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Enablers and barriers to equitable participation for students with blindness or low vision in Australian mainstream secondary schools

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ABSTRACT

A global commitment to inclusive education through policies and legislation has been espoused to provide equitable access to the curriculum for students with disability. Recent evidence suggests, however, that for students with blindness or low vision (BLV), the visual nature of the curriculum means that content can be inaccessible. This study explored the barriers and enablers that students with BLV encounter when engaging with the curriculum. Empirical data was collected through semi-structured interviews with six students with BLV in Australian mainstream secondary schools. The interviews were analysed to determine the factors that influenced equitable access and participation. The analysis uncovered a number of themes, including access to curriculum materials, support from classroom teachers, support from specialist educators and familiarity with, and use of assistive technologies. The results of this study demonstrated that more professional development is needed for teachers and other stakeholders to prepare students with BLV to participate in learning 'on the same basis' as their peers without disability.

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Introduction

Internationally, many students with disability attend mainstream educational contexts requiring access to the same curriculum content and learning environment as their peers. In the Australian context, approximately 90% of students with disability attend mainstream educational settings (Australian Institute of Health and Welfare [AIHW] 2020). Developing students' knowledge and skills to prepare for future employment and effective participation in the community remains an important goal for Australian education. This has been specifically expressed through the design of educational experiences which afford *all* students 'equity and excellence' (Education Council 2019, 6).

Despite commitment to inclusive education practices, for students with blindness or low vision (BLV) aspects of the curriculum that are visual in nature often present barriers

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to access and engagement (Cain and Fanshawe 2020; McLinden et al. 2016; Siu and Morash 2014). This can result in students avoiding particular subjects such as mathematics, visual art, and geography, and exclusion from other areas of the curriculum such as school camps and sporting teams (Cain and Fanshawe 2019). Adjustments to the ways in which students with BLV access the curriculum compensate for a lack of vision on which their peers rely. These include the use of disability-specific tools such as braille keyboards, assistive technologies such as text-to-speech apps, the use of a white cane to orientate within the physical environment, and scaffolded learning experiences to understand social interactions.

This study aimed to fill the gap around current understanding of how students with BLV can gain access to the curriculum on the same basis as their peers. Six students in mainstream secondary school with BLV were interviewed with the aim to identify factors secondary students with BLV perceive as enablers and barriers to equitable access to the school curriculum.

Review of relevant literature

Historical overview

Historically, students with BLV were excluded from mainstream settings and educated in a segregated manner in special schools. The curriculum focused on disability-specific content and skills (particularly life skills), orientation and mobility, and the use of braille (Schifter 2015). In the 1970s, momentum for inclusive practices grew, and in 1994, the *Salamanca Statement and Framework for Action* (UNESCO 1994b) was developed with the aim of creating inclusive school systems so that students with disability (including students with BLV) could be catered for in their local mainstream school. Within Australia, the 2005 *Disability Standards for Education* (Australian Government 2005) solidified the aims of the *Salamanca Statement*, by stipulating the obligations of education providers to ensure that students with disability were to participate in inclusive education 'on the same basis' as their peers.

In 2014, the Australian Curriculum was introduced to provide consistent national standards in education. Students with disability were considered able to achieve educational standards commensurate with their peers 'as long as the necessary adjustments are made to the way in which they are taught and to the means through which they demonstrate their learning' (Australian Curriculum Assessment and Reporting Authority [ACARA] 2013, 1). For students with BLV specifically, Article 24 of the *Convention of the Rights of Persons with Disabilities* (2006) includes facilitation of 'the learning of braille, alternate script, augmentative and alternative modes, means and formats of communication and orientation and mobility skills' (3).

According to Australian Institute of Health and Welfare (AIHW 2020), 89% of students with disability attended mainstream secondary schools. Some students with BLV may be educated in special education units or schools for the blind which provide dedicated resources and expertise to implement disability-specific skills (Hollier et al. 2013). Within the mainstream school, BLV is a low incidence disability, which can present challenges for educators, as teachers have not previously catered for students with BLV in the classroom (Siu and Morash 2014).

There are multiple barriers to engagement with the curriculum for students with BLV, primarily due to the visual nature of the content and educational environment (Cain and Fanshawe 2020; Jessup et al. 2018; Opie 2018a; 2018b; Opie and Southcott 2015). The two main identified barriers are teachers' professional knowledge about how to support students with BLV, and the effective implementation of disability-specific skills to develop students' independence, which will be expanded upon here.

Professional knowledge and personal willingness to support students with BLV

A school's commitment towards inclusion is a pertinent factor in the implementation of equitable education for students with disability (Cain, Gibbs, and McRae 2020). The beliefs, attitudes, and behaviours of staff, parents, students, and community members can influence the extent to which students with BLV may feel included or stigmatised (Thurston 2014). So too, the lack of knowledge about BLV and common accompanying assumptions (Whitburn 2014). Some teachers may have lower expectations for students with BLV or complete the work for them (Opie 2018a). Negative attitudes may result from a lack of prior experience combined with a lack of teacher training and funding to upskill teachers to work effectively with students with BLV (Reed and Curtis 2011). Fanshawe and Cain (2021) argue that students with BLV should be held to the same high expectations as their peers, especially when they are equally capable of completing set tasks. Forecasting to an independent future, students with BLV must engage fully with all aspects of the Australian Curriculum to be prepared for competitive job markets where all people tend to be judged equally. Viewing students as unique individuals with strengths and abilities and promoting attitudes and ways of working supportive of true inclusion are the primary enablers of providing an equitable experience for students with BLV (McLinden et al. 2017).

Teachers' limited abilities to provide accessible resources and learning materials to support students with BLV have been emphasised in the literature (Holbrook 2015; Siu and Morash 2014). Most pre-service teachers receive one subject dedicated to diversity and inclusion in their training which covers a wide variety of issues pertaining to cultural, linguistic, and disability in a limited manner (Cain and Fanshawe 2020). The result is that many teachers feel unprepared to adequately cater for a diverse range of student needs (Cain, Gibbs, and McRae 2020). Professional development for teachers and support staff is, therefore, an important enabler. In the American context, Brown, Packer, and Passmore's (2011) study revealed that most teachers received between one and eight hours of training at the beginning of the year when a student with BLV was placed in their class, with some receiving no training at all. Reed and Curtis (2011) acknowledged that professional development could be costly for schools, specifically in secondary schools, where multiple teachers required training to make content and pedagogy accessible for students with BLV (Jessup et al. 2018).

Teacher training in adaptive technologies was also identified as important to support students' access to the curriculum, as Jones et al. (2018) indicated that 'the most significant predictor of student assistive technology use is the preparedness of their teachers' (31). This is particularly important, as when students are able to use assistive technology independently, they are afforded control over their own learning and gain the independence required for future employability (Opie 2018a).

There are limitations in recruiting and retaining qualified support staff, such as advisory teachers and therapists, to provide specialist knowledge to support classroom teachers and students with BLV in accessing the school's academic, physical, and social environments (Opie 2018a; Pogrund 2017). An international study (McLinden et al. 2017) found that not all specialist advisory teachers hold relevant qualifications to teach students with BLV. Furthermore, even if schools did have access to qualified teachers, it was identified that lack of time was a significant barrier to providing sufficient support for students in schools (Opie 2018a).

Implementation of disability-specific skills to support students' independence in inclusion

Over the past 25 years, a large and growing body of the literature has argued students with BLV require explicit teaching of the knowledge and skills that are learnt incidentally by their peers through vision (Allman and Lewis 2014; Siu and Morash 2014). These disability-specific skills, also known as the *Expanded Core Curriculum* (ECC), devised by Hatlen (1996), consisted of nine key areas to compensate for a lack of vision (refer to Figure 1).

In Australia, the South Pacific Educators in Vision Impairment [SPEVI] (2016) specified that 'in addition to the general (core) curriculum, provision of the ECC will maximise the

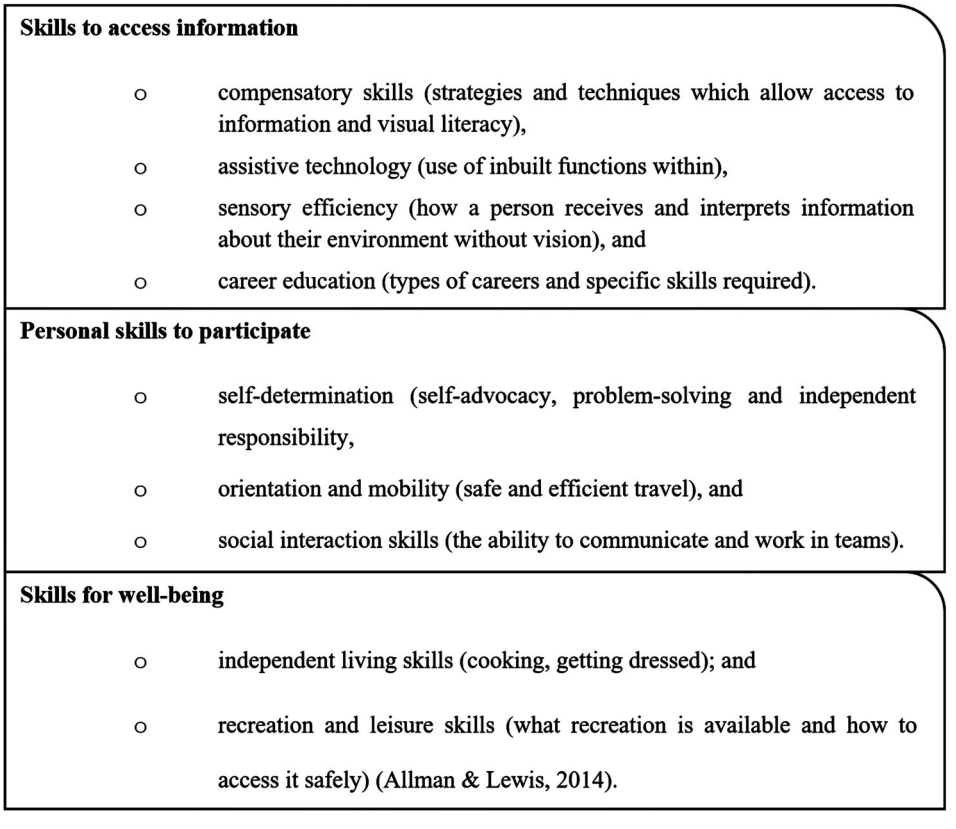

Figure 1. Expanded core curriculum skills (Hatlen 1996).

academic, social, vocational and life skills of learners with vision impairment' (12). It is argued that development of the ECC skills is essential to ensure students become capable of accessing learning in senior secondary (McLinden et al. 2016). Despite research that clearly highlights the success of the disability-specific skills in career and life outcomes for older adults, there is debate about how the disability-specific skills could be effectively taught to students with BLV in mainstream classrooms (Wolffe and Kelly 2011).

Within the ECC, disability-specific skills remain as suggestions only, with no clear guidelines as to what should be taught, when they should be taught, who is responsible for teaching these skills (Keil and Cobb 2019). A lack of understanding about the role that these skills play in the long-term education of students with BLV was also identified as a barrier to purposeful implementation of the ECC internationally (James, Cobb, and Keil 2021). In 2019, Pogrund renewed the call to implement disability-specific skills for all students with BLV, to enable measurable ways to design and assess development through the knowledge and skills required to be successful in education, employment, and community interaction.

Theoretical framing

This study is framed by McLinden et al.'s (2016) *Learning to access* and *Access to learning* theory (Figure 2) which is used to depict increasing agency for students with BLV in their learning over time. *Access to learning* is based on the observation younger students are provided with materials in their preferred format by educators to enable participation in learning. *Access to learning* is provided only if someone advocates for the student to gain access to learning. McLinden et al.'s (2016) model proposes that over time, educators should move from providing students with *Access to learning*, and instead focus on teaching students the knowledge and skills to effectively participate in the curriculum independently. Specifically for students with BLV, *Learning to access* is developed through the explicit teaching of the ECC to develop the knowledge and skills to access information, advocate for learning needs, and develop skills to navigate the physical environment (Hewett et al. 2018; Keil and Cobb 2019; McLinden et al. 2016). Thus, as students are *Learning to access*, they begin to make informed decisions about how to participate in learning, resulting in increased agency for the student.

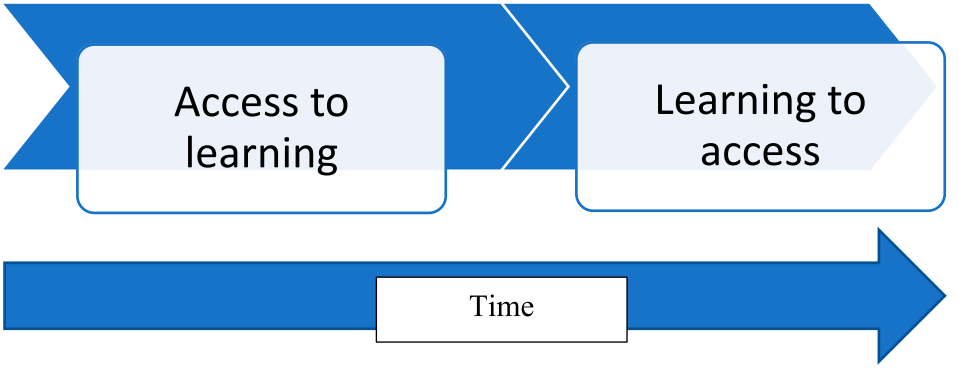

Figure 2. Access to learning moves to learning to access over time (McLinden et al. 2016).

The Learning to access and *Access to learning* framework (McLinden et al. 2016), is underpinned by Bronfenbrenner's (1979) systems model whereby the context and inter-dependent relationships influence students' development. The systems model is based on socio-cultural philosophies which challenge the deficit approach to disability, to investigate how a student might experience disability within their environment.

Research design

Methodology and methods

This study forms part of a larger research project focused on identifying the barriers and enablers to learning for students with BLV in mainstream Australian educational contexts. The research was designed using qualitative approaches to gain in-depth data on participant experiences, strengthen research and triangulate data (Creswell and Plano Clark 2018). Hence, qualitative interviews were deemed useful for this study as they provided the potential to aid a rich understanding of the complex processes that impacted these students' experiences.

Participants

Central to the study were six students educated in mainstream secondary schools in Australia, who were diagnosed with blindness or low vision by a medical professional. Students' visual acuity is reported here as complete blindness (with no light perception), legally blind (vision of worse than 6/60) and low vision (vision worse than 6/18). Using the Snellen fraction, a person with vision of 6/60 can see at 6 metres what is expected to be viewed at 60 metres with standard vision (World Health Organisation [WHO] 2018) (see Table 1).

Students were provided with a non-gendered pseudonym to protect anonymity. Anonymity is particularly important given the low incidence of BLV in Australia and the potential to identify students by age, grade level, and gender. As such, ages and places of residence were not reported. Purposive sampling was employed to select individuals who had knowledge or experience of BLV (Creswell and Plano Clark 2018). Prior to the recruitment of participants, this study was approved by the University, Research Ethics Committee (H20REA124). Participants were recruited by invitations sent through local blindness-specific organisations.

Data collection and analysis

Data were collected through interviews with the student participants, approximately 40 min in total. Students were asked questions which aimed to identify what adjustments

Table 1. Participants' demographics.

Characteristic			Gender		Participants' visual acuity			Impairment	
Location									
Participant groups	M	F	Low vision	Legally blind	Totally blind	Congenital	Acquired	Metro	Regional/ rural
Students	2	4	2	3	1	5	1	5	1

Student pseudonyms: Sam, Jo, Chris, Kye, Jaime and Charlie

were made for them in the classroom to access the curriculum. Sample interview questions are included in Appendix A. The interviews were conducted either online (4) or in person (2). Audio files were uploaded into *Panopto*, a program that can manage multimedia files and automatically transcribe the audio content. Notes and themes were collated while listening to the original audio recordings and member checked with participants.

Inductive category development was employed to theme data from the participant interviews (Mayring 2000). This involved creating tentative themes and undertaking formative checks to review themes or formulate new categories. As an inductive method has been criticised for the possibility of research bias (see Creswell 2013), the researcher used NVivo to search for common words and themes using the word search tools and compared to the notes and themes taken while editing the transcriptions. As each case study's data was analysed into themes in NVivo, both the number of respondents (how many participants commented) and the number of references (how many comments) were collected. These were used to examine the frequency of responses for each stakeholder group. Revisions of themes were made as required, and the final working-through of interview data resulted in a summative check of the reliability of the themes for each case study (Mayring 2000).

The themes identified included access to curriculum materials, support from classroom teachers and specialist advisory teachers, and the use of assistive technologies and applications. The following section explores these themes.

Research findings

Access to curriculum materials

The ability of students with BLV to access curriculum materials was identified as an enabler to learning in mainstream secondary schools. Successful access requires that students can engage with the curriculum content either in the format in which it was provided or through adjustments to the presentation of the curriculum, teaching strategies, and/or the learning environment (SPEVI 2016). All students referred to both the adjustments that they made independently and those from teaching and support staff. Alternate formats included digital formats, tactile formats (such as braille), audio access (through screen readers and audio description), as well as visual access (through enlarged and/or reformatted diagrams, graphs, and tables). The provision of materials in digital form is summarised in Table 2.

Students explained that the visual nature of the curriculum meant there were times when learning materials could not be accessed independently, for example, images, videos, and graphs (Kye) or printed materials (Chris). When students were unable to make suitable adjustments themselves, support was provided from various sources such as their classroom teachers, school-based support teachers, external advisory teachers or therapists, or their parents.

Support from classroom teachers

All students reported that their teachers facilitated access to learning by providing digital materials, either by email or uploaded to the school learning management system, for

Table 2. Assistive technology examples from participants.

All participants	• Provision of materials in digital form so students could access in their preferred format; • Screen reading software was employed, which read out digital curriculum content.
Chris and Kye	• Photos of documents or the board were taken using the student's phone or tablet, and the image was enlarged with the inbuilt magnification tool
Kye, Jo and Sam	• Braille access was gained through the interaction of an electronic braille device which was able to input digital files and output braille to a refreshable braille display

example, Chris shared: 'some teachers, like my history teacher and my math teacher, they really did their best to support me, they … send me stuff that's electronic but before class'. Participants described that when classroom teachers provided relevant curriculum materials in digital format prior to their class, it enabled them access to materials electronically through screen reader software, magnification tools, or electronic braille devices.

Kye reported that visual, tactile, and auditory adjustments were used to support learning, such as when visual content was on the board:

> The teacher in maths, instead of writing on the board, he does it in OneNote. Or using the equation editor so I'm not reading the board. He always reads it out too. Then for the other classes and using the board, they sometimes use special pens, really dark black then I use my camera, with the black pen to Zoom in.

When the curriculum materials contained diagrams, Kye's teacher aide would create adjustments through PIAFS [Picture in a Flash], that is, tactile images created on specialised paper that have a heat-induced reaction to marks or lines, causing them to swell. Kye said that the teachers uploaded subject material onto the school's online learning management system or by email, so Kye could use VoiceOver to read out the content at the same time as the other students in the classroom. It was encouraging to see that Kye's teachers used a range of different strategies within the classroom which enabled access.

Half the students shared that they had the opportunity to discuss with teachers what adjustments should be made to support their learning. Jo met with classroom teachers and the support teacher at the beginning of the year to detail their preferred formats for accessing curriculum materials. Chris used emails to outline their personalised learning needs. Similarly, Jaime said they had very good communication with the support team at school and was confident to tell teachers how to make suitable adjustments. Jaime suggested that the ability to communicate needs with teachers was important in the long-term 'because it brings in interpersonal skills – you're always having to work with people, so theoretically, you should be really good in the workplace because you've got really good communication skills'. Jaime had identified that interpersonal skills through working with others were important for future employability.

Jaime, Charlie, and Chris indicated that teachers would ask them about their individual preferences to access curriculum materials. Jaime shared, 'they'll ask if I need anything extra reformatted. They will check with me if I can read the documents and what they need to do'. Similarly, Charlie said that their teachers often approached them to see what assistance they needed, but not all teachers did this. Charlie reported that when teachers made adjustments, 'they each approach it differently'. Chris explained

further, 'a couple of them were problematic … but others really did their best to support me'. Rather than rely on teachers to make adjustments, Charlie preferred to access work independently where possible:

> In primary school, I just felt as though adults knew better … I had a teacher who wanted me to get a scribe or wanted me to write with a pen. She thought she knew best when we did the stuff she wanted. It wasn't the best. So, I think listening to the student is the most important part. I know myself more as I get older and I feel like I know [what modifications are needed] the best. I'm in senior school. I'm trying to be a lot more independent since everything's online.

Charlie recognised their own role and agency in accessing the curriculum, indicating that as they progressed through school, their independence grew as did their understanding of what adjustments were best suited to access particular curriculum content.

While many of the students in this study expressed confidence in explaining their needs, Chris said they were uncomfortable receiving adjustments in the classroom. Chris, who had lost central vision at the age of nine, shared that even though many of their teachers supported access by providing digital content and extra time, they were self-conscious about appearing different from their peers at school. Chris shared the impact of losing vision on their education, stating that they:

> Go back and forth with acceptance and then depression, anger, and denial. I'm never, never, fully okay with it. So, I think depending on how mentally strong I feel, I'm much more open to things. And if I'm, like, really upset, I just don't want anything to do with any of it.

Chris pre-arranged to sit at the back of the classroom through email with the teacher. Chris explained, 'I'm self-conscious of how much I have to zoom in. And I don't really want people seeing that because people say stuff and I don't need that in my day'. Sitting at the back of the class enabled Chris to use the magnifier on their laptop to enlarge text without other students noticing.

Additional support to access learning

Support teachers within the school were identified by all students as providing important access assistance. Sam described working in a small groups with a support teacher three times a week. Sam and Jo reported that their support teachers received materials from classroom teachers and converted them into accessible formats such as braille. Others reported there was a department in the school with support teachers who assisted generalist teachers to make the curriculum accessible. Jaime clarified, 'if the teacher actually made the digital copy that I can access, then they'll send it to me. But if it's inaccessible, the team at my school has to reformat it for me to access'. It is encouraging that students identified that support was provided within the school.

All students offered that they received additional time for classroom activities and assessment. Two students reported that they received extensions to the due dates of assignments, whilst others reported receiving extra time in the format of a spare subject. These students studied five subjects instead of six, which enabled three lessons a week to study and complete their homework. Sam and Chris explained that although they received extra time on the exams, it took a lot longer than their peers to access the content through assistive technology. Chris stated, 'I think one thing that's

particularly tricky is that other students can skim back and read words, whereas I'd have to reread the whole paragraph again. So, you definitely need any time they're going to give you'. Extra time was viewed as a reasonable and equitable adjustment, as it took students longer to access content with assistive technology than it took their peers to read the content.

In addition to support within the school, half the students reported that external advisory teachers and therapists also assisted. Charlie reported that their advisory teacher 'comes and helps me every second week. She asks me how stuff is going, she reviews all my subjects, what we're doing in the subjects and offers any help'. These external specialists provided assistive technology lessons and orientation and mobility training to navigate the school environment. Adjustments to provide accessibility within the physical environment were also identified. For example, Charlie's school had modified the physical environment by painting potential hazards yellow to ensure they were easily visible to people with low vision. Similarly, Kye said the school made modifications to the location of their classes to ensure they could move quickly through the school campus.

While students reported adjustments within the school were available to support learning, Charlie said there was not the same access for extra-curricular interschool events and external testing:

> My school's very accepting. I feel very comfortable … they give me the choice of what I need to do and what helps me learn best, which I think is the most useful thing. But we had this geography competition, which is out of school, and we didn't have a digital version of that because they didn't get it for us. And then I went to academic services, but no one was there, everything was empty. I've gone to the library to get a photocopy to make it digital. And then I ended up getting an award for it. But then this year the same thing happened. But I just said 'stuff it'. It's not important to me. It's just extra work, [that is not accessible] like other competitions and [the national literacy and numeracy standardised tests].

Charlie also identified that support was not always available for after-school events, which created a barrier to accessing extra-curricular activities.

Parents were an important support for learning. Chris shared that once they had a large amount of homework for their psychology subject, and their mother played a significant role in supporting their access and engagement: 'I'd ask Mum to read this for me. Tell me what this is because I can't see it properly. Sometimes mum would read me big, long pages of stuff'. As stated by participants, important enablers included student-initiated adjustments, support from classroom teachers and specialist teachers, external advisory teachers, therapists, and parents.

Knowledge and use of assistive technology

When asked 'What assistive technology tools do you use to access learning?' students shared listed 16 different types of technology used to access the curriculum, as shown in Figure 3. All students reported using a laptop, with five students also using iPads and an iPhone.

Most students used 'OneNote' as a platform for receiving and storing information from the school, along with emails. Students also mentioned the use of shortcuts or keyboard commands to action items on the computer. Three of the students were braille

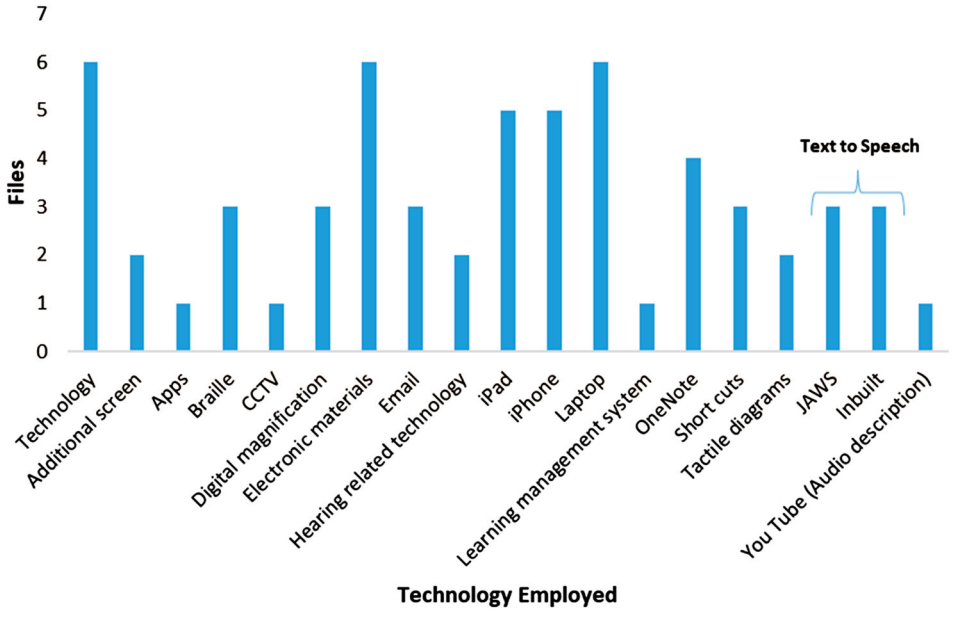

Figure 3. Types of technology used by students.

readers. Kye accessed electronic braille (eBraille) through an eBraille device that connected to their iPhone, iPad, and laptop. Sam used a combination of eBraille and printed braille, while Jo used eBraille, printed braille, and hearing-related technology to access learning. All students used text-to-speech screen readers to access learning. Screen readers inbuilt to the device (accessibility tools provided in mainstream software, such as Voice Narrator from Microsoft and Voiceover from Apple) were used by half the students. The other three students used specialised screen readers, namely Job Access With Speech (JAWS), to access audio information from the screen. JAWS was reported by Sam and Jo to be incompatible with OneNote. The students said to combat this issue, their teachers emailed them the required work.

When the students were asked, 'Do you think you know enough about digital technology to access learning?' most students stated they were good at technology because they had a lot of experience using it. Charlie claimed, 'I'm pretty tech-savvy compared to all my friends'. Kye and Jaime indicated their assistive technology skills were good because they had used technology all of their lives. Jaime had technology lessons from the age of six, therefore had experience with assistive technology prior to senior secondary school. As with Jaime, Jo and Kye stated their knowledge in technology came from explicit lessons in assistive technology. Kye voiced, 'I'm a lot better at technology than some of my mates because I have been shown how to use it'.

Conversely, Chris stated they used their computer as usual, as they were familiar with using computers before losing their vision. Chris said they had advanced skills that assisted curriculum access, as they used shortcuts to access commands and split screens for easier access. Chris preferred to explore technology independently: 'I taught myself how to use it just by playing around and seeing what works and what I like'. Charlie shared why knowing how to use digital technology was important to them:

> We need to use a computer correctly to the level of any other employee and access any computer, not just one with all your software. When people aren't good at technology it just stops them from learning. They spend time on their technology rather than actually doing their work … which means ten minutes more work at home.

Charlie expressed that knowledge of technology was an enabler to accessing the curriculum, but not all students were as confident in their skills. Sam stated, 'I know a bit about technology. But I feel like there's always something to learn and it's always changing, isn't it?' Students reported different levels of knowledge about the use of assistive technology to access learning.

Barriers to using technology

All students reported challenges with their assistive technology when it did not suit their needs, was not working, or made them look different in the classroom. Despite living in a rural area, Jaime had a braille machine and had received assistive technology lessons. However, they did not use braille in secondary school and preferred to use screen readers. Jo described equipment purchased for them, specifically an eBraille machine and a CCTV, which were not working and therefore unable to be used to access the curriculum. Chris also had an eBraille machine but was not interested in learning braille because 'some of the technologies that are offered are just a little bit excessive, because a lot of the stuff they do, you can do with a phone already'. Students shared that although technology could be an enabler, it could also inhibit access to the curriculum if it did not work or was unable to be used.

Discussion

Results from this study indicated that the students' actions showed evidence of students' own implementation of knowledge and skills of the ECC to access the curriculum independently, consistent with McLinden et al.'s (2016) *learning to access* expectation for students in senior secondary school. Students indicated they were learning to access through the variety of self-initiated adjustments, including use of technology such as screen readers. Inbuilt accessibility tools on mainstream devices were preferred by most students in this study, who appreciated that mainstream technology was widely available and more socially accepted in schools and the workforce. Charlie, for example, wanted to use the inbuilt voice function of the computer, rather than the specialised program of JAWs, as the accessibility function would automatically be loaded on computers in the workplace. These findings align with those of McLaughlin and Kamei-Hannan (2018), who highlight that the use of mainstream devices and applications resulted in a decrease in social stigma for people with BLV. For this reason, some advisory teachers promote the use of mainstream devices wherever possible, as she purported it was a more inclusive approach towards learning.

Participants also shared that when not able to access the curriculum independently, assistance was required from parents, teaching staff and specialists to make adjustments, which included the provision of alternate formats through auditory, visual, tactile, and digital means and adaptations to the school environment. Along with teachers reading out course materials, altered font size, altered colour and contrast of printed materials,

provision of brailled or digital materials, along with consideration of physical placement within the classroom. When materials were not accessible, students had to be provided with *access to learning* by teachers, parents and other support staff.

Barriers for students to access learning independently were also reported by participants, specifically in external examinations and extra-curricular activities. In some cases students were removed from testing, which was problematic because participation in secondary schooling for all students is an important goal of the Australian Curriculum (ACARA 2012; Education Council 2019). Practices that discouraged participation negate the intentions of the *Salamanca Statement* (UNESCO 1994a), which states that 'schools should accommodate all students regardless of their physical, intellectual, emotional, linguistic or other conditions' (6). Figures from AIHW (2020) showed that only 34% of people with disabilities complete Year 12 or equivalent in Australia, compared to 66% of people without disabilities. The lower levels of completion for students with disabilities have been attributed, in part, to difficulties accessing curriculum content. If students cannot access examinations equitably, they cannot accurately demonstrate their understanding which may impact subject grade results and tertiary entrance scores necessary for students' future outcomes. Therefore ensuring all students can access content and participate in learning and assessment ensures Australia's commitment to inclusive education and corresponding goals to promote equity for all students (Education Council 2019; UNESCO 1994b).

Conclusions and implications for practice

The authors acknowledge the small sample size as indicative of the low prevalence of secondary aged students with BLV in Australia. This has not detracted from the rich empirical data obtained. It is important to note, that while the students all reported having access and support to education, this is not necessarily the case for all students with BLV, as each student possesses unique characteristics and socio-economic contexts.

Students with BLV experience unique challenges which result in barriers to accessing the curriculum. This is significant, as the curriculum has been rigorously designed to teach students the cognitive skills required in secondary school, along with the personal and social capabilities required to interact with others. These skills contribute to career readiness and preparation for the workforce. The results from this study showed that when students used the disability-specific knowledge and skills gained from the ECC, they were able to make independent adjustments to the curriculum specifically use of assistive technology. This indicates that *learning to access* was an enabler for students to access the curriculum (McLinden et al. 2016).

Despite use of knowledge and skills gained from the ECC all students in this study still required teachers and other experts to adjust learning and teaching materials, to provide *access to learning*. This means that accessibility requirements for students with BLV were not inherent and embedded into the curriculum. Therefore, the way curriculum was presented, impacted students' ability to independently participate in learning. These findings showed the students ecosystem influenced accessibility to learning.

This study has identified the need to develop curriculum materials with accessibility at the forefront to ensure all senior secondary students can access materials. Secondly, professional development is needed for teachers and other stakeholders to prepare students

with BLV to ensure equitable access to learning. Thirdly, the results suggest the importance of frequent and purposeful teaching of compensatory skills to students with BLV. Through engaging with the *Access to Learning and Learning to Access* framework, students with BLV can experience independent and agentic education.

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No potential conflict of interest was reported by the author(s).

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Appendix A

Sample interview questions

1. What sorts of changes have been made for you, or you wish were made for you? (e.g. reduction of glare, lighting, contrast, allowance for visual fatigue, adjustments for exams and assessment)
2. What technology are you using in the classroom now?
3. What technology do you have at home?
4. What technology have you been shown to use? (e.g. low vision devices, adaptive technology, braille, magnification, software, large display devices -e.g. calculators, support teachers – e.g. scribe, text-to-speech, audio books, rest breaks, touch typing)?
5. What sorts of things does your teacher do to support you?
6. Are you consulted when teachers or others are planning how best to assist you?
7. Do you think you know enough about technology to access learning? Why/Why not?
8. What do you think needs to be included in the curriculum for students who are blind or vision impaired?