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via Mr Dean Tollis
Chair

Submission for 'Digital Innovation in Secondary Education'.

The Education and Health Standing Committee
From Gifted WA.

Gifted WA is an advocacy, education and support not-for-profit representing families and educators who work with gifted young people. Both its committee and membership consists of teachers, university educators, researchers, education specialists, mental health professionals and parents of gifted children.

We continuously see or hear of WA's gifted children experiencing frustration, psychological distress and low resilience. We talk to families who are drained by advocating for their child in school while dealing with their child's heightened emotions at home, and educators who are stressed when they haven't been trained to handle gifted learning needs or identify gifted students in the classroom.

Our organisation is primarily concerned with the *prevention* of mental health issues, and resilience for gifted young people and those who support them. We look at gifted education through the lens of positive mental health outcomes rather than academic excellence or achievement.

Researchers have found both physical differences, and differences in neural transmissions, between gifted and typical age peers (Jin et al. 2007, Jin. et al. 2006). Giftedness is about the brain working in a different way to population norms; just as an ADHD or ASD brain is different to the population norm. Like ADHD and ASD, and because it causes such asynchronous development, giftedness requires its own educational accommodations.

Unfortunately, in the English language, "talent" is a synonym for "gifted", which contributes to misunderstanding, stereotype and judgement, some of which are entrenched in the Australian psyche. In the case of a person who has been identified "gifted", the word talent needs to be separated. Hence we subscribe to Francoys Gagné's definition of giftedness. He proposes that a child with high potential or natural abilities (gifted) needs the right catalysts, including education and practice, to transform that potential into outstanding mastery (talent).

Case studies, our member anecdotes, research and literature reviews all tell us that the "quality of the educational fit has more impact on social-emotional development" than the affective characteristics of being gifted. (Cross, 1997; Neihart, 1999; Robinson et al., 2002

cited in Gallagher et al., 2011). Therefore, we can all play a part in creating positive mental health outcomes for gifted children by improving the educational fit. Digital innovation is part of that jigsaw.

When a gifted student is not given the right learning accommodations or environment, their potential may not develop into talent. In addition, the student has a greater chance of may establishing, at-risk behaviours, low resilience and/or mental health issues.

External education factors that can affect a gifted child's mental health include:

- frustration in school from not having their needs supported
- stereotypes and/or cultural expectations
- difficulty in finding peers to relate with openly
- a lack of understanding from others.
- heightened sensitivities in comparison to others, and
- denial from educators and policymakers about their educational needs.

Digital innovation is essential in addressing some of the above factors for gifted students in both primary and secondary education.

In this submission, we will not answer all questions. We will provide answers where we feel our viewpoint is different and valuable. Our comments come from peer reviewed research specifically related to gifted students, along with our committee and professional and anecdotal experiences.

2. The role of digital technology in addressing secondary student engagement and retention.

By their very nature, gifted students have a curiosity about the world that starts from an early age. However, in research, UWA's Prof. Peter Merrotsy (also a founding member of gifted WA) discovered that gifted people were over-represented in youth detention. Some of these students had disengaged, but for many, they had never engaged in the first place, or had made (very) poor decisions for many different reasons. "Kevin Lamoureux (University of Winnipeg) and I thought that their high ability may have made them leaders and hence drawn attention to themselves, hence making them more likely to end up in the juvenile justice system" (Merrotsy, 2019, personal communication). It is also worth noting that about 85% of youth going through the juvenile justice system or in detention are Aboriginal.

Gifted students can be both high performers and at-risk learners. They need consistent education opportunities that suit their learning needs. Without this, gifted students can disengage, underperform and develop mental health issues like maladaptive perfectionism, anxiety, self-harm, addiction and depression. They may struggle with a choice between masking their intellectual abilities/interexts for acceptance by age peers and excelling in an area that is not valued by their peer culture (Merrotsy, 2013). Disengaged students can also find undesirable or antisocial ways to engage their brain.

In 2004, Olszewski-Kubilius and Lee researched why gifted adolescents preferred online courses (cited in Periathiruvadi and Rinn, 2012, p. 161). The students identified a "desire to

learn more about a particular content area, unavailability of face-to-face courses offered at their school, desire to study at their own pace or to get ahead, ability to gain advanced placement credit, and desire for extra coursework that they could not fit into their regular school schedules".

gifted students need to be taught entirely differently, and with generally more advanced content than their typical peers. Meaningful use of digital technology can provide a major benefit in addressing secondary student engagement and retention. These include, but are not limited to digital technologies that:

- **Make it easier for the teacher to create differentiated content**, like online courses, free video libraries such as KhanAcademy.org, and video technology. Also, "the same material, presented by the same teacher can produce different levels of learning, depending on the availability and use of technology by the students" (Seigle and Foster, 2001, as cited in Zimlich, S.L. 2015).

- **Provide alternative ways for students to show their learning for assessment**. While this is useful for gifted students, it is also beneficial for gifted students with another disability, who are called twice-exceptional students (see more on twice exceptional students in section 3). Examples include video content, audio content, digital photography montages, wikis etc.

- **Adapt to the student's required level of difficulty**. Computerised adaptive testing (CAT) can be used for both pre-assessment testing (see more on this in section 4) and to increase engagement in particular topics through apps and other games. This CAT technology enables the difficulty level of questions to change according to the answers a student gives. Hence the questions are truly personalised for the individual student's ability, enabling a gifted student better engage as the questions become more complex, and therefore to reach a higher level, more reflective of their ability.

- **Provide opportunities for a student to learn about their area of interest**. Independent learning opportunities such as mentorships, independent study and online courses are particularly helpful for gifted students, who may be unable to access these in their physical location.

- **Enable children to enter competitions**. Some gifted children are engaged and motivated by competition. Digital technology is a way to access these competitions.

- **Give access to online courses.** Research has found that some gifted adolescents preferred online courses because they could learn more about a particular topic, learn about something that wasn't offered at their school, study at their own pace, get advanced placement credit and have extra learning that wouldn't fit into their school schedule (Olszewski-Kubilius and Lee, 2004, cited in Periathiruvadi and Rinn, 2014).

- **Reach a wider audience**. Some gifted students are motivated by having their projects reach a wider audience than just the teacher.

In addition to the above factors, digital technology provides social opportunities for gifted students to feel connected and accepted.

Linda Silverman (1993, p.72, as cited in Gross 2002) said: *"When gifted children are asked what they most desire, the answer is often 'a friend'. The children's experience of school is completely coloured by the presence or absence of relationships with peers."*

Research spanning 70 years (Gross. 2002) has shown that intellectually-gifted children look for friendships with gifted children around their own age, or high ability children who are older than them. Hence, gifted children choose friends who are closer in mental age rather than chronological age and where the expectations of friendship are more similarly aligned than with typical age peers.

With the lowest levels of giftedness said to occur at a rate of 1 in 100, and exceptionally gifted children being 1 in 1000, gifted students can be starved of relationships with similar peers, especially in schools that separate students based on chronological age. As a result, they don't get to practice their social skills, which then causes a lag behind. Digital technologies allow students to connect with anyone around the world who shares their interests and abilities. Finding like-minded peers and mentors online can help gifted students feel accepted, feel less 'different', and help them develop their identity more positively than if they don't have access to this.

Erik Erikson's (1963) theory of Psychosocial Development talks of the adolescent period of time where an individual either refines their identity or deals confusion and a weak sense of self. With this in mind, Cross (2004) explains that important to developing identity are outlets that provide valued interactions and build relationships. "Arguably, the most important benefit of using computer-based communications to interact with others is the feeling of being connected (part of a community) and gaining a sense of belonging. From those feelings, acceptance is often the next step of development to emerge. It is very important in the lives of gifted students to feel accepted. This allows them to move forward in life not feeling aberrant or detached from society." (Cross 2004, p. 63)

Therefore, gifted secondary students need digital technologies for social and emotional needs as well as their learning.

Digital technologies provide training and resource opportunities for teachers. A teacher who understands giftedness is more likely to keep a gifted child engaged and at school.

The teacher-student relationship is a major factor in gifted education. A teacher who understands the requirements and nuances of gifted students is more likely to have a close relationship with a student. When the relationship is strong, a gifted child is less likely to develop disruptive behaviour that makes it difficult for classroom peers, and is more likely to attempt the challenges and course work that the teacher provides.

Currently in Australia, pre-service teachers are taught very little about gifted education at universities. Over a four-year degree, they might receive 45 minutes of learning, in one lecture, with little in-depth discussion. Meanwhile, their in-service contemporaries may also require further professional development about gifted needs, in line with new research.

Associate Professor Jae Jung is the Head of Gifted Education at the University of NSW. He argues that an entire generation of students can attend a particular school, and not get "the education provisions they need because of a lack of training" (Baker, 2019). This lack of training leads to students not being identified and accommodated in the classroom. Without training, sometimes the only clue to a child being gifted is a teachers' gut feeling that a student "has more to give"(Chaffey, 2002, p. 2 as cited in Merrotsy 2013).

Digital technologies enable educators to access the latest research and resources in gifted education. In addition, social media, private teacher groups, private gifted groups, and organisations such as Gifted WA, provide knowledge, support and resources for educators. Online courses, such as the Gifted and Talented Education professional development package for teachers, offered by the Gifted Education Resource, Resource and Information Centre (Gerric) at the University of New South Wales, are important for teachers to learn more about identifying gifted students, and how to implement accommodations in their classroom.

3. How digital innovation can increase equity of opportunity in secondary education

With more gifted students in WA than places in secondary gifted and talented selective programs, digital innovation can increase equity of opportunity by enabling students to virtually access specialised teaching and courses.

In addition, computer adaptive technologies and pre-testing on topics/subjects would make learning more equitable for gifted students in the classroom, because gifted students would not need to sit hours of lessons being taught what they already know.

While giftedness occurs across all communities**,** evidence shows disadvantaged students are not equally represented in high potential or gifted programs (NSW Govt High Potential and Gifted Education Policy, 2019)**,** and they are less likely to be identified and get the learning provisions they need. Merrotsy (2013) explains that gifted children from "backgrounds of disadvantage are particularly at risk" of not realising their potential. Not realising their potential can lead to low resilience, identity issues, mental health issues or unsociable behaviours.

The NSW Government's new High Potential and gifted Education Policy lists several groups that may not receive equitable provisions for giftedness. These include students at risk, indigenous students, students from low socio-economic backgrounds, students from diverse cultural and linguistic backgrounds, students with disability and rural and remote students.

Digital innovation provides opportunities to redress some of this disadvantage, by enabling:

- teachers to further their education and knowledge about giftedness (and thereby identify students that they wouldn't traditionally identify because of disadvantage).
- differentiation opportunities
- alternative assessment methods
- computer adaptive technology for pre-testing and to increase engagement
- connection with mentors
- connection with like minds
- access to higher level education
- access to content with more interesting and complex concepts
- assistive technologies
- culturally understand of content and programs
- language conversion (ie. cloud-based communication that enables remote phone or video interpreting such as 2M lingo may assist some indigenous students)
- appropriate information/education about mental health ie. anxiety, perfectionism, self-harming that they might not otherwise have access to because of geographical distance, cost or cultural concerns.

Some more in-depth examples of how digital innovation can increase equity of opportunity for gifted students in secondary education include:

Students with disability: The NSW High Potential and gifted Education Policy (2019, 1.3.2) states that "High potential and gifted students with disability should be provided with support, including reasonable adjustments for disability, to allow them to participate in their education on the same basis as high potential and gifted students without disability." gifted WA agrees with this.

Twice exceptional students or "2e" are gifted students who "give evidence of one or more disabilities" such as "specific learning disabilities (SpLD), speech and language disorders, emotional/behavioural disorders, physical disabilities, autism spectrum or other impairments such as attention deficit hyperactivity disorder (ADHD)", (NAGC website).

Digital innovation can increase equity of opportunity by reducing frustration or limitations in areas the student finds difficult ie. voice recognition software for a child who is unable to type, apps such as iWordQ that helps struggling writers and readers (ie. dyslexia, dysgraphia), robots to help students on the autism spectrum to engage in lessons (as are being trialled by the CSIRO at Murray Bridge High School in South Australia).

Digital innovation can help students with executive function challenges to organise their day-to-day tasks and long-term planning. Apps such as IstudiezPro, programs like Live Binders, and Online Stopwatch all assist a student struggling with planning, prioritising and transitioning. Some students have difficulty notetaking and digital innovations can help students with this and also improve the quality of the notes.

Digital innovation can also allow teachers to assess students in different ways to the traditional text-based methods.

Rural and remote students: Isolation and small school size cause inequity for rural students because of the distance to find like-minded peers, access to resources, mentors, educational or enrichment opportunities, and access to jobs/careers/work experiences (Centre for Education Statistics and Evaluation, 2019). Online learning, virtual classrooms, connecting with mentors and like-minded peers, can provide advanced learning as well as social connection. Aurora College in New South Wales is a virtual selective high school "providing students in rural and remote areas the chance to study specialist subjects using the latest technology" (Aurora College website, 2019). Students are enrolled into the selective class and also their local (base) secondary school. Aurora College uses an online conferencing system with webcams and microphones and lessons can be recorded. The aim is for students to stay with their family, local school and community, to provide a peer group of like minds, and to offer mentorships and expanded career opportunities. The school uses Adobe Connect (eg. web conferencing), Moodle (open source learning management system), Edmodo (content sharing), iTunes U (educational audio and video files) and Open University (online higher education), among other technologies.

Talented girls and STEM: Research has found that girls' STEM interests decrease during secondary education, but mentoring is an effective way to maintain their interest (Stoeger, Hopp and Zeigler, 2017). Successful female role models are crucial to girls continuing on the STEM pathway (Stoeger, et al. 2017). Because of the historically low numbers of women in STEM careers, it can be difficult to find role-models willing to mentor in a close enough geographic location to a student. Also, it adds logistical difficulties to find another adult to transport a student to an appropriate mentor. From researching gifted girls and STEM, Stoeger, Hopp and Zeigler (2017, p. 2) state that "online mentoring is particularly useful for getting talented female secondary students excited about STEM". Online mentoring programs open up the possibility of online communities that allow communication between more than one role model and one student (Stoeger, et al. 2017).

Gifted boys and handwriting: In 2005, Dixon et al. (2005) investigated the critical thinking skills of gifted adolescents in handwritten essays, compared with typed essays. When they used a computer, gifted boys had an 83% increase in the number of words used compared with the handwritten essays. "The authors suggested that the benefits of software for gifted boys were speed and efficiency" (Periathiruvadi and Rinn, 2012). The gifted girls scored better than the boys in handwritten essays, but by using computers to type the essays, the boys and girls scored similarly.

4. The potential for digital technology to cater to the needs of high performers and at-risk learners in secondary education.

Gifted and at-risk learners have specific needs. The NSW High Potential and gifted Education Policy (2019) suggests at-risk gifted and high potential students may:

- be underachievers
- be disengaged and withdrawn
- refuse to go to school
- have changed behaviours and attitudes
- be psychologically vulnerable

- question authority and have low self-esteem or low resilience
- show indecisiveness, uncertainty, doubt or ambiguity

At-risk behaviours in gifted and high potential students, as well as underachievement, can be caused by disengagement with learning, equity issues in accessing suitable and optimal learning environments, lack of sufficient challenge, relevance and complexity, inappropriate pedagogical strategies, fear of social isolation, and non-identification, particularly for disadvantaged students due to limited professional development (NSW High Potential and gifted Education Policy 2019).

The US National Association for gifted Children (NAGC), argues that all school districts, and states should be accountable for the learning gains of all students. Its accountability position statement says: "Instruments designed to assess student learning must have sufficiently high ceilings to accurately measure the learning gains of students who can demonstrate above-grade performance."

High ceilings are needed because a student who has disengaged is unlikely to be working to their potential in a classroom. If given a chance to be tested above level, a student may engage with more complex content. In one WA example, an at-risk gifted child was under achieving, school refusing and developing mental health issues. The 8-year-old had already been accelerated to Year 5. At the time he reported no social issues with peers, but he was self-harming including biting himself until blood showed and pulling his fingernails from the skin. By using high ceilings in assessment, and computer adaptive testing (CAT), the education team discovered that he needed to learn many topics well into the secondary education realm. Several weeks into teaching more complex material, the school, his mental health professional, and the boy's family have all noted a huge change in his demeanour, attitude, engagement in school and schoolwork, and mental health. This case study is a common story within the gifted community.

Professionals in gifted education agree that formal and informal testing before a topic enables the classroom learning to be pitched at the right level. Computer adaptive tests tailor questions to the individual student and reflect their ability level. For example, if a difficult question is answered correctly a more difficult question will be given. Conversely, if the student answers a questions wrong, they are given a simpler question. Welch (2016) says computer adaptive tests (CAT) allow schools to "measure whether gifted and talented students are learning new information and moving up to the next level".

Because computerised adaptive technology helps with engagement, tests using this method provide more accurate pictures of a student learning. "CATs that present students with different test items based on their performance can be useful for preventing gifted students from getting bored or frustrated with the assessments. CATs can also be helpful for tracking students' growth over time in different content areas and challenging them in areas of their interests (Clark, 2004)." (Cited in Periathiruvadi and Rinn, 2012, p. 165).

If used consistently and regularly, digital innovation can help to identify what level of learning a gifted high-performing or at-risk student will need, what gaps they have, and if they have already learned content that is about to be taught. In addition, digital innovation

has huge potential in secondary education to provide gifted children with the resources, stimuli and opportunities and connections they need to think at a higher level. Digital technologies have the potential to allow gifted students to productively be engaged in desired careers at an earlier age.

5. Challenges to implementation, including provision of digital infrastructure, resources and technical support.

Many of the challenges for implementing digital infrastructure, resources and technical support are the same for gifted students as they are for other students. These include costs, technical proficiency, funding, and limited time. Country and low socio-economic schools may not have appropriate internet access and students may not have access to technology at home for homework. Some socio-economic and cultural groups will have more types of available technology in school and home compared with others, therefore creating education inequity.

However, a study of technology use by gifted and talented teachers in their classrooms by Zimlich (2015) found “it is not so much the quantity of available technology, but the quality of its use that distinguishes teachers known for using educational technology with students" from the "teachers who are not known for using technology with students" (Zimlich p. 118).

Student differences in ability is one challenge for implementing digital infrastructure and innovation in the classroom. Some gifted students have so much access to digital technology, and proficiency to match, that they could set up the whole school’s IT and technology system if given the chance. They can also work around the school’s online safety or security measures. Zimlich (2015) studied gifted and talented classrooms that frequently used technology in the US. She says teachers must have a plan to identify and address the learning both for students who are technology experts and those who are novices. Another challenge is that sometimes student proficiency and/or technical “difficulties” can interfere with learning content, and time is spent on the technology rather than the content.

Teacher training: In Zimlich’s study, she chose gifted and talented teachers who all had a masters level qualification at the University of Alabama, who frequently used technology in the classroom, and who understood 21st Century Skills. She found that a commonality between all of the teachers was they personally sought learning opportunities and worked with technology experts, tried new technology, used it personally and professionally, attended conferences and professional development that motivated towards trying different technologies, mentored others in using technology and were motivated to use technology to make their job easier. Zimlich (2015) argued that because of continuous technological advances, it was just as important for technologically experienced teachers as novice teachers to receive support and training in technological innovations. Zimlich noted that the individual gifted and talented teachers in the study sought out their own help from technology experts and used professional social networks, including online, to collaborate with other teachers and build skills in using technology within the classroom.

Teacher attitudes: In the study, Zimlich (2015) found that the level of trust and bonding between the teacher and their student positively impacted the technology experience. In a

literature review about technology in education, she wrote that teacher willingness to shift classroom practice from 'teacher centric' to 'student centric' techniques positively affected the use of educational technology. Also, teachers were motivated to use technologies that students would find engaging and that they'd need to use in the future. Some teachers seamlessly included technology in the classroom whereas "for others, many aspects of planning and organisation make technology enhancements problematic" (Garcia and Rose 2007, cited in Zimlich, 2015). Therefore, teacher attitude can be a potential challenge for using technology in the classroom.

School leadership and administration: Schools' use of technology, and implementation of digital infrastructure can be affected by the attitudes of leadership teams, policies and planning. Schools can investigate whether all teachers have equal access to equipment and should examine how it is used (Zimlich, 2015).

Class sizes: In the study investigating technology use in gifted and talented classrooms, Zimlich (2015) found smaller class sizes and multiple opportunities for students to use a variety of technologies increased their proficiency. Also beneficial were teachers who worked with students over multiple years and teachers who asked students to reflect on the learned content as well as their use of technology.

Limited resources and/or bureaucracy: "*As Chai, Koh, and Tsai (2013) found, limited technology resources or bureaucracy in acquiring access to the technology discourages teachers from using technology with students*" (Zimlich 2015, p. 117). In addition, access to computers and laptops, and what websites were blocked, changed or decreased what the teachers and students could do. However, the study found that some gifted and talented teachers had individually applied for grants to upgrade technology infrastructure. Zimlich (2015, p.118) suggests "having a teacher panel to help evaluate the educational value of various Internet resources will help produce thoughtful decisions about what websites to block."

Time: In a secondary environment with high curriculum requirements, it can be difficult for students to have enough time to trial-and-error the technology as well as fulfil the content requirements. A challenge to using digital innovation in secondary education is the time for students to learn new software. Zimlich also suggests that schools create technology sequence plans through the year levels, to help build student skills.

Safety and social emotional: Previously in this submission we've talked about how digital technologies in secondary education are important for gifted children's learning needs and also their social emotional needs. However, Peterson and Ray (2006 cited in Siegle 2010) found that 67% of gifted students said they had been the victim of some type of bullying in their first 9 years of school. Siegle (2010) cautions about the issues cyberbullying and sexting cause for gifted students (cited in Periathiruvadi and Rinn, 2012). The challenge here is about whether to block social networking, video and photo sharing sites at school, or whether for gifted children a) the benefit outweighs the risk, and b) parents and educators are equipped to teach safe practises and model and monitor proper use, as with all children.

Thank you for reading this submission. We look forward to hearing the outcome of the inquiry.

Kind Regards

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