuCette 1989; Garrett et al. 2015).

Teachers who have completed specialised training or advanced studies have been found to be more effective in meeting the needs of gifted students (Hansen & Feldhusen 1994; Wallace 1989). This includes evidence of greater utilisation of effective teaching strategies (Gross 1997b; Rowley 2008), with substantial effects on both teaching practice and student results (Needels & Gage 1991; VanTassel-Baska & Stambaugh 2005). Studies of teachers whose students achieved outstanding school results have shown that these teachers had specific skills and practices that helped to promote an optimal environment for high-level learning and academic performance (Ayers, Dinham & Sawyer 2004; Laine & Tirri 2016). Research also shows that specialist-trained teachers can be more effective in identifying gifted students and creating challenging learning experiences than those who have not received training (Vialle & Rogers 2012; Fraser-Seeto 2013). Research into gifted student perspectives on their teachers also shows that students can recognise and appreciate teachers who are more engaging and more effective at teaching them on account of their training (Tischler & Vialle 2009).

Despite these factors, study in gifted or high-ability education is not a mandated part of pre-service education courses, and very few Australian university schools of education require it as a mandatory degree component (Fraser-Seeto 2013; Henderson & Jarvis 2016). Specialist training or additional qualifications are not usually not required for appointment to specialist or selective school programs, despite research strongly supporting its implementation (Hansen & Feldhusen 1994; Gross 2004). For teacher professional learning to be implemented effectively, strong school leadership organisational structures, and whole school support program support is needed. An Australian study by Jolly & Peters (2018) suggests that school leadership and organisational structures may be critical factors to ensure that teachers implement changed practices as a result of their professional learning.

6. Conclusion

For Australia to lead in the knowledge economy of the 21st century, we need a culture of excellence where high achievement is expected and challenge is celebrated. There is strong evidence to suggest that greater use of effective evidence-based practices is needed to ensure that gifted students have the right opportunities to reach their educational potential. Studies in Australia and comparable international contexts indicate that some existing gifted education programs and strategies have not had the desired impact on achievement outcomes, and have missed many gifted students from disadvantaged backgrounds. A review of recent research strongly suggests purposeful talent development programs, incorporating evidence-based effective practices and explicit teaching, are needed to optimise the achievement and talent development of gifted learners (Stoeger et al. 2017). Strategies such as academic acceleration, purposeful gifted student programs, enrichment and extension are needed to extend and challenge students with high academic potential (Subotnik, Olszeski-Kubilius & Worrell 2011; Steenbergen-Hu, Maken & Olszewski-Kubilius 2016). We especially need to work towards closing excellence gaps in achievement for gifted students from disadvantaged groups, who may rely more heavily on schools to provide programs for talent development (Plucker & Peters 2016). Use of formative assessment and student achievement data will help inform the teaching and learning cycle so that gifted students are appropriately challenged.

To achieve this, teachers and school leaders need to be equipped with the most recent research evidence on what works best for gifted learners, coupled with examples of effective practice from high-achieving and high-growth schools (VanTassel-Baska et al. 2009). Teachers and schools must plan for, and evaluate the efficacy of, their school programs with student achievement in mind, and work to address issues of pervasive underachievement and excellence gaps (Renzulli & Reis 1997; Plucker, Hardesty & Burroughs 2013). Ensuring that teachers are equipped with the skills to extend and challenge gifted learners, at both pre-service and in-service points of professional development, will help to maximise outcomes. Assessing the learning needs of a broad range of learners will help.

Although no small challenge, taking these steps to re-think gifted education will help to create a situation where all learners – regardless of their background – have the greatest opportunity to achieve excellence.

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