University Library

MINERVA ACCESS

A gateway to Melbourne's research publications

Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:
White, E

Title:
Strategies for teaching digital literacy to students with multiple disabilities including vision impairment (MDVI): Combining evidence with expertise

Date:
2019

Citation:
White, E. (2019). Strategies for teaching digital literacy to students with multiple disabilities including vision impairment (MDVI): Combining evidence with expertise. Journal of the South Pacific Educators in Vision Impairment, 12 (1), pp.14-48

Persistent Link:
https://hdl.handle.net/11343/233877

License:
Unknown

Journal of the

South Pacific Educators *in* Vision Impairment

Volume 12, Number 1, 2019

ISSN 1443-7597 www.spevi.net

Table of Contents

Role of the SPEVI Journal 4
Presidents' Message 8
Editorial 12
Strategies for teaching digital literacy to students with multiple disabilities including vision impairment (MDVI): Combining evidence with expertise 14
Social Inclusion and High School Students with Visual Impairments 49
The Role of the ECC in Developing Skills for the Successful Transition to Adult Life66
Early learning experiences for children who are blind or have low vision: the building blocks of later Orientation and Mobility (O&M) skills. 74
Documenting Tactile Graphicacy 82
Now you see me…now I see myself. A sequential guide to teaching portraiture to students who are blind and vision impaired. 99
Critical Reflection on Working with Students with Vision Impairment and Complex Needs 103
South Australian School for Vision Impaired Braille Butterflies Program: The metamorphosis to braille proficiency through a whole school approach to literacy 109
Report: Sonokids' Ballyland Apps Update – Olé, and Get Coding! 115
Report: Monash University ARC project investigating 3D printing for accessible graphics 117
Report - Braille education using accessible inclusive digital technologies 118
Report: International Council for Education of People with Visual Impairment 119
Report: UsherKids Australia 123
Report: Vision Australia – Implementing our Four Pillars 2020 124
Report: CVI Community Australia 125
Vale Nicole Donaldson 127
Vale Diana Braun 127
About SPEVI 128

Role of the SPEVI Journal

The South Pacific Educators in Vision Impairment (SPEVI) Inc. is the major professional association for educators of students with vision impairments in Australia, New Zealand and the South Pacific region. SPEVI acts as the professional body in matters pertaining to the education and support of preschool and school-age students who are blind, have low vision, deaf-blindness, or additional disabilities.

The Editorial Committee intends the Journal to be a vehicle for informing researchers, administrators and educators working in government and non-government education organisations, as well as specialist and generic teachers, orientation and mobility (O&M) instructors, allied professionals, parents and others in our communities about research, issues, policies and their implications for practice in Australia, New Zealand and the Pacific Region.

Editorial Committee

Dr Bronwen Scott, Independent Options for Mobility, Victoria, and the Macquarie University, NSW

Dr Frances Gentle AO, RIDBC Renwick Centre, Royal Institute for Deaf and Blind Children; the University of Newcastle and Macquarie University, NSW

Ms Sue Spooner, University of Auckland

Dr Michael Steer, AM, RIDBC Renwick Centre, the University of Newcastle and Macquarie University

Assoc. Prof. Paul Pagliano (Adjunct), School of Education, James Cook University, Townsville, QLD

Editorial Advisory Panel

Dr Jane Brown, Education Queensland

Ms Josie Howse, Braille and Large Print Service, Department of Education and Communities NSW

Ms Michelle Knight, RIDBC VisionEd, Royal Institute for Deaf and Blind Children

Ms Debra Lewis, Statewide Vision Resource Centre, Victoria

Dr Sue Silveira, RIDBC Renwick Centre, the University of Newcastle and Macquarie University

Design of front cover by Lena Karam, RIDBC Renwick Centre, Royal Institute for Deaf and Blind Children

Printing by The Printing Hub, Carrum Downs VIC

© South Pacific Educators in Vision Impairment Inc. ISSN 1443-7597

This work is copyright. Apart from uses permitted under the Copyright Act 1968, no part may be reproduced by any process without written permission from SPEVI Inc. Requests and inquiries should be directed to the Convening Editor, Bronwen Scott, RIDBC Renwick Centre, Private Bag 29, Parramatta NSW 2124 Australia, Email: bronscott@iinet.net.au

Opinions expressed in this publication do not necessarily represent the views or policies of SPEVI, but have been presented to stimulate informed debate.

Permission to Copy

No specific permission is required to photocopy or reproduce a single copy of a complete article as it appears in the Journal of South Pacific Educators in Vision Impairment, if the reprint is for free distribution within an educational organisation or classroom. Permission for other reprinting or re-publication must be obtained from the Editors.

SPEVI Journal Subscription and Membership

SPEVI membership is open to educators, professionals and parent groups supporting children and adults with vision impairments. This Journal is provided free to SPEVI members as part of their annual membership benefits. There is an A$25.00 subscription fee per volume for non-members (A$35.00 for subscriptions outside the Pacific region). Membership information and forms are available on the SPEVI website, http://www.spevi.net/spevi/index.php. Please direct all correspondence regarding JSPEVI subscriptions to the Convening Editor, Frances Gentle.

Call for Articles

Original manuscripts, reports and news items are sought for the refereed and non-refereed sections of the next issue of JSPEVI. Topics appropriate for the journal include, but are not limited to the following:

- original research studies, with practical relevance to education of persons who are blind or vision impaired,
- literature and book reviews,
- conceptual, policy or position papers,
- descriptions, reviews or evaluations of innovative instructional curricula, programs or models of education for persons who are blind or vision impaired, and
- letters to the Editor

Letters to the Editor

Members of the editorial committee wish to encourage discussions of important issues that affect the education of children and adults with vision impairments. The journal should be a vehicle for continuing dialogue about current and future directions. The editorial committee invites letters that explore the many issues facing professionals and families supporting learning with sensory disabilities, particularly those arising from articles in the journal.

Guidelines for Contributors

Manuscripts that are of a scholarly nature should be submitted electronically, with the content subdivided into the following two files:

File 1 Author information

Authors must submit a separate file containing (a) the manuscript title, (b) author or authors' name, professional title/status and organisational affiliation of authors, and (c), preferred contact details (address, email, fax, telephone) for the principle author (or co-author) who will be handling correspondence.

File 2 Manuscript

Manuscript presentation: Manuscripts should be submitted in Arial 11-point font, double line spaced, with left aligned paragraphs, 2.54cm page margins (normal margin setting) and numbered pages. A running title header should be included on each page (with no authorship information included).

Size limit: The preferred size limit for scholarly manuscripts is 5000 words or less. The preferred size of agency reports is one A4 page of single line text.

Abstract: Academic manuscripts should include an abstract of 120 words or less, giving a brief summary of the overall content. The abstract may be followed by a list of key words.

Figures and tables: Numbered figures and tables should be included in the manuscript. Tables should be created using a table function, and figures submitted in Black and White, with consideration to the readability of the figure when reduced for publication.

Referencing guidelines: Citations and references included in manuscripts should conform in style to the American Psychological Association (APA). APA guidelines are available on the Newcastle University website: http://libguides.newcastle.edu.au/apa-6th, or the Curtin University website: http://libguides.library.curtin.edu.au/content.php?pid=141214&sid=1335391.

Acknowledgments and permissions: Please note that authors are responsible for all statements made in their work and for obtaining permission from copyright owners to reprint or adapt a table or figure, or to reprint a quotation of 100 words or more. In such instances, authors should write to the original author(s) and publisher(s) to request non-exclusive world rights in all languages to use the material in the article and in future editions. Please provide copies of all permissions and credit lines obtained. Credit (acknowledgement) should be included in the manuscript for any type of sponsorship, donations or grants, or technical assistance, or to professional colleagues who contributed to the content of the article, but who have not been listed as authors.

Compliance with ethics requirements: For manuscripts reporting original research studies, authors are responsible for ensuring that the reported research has been conducted in an ethical and responsible manner, with full compliance with all ethical requirements and legislation. This includes adherence to privacy and confidentiality guidelines regarding publication of participant information, including de-identification of participants' information and data. Authors must confirm in the manuscript that written consent has been obtained prior to publication if participant information is included. Where such a person is deceased, authors are responsible for securing written consent of the deceased person's family or estate. Authors are encouraged to consult the Australian Government National Health and Medical Research Council's **National Statement on Ethical Conduct in Human Research (2007) – Updated March 2014**, see http://www.nhmrc.gov.au/guidelines-publications/e72.

Manuscript review process: Manuscripts will be acknowledged upon receipt. Following preliminary editorial review, articles will be sent to members of the Editorial Advisory Panel and where warranted, to consulting reviewers who have particular expertise in the subject. This journal uses the "blind review" system. Reviewer feedback will be sent to the author/s with an invitation to revise the manuscript content and/or respond to the reviewers' comments. The review process may sometimes take up to three to four months. The names of consulting reviewers will periodically be published in the journal. Reviewed manuscripts will remain the property of South Pacific Educators in Vision Impairment (SPEVI). Authors will be advised in writing if their manuscripts are not accepted for publication.

Permission to copy: No specific permission is required to photocopy or reproduce a single copy of a complete article as it appears in the Journal of South Pacific Educators in Vision Impairment, if the reprint is for free distribution within an educational organisation or classroom. Permission for other reprinting or re-publication must be obtained from the Editors.

Manuscript submission: Please forward your contributions for the 2020 issue of JSPEVI to the Convening Editor, Dr Bronwen Scott, Email: bronscott@iinet.net.au.

Presidents' Message

Phia Damsma, Dr. Frances Gentle AO, Sharon Duncan, Presidents

Dear Reader,

In preparing this Message, we recognise the contributions of our Convening Editor, Dr Bronwen Scott, the Editorial Committee and Editorial Advisory Panel, and importantly, the authors who have contributed their articles and reports to this 2019 volume of JSPEVI.

As SPEVI Presidents, our role is to support and promote SPEVI's Mission, Vision and Aims, and to encourage activities that enhance the professionalism and professional practice of our members. We are thankful to SPEVI members who have provided leadership or initiated activities on behalf of SPEVI during the year at national and local levels. At the national level, the following members have accepted nomination to the Committees of Management in Australia and New Zealand:

- Presidents: Phia Damsma, Frances Gentle, Sharon Duncan
- Vice Presidents: Melissa Fanshawe (Aust)
- Treasurers: David Rice, Ernie Belk
- Secretaries: Carly Turnbull, Jude Shelley
- SPEVI Web and List Coordinator: Phia Damsma
- JSPEVI Convening Editor: Bronwen Scott
- Representative, Round Table on Information Access for People with Print Disabilities: Phia Damsma
- Representative, International Council for Education of People with Visual Impairment: Ben Clare
- SPEVI Facebook Page: Ben Clare
- SPEVI VI-NDIS Working Group: Michelle Knight
- Public Officer (Australia): Sue Silveira
- Communications (NZ): Yin Yin Htay
- Directors: Pranitha Moodley and Paul Pagliano (Aust), Kay Hood (NZ)

The SPEVI Committees of Management (COM) met on a regular basis during the year, either in person or by teleconference. These meetings are an important way of staying connected and sharing information. The Australian and New Zealand Presidents and Committees of Management have expressed their intention to collaborate more closely with each other, to ensure that SPEVI continues to be a strong and vibrant members' association. Efforts will be made to increase representation of Pacific Island members at the leadership levels of the association, and to promote opportunities for SPEVI members to collaborate and share information. In addition to the regular COM meetings, a meeting of Leaders in Vision Education Services (LIVES) was held in June 2019, in conjunction with the RIDBC vision conference, "VISCON". The next LIVES meeting is scheduled for the January 2020 SPEVI Conference in Adelaide.

SPEVI 2020 Conference

An ongoing activity throughout this year has been the planning, preparation and organising of the SPEVI Conference that will take place at the Pullman Adelaide Hotel, from 12-15 January, 2020. The Conference theme is "Creating a clear vision for the future", and there will be opportunities to learn, share and celebrate the diversity of perspectives and approaches to service delivery. We sincerely thank members of the SPEVI South Australia Local Organising Committee, the SPEVI Committee of Management, and Synergy Events, our event management company, for their hard work and contributions to all aspects of the conference.

The conference venue (Pullman) is excellent, the keynote presentations and program look exciting and informative, and the welcome event and gala dinner offer opportunities for socialising with friends old and new.

Launch of online biennial membership system

An exciting initiative this year has been the launch of SPEVI's online membership system, with all renewals due at the end of May every two years – see https://www.spevi.net/join/. The system enables new members to complete the relevant online membership application form on the SPEVI website; and current members will receive automated reminders prior to May in the renewal year.

SPEVI acknowledges with thanks, the work of Craig Cashmore of PeppaCode in developing and supporting the online system. At the present time, the system accepts memberships from Australia and Pacific Island Countries, with applications from new and renewing New Zealand members directed to the SPEVI NZ Secretary. Discussions have commenced regarding moving SPEVI New Zealand's membership process across to an online system.

SPEVI Surveys

SPEVI has undertaken two member surveys during 2019. The first survey related to the selection of a suitable term for a person's use of a range of media options (e.g. braille, digital, print, audio) for information access and communication. After a decisive outcome to the survey among SPEVI members, with respondents from New Zealand and Australia (NSW, Victoria, Queensland, Tasmania, West Australia and South Australia), SPEVI announced adoption of the term **multisensory media** for use in future publications in May of this year.

The second survey was initiated by Pranitha Moodley and related to use of accessible calculators. To date, the survey has received a great response and the outcome will soon be reported. We hope that Pranitha's survey will be the start of many discussions around STEM on the SPEVI List.

Promotion of projects

SPEVI is an association of, and for, its members, and the Committees of Management in Australia and New Zealand recognise the importance of supporting innovative projects and technologies undertaken by SPEVI members. SPEVI continues to be a proud sponsor of the Monash University "Accessible 3D Printed Graphics" project, a three-year Australian Research Council (ARC) Linkage research project. We congratulate the research team for their work to date and look forward to the project outcomes.

SPEVI members may apply for a funding contribution from SPEVI for projects, activities, or events that are aligned with the SPEVI Vision and Aims. The SPEVI Members Project Submission Form is available on the SPEVI website, and submissions should be sent to the relevant SPEVI Secretary in Australia or New Zealand.

This year, the Committee of Management approved funding for the following two projects that were proposed by SPEVI members. We extend our thanks to Lena Karam of RIDBC Renwick Centre for undertaking the work required to complete these projects.

- Creation of an archive of the presentations and papers of previous SPEVI Conferences. This project has now been completed, and an open access repository of the papers and presentations for the 2013, 2015 and 2017 conferences is available on the 'Conferences' page on the SPEVI website.

- Publication of a booklet by Emma-Mae Schmidt, entitled 'The Blind Girl's Guide to Puberty'. SPEVI's contribution included assisting with the creation of the front cover, formalising the publication so that it can be catalogued by libraries, and posting the booklet on the SPEVI website for easy download.

> This project has been completed and the booklet is available in accessible Word and PDF formats on the SPEVI webpage containing 'Educational Information'. Use Ctrl-F to find the title on the page.

We anticipate that these projects will be appreciated by SPEVI members and other professionals in the field of vision impairment.

Honorary Awards

SPEVI offers honorary life membership and special recognition awards to members who make an outstanding contribution to the field of education of persons with vision impairment. SPEVI New Zealand established the Barbara Armitage Award in 2003, in memory of Barbara Armitage who at the time of her death had been a Resource Teacher Vision based in Dunedin. Members are invited to submit detailed nominations to the SPEVI Committee of Management in Australia or New Zealand. A list of recipients of SPEVI's honorary awards is available on the SPEVI website – see https://www.spevi.net/awards/life-members/

In Memory

On Friday 21 June, our dear colleague, friend and former member of the SPEVI Committee of Management Nicole Donaldson passed away after a long illness. We are grateful for all the valuable contributions that Nicole made to the field of education for students with vision impairment and to our professional association. In honour of Nicole, the SPEVI Committee of Management (COM) has donated a set of DapDots braille readers to Jamboree Heights State School in Queensland. Each book includes the following commemorative dedication to Nicole:

> "This book is provided in loving memory of Nicole Donaldson, a dedicated and inspiring teacher of the blind and vision impaired, who believed the whole world should be in braille!"

We would like to thank Juleeanne Bell and Melissa Fanshawe for their assistance in selecting the commemorative gift in honour of Nicole. Melissa has presented the books to the Head of Special Education at Jamboree Heights State School.

As you may conclude from this message, it has been a busy year. Please be in touch if you wish to discuss any of the above initiatives. We look forward to welcoming you all to Adelaide, for the 2020 SPEVI Conference!

Frances Gentle, Phia Damsma and Sharon Duncan
Presidents of SPEVI

Editorial

Welcome to JSPEVI's twelfth volume. The journal aims to provide a forum for scholarly exchange among organisations and individuals who support and promote education for learners with vision impairment. I am pleased to present a number of papers in this edition of the journal – many thanks to all our contributors!

Our lead paper from Emily White provides research-based strategies to support teachers to scaffold the digital literacy learning of their students with multiple disabilities, including vision impairment. This includes a number of Appendices with detailed and targeted teaching strategies which are available in the on-line version of this edition. This is followed by another research-based paper looking at social inclusion for high school students with vision impairment. Jessop discusses the link between self-determination and social inclusion, suggesting that a self-determination framework is useful to high school social inclusion as it highlights the needs for competence, autonomy and relatedness in school settings.

Sevier's paper looks at the role of the Expanded Core Curriculum (ECC) in helping develop the skills that students with vision impairment need to transition successfully to adult life. In particular, he focusses on the importance of self-determination and career education, and the role of the ISTV in fostering the development of those critical skills. This is followed by a paper from Izzard which looks at another component of the ECC, orientation and mobility. Izzard, who is an early childhood educator, discusses the importance of early learning experiences to the later development of O&M skills, laying out the important 'building blocks' infants and toddlers develop when engaged in active play, and developing self-initiated and purposeful movement.

From the ECC and O&M, we move to tactile graphicacy, or the ability to read, interpret and produce tactile graphics and raised line drawings. Curtin, Lewis and Holloway explore the fundamental skills required to develop tactile literacy, and provides strategies for teaching and engagement. This is followed by a paper from Lily Gower looking at visual arts in the curriculum, and also provides an example of a program designed to introduce self-portraiture to young students with vision impairment.

Lindsey Patti provides a personal account of how she used tools of critical reflection drawn from the nursing profession to improve her own professional practice when advocating for her students, particularly those with complex needs. Jones and Rattray discuss how a whole school approach to literacy has supported braille proficiency at the South Australian School for Vision Impaired. They include a description of how each school day follows a specific theme designed to provide students with a wide range of experiences in pre-braille and tactile concepts.

As always, a number of reports are included to keep you updated with relevant projects happening around the region. There is an update on the Sonokids' Ballyland Apps, a Monash University project investigating 3D printing for accessible graphics, and a report on RIDBC's use of accessible technologies to deliver online information and training programs, including braille education. Ben Clare and Fran Gentle provide an update on what is happening in the wider Pacific region through their connections with the International Council for Education of People with Visual Impairment (ICEVI).

Finally, there is information on two new support groups started by parents and professionals – UsherKids Australia and CVI Community Australia, along with an update from Vision Australia on their new children's services model.

We also sadly acknowledge the passing of two individuals prominent in the vision impairment field. Tribute is made to former member of the SPEVI Committee of Management, Nicole Donaldson, along with Diana Braun, long-standing and active member of the Association of Blind Citizens of NSW/ACT and Blind Citizens Australia.

I hope you enjoy this bumper edition of JSPEVI! Many thanks again to the contributors, and to the JSPEVI Editorial Committee and Advisory Panel for their assistance.

Dr Bronwen Scott
Convening Editor

Strategies for teaching digital literacy to students with multiple disabilities including vision impairment (MDVI): Combining evidence with expertise

Emily White

Abstract

For students with multiple disabilities including vision impairment (MDVI), the skilful use of technology can provide access to learning, yet research suggests that teachers need increased support to teach this capability. To assist teachers to accurately meet the digital literacy learning needs of students with MDVI, this study developed targeted teaching strategies and advice for these students whose Zone of Proximal Development (Vygotsky, 1978) was identified within an empirically validated digital literacy learning progression (White, 2019). Expert review of evidence-based strategies and advice resulted in the enhancement and endorsement of 101 strategies by those with expertise in MDVI and technology education. These strategies can support teachers to scaffold the digital literacy learning of their students with MDVI.

Key Words

Digital literacy, multiple disabilities including vision impairment (MDVI), teaching strategies, evidence-based teaching, learning progressions, technology.

Digital Literacy for Students with MDVI

For many students with disability, the nature and severity of their disability may impact on social inclusion, learning, and educational needs (Kuper, 2014; Tuersley-Dixon, 2016) due to interactions with physical, informational, and socio-cultural barriers. It could be argued that students with multiple disabilities including vision impairment (MDVI) face some of the most substantial barriers to accessing their rights to learning and to being able to interact with others for the purposes of learning (United Nations [UN], 2006), due to the “complex, interactional and multiplicative” (Bruce, 2011, p. 291) impacts of multiple disabilities that can affect performance in school (Heller, 2004). Digital technology use can play an important role in enabling students with MDVI to access learning and social interaction.

Students with MDVI

For the purposes of this study, students with MDVI are defined as those with a diagnosed vision impairment in addition to one or more other disabilities, which must

include intellectual disability. The caveat of intellectual disability is included as this study was situated within a broader research project by White (2019) that focused on students whose primary disability was intellectual, but who may have had additional disabilities, such as, but not limited to, vision impairment, d/Deafness or being hard of hearing (DHH), physical disability, and/or autism spectrum condition. Since the research community does not have a firm agreement regarding the nomenclature to describe students with multiple disabilities including vision impairment (McLinden & McCall, 2016), the term MDVI has been applied due to its current general use in research literature.

Digital Technology Use to Access Learning

While other areas of the general curriculum, such as literacy and numeracy, remain critically important to students with disability, many curriculum areas require the effective use of digital and/or assistive technology to access informational and social opportunities for learning in these areas (Israel, Marino, Delisio, & Serianni, 2014). Digital literacy capability, coupled with any digital and/or assistive technology required, is suggested to enable students with disability to access the same curriculum content as students without disability (Puckett, 2011; Starcic & Bagon, 2014). Achieving equitable informational access can have a positive effect on the educational success of students with disability (Draffan, Evans, & Blenkhorn, 2007; Subramaniam, Oxley, & Kodama, 2013) and with digital literacy capability, can support their curricular learning (Farmer, 2009; Stone-MacDonald, 2015) and improved post-school options (Wolffe & Kelly, 2011). Alper and Goggin (2017) considered that technology use could also help circumvent barriers to social inclusion in learning, as “digital technologies offer children with disabilities tools and platforms for belonging and cultural exchange hitherto denied” (p. 730). By addressing the capabilities needed to use digital technologies, digital literacy is thus proposed to enable social learning (Carrington & Robinson, 2009) and mitigate social exclusion (Warschauer, 2003), the latter noted as a common experience for students with disability (Diaz, 2010; Gold, Shaw, & Wolffe, 2010). As McKeown stated,

When you reflect that, in the past, many young people with a sensory impairment rarely communicated with anyone who wasn’t in the same room as them, you begin to appreciate the impact that technology has had on their lives. It has opened up a whole world of contacts and experiences. (2000, p. 41)

The Construct of Digital Literacy

Substantial international discourse within the field of technology learning has sought to understand the nature of this learning; for an introduction to the complexity of the discussion, see Lankshear and Knobel (2015). White’s (2019) research to develop and validate an assessment and derived learning progression of digital literacy

learning for students with disability required a novel construct definition of digital literacy:

As a situated social practice, digital literacy is here defined as being able to interpret and use the symbols, text/graphics, and tools of digital technology and networks, and also the ability to do so in a culturally appropriate manner. Digital literacy, combined with any required assistive technology, offers an increased ability to access, create, share, and organise social, information, communication, and education opportunities, while participating in the digital, networked environment that has fast become a sociocultural norm in the 21st century. (White, 2019, p. 74)

For some students with disability, using digital technology may be difficult, if not impossible, without the use of assistive technology (Forlin, Chambers, Loreman, Deppeler, & Sharma, 2013; United Nations Educational Scientific and Cultural Organisation [UNESCO], 2006). Assistive technology can be understood as those technologies that serve to maintain or improve the capacity of a person with disability to function and participate (World Health Organisation, 2018). These may include specialised software or hardware, such as screen magnification software, or commonly used software or hardware, such as a computer. White's (2019) research, from which this study is derived, was inclusive of assistive technology use to enable access to common digital technologies (e.g., tablets).

The Digital Literacy Learning Progression for Students with Disability

For teachers of students with disability seeking to teach digital literacy capability, an empirical learning progression, such as White's (2019), can support teacher understanding of how this capability unfolds in students for the purpose of planning and teaching. Learning progressions describe a pathway of learning within a domain that occurs over an extended time period so to provide an understanding of how increased sophistication in thinking and skills can be expected to develop, with the support of a teacher (Heritage, 2008). Using this approach, learning is not described as being restricted to age or grade/year in school, so learning goals can focus on achieving the next step, or level, in the learning progression, rather than being compared to age- or grade-equivalent peers without disability, or peers who have different amounts of skill or knowledge. Empirical learning progressions rely on the statistical analysis of data to plot an expected learning pathway for those represented by the data sample. White's (2019) empirical digital literacy learning progression was validated for use with students with disability regardless of age, gender, or the nature or severity of disability, including MDVI (White, Woods, & Poed, 2017). See Table 2 for a summarised version.

Targeting Teaching and Learning Using Learning Progressions

Since empirical learning progressions describe an expected trajectory of learning based on data, a teacher can use the descriptions of a student's current and next level as described by the learning progression to determine what the student is likely to be ready to learn next – the student's Zone of Proximal Development (ZPD) (Vygotsky, 1978). For example, a student ready to consolidate about half of the learning within a learning progression level should have learning goals set which support the achievement of that learning, while including goals drawn from the next level when the student has demonstrated achievement of those skills or knowledge at the current level. The student may also still need to build some skills or knowledge from a lower level as well.

Initial Development of Targeted Teaching Strategies

The learning and teaching cycle should include the determination of a student's current abilities and point of readiness to learn, or ZPD (Vygotsky, 1978), in order to set targeted individualised learning goals (Griffin, Francis, & Robertson, 2018). To plan the attainment of these targeted goals requires the identification of evidence-based interventions to support the student's learning, and determination of those most likely to be effective for that student. White's (2019) research to develop and validate a digital literacy assessment tool and derived learning progression included the development of teaching strategies and advice that addressed each of the six identified levels of the learning progression, so to provide teachers with a holistic approach to planning for, and teaching, digital literacy to students with intellectual disability who may have additional disabilities. This list of teaching strategies and advice targeted to each level of the digital literacy learning progression was developed via a process which valued the input of teachers with experience in teaching technology use to students so described. The following sections describe the curation of these initial teaching strategies and advice, and their review by teachers with expertise in the education of students with primarily intellectual disability and in technology education. Further investigations were then undertaken to explore and improve the validity of the list of strategies and advice for use with students with MDVI via a review by professionals with dual expertise in the education of students who have vision impairment or MDVI, and in technology education.

Locating Empirically Based Teaching Strategies

The initial stage of developing a list of targeted teaching strategies and advice involved a review of empirical studies that identified practices likely to support digital literacy learning in students with disability. Published in peer-reviewed academic journals, these studies (e.g., Cihak, Wright, C. C. Smith, McMahon, & Kraiss, 2015; Edrisinha, O'Reilly, Choi, Sigafoos, & Lancioni, 2011; J. L. M. Smith, Sáez, & Doabler, 2016; Jones & Hensley-Maloney, 2015; Spooner, Knight, Browder, & Smith, 2012) identified teaching practices that supported gains in learning, particularly for

students with disability, and in digital literacy capability. Information from edited books (e.g., Archer & Hughes, 2011; Hall, Meyer, & Rose, 2012) was included which regarded the education of students with disability via teaching strategies appropriate to digital literacy learning. Further information on the sources of the strategies can be found in White (2019). The guidance from these resources was crafted into statements of teaching strategies and advice that were aimed at teachers of students with disability who may or may not be familiar with teaching these students, or teaching digital literacy capability. Suitable draft statements were allocated to levels within White's (2019) learning progression according to how well they addressed the learning expected in each level. These statements were aimed at students with primarily intellectual disability, as per the focus of White's (2019) larger study, though sought to be inclusive of students who had additional disabilities as well as intellectual disability.

Applying Teacher Expertise

To improve the quality of the teaching strategies and the accuracy of their targeting to the levels of the learning progression, review and drafting activities were undertaken with teachers with expertise in teaching digital technology use to students with primarily intellectual disability in a one-day panelling workshop. Ten specialist education teachers, four researchers in learning intervention and educational assessment, and a stakeholder representative from the Victorian Government Department of Education and Training's Student Wellbeing Division attended. The teachers included three information and communications technology (ICT)/digital technology coordinators, a school curriculum leader, and a doctoral student researching digital technology use to support primary students' learning, who was also a lecturer in ICT skills for teachers. The ten specialist teachers represented a range of specialist schools, including those dedicated to the education of students with mild, moderate, and profound intellectual disability, with physical disability/health impairment, and/or with autism spectrum condition. The four researchers and the government representative served as observers who asked questions during discussions.

In pairs, the teachers reviewed the collated teaching strategies and advice and drafted additional strategies based on their knowledge and expertise. As a group, the teachers reviewed the decision-making of each pair and added or modified strategies to support the relevance of the strategies for the range of students working within the digital literacy learning progression and their applicability to teachers regardless of school context or experience in teaching students with disability and/or technology use. Feedback from the ten participating teachers regarding the wording and targeting of statements was used to revise the strategies and advice. By the end of the workshop, consensus was reached among the specialist teachers for the list of teaching strategies and advice. They endorsed 113 draft strategies and advice as being:

- suitable to support the digital learning of students with disability within each learning progression level;
- respectful of students with disability, regardless of age or the nature or severity of their disability, and
- useful for teachers, regardless of educational setting or expertise in teaching students with disability and/or teaching digital literacy.

Refining Teaching Strategies for Students with MDVI

Specialist knowledge was sought from those with specific content knowledge and familiarity with sub-groups within in the target population, as per advice from Wolfe and Smith (2007a) to support content accuracy and accessibility by all intended users. Professionals with expertise and experience in digital technology teaching and in the student sub-groups under-represented in the first workshop, such as students with MDVI, were thus engaged to further panel the draft list of 113 teaching strategies and advice for these sub-groups. A panel of three experts in vision impairment and technology education who had substantial experience in teaching technology use to students with MDVI reviewed and revised these strategies for students with MDVI.

Panelling with Experts in Vision Impairment/MDVI and Technology Education

Students who are not able to use vision well, or at all, to access and participate in learning may require alternative teaching approaches, such as those that use touch and/or sound to share information, as well as instruction in assistive technology use to access common digital technology (Ferrell, Bruce, & Luckner, 2014). As most students with disability experience multiple disabling conditions (Australian Institute of Health and Welfare, 2004), many students with vision impairment have additional disabilities. Due to vision impairment being a very low incidence disability in children (Solebo & Rahi, 2014), most teachers do not have experience or specialist qualifications in teaching students with vision impairment, including students with MDVI. Expert advice was therefore sought regarding teaching strategies and advice for the specific digital literacy learning needs of students with MDVI who were identified as working within White’s (2019) digital literacy learning progression levels, so to better support their teachers.

Three professionals with dual expertise in vision impairment education and in teaching technology use to students with vision impairment, MDVI, or d/Deafblindness were identified through their professional reputation. They were recruited from two of the leading centres in educational expertise for students with vision impairment in Australia, and from an international assistive technology company specialising in vision impairment and d/Deafblindness. One expert was a qualified specialist vision impairment teacher and former classroom teacher. Another

expert was a qualified specialist vision impairment teacher and an assistive technology professional. The third expert was an assistive technology professional who identified as a person who is blind and used assistive technologies. All three regularly taught digital and assistive technology use to school-aged students with vision impairment, MDVI, or d/Deafblindness and provided related professional learning to teachers. Each had over ten years' experience in working with students who had vision impairment or MDVI, and with using digital and assistive technology for teaching and learning.

Each of the three experts on the panel was given the draft strategies and advice targeted to the learning progression levels, as well as a demographic questionnaire regarding their profession, use of digital and assistive technology for teaching and learning, and years of experience with working with students with disability, and experience with using digital and assistive technology for teaching and learning. Feedback was sought from the experts about the suitability of the draft teaching strategies and advice for students with MDVI. They were also asked to modify any strategies and advice and/or provide any additional strategies or advice as they saw fit.

Scoring feedback

The experts were asked to score the draft teaching strategies and advice with a 2, 1, or 0 regarding the applicability of the strategy or advice statement for school-aged students with MDVI working within the six levels of White's (2019) digital literacy learning progression. A score of 2 was given to strategies or advice that the expert would use often or with most of these students, a score of 1 for those which the expert would use sometimes or with some students, and 0 assigned to those that the expert would not use. Table 1 depicts the scoring analysis outcomes, which indicated strong overall support from all three experts on the panel. Endorsement was analysed by recording the total number of 0 scores for each strategy. The infrequency of 0 scores indicated that the experts agreed that nearly every strategy was applicable to some, if not most, students with MDVI. Such strong endorsement provided a further argument for the consequential validity of the assessment tool and derived learning progression, since these general strategies could be applied to students with unique learning needs due to having MDVI.

Table 1

Scores Assigned to the Teaching Strategies and Advice in Each Level by Experts in Vision Impairment/MDVI and Technology Education

Level	Number of strategies/ advice statements in level	Number of 0 scores in total	% of 0 scores	% of scores of 1 or 2
1	24	1	1.4%	98.6%
2	19	2	3.5%	96.5%
3	16	1	2.0%	98.0%
4	16	1	2.1%	97.9%
5	18	4	6.7%	93.3%
6	20	2	3.9%	96.1%

Results of the Spearman correlation between the scores assigned to each of the teaching strategies by the three experts indicated a significant positive association between the first and second expert ($rs(109) = .41$, $p < .001$), between the first and third expert ($rs(81) = 0.44$, $p < .001$), and between the second and third expert ($rs(77) = 0.33$, $p < .001$). These findings suggested strong agreement between the experts regarding the applicability of the strategies for students with MDVI. As each expert was experienced in the technology-specific education of students with MDVI, yet had different areas of additional expertise or experience, their agreement on the usefulness and quality of the strategies offered a substantial argument for the strategies' validity for students with MDVI.

Written feedback

Most comments from the three experts suggested slight wording changes to be more inclusive of the learning approaches common to students with MDVI, such as auditory feedback, tactile objects, and braille resources as appropriate. One expert addressed the challenge of teaching the use of technologies that are less accessible to students who use braille: "The iOS and computing environments are not so accessible for our very early users of braille as there is a literacy element. However, what about other tactual experiences, toys (vibrational), etc., which can be included with the development of technology skills?". The experts emphasised descriptive language use when teaching this cohort of students, suggesting, "Introduce the student to common controls, allowing them to look at/feel/press them, and point out the typical features of them, e.g., 'This is the space bar. It is usually long, going from left to right, and is in the centre and front of the keyboard'". The experts encouraged regular repetition of learning experiences and connecting new experiences to familiar ones, such as using an audio recording of a family member's voice on a new device.

Many comments included examples of technology use to support student access to information and communication, and recommended teaching touch typing as soon as practicable. Several comments suggested specific teaching activities, such as,

With the teacher using their own device and the student using theirs, take turns to initiate each step and then the other copies…. If the student does not know what to do at their turn, give prompts in the student's preferred format such as verbal. This helps to make the process a game-like process and alleviates the pressure of the student recalling each step.

Piloting with representative end users

In addition to panelling with professionals with expertise in the education of students with low incidence disabilities, the teaching strategies were also piloted with representatives of end users, as recommended by Wolfe and Smith (2007b) to develop evidence for content validity. A piloting workshop was held for sixteen teachers from a specialist school that catered for students whose primary disability was mild to profound intellectual disability. The participants scored and provided written feedback on the strategies in the same manner as the specialist experts. This feedback was incorporated with that of the specialist experts in the final review of the teaching strategies and advice for students with MDVI, to provide strategies that were not only specific to the unique learning needs of students with MDVI, but easy for those without expertise in MDVI education to understand and implement.

Applying Feedback to Finalise Teaching Strategies for Students with MDVI

While the additional information provided by the three experts in teaching technology use to students with vision impairment/MDVI would be likely highly beneficial for less experienced teachers of a student with MDVI, to include all suggestions and modifications in a single document would have made the strategies too lengthy and detailed for most teachers to access readily. In addition, the specificity of many strategies targeted for students with MDVI may have meant that teachers would have found these inapplicable to students who could access visual information well. Two versions of the teaching strategies were thus devised. In the first version, a balance was sought to include sufficient strategies aimed at students with MDVI, while recognising that such approaches might be less useful or inappropriate for the majority of students who access information well through vision. As a result, this broader list of strategies in White (2019) are inclusive of students with MDVI, as well as those with other disabilities.

In the second version of the strategies aimed at students with MDVI, the advice of the experts in vision impairment and technology education was given a greater weight in the determination of strategies, and refined where appropriate with the feedback from piloting. This list aimed to provide detailed support to those teachers

who may work mainly with students with MDVI, or who desire additional specific strategies to assist in teaching their student/s with MDVI. The list also sought to highlight, privilege, and promote the deep knowledge of those rare professionals with specialist experience, and expertise in vision impairment, including MDVI, coupled with technology education.

Ranking and Ordering Strategies

The mean of the scores assigned to each strategy by the experts in vision impairment and the piloting workshop participants was calculated and used to determine which strategies were considered the most useful for students with MDVI. Across all six levels, most strategies were ranked similarly by the two groups. Given the different focus of the groups, the most common and largest differences in opinion related to strategies designed for students with MDVI. As the means assigned by the two groups were very similar for most strategies, to determine the most highly regarded strategies for students with MDVI, the strategies were first ranked using the scores assigned by the experts in vision impairment education. Strategies that were scored less than 1.5 by these experts were removed, as these were likely to only be useful for a few students with MDVI. From the 113 original draft strategies and advice statements, 101 were endorsed by the three experts in vision impairment/MDVI and technology education for use with students with MDVI. Any strategies with the same score from the panel were then ranked by the score assigned by the piloting workshop participants from the specialist school.

An example of the outcomes of the ranking process is displayed in Table 2.

Table 2

Sample Draft Teaching Strategies for Students with MDVI from Level 2 as Compared by Mean Scores from the Panelling Group and the Piloting Group

Draft teaching strategy	Vision impairment/ MDVI education experts	Workshop participants from specialist school
	Mean score	Mean score
As far as possible, provide a calm and comfortable environment for learning to explore and use digital technology in order to minimise unnecessary distractions.	2.00	2.00
Have an assistive technology assessment completed by a qualified professional to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps.	2.00	1.63
As appropriate for the student, consider placing your hand under the student's hand to help the student learn the hand shape and action needed to interact with a device or program/app, such as pressing a switch or swiping a screen, and to offer the student the choice of when to interact with the feature.	2.00	1.50

Targeted Teaching Strategies for Students with MDVI

The teaching strategies and advice in Table 3 are a sample of the full list (see the Appendix) of the 101 endorsed strategies for students with MDVI working within the digital literacy learning progression levels. A brief description of each level is included for contextualisation. Some strategies are repeated across more than one level, as the experts determined these strategies were relevant for students working in multiple levels.

Table 3

Digital Literacy Learning Progression Level Descriptions (White, 2019) and Selected Targeted Teaching Strategies/Advice

Level	Level description	Targeted teaching strategy or advice
1	The student attends and/or reacts to digital technology being used, and to the content on digital technology devices, such as images or sounds. S/he is starting to interact with features of digital technology with support.	Position the student in an environment which is optimal for focusing on a device or program/app. Consider and address the impact of any visual, hearing, or physical needs of the student when using digital technology, such as whether s/he can see or hear the content, if screen magnification or headphones are needed, or how the student might interact with the device.
2	The student is beginning to follow single-step directions and/or relies on adult support to explore and use digital technology. S/he is starting to make a choice between two familiar digital activities. The student may recognise when something new is introduced via digital technology, or when digital technology is not working.	Consider the student's strengths, preferences, and interests, and how available technologies can be used to support his/her learning for a task at hand. If possible, incorporate familiar photos, images, or symbols into a familiar device or a program/app to increase the student's opportunities to respond to them.
3	The student is beginning to use familiar digital technology to achieve his/her own ends, by working from directions, single-step routines, or prior experience. S/he is starting to request and may maintain interest in using familiar digital technology. S/he is learning to identify familiar digital technology symbols.	Use a range of content types and subject material to engage the student and help generalise his/her learning.
4	The student is learning to apply prior knowledge of familiar digital technology. S/he is starting to follow rules, group procedures, and	Give specific praise and targeted feedback (e.g., "I like how fast you tapped the screen, now try with one finger"), connecting actions with the

	instructions to complete tasks, create and save own content, and explore new functions and symbols. S/he may express likes and dislikes about digital technology, and is beginning to use digital technology terms to describe actions or intentions.	outcome (e.g., "You touched the close button, now the app is closed") to help the student know what s/he did well, what to work on next, and why a desired outcome did or did not happen.
5	The student is learning to identify strategies and guidelines to organise his/her own use of digital technology, including safe handling and care. S/he is starting to apply problem-solving strategies to determine the appropriate device for a task, and to resolve issues with digital technology. S/he is learning to attend to and persist in using familiar digital technology for a task.	Place visual, audio, and/or tactile supports for digital technology rules and guidelines where the student can easily access them to help him/her recall and follow expectations. Use pictures, symbols, and/or concrete objects to support the student's understanding of technical or difficult terms.
6	The student is learning to control and manage his/her own use of digital technology, including device use, file management, and sharing and editing content. S/he is starting to explain the purpose and personal importance of strategies and reasons for using different features of digital technology.	Break a digital technology procedure, such as uploading a file, into small steps, then explicitly teach each step systematically with frequent repetition, to help the student understand and complete each step. Ask the student to explain the steps in a task to determine his/her understanding of the process. Provide step-by-step directions with screenshots or other images of steps in a process, such as uploading a file. Offer repetition of skills over days and weeks to allow for practice and rehearsal of information.

These teaching strategies and advice were developed as a support for teachers to use in conjunction with their professional judgement regarding the appropriateness of each strategy or advice statements to scaffold the digital literacy learning of individual students with MDVI working within the levels of White’s (2019) digital

literacy learning progression. It is expected that not all strategies or advice will be useful for all students with MDVI, due to the individuality of each student, and that some strategies or advice may need to be further modified by a teacher to meet the learning needs of their student with MDVI. It is recommended that qualified specialist teachers in vision impairment are consulted when planning for the digital literacy learning of students with MDVI, so to provide expertise in understanding and addressing the complex learning profiles of these students, and promote the best outcomes for their learning.

Considerations for Validity and Next Steps

Drawing on the recommendations of Wolfe and Smith (2007b) to use a process of review by subject matter experts for the purpose of supporting validity claims, the refinement and endorsement of the strategies through panelling and piloting with those with specific expertise and experience provided evidence of content validity. Evidence of connections between the teaching strategies and advice, the learning progression, and the underlying modified taxonomy used (Dreyfus & Dreyfus, 1980) was found to support further validity arguments for the strategies (White, 2019). As these strategies were panelled and piloted by a total of 26 teachers from 17 specialist schools, and further panelled with three experts in technology education for students with vision impairment, including MDVI, piloting the strategies with classroom teachers in mainstream schools, and panelling with a greater number of experts in technology education for students with vision impairment, including MDVI, would allow the validity of the strategies for students with MDVI to be further examined. To explore their effectiveness, it is recommended that future research investigate the impact of the strategies on the learning of students with MDVI to determine which strategies support the greatest gains in learning. Lastly, research should be undertaken into the validity of the strategies in international contexts, including in non-English speaking areas, as Australian students with MDVI are not unique in their right to access equitable digital literacy teaching and learning (United Nations [UN], 2006).

During the panelling process with professionals with expertise in the technology education of students with vision impairment or MDVI, a comment from one expert noted the applicability and pragmatism of the strategies. The expert wrote, “I have a tendency to gravitate towards tools that are practical, intuitive and have a sense of purpose. This, I think your work does this.” This commendation, coupled with the endorsement of the strategies by the ten specialist teachers, and the three experts in vision impairment/MDVI and technology education, suggested several positive outcomes. Firstly, that arguments could be made for the strategies’ face validity for those with specific expertise in teaching digital technology use to students with primarily intellectual disability. Secondly, that arguments could be made for the consequential validity of the assessment tool, as the derived learning progression could support teacher decision-making for targeted learning interventions. Lastly,

that the holistic approach to planning and teaching provided by the integrated use of White's (2019) derived digital literacy learning progression and the targeted teaching strategies was considered to be of substantial value as a support for teachers.

As a response to calls for increased supports for teachers of students with disability in teaching digital literacy in general, and the potential for effective digital technology use to enable these students, particularly those with MDVI, to access learning and social interaction, this work provides an important practical contribution in assisting teachers to meet the digital literacy learning needs of their students with MDVI. Teachers can be confident of the quality and validity of the targeted teaching strategies and advice to build the digital literacy capability of their students with MDVI, and, when used with White's (2019) assessment tool and learning progression, can apply a comprehensive approach to understanding, planning for, and teaching this critical 21st century skill (Griffin, McGaw, & Care, 2012).

Acknowledgements

This study was part of the Students with Additional Needs (SWANs) General Capabilities Research, which was funded by an Australian Research Council Linkage Grant (LP140100163) in partnership with the University of Melbourne and the Victorian Government Department of Education and Training. The author wishes to thank Dr Kerry Woods and Associate Professor Shiralee Poed for their guidance and assistance, Ms Karen Underwood from the Victorian Government Department of Education and Training, the experts in technology education and vision impairment education, including MDVI, and the other specialist teachers whose efforts, experience, and expertise underpinned this research.

References

Alper, M., & Goggin, G. (2017). Digital technology and rights in the lives of children with disabilities. *New Media & Society, 19*(5), 726-740. doi:10.1177/1461444816686323

Archer, A. L., & Hughes, C.A. (2011). *Explicit instruction: Effective and efficient teaching*. New York, NY: Guilford.

Australian Institute of Health and Welfare. (2004). Children with disabilities in Australia (AIHW cat. no. DIS 38). Retrieved from http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442455787

Bruce, S. M. (2011). Severe and multiple disabilities. In J. M. Kauffman & D. P. Hallahan (Eds.), *Handbook of special education* (pp. 291-303). New York, NY: Routledge.

Carrington, V., & Robinson, M. (2009). *Digital literacies: Social learning and classroom practices.* London, UK: Sage.

Cihak, D. F., Wright, R., Smith, C. C., McMahon, D., & Kraiss, K. (2015). Incorporating functional digital literacy skills as part of the curriculum for high school students with intellectual disability. *Education & Training in Autism & Developmental Disabilities, 50(*2), 155-171. Retrieved from https://www.jstor.org/stable/24827532

Diaz, A. M. (2010). School memories of young people with disabilities: An analysis of barriers and aids to inclusion. *Disability and Society, 25*(2), 163-175. doi:10.1080/09687590903534346

Draffan, E. A., Evans, D. G., & Blenkhorn, P. (2007). Use of assistive technology by students with dyslexia in post-secondary education. *Disability & Rehabilitation: Assistive Technology, 2*(2), 105-116. doi:10.1080/17483100601178492

Dreyfus, S. E., & Dreyfus, H. L. (1980). *A five-stage model of the mental activities involved in directed skill acquisition*. Berkeley, CA: University of California Berkeley.

Edrisinha, C., O'Reilly, M. F., Choi, H. Y., Sigafoos, J., & Lancioni, G. E. (2011). "Say cheese": Teaching photography skills to adults with developmental disabilities. *Research in Developmental Disabilities, 32*(2), 636-642. doi:10.1016/j.ridd.2010.12.006

Farmer, L. S. J. (2009). School library media specialist collaboration with special education personnel in support of student learning. *Evidence Based Library and Information Practice, 4(*2), 37-55.

Ferrell, K. A., Bruce, S., & Luckner, J. L. (2014). Evidence-based practices for students with sensory impairments. Gainesville, FL: University of Florida Collaboration for Effective Educator, Development, Accountability, and Reform Center. Retrieved from: http://ceedar.education.ufl.edu/wp-content/uploads/2014/09/IC-4_FINAL_03-30-15.pdf

Forlin, C., Chambers, D., Loreman, T., Deppeler, J., & Sharma, U. (2013). Inclusive education for students with disability: A review of the best evidence in relation to theory and practice. Retrieved from https://www.aracy.org.au/publications-resources/command/download_file/id/246/filename/Inclusive_education_for_students_with_disability_-_A_review_of_the_best_evidence_in_relation_to_theory_and_practice.pdf

Gold, D., Shaw, A., & Wolffe, K. (2010). The social lives of Canadian youths with visual impairments. *Journal of Visual Impairment and Blindness, 104*(7), 431-443.

Griffin, P., Francis, M., & Robertson, P. (2018). Collaborative teaching teams. In P. Griffin (Ed.), *Assessment for teaching*. Cambridge, UK: Cambridge University Press.

Griffin, P., McGaw, B., & Care, E. (2012). *Assessment and teaching of 21st century skills*. Dordrecht, Netherlands: Springer.

Hall, T. E., Meyer, A., & Rose, D. H. (Eds.). (2012). *Universal design for learning in the classroom.* New York, NY: Guilford.

Heller, K. W. (2004). Integrating health care and educational programs. In F. P. Orelove, D. Sobey, & R. K. Silberman (Eds.), *Educating children with multiple disabilities: A collaborative approach (*4th ed., pp. 379-424). Baltimore, MD: Paul H. Brookes.

Heritage, M. (2008). Learning progressions: Supporting instruction and formative assessment. Retrieved from http://www.ccsso.org/documents/2008/learning_progressions_supporting_2008.pdf

Israel, M., Marino, M., Delisio, L., & Serianni, B. (2014). Supporting content learning through technology for K-12 students with disabilities (Document No. IC-10). Gainesville, FL: University of Florida Collaboration for Effective Educator, Development, Accountability, and Reform Center. Retrieved from http://ceedar.education.ufl.edu/tools/innovation-configurations/

Jones, B. A., & Hensley-Maloney, L. (2015). Meeting the needs of students with coexisting visual impairments and learning disabilities. *Intervention in School & Clinic, 50*(4), 226-233. doi:10.1177/1053451214546401

Kuper, H., Dok, A.M.V., Wing, K., Danquah, L., Evans, J., Zuurmond, M., & Gallinetti, J. (2014). The impact of disability on the lives of children: Cross-sectional data including 8,900 children with disabilities and 898,834 children without disabilities across 30 countries. *Public Library of Science One, 9*(9), e107300. doi:10.1371/journal.pone.0107300

Lankshear, C., & Knobel, M. (2015). Digital literacy and digital literacies: Policy, pedagogy and research considerations for education. *Nordic Journal of Digital Literacy, 10(*Jubileumsnummer), 8-20.

McKeown, S. (2000). *Unlocking potential: How ICT can support children with special needs.* Birmingham, England: Questions.

McLinden, M., & McCall, S. (2016). *Learning through touch: Supporting children with visual impairments and additional difficulties.* New York, NY: David Fulton.

Puckett, K. (2011, June). *Technology applications for students with disabilities: Tools to access curriculum content.* Paper presented at the EdMedia: World Conference on Educational Media and Technology, Lisbon, Portugal.

Solebo, A. L., & Rahi, J. (2014). Epidemiology, aetiology and management of visual impairment in children. *Archives of disease in childhood, 99*(4), 375-379. doi:10.1136/archdischild-2012-303002

Smith, J. L. M., Sáez, L., & Doabler, C. T. (2016). Using explicit and systematic instruction to support working memory. *Teaching Exceptional Children, 48*(6), 275-281. doi:10.1177/0040059916650633

Spooner, F., Knight, V., Browder, D., & Smith, B. (2012). Evidence-based practice for teaching academics to students with severe developmental disabilities. *Remedial and Special Education, 33*(6), 374-387. doi:10.1177/0741932511421634

Starcic, A. I., & Bagon, S. (2014). ICT-supported learning for inclusion of people with special needs: Review of seven educational technology journals, 1970-2011. *British Journal of Educational Technology, 45*(2), 202-230. doi:10.1111/bjet.12086

Stone-MacDonald, A. (2015). Using iPad applications to increase literacy skills for children preK to grade 3 with disabilities. *Young Exceptional Children, 18*(3), 3-18. doi:10.1177/1096250614535220

Subramaniam, M., Oxley, R., & Kodama, C. (2013). School librarians as ambassadors of inclusive information access for students with disabilities. *School Library Research, 16*, 1-34.

Tuersley-Dixon, L., & Frederickson, N. (2016). Social inclusion of children with complex needs in mainstream: Does visibility and severity of disability matter? *International Journal of Developmental Disabilities, 62*(2), 89-97. doi:10.1179/2047387715Y.0000000011

United Nations [UN]. (2006). Convention on the Rights of Persons with Disabilities. Retrieved from http://www.un.org/disabilities/convention/conventionfull.shtml

United Nations Educational Scientific and Cultural Organisation [UNESCO]. (2006). *ICTs in education for people with special needs: Specialized training course*. Moscow, Russia: UNESCO Institute for Information Technologies in Education.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman Eds.). Cambridge, MA: Harvard University Press.

Warschauer, M. (2003). *Technology and social inclusion: Rethinking the digital divide.* Cambridge, MA: MIT Press.

White, E. H. (2019). *Digital literacy for students with disability: Recognising ability and supporting learning through assessment, evidence, and expertise.* (Doctoral dissertation), The University of Melbourne, Melbourne, Australia. Retrieved from http://hdl.handle.net/11343/224996

White, E. H., Woods, K., & Poed, S. (2017). *The assessment and development of digital literacy in students with vision impairment and additional learning*

needs: Preliminary findings from a current PhD study. Proceedings from the 9th International Council on the Education of People with Vision Impairment European Conference, Bruges, Belgium. Retrieved from http://www.icevi-europe.org/files/2017/empowered-by-dialogue/icevi-europe-2017-proceedings.pdf

Wolfe, E. W., & Smith, E. V., Jr. (2007a). Instrument development tools and activities for measure validation using Rasch models: Part I - Instrument development tools. In E. V. Smith & R. M. Smith (Eds.), *Rasch measurement: Advanced and specialized applications* (pp. 202-242). Maple Grove, MN: JAM Press.

Wolfe, E. W., & Smith, E. V., Jr. (2007b). Instrument development tools and activities for measure validation using Rasch models: Part II - Validation activities. In E. V. Smith & R. M. Smith (Eds.), *Rasch measurement: Advanced and specialized applications* (pp. 243-290). Maple Grove, MN: JAM Press.

Wolffe, K., & Kelly, S. M. (2011). Instruction in areas of the expanded core curriculum linked to transition outcomes for students with visual impairments. *Journal of Visual Impairment & Blindness, 105*(6), 340-349.

World Health Organisation. (2018). Disability: Assistive devices and technologies. Retrieved from http://www.who.int/disabilities/technology/en/

This paper underwent a blind peer review process before being accepted.

Editor's Note: The online edition of this journal includes a number of Appendices related to this paper which outline specific teaching strategies. Due to the length of the Appendices, they have not been included in the print edition. They can be accessed at https://www.spevi.net/jspevi/

APPENDIX

Teaching Strategies and Advice Targeted at Students with MDVI Working within the Digital Literacy Learning Progression (White, 2019)

Level 1 Description Summary

The student attends and/or reacts to digital technology being used, and to the content on digital technology devices, such as images or sounds. S/he is starting to interact with features of digital technology with support.

Level 1 Teaching Strategies and Advice

1. Position the student in an environment which is optimal for focusing on a device or program/app. Consider and address the impact of any visual, hearing, and/or physical needs of the student when using digital technology, such as whether s/he can see or hear the content, if screen magnification or headphones are needed, or how the student might interact with the device.
2. Offer extra wait time for the student to react to a device or program/app to allow the student to process and respond to the experience.
3. Model common interactions with digital technology by describing your interactions (e.g., “I like listening to this book on the tablet”, or “I’m taking a photo with my phone”) to reinforce the use of technology in day to day life.
4. Offer content which is related to the student’s preferences, home, and community life, such as photos, audio recordings, or videos of family members, to make the content relevant and engaging to the student. Seek advice from parents/carers, previous teachers, and others who know the student well about his or her interests and preferences, to help motivate the student to attend to the content on a device.
5. Use a variety of content types, such as still and moving images, videos, songs, sounds, and audiobooks, to provide multiple opportunities for engagement with digital technology.
6. Cue the student in to the device or program/app to be used, using the correct terms (e.g., “Let’s look at your iPad together”, or “It’s time to listen to the (app name) app”), to help the student prepare for the learning experience.
7. Use simple digital technology terms to describe the student’s interaction with technology to help the student develop language concepts (e.g., “You’re tapping the screen” or “Let’s turn on the computer together”).

8. Use simple language to recognise and assign meaning to the student's behaviour when s/he shows engagement or interaction with a device or program/app (e.g., 'You're smiling. You like this app").
9. Use modelling, hand-under-hand or hand-over-hand assistance, visual and/or verbal support to explicitly teach ways to interact with a device or program/app.
10. Encourage the student to demonstrate awareness and preferences about a device or program/app by offering regular opportunities to respond in the mode/s most suited to his or her abilities, and looking for a variety of response types. Give the student regular opportunities to express his/her awareness of and preferences about a device or program/app. Look for changes in behaviour such as looking away, reaching, vocalising, becoming still, or smiling to indicate awareness and preferences.
11. Describe to the student what is happening when another person is using a device, to help him/her understand the sounds and/or images that s/he might be experiencing.
12. Plan for frequent practice of a new skill with a device or program/app to help the student recall and reinforce his or her learning.
13. Show the student's family/carers how to use his or her device/s and/or programs/apps. Encourage them to use digital technology with the student at home, such as engaging in a program/app together. As appropriate, offer the family/carers the opportunity to take a familiar device home, and/or assist them to download and use a familiar program/app on their own device, so the student can reinforce his or her learning at home.
14. As appropriate for the student, consider placing your hand under the student's hand to help the student learn the hand shape and action needed to interact with a device, such as tapping a screen or pushing a button, and to offer the student the option of interacting when s/he is ready.
15. Have an assistive technology assessment completed to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps.
16. Give simple, specific praise and targeted feedback, using digital technology terms (e.g., "Good tapping the screen. Try with one finger") to support language development and to help the student know what s/he did well and what to work on next.
17. Present new or unfamiliar programs/apps on a familiar device, or, use new or unfamiliar devices to access a familiar program/app, to help the student apply prior knowledge to a new learning experience.

18. Offer multiple occasions for the student to encounter familiar digital technology features, such as buttons, dials, and touch screens, to support generalisation of the skills needed to interact with them.
19. Use devices with touchscreens (e.g., tablets, interactive whiteboards) and/or programs/apps with a switch or button control for cause-and-effect-based activities which can provide the student with immediate visual and/or auditory feedback on even the smallest amount of effort.
20. Reward any purposeful interaction, or intent to interact with a device or program/app, consistently and immediately, to show the student you recognise his/her efforts.
21. Increase the student's awareness of new or different devices or programs/apps by offering programs/apps that vary in content, sounds, and appearance.
22. Present a device or program/app at different times of the day and in different environments, including at home if possible, to maximise opportunities for the student to react and respond to it.
23. Make an activity schedule or task directions for the student using photos, tactile symbols and/or audio recordings of digital activities or actions (e.g., first touch the screen, then hear the sound) to emphasise the concept of sequencing steps. Audio recordings could include the voice of a significant person for the student as well as sounds relevant to the task (e.g., a zipper being zipped). Encourage the student to play, pause, and rewind the information to support learning and recall as well as the understanding of these functions.

Level 2 Description Summary

The student is beginning to follow single-step directions and/or relies on adult support to explore and use digital technology. S/he is starting to make a choice between two familiar digital activities. The student may recognise when something new is introduced via digital technology, or when digital technology is not working.

Level 2 Teaching Strategies and Advice

1. Consider the student's strengths, preferences, and interests, and how available technologies can be used to support his/her learning for a task at hand. If possible, incorporate familiar photos, images, sounds, or symbols into a familiar device or a program/app to increase the student's opportunities to respond to them.

2. As far as possible, provide a quiet, calm and comfortable environment for learning to explore and use digital technology in order to minimise unnecessary distractions.
3. Look for changes in the student's behaviour when digital technology is not working, as these changes may be attempts to communicate. Use simple language to recognise and assign meaning to the student's behaviour (e.g., "You're calling out. Is your computer broken?"). Model appropriate responses to technology not working through role-playing and social scripts, such as taking a device to an adult and/or saying/signing "it's broken".
4. Try using new or unfamiliar programs/apps that have features, images or other aspects in common with familiar programs/apps, or that may be otherwise recognisable to the student, to help him or her apply previous knowledge when learning to use a new program/app. Look for any interest or acknowledgement of new or different programs/apps or devices, and provide structured opportunities to explore and experiment with them.
5. Provide learning activities involving new or unfamiliar programs/apps which can be undertaken in a small group setting, to provide the opportunity for peer modelling, peer teaching, and peer feedback to the student.
6. Help the student to understand when it is time to use digital technology, and when it is time to stop, by using an activity schedule in conjunction with social scripts, positive reinforcement and/or modelling of stopping the use of digital technology. Reinforce the stopping of technology use by using visual reminders and actions such as covering the computer with a cloth, placing a device into a box and putting it away, or using a countdown timer. As appropriate, these should be negotiated with the student so s/he understands the meaning of the reminder.
7. Show the student's family/carers how to use his or her device/s, programs/apps and/or assistive technology. Encourage them to use digital technology with the student at home, such as engaging in a program/app together. As appropriate, offer the family/carers the opportunity to take a familiar device home, and/or assist them to download and use a familiar program/app onto their own device, so the student can reinforce his or her learning at home.
8. Have an assistive technology assessment completed by a qualified professional to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps.

9. Use simple technology terms to connect the student's interaction with a device or program/app and its effect (e.g., "You pressed the power button. Now it is off"), and to offer specific praise and targeted feedback (e.g., "I like how you tapped the screen. Do it with one finger this time") to help the student know what s/he did well and what to work on next.
10. As appropriate for the student, consider placing your hand under the student's hand to help the student learn the hand shape and action needed to interact with a device or program/app, such as pressing a switch or swiping a screen, and to offer the student the choice of when to interact with the feature.
11. Describe when a device or program/app has stopped working using simple technology terms to support the student's language development and understanding of what has occurred. If possible, have a second device or activity on hand to help minimise frustration for the student.
12. As appropriate for the student, consider placing your hand under the student's hand to help the student learn the hand shape and action needed to interact with a device or program/app, such as pressing a switch or swiping a screen, and to offer the student the choice of when to interact with the feature.
13. Incorporate the student's interests or classroom topics (e.g., favourite music, counting) into learning to use a new device or program/app, to engage the student in an unfamiliar activity. Use a range of different devices and programs/apps that vary in content, sounds, and appearance to increase the student's awareness of new or different devices or programs/apps.
14. Always give the student the option that s/he chose to reinforce the outcome of his/her decision about a digital activity. Consider using the student's name when describing his/her choice (e.g., "Tom chose the computer") to gain attention and reinforce the outcome of the choice.
15. Build digital technology skills gradually by first introducing skills in isolation and then integrating them with other skills to enable the student to practice and to begin to generalise skills across different devices and programs/apps. Provide the student with a video or audio recording of him/herself, or another person, using a device or program/app, to reinforce and teach the skills required. Offer frequent practice of a new digital technology skill to help the student recall and reinforce his or her learning.
16. Support the student to generalise the use of digital technology by providing a range of different opportunities and/or environments to use a familiar device or program/app, as appropriate for him or her.

17. Create photos, visual or tactile symbols, or pre-recorded audio messages of common phrases or words, such as ‘I need help’, ‘broken’, ‘computer’, and ‘more’, that the student can readily access to communicate about the use of digital technology.

Level 3 Description Summary

The student is beginning to use familiar digital technology to achieve his/her own ends, by working from directions, single-step routines, or prior experience. S/he is starting to request and may maintain interest in using familiar digital technology. S/he is learning to identify familiar digital technology symbols.

Level 3 Teaching Strategies and Advice

1. As far as possible, provide a quiet, calm and comfortable environment for learning to explore and use digital technology in order to minimise unnecessary distractions.
2. Consider the student’s strengths, preferences, and interests, and how available digital technologies can be used to support his/her learning for a task at hand. Use a range of content types and subject material to engage the student and help generalise his/her learning. Link the creation of content, such as taking a photo or making an audio recording, to a curriculum focus or student’s area of interest to make the process and final product relevant to the student.
3. Provide clear explanations of an action or task, such as creating content using digital technology, using simple, consistent language which includes the correct terms. When presenting the student with a new task using digital technology, provide full support for the first action or skill, then gradually decrease support until the student can perform it without assistance. Give small amounts of new information about how to create content with repeated opportunities to practice to help the student retain new learning.
4. Describe the student’s action with digital technology, and connect it with the likely desired outcome (e.g., “You’re reaching for the computer. Do you want the computer?”). Reinforce his/her actions by using the correct terms, such as “You tapped on the close button, now the app is closed”, to connect actions and outcome, and to build his/her digital technology vocabulary. Give specific praise and targeted feedback (e.g., “I like how you tapped the screen. Do it with one finger this time.”) to help the student know what s/he did well and what to work on next.
5. Teach and use the words/signs of familiar devices, programs/apps and content, and include digital technology terms, symbols, devices and

programs/apps in the student's communication system to support language development. Teach and model the use of a digital technology symbol, such as the play/pause symbol, in context with where the student might encounter it, to connect previous and new learning. As appropriate for the student, offer photos, visual or tactile symbols, or pre-recorded audio messages of common phrases or words, such as 'I need help', 'broken', 'computer', and 'more', that the student can readily access to encourage communication about technology.

6. Encourage the student to make a selection from content on a device, such as choosing a desired picture or sound from several on a touchscreen, by offering different combinations of preferred and non-preferred options. Ensure that the student always receives his/her chosen option, to reinforce the successful outcome for the student of making a decision.
7. Create a learning activity involving digital technology which can be undertaken in a small group setting, to provide the opportunity for peer modelling, peer teaching, and peer feedback to the student.
8. Have an assistive technology assessment completed to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps. As appropriate for the student, use accessibility features, such as screen magnification or text-to-speech, to make information or content more accessible.
9. Try teaching and reinforcing a digital technology procedure by modelling all steps but the last to the student, then assisting him/her to do the last one. Once confident with the last step, then teach and assist the student to do the second-to-last step, followed by the last step. Once confident with the second-to-last step, repeat this process for each preceding step until the student can complete the full procedure.
10. Use modelling, hand-under-hand or hand-over-hand assistance, visual and/or verbal support to explicitly teach ways to interact with a device or program/app. As appropriate for your student, consider placing your hand under the student's hand to help him or her learn the hand shape and action needed to interact with a device or program/app, such as plugging in headphones or swiping a screen, and to offer the choice of when to interact with a function.
11. Show the student's family/carers how to use his/her device/s, programs/apps and/or any assistive technology. Encourage them to use digital technology with the student at home, such as sharing a favourite book on a tablet, watching a preferred video on the computer, or engaging in a program/app together. As appropriate, offer the family/carers the opportunity to take a familiar device home, and/or show them how to download and use a familiar

program/app onto their own device/s. Learning and participating with family members will support the student to generalise the use of digital technology as well as to model actions after people who s/he knows well.

12. Make it easier for the student to locate desired content or programs/apps by using folders, colours, images, or labels to organise content or programs/apps on a device. Have a device ‘help box’ into which the student can place his/her device, to signal that s/he needs support.
13. Provide concrete representations of the amount of time a student is expected to focus on using a device or program/app, such as an audible and/or visible countdown timer, to scaffold the student’s awareness of expectations and his/her progress towards them. Help the student to understand when it is time to continue using digital technology, and when it is time to stop, by using an activity schedule in conjunction with social scripts, positive reinforcement and/or visual modelling of successfully stopping the use of digital technology.
14. Build digital technology skills gradually by first introducing skills in isolation and then integrating them with other skills to enable the student to practice and to begin to generalise skills across different devices and programs/apps. Use a visual and/or tactile image, video, and/or audio recording of a skill, such as zipping a tablet case, to support the direct teaching of following a single-step instruction. Offer frequent repetition and practice of digital technology skills over days and weeks to help the student recall and reinforce his/her learning.
15. Provide structured opportunities to explore and experiment with new or unfamiliar digital technologies to help the student develop curiosity about technology. Consider providing access to a new or unfamiliar app or program, with support, for a short amount of time to give the student the opportunity to develop an awareness of the app/program. Use device settings to control access to a program/app.

Level 4 Description Summary

The student is learning to apply prior knowledge of familiar digital technology. S/he is starting to follow rules, group procedures, and instructions to complete tasks, create and save own content, and explore new functions and symbols. S/he may express likes and dislikes about digital technology, and is beginning to use digital technology terms to describe actions or intentions.

Level 4 Teaching Strategies and Advice

1. Explicitly teach and model a digital technology skill using clear and consistent language and visual instructions. Give specific praise and targeted feedback

(e.g., “I like how you tapped the screen. Do it with one finger this time.”), connecting actions with the outcome (e.g., “You touched the close button, now the app is closed”) to help the student know what s/he did well, what to work on next, and why a desired outcome did or did not happen.

2. Consider the student’s strengths, preferences, and interests, and how available technologies can be used to support his/her learning for a task at hand. Create opportunities for the student to use technology to create content which is related to his or her interests, to make the process and product motivating and relevant.
3. Encourage increased independence and initiation by gradually withdrawing supports when the student demonstrates progress with a digital technology skill. Plan for repetition and regular revision of digital technology skills over days and weeks to reinforce new learning.
4. Provide opportunities to use different programs/apps on different devices to support the student to generalise skills, such as saving information and content. Help the student compare familiar devices or programs/apps with new or unfamiliar ones, and highlight differences that change the way s/he uses the new or unfamiliar technology. Encourage structured and unstructured, supervised exploration and experimentation with new or unfamiliar technologies by applying previous skills and knowledge to promote curiosity about technology and generalise learning.
5. Show the student’s family/carers how to use his/her device/s, programs/apps and/or any assistive technology. Encourage them to use digital technology with the student at home, such as sharing a favourite book on a tablet, watching a preferred video on the computer, or engaging in a program/app together. As appropriate, offer the family/carers the opportunity to take a familiar device home, or show them how to download and use a familiar program/app onto their own device/s. Learning and participating with family members will support the student to generalise the use of digital technology as well as to model actions after people who he or she knows well.
6. As far as possible, provide a calm and comfortable environment for learning to explore and use digital technology in order to minimise unnecessary distractions.
7. Use the correct digital technology terms with the student when describing an action or intention (e.g., “Put the headphone jack in the port”) to teach and reinforce the use and meaning of terms. Promote a consistent learning environment by encouraging others who use technology with the student to use the same terms.

8. Have an assistive technology assessment completed to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps. As appropriate for the student, use accessibility features, such as screen magnification or text-to-speech, to make information or content more accessible.
9. Use simple visual and/or tactile graphic organisers with pictures, symbols, and/or words, to help the student consider how s/he feels about and uses different digital technologies. Offer opportunities to share feelings and preferences about digital technology use, and model approaches to making a decision about using technology for a task, to encourage thinking and decision-making skills.
10. Use word banks, visual and/or tactile graphic organisers, photos, symbols and/or audio recordings paired with digital technology terms to support the meaning of the terms and encourage recall. Incorporate terms that the student is likely to encounter in instructions from a device or program/app, such as ‘next’, ‘quit’, or ‘exit’ in games or writing activities, to support the student’s understanding of these words. Create activities with familiar devices or program/apps, role-playing, and storage/handling routines as opportunities to practice using the correct terms for actions or intentions.
11. Provide consistent instructions, signals, and/or procedures to help the student know what to expect each time s/he is asked to stop using digital technology. Use a simple countdown timer to show how much time s/he has left with the device or program/app, and/or an activity schedule in conjunction with social scripts, positive reinforcement, and/or visual modelling of successfully stopping the use of digital technology, to support transitions from a digital technology activity.
12. Explicitly teach the following of rules to use digital technology, such as keeping a password private, through modelling, visual and/or verbal supports, role-play, and repetition. Offer the student a copy of the rules, with images as needed, to have on his/her desk to help him/her learn and follow classroom expectations around digital technology use.
13. Break down a safe handling and storing procedure for digital technology into small steps, then teach each step systematically with modelling, visual and/or verbal support, and frequent repetition, to help the student understand and complete each step. Emphasise the concept of ‘first do this step, then do this step next’ by using photos, visual, and/or tactile symbols to show the student a depiction of each of the steps involved. As appropriate, consider placing your hand under the student’s hand to help the student learn the hand shape and action, such as unplugging a power cord, and to offer the choice of when to engage with an action.

14. If possible, show a familiar and unfamiliar digital technology symbol side by side to each other, in context (e.g., on the device or program/app) and encourage the student to look for what is similar.
15. Try teaching and reinforcing a digital technology procedure by modelling all steps but the last to the student, then assisting him/her to do the last one. Once confident with the last step, then teach and assist the student to do the second-to-last step, followed by the last step. Once confident with the second-to-last step, repeat this process for each preceding step until the student can complete the full procedure.

Level 5 Description Summary

The student is learning to apply prior knowledge of familiar digital technology. S/he is starting to follow rules, group procedures, and instructions to complete tasks, create and save own content, and explore new functions and symbols. S/he may express likes and dislikes about digital technology, and is beginning to use digital technology terms to describe actions or intentions.

Level 5 Teaching Strategies and Advice

1. Consider the student's strengths, preferences, and interests, and how available digital technologies can be used to support his/her learning for a task at hand.
2. Give specific praise and targeted feedback, using correct digital technology terms (e.g., "I like how you tapped the screen. Do it with one finger this time.") to help the student know what s/he did well and what to work on next. Offer frequent practice of a new digital technology skill to help the student recall and reinforce his or her learning.
3. Use modelling, visual and/or verbal supports, role-play, and repetition to explicitly teach safe handling expectations, such as typing gently, and behavioural expectations for cyber-safety, such as keeping personal details private. Provide visual, tactile, and/or audio supports for rules and guidelines for the safe use of digital technology where the student can easily access them, such as his or her desk, to help him/her recall and follow expectations. Use pictures, visual or tactile symbols, and/or audio recordings to support your student's understanding of technical or difficult terms.
4. When introducing new strategies, skills, or content with digital technology, connect the current activity to past learning or information from the student's life or interests, to help him/her use existing knowledge and skills. When possible, 'think aloud' to show the student the steps you are taking to complete a digital technology task, such as an internet search, and explicitly

teach each step. Carefully watch and listen to the students' responses, focus on the target skill, and include modelling of the target skill or concept using clear and consistent language.

5. Encourage focus when using digital technology for learning by incorporating student interests, skills and/or preferences when choosing new programs/apps. Use social scripts to help the student understand good focusing behaviours, such as ignoring classroom sounds. Provide supports, such as noise-cancelling headphones or fidget objects, to help minimise external or internal distractions. Help the student set realistic goals for focusing his/her attention on a device or program/app.
6. As far as possible, provide a quiet, calm and comfortable environment for learning to explore and use digital technology in order to minimise unnecessary distractions.
7. Introduce new programs/apps to the student initially for short periods with support, and match the program/app with the student's skill level. Provide structured opportunities to explore and experiment with new or unfamiliar digital technologies to encourage curiosity about technology use and applying previous learning. Support the student's readiness to extend time on a new or unfamiliar device or program/app by emphasising the concept of 'first do this new thing, then do a preferred thing next'.
8. Have an assistive technology assessment completed to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps. As appropriate for the student, use accessibility features, such as screen magnification or text-to-speech, to make information or content more accessible.
9. Create a safe, suitable location for storage of devices to help the student organise the storage and care of technology. Support increased independence, planning and organisational skills by using visual, tactile, and/or audio supports, such as labels, symbols, pictures, or diagrams, to show the student where and how to store technology items.
10. Show the student's family/carers how to use his/her device/s, programs/apps and/or any assistive technology. Encourage them to use digital technology with the student at home, such as sharing a favourite book on a tablet, watching a preferred video on the computer, or engaging in a program/app together. As appropriate, offer the family/carers the opportunity to take a familiar device home, or show them how to download and use a familiar program/app onto their own device/s. Learning and participating with family members will support the student to generalise the use of technology as well as to model actions after people who he or she knows well.

11. Use modelling, hand-under-hand or hand-over-hand assistance, visual and/or verbal support to explicitly teach manual skills with a device, such as plugging it in or putting it in a case. As appropriate for your student, consider placing your hand under the student's hand to help the student learn the hand shape and action needed to interact with a device, peripheral, or assistive technology, such as removing a USB drive, and to offer the student the choice of when to interact.
12. Break a digital technology procedure, such as an internet search, into small steps, then explicitly teach each step systematically. Use modelling, visual and/or verbal supports, role-play, and repetition to help the student understand and complete each step. Ensure easy access to learning supports such as his or her communication system and/or a step-by-step visual and/or tactile schedule, flow-chart or graphic organiser, or audio recording of the steps in a digital technology procedure, to encourage reliance on these supports while decreasing direct assistance from adults. Gradually withdraw assistance as the student progresses with a skill to promote greater independence and confidence.
13. Try teaching and reinforcing a digital technology procedure, such as for caring for devices or naming and saving files, by modelling all steps but the last to the student, then assisting him/her to do the last one. Once confident with the last step, then teach the second-to-last step, followed by the last step, and so on until the student can complete all steps independently.
14. Teach and promote the use of digital technology for learning tasks, such as such as the use of software with spell checkers or word banks to improve student writing. If possible, create simple digital content to which the student can contribute, such as a class blog, email list, or newsletter, to support connections between learning, communication, and the use of technology.
15. Encourage internet searches related to a curriculum focus or the student's interests to make the process and results relevant and motivating. Use word banks and graphic organisers to help the student to brainstorm words or phrases related to information or content of interest to help the student undertake internet searches. Reinforce the correct spelling of search terms by using them as spelling words for improved search results.
16. Build skills gradually by introducing digital technology skills first in isolation and then integrating them with other skills to enable the student to practice and to begin to generalise skills across different devices and programs/apps. Try using new or unfamiliar programs/apps that have features, images or other aspects in common with familiar programs/apps, or that may be otherwise recognisable to the student, to help the student apply previous knowledge to a new program/app.

Level 6 Description Summary

The student is learning to control and manage his/her own use of digital technology, including device use, file management, and sharing and editing content. S/he is starting to explain the purpose and personal importance of strategies and reasons for using different features of digital technology.

Level 6 Teaching Strategies and Advice

1. Consider the student's strengths, preferences, and interests, and how available technologies can be used to support his/her learning for a task at hand.
2. Have an assistive technology assessment completed to see if the student can benefit from using assistive technology to improve his/her access to common devices and programs/apps. As appropriate for the student, use accessibility features, such as screen magnification or text-to-speech, to make information or content more accessible.
3. Break down a digital technology procedure, such as downloading a file, into small steps, then explicitly teach each step systematically with frequent repetition, to help the student understand and complete each step. Ask the student to explain the steps required to complete a task to determine his or her understanding of the process. Plan for frequent repetition and distributed practice of skills over days and weeks to allow for sufficient practice and rehearsal of information.
4. Provide structured and unstructured, supervised opportunities to explore and experiment with new or unfamiliar digital technologies to help the student develop curiosity about technology use as well as opportunities to apply previous learning. Offer learning tasks which encourage the student to explore ways to combine different devices, programs and/or apps to achieve an intended outcome, such as a multimedia presentation.
5. Teach and promote the use of digital technology for student learning tasks, such as using software with word banks to improve writing, or software for mind mapping to organise thinking. Create student learning tasks which require the student to share responses, information, content and/or presentations in an online environment which other students can access.
6. Offer the student multiple ways to upload or download files, such as from different websites, web browsers, social media, and email programs. A class account managed by the teacher may be used instead of a student's personal account. Use visual and/or tactile graphic organisers to help the student categorise and compare different ways to upload and download files.

7. Engage the student in helping to set rules and guidelines around controlling his or her use of digital technology, and using it safely. Place a copy of personal or school rules for digital technology use, with visual and/or tactile images as needed, on the student's desk to help him/her recall and follow the expectations around cyber safety.
8. Link the student's interests or classroom topics to the creation of a finished product with digital technology, or to internet searches to locate content to upload and download, to make the process relevant to the student's broader learning objectives. Provide step-by-step directions which include screen-shots or other visuals of steps in a process, such as uploading or downloading files. Use digital technology terms, such as 'upload', in literacy activities to encourage the student to use them when discussing technology use or tasks.
9. As far as possible, provide a calm and comfortable environment for learning to explore and use digital technology in order to minimise unnecessary distractions.
10. Teach and promote the use of digital technology for student learning tasks, such as using software with word banks to improve writing, or software for mind mapping to organise thinking. Create student learning tasks which require the student to share responses, information, content and/or presentations in an online environment which other students can access.
11. Teach and reinforce the learning of a digital technology procedure, such as sharing a file, by modelling all steps but the last to the student, then assisting him/her to do the last one. Once confident with the last step, then teach the second-to-last step, followed by the last step, until the student has learned all the steps in a procedure. Use modelling, visual, and/or verbal supports, and repetition to explicitly teach the use of folders, tags, and website bookmarks for organising files and content, using a consistent approach.
12. Show the student's family/carers how to use his/her device/s, programs/apps and/or any assistive technology. Encourage them to use digital technology with the student at home, such as sharing a favourite book on a tablet, watching a preferred video on the computer, or engaging in a program/app together. As appropriate, offer the family/carers the opportunity to take a familiar device home, or show them how to download and use a familiar program/app onto their own device/s. Learning and participating with family members will support the student to generalise the use of technology as well as to model actions after people who he or she knows well.
13. Try using online collaborative environments, such as a class chatroom, as well as modelling, peer teaching, visual and /or verbal supports, role-play, and repetition to explicitly teach and practice safe and appropriate behaviours online. Provide information via visual charts, audio recordings, or tactile or

braille resources around the room to reinforce key messages, such as keeping personal details private. Encourage the student to share his or her understanding of safe and appropriate digital technology use with his or her peers through creating a game, presentation, or skit.

14. Provide opportunities for the student to apply digital technology skills for collaborative learning by teaching him/her how to share files for comment and/or collaborate with other students to secure online sites. Encourage collaboration with others when using technology by using peer teaching to teach and reinforce skills with editing content to create a finished product.
15. Use visual and/or tactile graphic organisers to help the student compare different digital technologies and to support his/her reasoning for choosing one over another for a task. Encourage the student to verbalise thinking or strategies, or even the explicit strategies modelled by the teacher, when making a decision to choose a device or program/app. Give the student extra time to consider the decision or task at hand and provide his or her approach.

Emily H. White, PhD.

Research Fellow at the Melbourne Graduate School of Education.

Emily.white@unimelb.edu.au

Mobile: 0415 170 420 (preferred)

Work: 03 9035 3150

Social Inclusion and High School Students with Visual Impairments

Glenda Jessop

Abstract

Background: This paper provides an overview and summary of a study on the social inclusion of 12 Australian high school students with VI: how they described school social inclusion, whether they felt included, and what influenced these feelings.

Method: Seven times a day for one week, participants responded to the same in-the-moment survey about the activity in which they were engaged. A questionnaire, the Psychological Sense of School Membership and interview complemented these data.

Results: Students felt less accepted and fitted less at school than out of school. “Doing nothing”, due to curriculum inaccessibility was the least positive “activity” of the week. The presence of an additional disability negatively influenced school social inclusion. Students described school social inclusion as being noticed by others. Five themes encompassed the influences on school social inclusion: (a) putting myself forward; (b) knowing me; (c) having control; (d) having a place to shine; and (e) peer exclusion and rejection. These themes align with the needs for competence, autonomy and relatedness as articulated in self-determination theory, a theory of motivation.

Conclusion: Students with VI will be motivated, and feel included, in high school if activities and interactions fulfil their needs for competence, autonomy and relatedness. Curriculum accessibility is *vital* to social inclusion. Students with additional disabilities may need additional monitoring.

Introduction

While academic outcomes are important within educational settings, parents and educators have increasingly focussed on the social aspects of these settings. This focus arose as educators and parents realised that children with disabilities were not spontaneously accepted by their peers if simply physically located alongside them (Foreman & Arthur-Kelly, 2008; Bourke & Burgman, 2010; Lindsay & McPherson, 2012).

Social inclusion is important to the long-term development of a healthy self-concept, wellbeing, motivation and good academic outcomes. Lack of inclusion, which includes bullying, teasing and exclusion, can lead to students feeling anxious,

depressed and lonely, reduces long-term emotional wellbeing (Thomas et al., 2015). In high school lack of inclusion may lead to absenteeism and limited or non-existent academic qualifications which in turn impact on employment or financial self-sufficiency.

Vision impairment (VI) in childhood impacts on the learning of social interaction skills other children. It also impacts on the amount of time needed to complete everyday tasks and activities. In the inclusive school context, students who use alternate formats to access visual information can take longer to take notes, read, and complete their work than do their peers. Students with VI may not be as proficient at PE or some sports and may thus compare themselves, or be compared, unfavourably with their peers. Students with VI may also learn to suppress their preferences for exploring and learning about the world. This suppression can diminish an innate sense of self.

If teachers fail to adequately adapt their instruction to meet a student with VI's needs, students may thus not be able to keep up with peers and consequently be regarded as less capable. Conversely, the in-class assistance and accommodations provided to students with VI can also be perceived as socially restrictive or stigmatizing (Giangreco, 2010; Mortier, Desimpel, de Schauwer, & van Hove, 2011; Whitburn, 2013a).

Historically, children with VI had relatively limited choice or control over decisions about their life. Now they are expected, as are their typically-developing peers, to make choices about issue that affect them. However, children with VI, because they need protracted instruction to learn certain skills, can become used to being told what to do and rely on other people to solve problems and make decisions for them. For this reason, self-determination skills are an essential component of the Expanded Core Curriculum (ECC). These teach students to: regulate and direct their own behaviour, set appropriate goals for themselves, identify solutions to present and future problems, direct and reinforce their own behaviours, and monitor and evaluate their own performances (Agran, Hong, & Blankenship, 2007; Helps, 2015; Wills, 2015). In these self-determination strategies, a student's individual efforts are paramount.

Self-determination theory, is a theory of motivation. It highlights the role of interpersonal contexts in enhancing or diminishing self-determination, or self-motivation (Deci & Ryan, 2008) and widens the focus of self-determination beyond an individual's efforts to consider the social environment. Its thesis is that people are more motivated to engage in activities and interactions if these activities and interactions satisfy their innate needs for competence, autonomy and relatedness. The degrees to which these basic psychological needs are supported within an environment, affect both the type and strength of a person's motivation. In this theory, competence is the need to experience mastery, autonomy is a sense of

volition, choice and agency (rather than independence) and relatedness is the need for relationship security and the desire to feel connected to others.

Overview of the Research

This research arose from conversations with young people with VI during which they disclosed they had been socially isolated in their “inclusive” high schools and that this had negatively affected them. These young people’s experiences echoed the social experiences of earlier generations of students with VI in inclusive settings. Anecdotal evidence was that social strategies that worked in primary school tended to “fall apart” in high school. Socially, high school was much harder.

My research questions were: (a) How do students perceive social inclusion at high school? (b) How socially included do they feel at school? (c) What are the differences in the qualities of their school and non-school activities and interactions? And, (d) What are the different influences on social inclusion at school?

To answer these questions, I used experience sampling methodology (ESM). ESM enables researchers to capture data about both the subjective and objective aspects of experience. Participants are signalled randomly throughout a pre-determined period and asked to fill out the same short in-the-moment survey about their current activity. I used two additional data sources to complement the ESM data, hence, three data sources overall. These were (a) the Psychological Sense of School Membership (PSSM) questionnaire, (b) experience sampling (ESM) surveys, and (c) individual interviews. Table 1 provides an overview of the research questions and data sources for this mixed methods study.

Table 1. Research Questions and Data Sources

Research Question	Data sources
1. How do students perceive social inclusion at high school	• Interview: 1-2 weeks after ESM responses had been reviewed.
2. Do students feel socially included at high school	• PSSM: administered pre-ESM surveys. • ESM responses (school data) • Interview
3. What are the differences in the qualities of students' school and non-school activities & interactions?	• ESM responses (school & non-school data)
4. What influences perceptions of social inclusion in high school?	• PSSM • ESM responses (school data) • Interview

Data collection tools

Everyday Inclusion Survey (ESM Survey). This survey was designed to elicit information about the quality of activities and social interactions. It was administered (Jessup, Bundy, Broom & Hancock, 2013) using an accessible app, the PIEL survey app (https://pielsurvey.org/). For seven consecutive days, these participants carried an iDevice loaded with the PIEL Survey App (see article). Seven times each day, the app signalled them to complete the ESM survey.

The Psychological Sense of School Membership (PSSM). This questionnaire measured students' subjective sense of school belonging or membership, the extent to which students feel accepted, respected, and valued in their academic context (Goodenow, 1993). The PSSM was administered immediately before the students began their ESM survey week (see Table 1), and hence before they began to report (via the ESM surveys) their perceptions of loneliness, enjoyment, fitting in and acceptance in the various activities of daily life.

Interviews. All participants were interviewed at least once. As well as clarifying and expanding on ESM responses, interviews further explored the social aspects of school.

Participants

Twelve Australian high school students with VI (aged 13-17 years, 6 males) were recruited via organisations working with adolescents with VI**.** Students were in their second year of high school or above and three had VI and additional disabilities. All participants and their parents gave informed consent.

Results

Detailed discussion of the various study results can be found elsewhere (Jessup, Bundy, Broom, & Hancock, 2017, 2018; Jessup, Bundy, Hancock, & Broom, 2018). This paper summarises the findings of the overall study and its implications for research and practice.

Two issues emerged as important in the context of the overall study. These are: (a) the links between self- determination and social inclusion, and (b) the social challenges of students with VI and additional disabilities.

Thee three sources of data provided a rich perspective on the complexity of these participants' experiences but also presented some anomalies. As a group the participants scored high on the PSSM (Jessup et al., 2017), a measure of school connectedness. However, the ESM results and interviews revealed that participants fitted in significantly less and felt significantly less accepted in their interactions at school than in the other contexts of their week (Jessup, Bundy, Broom, et al., 2018).

It is possible that participants, when responding to the PSSM at the beginning of their research involvement, may have felt a need to be more positive in their responses and their repeated measures in-the-moment (ESM) responses, were less subject to this conscious (or unconscious) manipulation. In interview, participants had the opportunity to share more freely, and in more detail, about their school experiences. De Verdier (2016) similarly found anomalies with participants with VI when using psychometric measures. Her participants' psychometric results were similar to norms of sighted students. It was only through subsequent interviews that she learned her students were stressed about school and felt lonely.

In interview, participants described school social inclusion as being noticed and not overlooked or ignored by either staff or peers (Jessup, Bundy, Hancock, et al., 2018). Four of the 12 participants, including all three participants with additional disabilities, had experienced peer exclusion.

Five themes encompassed the influences on school social inclusion (see figure 1). These were: (a) putting myself forward; (b) knowing me; (c) having control; (d) having a place to shine; and (e) peer exclusion and rejection.

Putting myself forward: Putting myself forward describes the strategies that participants used to develop relationships and enhance social inclusion.

***Knowing me**:* Knowing me refers to the attempts of others within the school community to build relationships with them. Participants repeatedly talked about how important it was that staff and peers attempted to get to know them as individuals

***Having Control**:* Participants' experience of social inclusion was enhanced when they felt they had control over decisions and learning. Accessibility was crucial to control. Participants lacked control when they were overlooked. They also described being frustrated and annoyed when they were left to do nothing in classes as they had not been given work on time and/or teachers were using inaccessible pedagogy. These included rapid "chalk and talk", movies, the whiteboard, PowerPoint presentations. Some students also felt excluded during sport.

Having a place to shine: This theme encompassed the participants' opportunity to engage in activities and interactions they enjoyed or felt skilled at doing: and be acknowledged as skilled by others. Some participants shone in music, sports, drama or specific subjects.

Peer exclusion and rejection: Participants described peer exclusion or rejection as their most hurtful school experience. Four participants, talked about, having no friends, being bounced between social groups, being teased or having ongoing conflicts with classmates. All these hurt and impacted their sense of social inclusion.

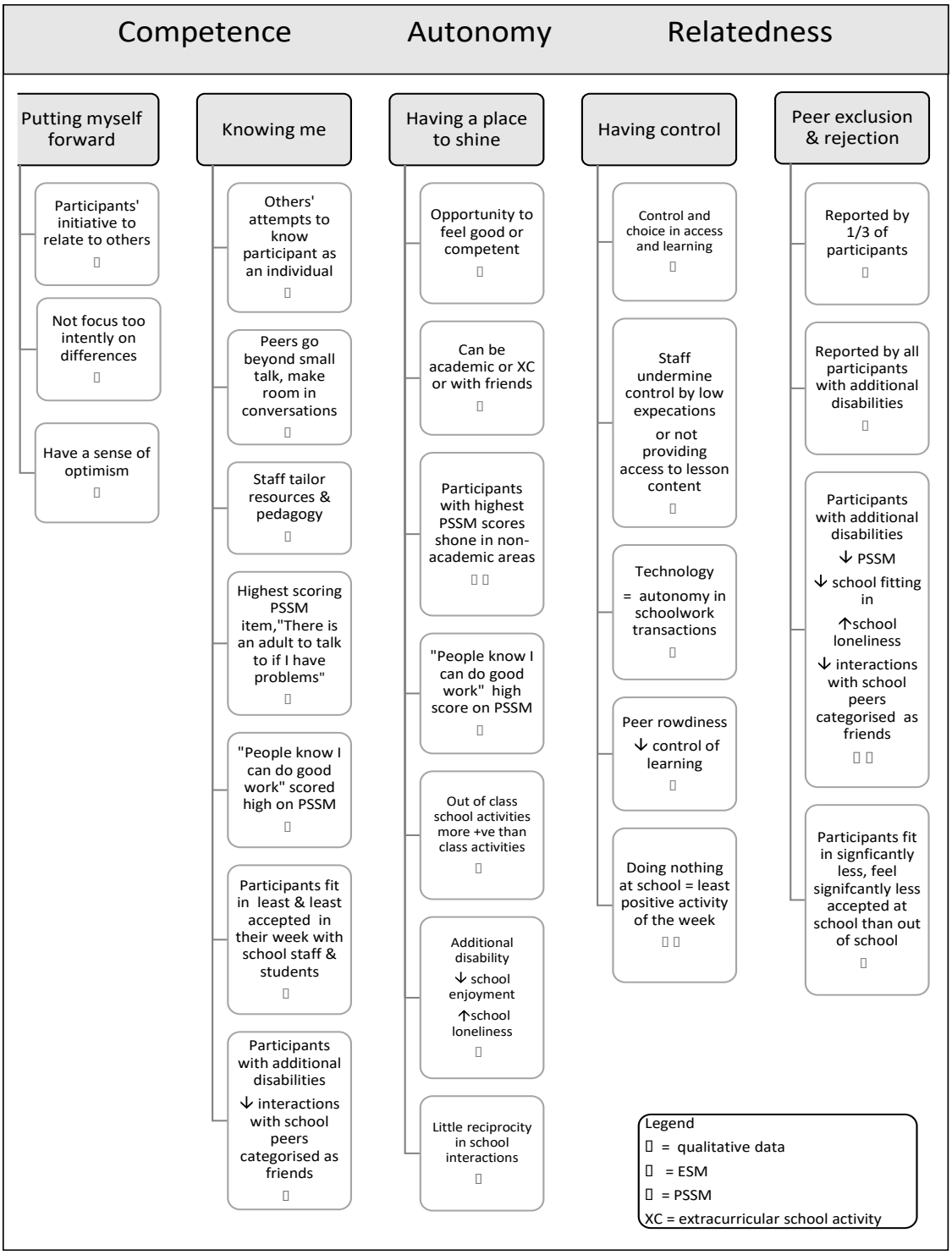


Figure 1: Synthesis of study results and key themes of social inclusion of high school students with VI.

School Social Inclusion and Self-Determination Theory (SDT)

These five themes, the influences on social inclusion, were then easily situated within Ryan and Deci's (2000, 2008) self-determination theory (SDT) framework, as they could be interpreted as the basic needs for competence, autonomy and relatedness (see Figure 1). The surprise with these results was that self-determination as part of the ECC is already at the forefront of skills required for students with VI.

This linking of high school social inclusion to self-determination (self-motivation) suggests that the extent to which school activities and interactions fulfil a student's innate needs for competence, autonomy and relatedness, will determine their motivation to engage actively in the experiences and interactions that will help them feel included in school.

Previous researchers of adolescents with VI and educational social inclusion have not explicitly linked social inclusion to self-determination theory. Hatlen (2004) linked school social inclusion to social skills, suggesting a lack of social skills was the prime reason students with VI were isolated in IE settings. Social skills undeniably contribute to friendships and belonging and, as such, relatedness. My results however have extended the requirements for social inclusion beyond relatedness alone, to bring to the forefront experiences that foster feelings of competence and autonomy.

This finding is important to educational settings as it shifts the focus away from "deficits" of the student to a focus on the social environment and also aligns with understandings of disability as created by social barriers, a social model of disability.

Competence*:* The theme of 'Having a place to shine', is most clearly aligned with the need for competence, or mastery. The themes 'Having control' and 'Putting myself forward' also align with this need. Competence, and the need to be recognised by others as competent, are key to the transition from dependence on the family to interdependence with friends (Sylwester, 2007). Thus, competence is important for all adolescents. However, because lack of ability is linked to stereotypes of VI and disability (Steer & Gale, 2006), competence is particularly pertinent to adolescents with VI (Uttermohlen, 1997).

Competence can be nurtured or developed in all students. My results suggest that competence, or 'a place to shine' does not need to be academic. Competence can also be social, for example being particularly humorous, or good at an extra-curricular activity, such as sports or music. Reciprocity in peer interactions suggests that peers acknowledge a student as competent.

Other researchers (Higgins & Ballard, 2000; Whitburn, 2013b; Worth, 2013) have described how the development of competence has been thwarted in school

environments by others having low expectations or being overly “helpful” or misjudging the ability of students with VI. These researchers identified thwarting the development of competence as a barrier to social inclusion.

Excessive, indiscreet or unwanted help, can inhibit the development of feelings of competence. In my study, factors that participants reported as thwarting the development of their competence included: teacher aides’ undermining their opportunity to learn by effort, staff failing to provide accessible lesson content (so participants do nothing in class), or peer rowdiness that compromised the ability to understand lesson content. Participants received nearly five times as much help at school as they gave to others (Jessup, Bundy, Broom, et al., 2018). This limited amount of reciprocity also suggests that others in the school community did not regard the participants as particularly competent.

Autonomy: The themes ‘Having control’ and ‘Putting myself forward’ align with the need for autonomy, or a sense of volition and agency. In SDT, autonomy and competence often partner in describing the mastery that comes from one’s own efforts and will (Ryan & Deci, 2000). The need for autonomy is congruent with the “work” of adolescence: questioning values prescribed by adults and seeking the freedom to test their own values, often away from adult supervision (Sylwester, 2007).

In my study, “doing nothing” at school reflected a lack of control and choice, inhibiting the development of both autonomy and competence. Paraeducators providing unwanted assistance and peer rowdiness inhibited students’ autonomy and competence (Jessup, Bundy, Hancock, et al., 2018).

Socially appropriate technology enhanced autonomy. None of the participants in this study described minimising the use of their technology. However, all, bar one, used mainstream technologies at school, alongside, or instead of, disability-specific devices.

Ironically, socially appropriate technology may have unintentional consequences. If students no longer look “disabled” by not using disability-specific devices, others may forget they need some learning resources provided differently. Mainstream devices, by lessening obvious differences between students with VI and class peers, may at times, contribute to their being overlooked, particularly by others who do not know them individually.

Braille use came with greater social costs than did technology. Some students found braille socially inhibiting and were not motivated to use it (Jessup, Bundy, Hancock, et al., 2018). This is concerning in that some students who choose not to use braille, and rely only on vision to read, might avoid reading if it is too tiring or painful and thus impede their learning.

Relatedness: The themes of ‘Putting myself forward’, ‘Knowing me’, and ‘Peer exclusion and rejection’ all point directly to relatedness. While the first two themes enhance relatedness, peer exclusion and rejection thwart this need.

Self-Determination: Teaching the Student and Changing the Environment

My findings call into question the extent, or if, self-determination can be *taught* to adolescents with VI considering that, from an SDT perspective, it is a by-product of a person’s interactions with the social environment. Adults can teach skills but adolescents need motive and opportunity to exercise them.

A student with VI will be motivated to use individual skills such as exercising choice, making decisions and setting goals if they (self) determine a reason, or feel compelled, to use them. Activities and interactions that fulfil the innate needs for competence, autonomy and relatedness, entice students to engage with, and feel included at, school. The prime environmental requirements, according to participants in this study, are for others in the school context to: notice and not overlook them, see them as competent, and respect their autonomy.

There is currently little documented research on the effectiveness of teaching self-determination strategies to students with VI. Levin (2011) evaluated the effectiveness of a structured self-determination intervention for students with VI and found no differences between the secondary school students who received this intervention and a control group. He suggested that future research should consider the skills of parents and educators to provide opportunities and supports to facilitate skill development. In other words, that future researchers investigate both students and their environments. My findings add weight to this call.

The Social Challenges of Students with VI and Additional Disabilities

The social challenges of students with additional disabilities was apparent across all data sources. At school, when they were compared with participants with VI alone, the participants with additional disabilities were significantly lonelier, fitted in less and had significantly lower PSSM scores (Jessup et al., 2017), and had fewer interactions with peers they categorised as friends (Jessup, Bundy, Broom, et al., 2018) than did participants with VI alone. My findings concur with those of De Verdier (2016) who noted students with VI and additional disabilities had less positive school experiences than peers with VI alone.

It is telling that the three participants in this study who had additional disabilities had fewer interactions with peers they categorised as friends than did participants with VI alone. During their time in this study, all three had time off school due to health issues. School absences, if frequent and chronic, can disrupt the continuity of

learning and participation in student group projects. They can also leave students with less time and opportunity to get to know their school peers. From an SDT perspective, additional disabilities can increase constraints on behaviour and decrease opportunities to act autonomously. These students are also at more risk of others defining them by deficits rather than by competence. These factors potentially impact on motivation to actively engage with others.

The social aspects of school for students with VI and additional disabilities need further investigation. As these young people now comprise the majority of students with VI, by extrapolation, the majority of students with VI may well have social challenges at school.

Implications for Future Research

Research on the social experiences of students with additional disabilities needs to be prioritised. As these students now form the majority of students with VI, they are arguably more “representative” of students with VI in research than are students with VI alone.

In light of the value of SDT in thinking about social inclusion, it would be useful to understand if the links between self-determination and social inclusion are specific to adolescents with VI or if they apply to adolescents with disabilities other than vision, or if they are applicable to adolescents more broadly. This information could be gleaned from a replication of this ESM study with these different groups. The PIEL Survey app (https://pielsurvey.org) could also be used for these studies.

Researchers investigating the social aspects of high school may need to focus more closely on how environments support or thwart the development of competence and autonomy as well as relatedness. This research could enable vision professionals to more effectively direct their interventions, towards the student or their environment.

Further research is needed into how the self-determination component of the ECC is delivered and its effectiveness. Teaching self-determination skills, without attention to the social environment may not be the best way to enable students to become self-determined.

Practice Implications

The challenge faced by educators and parents is to support, guide and educate young people with VI so they transition to adulthood with a robust self-concept and the skills, knowledge and networking necessary for their future. Practitioners also need to strive toward these outcomes while constrained by time and resources.

In this study I uncovered a link between self-determination and social inclusion and suggested that a self- determination framework is useful to high school social inclusion as it highlights the needs for competence, autonomy and relatedness in school settings. This raises a number of implications for practice.

Practitioners have often been urged to focus on teaching social skills to students with VI because of the belief that a lack of a student's social skills was the reason for social isolation (Hatlen, 2004). My study in no way diminishes the critical importance of social skills, but provides evidence that social skills should not be the only area invested in to facilitate social inclusion at school. It could be argued that one of the reasons social isolation has been a perpetual generational concern for students with VI in IE settings is this emphasis on social skills: a focus on changing the child rather than also looking at how the wider social environment disables.

The link between social inclusion to self-determination raises the question as to what extent self-determination can be *taught* as if it is a by-product of transactions within the social environment. This may also require that practitioners reframe their understandings of competence, autonomy and motivation as being influenced by environment, rather than view them as somewhat stable individual traits. While skills such as choice and decision making and goal setting can be taught, students need *reasons* (motivation) to exercise these at school. Advocating for change to barriers within the social environment may be a much more difficult task than is teaching social or self-determination skills to an individual student. It however may be a more effective longer term means to facilitate social inclusion.

Lack of curriculum accessibility was a structural barrier to social inclusion. First and foremost, students need to have access to curriculum content alongside peers so they are not forced to do nothing in class. Teacher aides, while facilitating access for a student, need to also foster competence and autonomy.

Participants with VI compared themselves to sighted peers and, except for one, this comparison was negative. In light of these negative comparisons, it is important that students with VI are helped to explore and develop strengths and competence and find a place to shine within the peer milieu. Out-of-class activities may provide one venue for students to shine. These activities provide a greater measure of choice and opportunity for students with VI to share and master interests alongside their peers. These also provide students with time to relate to their peers away from the structures of the classroom.

The most positive activities of the week were those with friends when out and about, outside of school. These were the counterparts to the non-class activities at school, over which participants had relatively more choice and control. Because they are "non-academic", the value of such activities can sometimes be overlooked. This structured and unstructured leisure and recreation can contribute to competence, identity development and resilience (Jessup, Bundy, & Cornell, 2012; Jessup, Cornell, & Bundy, 2010).

As part of teaching social skills, VSTs (and parents) need to encourage students to be optimistic, take initiative and seek opportunities to reciprocate with peers. VSTs (and parents) may also need to learn to firstly detect, and then learn how to guide

adolescents with VI to cope with peer rejection and teasing. In my study 33% of students described teasing, ignoring or rejection.

Adolescents may not be willing to talk about these issues, and they are difficult to detect (Thomas et al., 2015).

Limitations of this Research

The sample size was limited due to time constraints involved in recruiting students (minors) with a low-incidence disability who were dispersed across a large continent. This study involved substantial participant burden. Participants had to be prepared to carry and respond to a survey device seven times a day for a week. This requirement may have impacted on the number of students willing to take part in the study. As a consequence, there may be more students struggling at school than are represented here. This group of participants had a lower proportion of students with VI and additional disabilities than is representative of adolescents with visual impairments. In light of my findings of the social challenges experienced by students with VI and additional disabilities, this under-representation may be somewhat telling.

Conclusions

Students need to experience competence and autonomy, **as well as** relatedness in school settings. Hence school social inclusion has become explicitly linked to self-determination and the need to focus beyond deficits of the student to the role of the school social environment. This finding, although new for this group of young people, is not conceptually new. It reflects a wider debate about the extent to which people with impairments are disabled by social and interpersonal contexts (Oliver & Barnes, 2010).

These findings have exposed the need for school staff and vision professionals to take into account the wider social contexts in the quest for school social inclusion. Social inclusion starts with the student with VI being noticed by others in the school community. Students with VI will be more motivated to engage with activities and to be included if their needs for competence, autonomy and relatedness are met within these settings. Staff need to know students as individuals and ensure they can: access the curriculum, have opportunities to develop peer relationships, and find a place to shine.

References

Agran, M., Hong, S., & Blankenship, K. (2007). Promoting the self-determination of students with visual impairments: Reducing the gap between knowledge and practice. *Journal of Visual Impairment & Blindness, 101*(8), 453-464.

Arndt, K., Lieberman, L., & James, A. (2014). Supporting the social lives of adolescents who are blind: Research to practice. *Clearing House, 87*(2), 69-74. doi:10.1080/00098655.2013.848179

Bourke, S., & Burgman, I. (2010). Coping with bullying in Australian schools: How children with disabilities experience support from friends, parents and teachers. *Disability & Society, 25*(3), 359-371. doi:10.1080/09687591003701264

Buultjens, M., Stead, J., & Dallas, M. (2002). *Promoting social inclusion of pupils with visual impairment in mainstream schools in Scotland*. Paper presented at the Annual Conference of the British Educational Research Association, University of Exeter.

Cooney, G., Jahoda, A., Gumley, A., & Knott, F. (2006). Young people with intellectual disabilities attending mainstream and segregated schooling: Perceived stigma, social comparison and future aspirations. *Journal of Intellectual Disability Research, 50*, 432-444. doi:10.1111/j.1365-2788.2006.00789.x

de Verdier, K. (2016). Inclusion in and out of the classroom: A longitudinal study of students with visual impairments in inclusive education. *British Journal of Visual Impairment, 34*(2), 130-140. doi:10.1177/0264619615625428

Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. doi:10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne, 49*(3), 182-185. doi:10.1037/a0012801

Field, S., Martin, J. E., Miller, R., Ward, M., & Wehmeyer, M. L. (1998). *A practical guide for teaching self-determination*. Reston, VA: Council for Exceptional Children.

Foreman, P., & Arthur-Kelly, M. (2008). Social justice principles, the law and research, as bases for inclusion. *Australasian Journal of Special Education, 32*(1), 109 - 124. doi:10.1080/10300110701839964

Giangreco, M. F. (2010). Utilization of teacher assistants in inclusive schools: Is it the kind of help that helping is all about? *European Journal of Special Needs Education, 25*(4), 341 - 345. doi:10.1080/08856257.2010.513537

Goodenow, C. (1993). The Psychological Sense of School Membership among adolescents: Scale development and educational correlates. *Psychology in the Schools, 30*(1), 79-90.

Hatlen, P. (2004). Is social isolation a predictable outcome of inclusive education? *Journal of Visual Impairment & Blindness, 98*(11), 676-678.

Helps, A. (2015). *Towards empowerment and independence: Developing skills in self- determination for students who are blind or vision impaired*. Paper presented at the Biennial Conference of the South Pacific Educators in Vision Impairment, Melbourne.

Higgins, N., & Ballard, K. (2000). Like everybody else? What seven New Zealand adults learned about blindness from the education system. *International Journal of Inclusive Education, 4*(2), 163-178. doi:10.1080/136031100284876

Jessup, G. M., Bundy, A. C., Broom, A., & Hancock, N. (2013). Sampling social experiences in school: Feasibility of experience sampling methodology on an iPlatform. *Journal of the South Pacific Educators in Vision Impairment, 6*(1), 140-152.

Jessup, G. M., Bundy, A. C., Broom, A., & Hancock, N. (2017). The social experiences of high school students with visual impairments. *Journal of Visual Impairment & Blindness, 111*(1), 5-19.

Jessup, G. M., Bundy, A. C., Broom, A., & Hancock, N. (2018). Fitting in or feeling excluded: The experiences of high school students with visual impairments. *Journal of Visual Impairment & Blindness*, *112*(3), 261-273.

Jessup, G. M., Bundy, A. C., & Cornell, E. (2012). To be or to refuse to be? Exploring the concept of leisure as resistance for young people who are visually impaired. *Leisure Studies, 32*(2), 191-205. doi:10.1080/02614367.2012.695388

Jessup, G. M., Bundy, A. C., Hancock, N., & Broom, A. (2018). Being noticed for the way you are: Social inclusion and high school students with vision impairment. *British Journal of Visual Impairment, 36*(1), 90-103. doi:10.1177/0264619616686396

Jessup, G. M., Cornell, E., & Bundy, A. C. (2010). The treasure in leisure activities: Fostering resilience in young people who are blind. *Journal of Visual Impairment & Blindness, 104*(7), 419-430.

Khadka, J., Ryan, B., Margrain, T. H., Woodhouse, J. M., & Davies, N. (2012). Listening to voices of children with a visual impairment: A focus group study. *British Journal of Visual Impairment, 30*(3), 182-196. doi:10.1177/0264619612453105

Levin, D. S. (2011). *Evaluating the efficacy of the empowered curriculum of self-determination for students with visual impairments.* (Doctoral dissertation), Temple University, Ann Arbor.

Lindsay, S., & McPherson, A. C. (2012). Experiences of social exclusion and bullying at school among children and youth with cerebral palsy. *Disability and Rehabilitation, 34*(2), 101-109. doi:10.3109/09638288.2011.587086

Mason, H. L. (1999). Blurred vision: A study of the use of low vision aids by visually impaired secondary school pupils. *British Journal of Visual Impairment, 17*(3), 94-97. doi:10.1177/026461969901700303

Mortier, K., Desimpel, L., de Schauwer, E., & van Hove, G. (2011). I want support, not comments: Children's perspectives on supports in their life. *Disability and Society, 26*(2), 207-221. doi:10.1080/09687599.2011.544060

Ratcliff, J. J., Lieberman, L., Miller, A. K., & Pace, B. (2016). Bullying as a source of posttraumatic growth in individuals with visual impairments. *Journal of Developmental and Physical Disabilities*, 1-14. doi:10.1007/s10882-016-9523-z

Rosenblum, L. P. (2000). Perceptions of the impact of visual impairment on the lives of adolescents. *Journal of Visual Impairment & Blindness, 94*(7), 434-445.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78. doi:10.1037/0003-066X.55.1.68

Steer, M., & Gale, G. (2006). Blindness and social meaning: The baleful tale of Blind Freddy. *The British Journal of Visual Impairment, 24*(1), 34-36. doi:10.1177/0264619606060034

Sylwester, R. (2007). *The adolescent brain: Reaching for autonomy*. Thousand Oaks, CA: Corwin Press.

Thomas, H. J., Chan, G. C., Scott, J. G., Connor, J. P., Kelly, A. B., & Williams, J. (2015). Association of different forms of bullying victimisation with adolescents' psychological distress and reduced emotional wellbeing. *Australian and New Zealand Journal of Psychiatry, 50*(4), 371-379. doi:10.1177/0004867415600076

Uttermohlen, T. (1997). On "passing" through adolescence. *Journal of Visual Impairment and Blindness, 91*(3), 309-314.

Whitburn, B. (2013a). The dissection of paraprofessional support in inclusive education: 'You're in mainstream with a chaperone'. *Australasian Journal of Special Education, 37*(2), 147-161. doi:10.1017/jse.2013.12

Whitburn, B. (2013b). Accessibility and autonomy preconditions to 'our' inclusion: A grounded theory study of the experiences of secondary students with vision impairment. *Journal of Research in Special Educational Needs*. doi:10.1111/1471- 3802.12014

Wills, R. (2015). *Self-determination: The journey to motivation and independence.* Paper presented at the Biennial Conference of the South Pacific Educators in Vision Impairment, Melbourne.

Wolffe, K., & Kelly, S. M. (2016). Beyond reading & writing: Technology, social and living skills of a select group of academically capable blind students in the U.S. *The Educator, 29*(2), 18-30.

Worth, N. (2013a). Making friends and fitting in: A social-relational understanding of disability at school. *Social & Cultural Geography, 14*(1), 103-123. doi:10.1080/14649365.2012.735693

Glenda Jessop

Senior Research Associate, Faculty of Health Sciences, University of Sydney.

Glenda.jessop@sydney.edu.au

This paper underwent a blind peer review process before being accepted.

The Role of the ECC in Developing Skills for the Successful Transition to Adult Life

Brian Sevier

Abstract

The Expanded Core Curriculum [ECC] is vital for students with vision impairment to access and engage with the world in which they live. Students with vision impairment experience gaps in their education and learning based on their inability to observe the events around them. International and local (Australian) policies and standards ensure the provision of disability-specific resources and strategies for students with vision impairment. Specifically, the ECC components of self-determination and career education play key roles in post-school success as the skills inherent to these areas require students to make appropriate decisions, problem solve, set goals, and build self-knowledge or self-awareness. These skills and knowledge are crucial for students with vision impairment as they transition from school life to adult life. A summary of the local and international legislation focusing on equitable treatment of those with disabilities is provided to validate the global priority for inclusive classroom practices. An examination of the ECC elements of self-determination and career education follows, concluding with examples of how the ECC complements the core curriculum.

Introduction

The Expanded Core Curriculum [ECC] provides students with vision impairment the skills and self-knowledge necessary for a successful, independent life after school (Texas School for the Blind and Visually Impaired, n.d.). The skills developed and honed through the explicit teaching of self-determination and career education, two components of the ECC, are vital for students with vision impairment to achieve success in adult life. Students with vision impairment require purposeful and meaningful learning experiences designed with their individual needs in mind. The ECC works in conjunction with the core curriculum to ensure the needs of students with vision impairment are addressed and met through equitable planning and teaching strategies in an inclusive learning environment.

Inclusion is a Critical Right for Students with Vision Impairment

Students with vision impairment are afforded the right to an equitable education that takes their disability-specific needs into account. The United Nations Convention on the Rights of People with Disabilities (2006) outlines the components of inclusive education as one where persons with disabilities “learn life and social development skills [that] facilitate their full and equal participation in education and as members of the community” (p. 15). The goal of the United Nations convention is to ensure those

with disabilities, in this case a vision impairment, have the same opportunities to engage in learning experiences and the community as those without disabilities. In Australia, the entitlement of equitable education is outlined in the Disability Services Act 1986 and the Disability Discrimination Act 1996 (Australian Government, 2013; Australian Government 2018). These acts guarantee that access to educational facilities, resources, and curricula cannot be denied based on a person's disabilities (Australian Government, 2018). Rather, persons with disabilities are entitled to the resources necessary to develop and maintain independence, self-esteem, and engagement in the community (Australian Government, 2013). These government acts stipulate that students with disabilities, including students with vision impairment, have access to the disability-specific resources they need to lead the life they envision for themselves.

Specific to Australian schools, the Disability Standards for Education [DSE] 2005 (Commonwealth of Australia, 2006) protect the services and resources all students in the nation's schools need in order to successfully engage in their education. In terms of a student with vision impairment, for instance, the DSE 2005 outlines the entitlement of "accessible formats" as well as the "development of disability-specific skills" (Commonwealth of Australia, 2006, p. 25). Disability-specific supports are explicitly detailed in order to guarantee their delivery in a timely, appropriate fashion. Large print materials and multi-modal texts are examples of the accessible formats mentioned in the DSE 2005, while the development of skills related specifically to vision impairment are addressed through the nine components of the ECC (Allman & Lewis, 2014). Policies like the United Nations Convention on the Rights of People with Disabilities (2006), the DSA 1986 (Australian Government, 2013), the DDA 1996 (Australian Government 2018), and the DSE 2005 (Commonwealth of Australia, 2006) are supported by international and Australian governments to enable persons with disabilities, and especially students with vision impairment, to access support, resources and curricula through engagement in inclusive learning environments.

Inclusion describes an educational setting where all students have their individual backgrounds and needs acknowledged and assessed in order to deliver appropriate, tailored learning experiences (South Pacific Educators in Vision Impairment [SPEVI], 2016). Steer and Gentle (n.d.) define the fundamental elements of inclusion as "the provision of individualised instructional supports, addressing unique learning styles of individual students, and adapting the curriculum, teaching materials and teaching methods" (p. 4). In the case of students with vision impairment, the adaptation of curriculum, resources, and strategies is a function of the ECC and outlined in the DSE 2005 (Commonwealth of Australia, 2006) to ensure these students have equitable access to learning activities. An inclusive environment is crucial for the attainment of skills necessary for future success, and therefore a key component of a quality education. McDonough, Sticken and Haack describe the purpose of "high-

quality education" as to "equip children with the skills and knowledge they need to contribute to society" (2006, p. 597).

Purposeful practices and standards that teachers must exemplify ultimately result in a quality education for all students. According to the Australian Professional Standards for Teachers (Australian Institute for Teaching and School Leadership [AITSL], 2011), inclusive practices such as structuring lessons to meet the needs of students, acknowledging and addressing barriers to student success, and committing to foster relationships that develop knowledge are essential aspects of delivering quality educational experiences to all learners (AITSL, p. 5). In conjunction with the AITSL standards, the South Pacific Educators in Vision Impairment [SPEVI] emphasise that improvement in educational outcomes can be achieved through "the elements of high-quality, effective specialist teaching that will ensure equitable and inclusive education for learners with vision impairment" (2016, p. 5). The coordination between general educators and specialist teachers is essential for ensuring inclusive practices and providing equitable learning experiences for students with vision impairment. Professional practice, guided by standards developed to promote inclusive environments and quality learning experiences, ensures all students have opportunities to succeed regardless of race, ethnicity, orientation or disability.

Self-Determination and the Role of the ISTV

As with the other areas of the ECC, self-determination as a concept is intertwined in the development of skills across the scope of the ECC. However, self-determination is also crucial for the transition from school to independence and self-reliance. The purpose of self-determination in the ECC is ultimately to develop self-advocacy within students with vision impairment. Self-advocacy requires the development of capabilities to make good decisions, set goals, solve problems appropriately and communicate effectively (Wolffe & Rosenblum, 2014). These abilities are essential for participating in life experiences, engaging with communities and thriving in adult life. Wolffe and Rosenblum (2014) emphasise the impact of self-advocacy, describing it as a "fundamental component of self-determination" (Location 17004). The many skills incorporated in the concept of self-determination are necessary to compensate for any potential loss of direct support offered in educational settings. Deci argues that demonstrating self-advocacy through goal setting, problem-solving and appropriate communication, enables students with vision impairment to build a sense of independence that will promote a successful transition to adult life (as cited in Wolffe & Rosenblum, 2014, Location 17041). The Texas ECC Committee (2014) highlights the evolution of skills necessary for self-awareness and confidence that allow students with vision impairment to "become effective advocates for themselves and therefore have more control over their lives" (p.2). Students with vision impairment must strive to develop the skills inherent to self-determination in order to create and maintain autonomy as they progress into adult life.

The independence and self-advocacy skills necessary for developing self-determination must be developed intentionally and explicitly. Wolffe and Rosenblum (2014) assert that students with vision impairment must be guided by a knowledgeable professional in order to learn self-determination skills, or they risk remaining dependent on others (Wolffe & Rosenblum, 2014, Location 17042). The authors believe the itinerant support teacher- vision impairment [ISTV] is pivotal in providing access to the skills and knowledge required for self-determination. Students with vision impairment depend on fewer opportunities to observe and practice the specific skills that lead to self-determination, so they must rely on educators who possess knowledge and skills in vision impairment to offer supplemental information (Texas ECC Committee, 2014). The ISTV coordinates with classroom teachers, other support personnel, and families to deliver instruction in the ECC for students with vision impairment based on their individual needs (Sapp & Hatlen, 2010).

In terms of self-determination skills, the ISTV aids students to become familiar and comfortable with their vision conditions (Wolffe & Rosenblum, 2014). An understanding of visual limitations as well as opportunities to practice explaining their condition promote students with vision impairment to clarify what they need as well as express why it is required. The self-knowledge and appropriate communication established through understanding fosters self-advocacy in students with vision impairment (Wolffe & Rosenblum, 2014, Location 17093). Explicit feedback, or input regarding specific self-determination skills in an authentic context, encourages students with vision impairment to develop knowledge about their strengths and weaknesses, which enables accurate goal setting, problem solving and communication (Wolffe & Rosenblum, 2014). The identification of available choices as well as possible consequences in relation to the suitability of goals, problem-solving strategies, and social interactions, are also critical skills in self-determination. Not only do students with vision impairments require the opportunity to make decisions for themselves, but they must understand the consequences of their choices (Sapp & Hatlen, 2010, p. 341). The ISTV can offer insight into the implications of choices so that students with vision impairment mature into informed decision makers. Realistic feedback in an authentic context reinforces the development of meaningful connections, and ultimately, establishes a foundation for students with vision impairment to grow into adults with refined decision-making skills (Wolffe & Rosenblum, 2014, Location 17102). The role of the ISTV is a vital one for students with vision impairment as the ISTV endeavours to build self-determination skills through modelling, offer opportunities for authentic practice of skills, deliver specific feedback, and provide examples of effective self-determination through role models and peer models (Wolffe & Rosenblum, 2014, Location 17406).

Career Education and the Role of the ISTV

Career education, incorporated as part of the ECC, is vital for students with vision impairment (Wolffe, 2014). Encompassed within all areas of the ECC are the skills associated with achieving successful engagement in a career of one's choosing (Sapp & Hatlen, 2010, p. 347). The demonstration of knowledge and abilities gained from the scope of both the core curriculum and the ECC have an enormous impact on the course of one's life. Wolffe (2014) identifies the need for "effective career awareness, exploration, and preparation" as "determining factors in the trajectory of an individual's life" (Location 14817). In other words, the knowledge gained or not gained as well as the skills possessed or lacking, can greatly influence the life of a student with vision impairment. Purposeful and meaningful attention to the disability-specific skills inherent to the ECC are crucial to the future success of students with vision impairment. In 'Career education for students with visual impairments' (1996), Karen Wolffe determined that "it is essential that career education content be introduced throughout the educational process" (p. 2). Career education, therefore, is not a focus established in the latter stages of a student's educational life, but an overarching principle to be considered in the early stages of a student's education. The relevance of skills built and honed through exposure to the ECC in primary school are evident in the continuum of knowledge essential to exploring and preparing for active participation in life after school. McDonough, Sticken, and Haack (2006) explain that a student with vision impairment who is confident in the ECC as well as subjects in the core curriculum are "fully equipped to be competitive in the workforce" (p. 597).

Areas in the ECC such as compensatory access and assistive technology provide students with vision impairment with the skills required to gain information about tasks or jobs using assistive and optical devices. These areas of the ECC allow students with vision impairment to participate in everyday activities that centre around work and life. Orientation and mobility, another skill area included in the ECC, also equips students with the ability to safely travel to a job as well as navigate unfamiliar environments that may be encountered at a work site (Wolffe, 2014, Location 14895). The organisational and responsible maintenance of possessions, tools, and resources are skills linked to the independent living component of the ECC, while the appropriate and effective recognition/use of language, non-verbal cues and communication are vital skills attained in the ECC area of Social Interaction (Wolffe, 2014). Sacks and Rothstein (2010) conclude from data collected by the American Federation for the Blind that the relationship "between a student's successful transition to work and a student's being taught even just a few of the content areas of the ECC" is significant (p. 782).

The role of the ISTV in developing and practicing the multitude of skills and knowledge associated with career education in the ECC is critical. Direct intervention in the form of information sharing is an important aspect of an ISTV's role (Wolffe,

2014, Location 15896). Students may otherwise miss details pertaining to safety, expectations, processes and resources used in both school and work settings. A key role of the ISTV is facilitating the coordination of services, support and opportunities that students with vision impairment require in order to develop the abilities inherent to each component of the ECC (Wolffe, 2014, Location 15693). Collaboration ensures that students have access to the core curriculum by providing classroom teachers with examples of differentiation that focus on incorporating relevant areas of the ECC into everyday learning experiences (Sacks, Blankenship, Douglass & Kreuzer, 2014). These services, support and resources are essential for developing career awareness and preparation that Wolffe (1996) emphasises above.

The decisions that students with vision impairment will inevitably make about work and life experiences may be influenced by experiences coordinated by the ISTV. Sapp and Hatlen (2010) stress the importance of “firsthand experiences with various jobs and roles in life” which greatly impact career choices, independence and success for students with vision impairment (p.340). Firsthand experiences provide meaningful feedback and realistic expectations that students with vision impairment may not gather through incidental learning. Ever-present in work situations are the high expectations for tasks to be accurately and efficiently completed. The ISTV can create learning experiences where the student with vision impairment is held to a high standard, and feedback is presented in a method similar to a work situation. The effective use of high expectations and relevant feedback will not only provide information regarding work situations, but will also aid in the development of self-determination in students with vision impairment.

ECC links to core curriculum

The ECC is closely connected to the core curriculum in that they both inherently provide a framework that can be utilised for achievements in a student’s school and vocational careers, as well as successful social interactions and the development of independence. However, students with vision impairment require the additional skills innate within the ECC to access the content of the core curriculum (Sacks, Blankenship, Douglass & Kreuzer, 2014). According to Lohmeier (2005), areas of the ECC should be taught in conjunction with the core curriculum “because they are specific to the disability of blindness” (p. 127). Due to variations in accessing occasions of incidental learning among students with vision impairment, the skills and knowledge addressed in the ECC may be required in order to access the information within the core curriculum. These skills and knowledge can be readily accessible in classrooms focusing on the core curriculum. For instance, cultural nuances, collaboration skills, and the relevance of context in determining meaning can be taught in a HSIE lesson about the role of dictators in World War II to address the skills included in the self-determination area of the ECC (Lohmeier, 2007, p. 35). A lesson on the textual structures of a persuasive essay in English may highlight the importance of organisation, which is a key component of both the independent living

and career education components of the ECC. A science lesson on making good choices regarding personal health and fitness goals links to decision-making skills in independent living and self-determination. The inclusion of the ECC in teaching of the core curriculum not only provides students with vision impairment opportunities to experience new skills in various learning contexts, but it also demonstrates the high-quality nature of inclusive practices.

Conclusion

The ECC allows students with vision impairment to access the core curriculum and participate with inclusive classroom practices as outlined by international and Australian policies. Specific skills and knowledge inherent to the ECC, particularly within the areas of self-determination and career education, are essential to the successful achievement of independence, problem-solving skills and work placement for students with vision impairment. Inclusive practices, ISTV support and collaboration with classroom teachers, as well as explicit instruction targeted at students' needs ensure the potential for success for students with vision impairment.

References

Allman, C.B. & Lewis, S. (2014). A strong foundation: The importance of the Expanded Core Curriculum. In C.B. Allman, S. Lewis, and S.J. Spungin (Eds.), *ECC essentials: Teaching the expanded core curriculum to students with visual impairments* (Chapter 2). New York, AFB Press.

Australian Government. (2018). Disability Discrimination Act 1992. Retrieved on 11 May from https://www.legislation.gov.au/Details/C2018C00125

Australian Government. (2013). Disability Services Act 1986. Retrieved on 11 May from https://www.legislation.gov.au/Details/C2013C00015

Australian Government Department of Education and Training. (2018). *Disability Standards for Education 2005.* Sydney, Australia: Author.

Australian Institute for Teaching and School Leadership (2011). *National professional standards for teachers.* Carlton South, Vic: MCEECDYA.

Commonwealth of Australia. (2006). *Disability standards for education 2005.* Canberra, ACT: Author.

Lohmeier, K.L. (2005). Implementing the expanded core curriculum in specialized schools for the blind. *RE:view, 37*(3), 126-133.

Lohmeier, K.L. (2007). Integrating expanded core sessions into the K-12 program: A high school scheduling program. *RE:view, 39*(1), 31-38.

McDonough, H., Sticken, E., & Haack, S. (2006). The expanded core curriculum for students who are visually impaired. *Journal of Visual Impairment & Blindness,* 596-598. NSW Department of Education and Training. (1998). *Special*

education handbook for schools. Sydney, NSW: DET NSW Student Services Directorate. (Section 3.5, pp. 1-14; and Section 3.12, pp. 1-2.)

Sacks, S.Z., & Rothstein, S.M. (2010). The expanded core curriculum and the reauthorization of IDEA: Reality or rhetoric? *Journal of Visual Impairment & Blindness,* 781-782.

Sacks, S.Z., Blankenship, K.E., Douglass, S., & Kreuzer, D.T. (2014). Aligning the expanded core curriculum with state standards. In C.B. Allman, S. Lewis, and S.J. Spungin (Eds.), *ECC essentials: Teaching the expanded core curriculum to students with visual impairments* (Chapter 14, pp. 555-576). New York, AFB Press.

Sapp, W. & Hatlen, P. (2010). The expanded core curriculum: Where we have been, where we are going, and how we can get there. *Journal of Visual Impairment & Blindness, 104*(6*),* 338-348.

South Pacific Educators in Vision Impairment [SPEVI]. (2016). *Professional standards elaborations for specialist teachers (vision impairment*). Retrieved from https://www.spevi.net/professional-standards-elaborations/

Steer, M., Gale, G., & Gentle, F. (n.d.). *SPED 922: Curriculum frameworks and IEPs: General principles and approaches* [Topic 5 Commentary]. North Ryde, Australia: Macquarie University.

Texas School for the Blind and Visually Impaired. (n.d.). *What is the Expanded Core Curriculum?* Retrieved from https://www.tsbvi.edu/math/3973-ecc-flyer

United Nations. (2006). United Nations Convention on the Rights of Persons with Disabilities. Retrieved on 19 May from https://www.un.org/disabilities/documents/convention/convention_accessible_pdf.pdf

Wolffe, K. (n.a.). *Skills for success* [PowerPoint]. American Foundation for the Blind.

Wolffe, K. (1996). Career education for students with visual impairments. *RE:view, 28*(2), pp. 89-93.

Wolffe, K.E. (2014). Career education. In C.B. Allman, S. Lewis, and S.J. Spungin (Eds.), *ECC essentials: Teaching the expanded core curriculum to students with visual impairments* (Chapter 11). New York, AFB Press.

Wolffe, K.E. & Rosenblum, L.P. (2014). Self-determination. In C.B. Allman, S. Lewis, and S.J. Spungin (Eds.), *ECC essentials: Teaching the expanded core curriculum to students with visual impairments* (Chapter 12). New York, AFB Press.

Brian Sevier

Itinerant Support Teacher – Vision Impairment, NSW

Brian.sevier11@gmail.com

Early learning experiences for children who are blind or have low vision: the building blocks of later Orientation and Mobility (O&M) skills.

Patricia Izzard

Introduction

Research has validated that the early years in a child's life lay the foundations for all future development and that early learning experiences shape future development by affecting the way a young brain develops (Early Childhood Intervention Australia, 2016). The opportunity for learning that occurs in the early childhood years is greater than in any other period of life. Physical, emotional and cognitive development is rapid and interconnected, not only influencing the next stage of development within each domain but also affecting learning in other areas (Skellenger & Sapp, 2010).

Vision is considered the primary sense that a child uses to learn (Hershberger, 1992). Much of what a child learns in the first years of life involves using vision as a modality to attach names to object or actions; to realise that all of the sensory information about an object (sound, touch, smell, taste) all belong to the same object (Fazzi & Klein, 2002; Fazzi & Petersmeuer, 2001., as cited in Skellenger & Sapp, 2010). When vision is not available or is compromised, information needs to be obtained in other ways. For all babies, brain development relies on action and stimulation; neuronal connections in the brain are built, strengthened and reinforced through repeated experiences with a person, object or event (Ferrell & Spungin, 2011). According to Early Childhood Intervention Australia (ECIA), one of the intentions of early childhood intervention is to "optimise the child's learning and development, and the child's ability to participate in family and community life" (2016, p. 3). The ability to move confidently, safely and independently is considered one of the most essential skills that a child with vision impairment needs to acquire (Castellano, 2010). The building blocks for developing these skills start in infancy.

Early learning experiences are important for later O&M skills

Many of the motor difficulties seen in children who are blind have their origin in incomplete integration of neurological reflexes and reactions, which generally occur in the first few years of life (Rosen, 2010). Ideally, motors skills are developed in sequence with missed stages resulting in splinter skills and potential poor motor functioning later in life; subsequently, it is vital to begin to work in these areas in infancy (Rosen, 2010). Without meaningful and appropriate early learning experiences, children with vision impairment are at risk of the deficits in the following:

- **Low muscle tone** has been linked to reduced physical activity in infants who are blind. Starting with a lack of motivation to lift their head, supporting weight

on their hands, standing, walking and running is all impacted on by poor tone. Good tone is beneficial for movement (Anthony et al., 2002; Ferrell & Spungin, 2011).

- **Balance** first develops with the ability to balance the head and then continues down the body. It is necessary for running, ball throwing, jumping and standing (Ferrell & Spungin, 2011).
- **Motor planning** is impacted on by decreased sensory awareness, lack of movement experiences and neurological integration (Rosen, 2010).
- **Purposeful movement through space**: lacking the visual motivation to explore and purposefully move through an environment puts a child at risk of delayed development of spatial relationships which are essential O&M skills (Anthony et al., 2002)
- **Early motivation** to extend their hands and reach for an object (Anthony et al., 2002).
- **Wrist rotation** is an important development for participating in activities of daily living, e.g. opening containers and doors (Anthony et al., 2002).
- **Tactile exploration**: exploration and systematic searching and exploring qualities of an object to learn about function, shape, weight, composition and texture (Anthony et al., 2002).
- **Gross motor development** and postural differences (Anthony et al., 2002).
- **Proprioceptive awareness**, which is crucial for learning to perform specific motions and coordination (Rosen, 2010).
- **Vestibular awareness**, necessary for balance, equilibrium, arousal, coordination (Kaesai, 1991., as cited Rosen, 2010).
- **Understanding concepts** - mental representations, images or ideas of what something should be. The ability to perceive and discriminate similarities is fundamental for concept development (Skellenger & Sapp, 2010).
- **Environmental awareness** starts at home with knowledge about objects and their function in the environment in which they live and then extends to outdoors and the community (LaGrow, 1998).

Basic spatial and environmental concepts are essential for the development of O&M and are obtained through a child's purposeful interaction with the environment (Skellenger & Sapp, 2010). Although learning in some areas of development can occur at various times throughout life, developmental learning, also referred to as cumulative or a building-block process, is primarily linear (Skellenger & Sapp, 2010). The building-blocks process for development begins in infancy (LaGrow, 1998).

Why specific early learning experiences for young children with vision impairment are important

From infancy, incidental learning is a significant part of a child's development, with approximately eighty per cent of sensory information is taken in through the eyes

(Ferrell & Spungin, 2011). By just opening their eyes, vision can provide a greater quantity and quality of information in a shorter time period than any other sense (Barranga, 1986., as cited in LaGrow, 1998). They learn to sit unsupported, to walk, to babble, actively plan and participate in the events happening within their surroundings. Step by step, they develop skills with undue effort (Neilsen, 1993). Sighted babies can observe the environment visually; a baby that is blind or has low vision needs to touch the object world to observe. Their hands are their eyes, the perceptual organs for processing sensory integration (Cutter, 2007). They need to actively explore and discover the environment, to move and find out what is in their world. Facilitating the inherent enjoyment of exploration by providing relevant and meaningful opportunities for learning in the early years of life, children with vision impairment are more likely to achieve independence (Cutter, 2007).

Early learning experiences beneficial for the development of later O&M skill

It is imperative to preface any commentary regarding early learning experiences for children with vision impairment by elucidating that all children learn best through everyday experiences and interactions with familiar people in familiar and natural learning environments (McWilliam, 2010). Parents (or other key caregivers) are the first and primary educators for children. It is therefore essential that early intervention focuses on building their confidence and capacity to contribute to their child's learning and development; facilitating independent movement and developing concepts throughout the day for their child (Early Childhood Intervention Australia, 2016; Skellenger & Sapp, 2010).

Movement provides a large amount of information about the characteristics of the environment for children with vision impairment that is usually provided through vision. It gives meaning to words and provides information regarding size, location, texture and other qualities of objects (Skellenger & Sapp, 2010). The ability to move is a pre-requisite for all learning. For children with vision impairment, purposeful self-initiated movement, not passive movement is essential for developing motor skills. It is only through active interaction with the environment that they will learn how to function within it. It is only through active movement that children will develop muscle tone, proprioceptive awareness and coordination; all imperative for later O&M skill development (Rosen, 2010). During the first five years of life, most of what a child learns is learned through play; consequently, it is important that they have opportunity to actively experience as much as possible in the world around them (Skellenger & Sapp, 2010).

Neilson's (1993) Active Learning approach is based on the belief that all children can learn, and the role for caregivers and educators is to create environments or situations that encourage children to be active participants in their learning rather than being physically guided or instructed. This can be achieved by being

unobtrusively available to the child and creating spaces and presenting materials that are interesting, safe to explore and responsive. An Active Learning approach respects personal body space and facilitates learning in a way that more directive instruction (hand over) does not. It provides educational solutions to help children with vision impairment develop head control, sit unsupported, learn to stand and walk, develop spatial relations, achieve object concepts and self-identification, to talk, to play constructively and imitate interaction with others. Many valuable manufactured materials have been developed in unison with the Active Learning approach; however, they are not essential for executing the approach. The Active Learning approach is fundamentally about how to encourage a child to engage in intentional and meaningful movements; to learn to self-initiate, sustain, monitor and terminate their own movements; all important for later O&M (Cutter, 2007; Neilson 1993).

Children with vision impairment learn by exploring and manipulating objects in their environment and by comparing new objects to familiar ones. They need as many opportunities as possible to have hands-on experiences with a variety of real objects and textures; all of which will be facilitating concept development and spatial relations (Nelison, 1993). This starts in infancy and can be facilitated by encouraging babies to reach out and explore with their hands by introducing interesting sound and touch objects into their play space (Cutter, 2007). Learning to reach is an important fine motor skill that leads to control over the environment and can be the difference between a dynamic baby who actively explores the environment and a passive baby who waits for things to be brought to them (Ferrell & Spungin, 2011). Learning to reach to sound demonstrates that babies with vision impairment are aware that objects and people exist separate from them. It is an important stage in development for children with vision impairment as it provides motivation to move towards objects of interest (including people) by rolling, crawling and eventually walking (Ferrell & Spungin, 2011). Neilson's (1993) Little Room (Figure 1) is a space in which this can be facilitated. A variety of objects that are diverse in their properties (sound, texture, weight, size, density, temperature, shape, flexibility) are suspended from the ceiling of the Little Room and the child is free to explore and experiment with what they discover while moving their hands and legs (Hurst, 2019). The Little Room can be used in conjunction with a resonance board (Figure 1), or alternatively, a resonance board can be used independently of the Little Room. A resonance board is a flexible sheet of wood that gives tactile and auditory feedback whenever the baby moves. When they kick, there is sound and vibration. The feedback encourages the child to repeat the movement, and eventually to experiment with other movements as well. Sounds created by the child's movements resonate from the wood and this immediate feedback can help the brain integrate motor activity and listening skills which are necessary for independent O&M (Cutter, 2007; Neilson, 1993).

Figure 1. Little Room with Resonance Board (Hurst, 2019).

Another means of encouraging self-exploration in young children who are blind or have low vision is through the introduction of push toys and a long cane. Using weighted push toys can encourage walking while providing protection from obstacles in the environment (Cutter, 2007). During play, a long cane can be used with a young child in sitting position as an exploratory tool for reaching out into space. The young child can begin to experiment with the long cane, banging it onto different surfaces or objects and experiencing the different sounds and properties that the long cane comes into contact with (Cutter, 2007; Scott, 2012). The introduction of a long cane should be done in collaboration with an O&M specialist, the child's family and caregivers, and needs to be developmentally appropriate.

Proprioceptive awareness is the awareness of an individual's body position and posture. While it can be improved at any age, it develops during infancy and contributes to both the development of muscle tone and the establishment of coordinated movement (Hill et al., 1995., as cited in LaGrow, 1998; Rosen, 2010). Early age-appropriate experiences that will aid in the development of proprioceptive awareness including joint compression, weight bearing on the hands and knees, jumping, stamping, pushing and pulling games, massage, kicking feet against an object and being in the prone position (Rosen, 2010). Being in a prone position helps also helps to develop upper body strength as well as head and neck movements (Anthony et al., 2002).

Closely related to the proprioceptive system is the vestibular system. Vestibular input plays an important function in the regulation of muscle tone and coordination, balance and equilibrium, arousal and attending. It makes it possible for people to move effectively and in a coordinated manner (Rosen, 2010). Rosen (2010) reported that;

> Anecdotal evidence in working with preschool-aged children who are blind has shown that for children who have vestibular-based stereotypies (self-stimulating behaviours and mannerisms) such as rocking, the frequency and intensity of such stereotypies can often be reduced or eliminated by giving the child adequate experiences in activities that stimulate the vestibular sense (p. 121).

Activities that stimulate the vestibular system include rocking, tumbling, swinging, bouncing and spinning or holding a baby in positions that vary the vestibular input and provide opportunities for independent head righting (Ferrell & Spungin, 2011). Using a large inflated ball, with the child leaning tummy down on the ball while an adult mover the ball will stimulate the vestibular system as well as develop falling protection as the child learns to reach out to catch themselves (Anthony et al ., 2002). These activities can be incorporated repeatedly into daily routines with a young baby.

The development of spatial and positional concepts and environmental awareness; all of which are essential for O&M, can be developed through interactions with the environment (LaGrow, 1998; Skellenger & Sapp, 2010). There are endless opportunities to use language with an infant and teach concepts such as up, down, in, out, in front of, and in back of during daily routines such as changing, feeding, dressing, getting into the car etc., (Barclay, 2012; Ferrell & Spungin, 2011). Developing environmental awareness by actively involving a baby in daily routines will provide opportunities to add meaning to what is occurring around them. Feeling the warm water as it comes out of the tap or lifting the lid on the letterbox to remove the letter will give a child much more information than merely hearing the experiences or having them described to them. Having a young child in a front-facing carrier while participating in everyday household tasks, and providing descriptive language and tactile exploration during these tasks will help a child to add meaning to the sounds they hear in their world and enrich their understanding of world around them whilst also facilitating their tactile exploration and awareness (Barclay, 2012; Rosen 2010). A mother’s voice and smile could provide an infant with the motivation to lift their head while in the prone position. Providing repeated opportunities in the day for a young child to reach out and explore with their hands by presenting sound and touch objects will promote active movement (Cutter, 2007). Incorporation early O&M routinely into daily routines provides young children to consistently practice movement and mobility. This begins at home and then extends into other learning environments outside of the home.

Conclusion

It is imperative that at-risk infants and toddlers (such as children with VI) receive early intervention services from birth to ensure that they have improved skills later in life (Skellenger & Sapp, 2010). Early intervention services for children with vision impairment, as for all children, need to focus on building the capacity and confidence

of primary caregivers to contribute to their child's learning through everyday experiences in their home and community settings (McWilliam, 2010). Young children learn best through daily interactions in their natural environments and need to have the opportunity to practice skills and develop concepts repeatedly throughout their day (Skellenger & Sapp, 2010). For a child with vision impairment, the ability to move confidently and independently is considered one of the most important skills they can learn (Castellano, 2010). The building blocks for these skills begin in infancy through engagement in active play and self-initiated and purposeful movement. Incorporating active learning to facilitate the development of muscle tone, balance, strength, coordination and posture will promote motor development and independent movement in children with vision impairment, resulting in successful outcomes for independent movement and travel later in life (Anthony et al., 2002; Cutter, 2007).

References

Anthony, T.L., Bleier, H., Fazzi, D.L., Kish, D. & Pogrund, R.L. (2002). Mobility focus: developing early skills for orientation and mobility, In R.L. Pogrund, D.L. Fazzi, & Lampert, J.S. (Eds.). *Early focus: Working with young blind and visually impaired children and their families (*2nd ed., pp. 326-404). New York, NY: American Foundation for the Blind.

Barclay, L.A. (2012). *Learning to listen/listening to learn: Teaching listening skills to students with visual impairments.* (pp. 395-494). New York, NY: American Foundation for the Blind.

Castellano, C. (2010). *Getting ready for college begins in the third grade: Working towards an independent future for your blind/visually impaired child: Pre-K to middle school*. (pp. 39-68). Charlotte, North Carolina: Information Age Publishing.

Cutter, J. (2007). *Independent Movement and Travel in Blind Children: A Promotion Model.* Information Age Publishing, Charlotte.

Early Childhood Intervention Australia (ECIA). (2016) National Guidelines: Best Practice in Early Childhood Intervention. Retrieved from https://www.ecia.org.au/Portals/4/Resources/Other%20Resources/ECIA-National-Best-Practice-Guidelines.pdf?ver=2018-06-05-172656-123

Ferrell, K., & Spungin, S. (2011). *Reach Out and Teach* (2nd ed.). New York, NY: AFB Press.

Hershberger. P. (1992). Information loss: The primary psychological trauma of the loss of vision. *Perceptual and Motor Skills, 74*(2), 509-510.

Hurst, K. (2019). Little Room. Retrieved from http://activelearningspace.org/equipment/purchase-equipment/little-room

Hurst, K. (2019). Touch and the Development of the Tactile Sense. Retrieved from https://www.tsbvi.edu/touch

LaGrow, S. (1998). Orientation and mobility. In P. Kelley and G. Gale (Eds.), *Towards excellence: Effective education for students with vision impairments.* (pp. 193-208). Sydney: North Rocks Press.

McWilliam, R. (2010). *Routines-based early intervention*. Baltimore: P.H. Brookes.

Nielsen, L. (1993). *Early learning step by step: Children with vision impairment and multiple disabilities* (1st ed.). Copenhagen: SIKON.

Rosen, S. (2010). Improving sensorimotor functioning for orientation and mobility. In W.R. Weiner, R.L. Welsh, & B.B. Blasch (Eds.). *Foundations of orientation and mobility: Instructional strategies and practical applications.* (3rd ed., Vol. II, pp. 118-137).

Scott, B. (2012). *I'm starting to walk – I can use a cane! Introducing orientation and mobility sills to very young children who are blind or have low vision.* Melbourne, Australia: Author.

Skellenger, A.C. & Sapp, W.K. (2010). Teaching orientation and mobility for the early childhood years. In W.R. Weiner, R.L. Welsh, & B.B. Blasch (Eds.). *Foundations of orientation and mobility: Instructional strategies and practical applications.* (3rd ed., Vol. II, pp. 163-201)

Patricia Izzard

Early Childhood Specialist Teacher, Vision Australia

Patricia.Izzard@visionaustralia.org

This paper underwent a blind peer review process before being accepted.

Documenting Tactile Graphicacy

Louise Curtin, Debra Lewis and Leona Holloway

Please note that this paper is a revision of a paper presented at the 2019 Round Table Conference, 5 – 7 May 2019, Brisbane, Australia.

Abstract

Tactile literacy is the ability to access information through touch. For students who are blind or have severe low vision, this means having an interest in exploring with the hands, understanding how a book works and what to look for on a page, systematic movements for exploring the page and tracking a line, concept development, and ultimately being able to read and understand braille and tactile graphics. Tactile literacy is not inherent, but rather requires directed building up of skills.

This paper examines the fundamentals of tactile literacy: Why it is so important, what skills need to be taught, developmental milestones, and strategies for teaching and engagement.

Keywords

Tactile graphics; Pedagogy; Guidelines

Introduction

International interest in tactile literacy for blind and low vision children has flourished over the last 15 years, with growing recognition of its importance. This document is based on the approaches being taken in Australia and New Zealand with children from birth to the completion of their secondary schooling.

While a number of organisations have written guidelines for the production of tactile graphics (BANA, 2012; Frankel, 2012; Gale, 2005; Gardiner & Perkins, 2002), far less attention has been given to how the foundations of tactile literacy are reached. This paper outlines the importance of tactile graphicacy (section 1), how the skills are achieved (section 2) and provides some guidelines for the production of tactile graphics to support this learning (section 3).

What is tactile graphicacy and why is it important?

Tactile literacy and tactile graphicacy

Literacy is the ability to decode and produce a written language. It usually refers to a written script such as print or braille, but can equally apply to graphics. In order to be literate, you must first be able to perceive the written language, understand its

conventions (for example, reading from left to right), recognise its symbols and decode its meaning.

Tactile graphicacy in particular refers to the ability to read, interpret and produce tactile graphics or raised line drawings. This skill is an extension of tactile literacy, requiring explicit attention.

The importance of tactile literacy

For people who are blind or have very low vision, tactile literacy is the means to successful access to literacy, education, information and independence. Among blind adults, braille reading ability is linked to better employment rates, education levels, financial self-sufficiency, self-esteem and life satisfaction (Bell & Mino, 2013; Ryles, 1996; Silverman & Bell, 2018). Dixon (2000) states "Braille holds a special place of honor in the lives of those of us who use it—not only as a tool for true literacy but also as a tool for personal dignity, privacy, and independence" (p. 17). Exploring tactile picture books is the first step towards braille literacy. Moreover, there is evidence that practice and exposure to tactile stimuli such as braille and tactile patterns can aid brain development of touch perception (Sathian, 2000).

There is a direct link between tactile literacy and achievement at late secondary and tertiary levels. With an increasing use of visual presentation of the curriculum, our students who are blind or have low vision must be able to read graphs and all tactile diagrams effectively. Early success in exploring and interpreting tactile pictures is vital for confidence and interest in tactile graphics at a later age, and ultimately to ensure that a wide range of study and career options are attainable. In a recent study of university and TAFE students in Australia with vision impairments, half reported that they had avoided a potential study area or career due to concerns about access to graphics in that field, and there was an under-representation of these students in the STEM disciplines (Butler at al, 2017). We must work to ensure that future students can overcome such barriers through tactile literacy and self-advocacy skills (Holloway & Lewis, 2018).

The role of tactile pictures

If children who have vision loss are to have equitable access to books and stories, then “feely” pictures are essential. Consider a child at story time in a preschool centre, sharing a dual-media story book with their sighted peers. Such experiences empower children in their early experiences of sharing books and enable a more inclusive environment.

For the very young, tactile symbols are used to convey meaning, usually associated with a story book or a rhyme. In child care and kindergartens, tactile song cards allow a child with vision loss to learn and sing popular rhymes like “Round and round the garden” or “Twinkle twinkle little star”. These cards are a potent method in teaching concepts. Once such simple concepts are established in a child’s tactile

lexicon, they can be used to interpret other tactile graphics. If a child has a tactile card with a tracking circle shape embedded in it for “Teddy Bear, Teddy Bear, turn around” this this can then also be used in conjunction with others for “Here we go round the mulberry bush”, “Here’s a ball for baby” and “The wheels on the bus”. Then the child can begin to absorb the concept of round in many settings. It has been found that tactile graphics assist a child to retain information and the more active the searching of the tactual information, the greater the understanding of the text (Chen & Downing, 2006).

Parents report that children are attracted to tactile books when the print version is being read to them. This is usually the case when parents reinforce ideas about the story and the tactile picture they are feeling. Just as pictures are used to engage sighted children, if families reinforce how the tactile graphics relate to a story, a child who is blind or has low vision will remain focused on the story telling (Theurel et al, 2010) and better retain memory of the story or rhyme. Children who are blind and have low vision also use these small tactile books to tell their own story based on the symbols they are feeling. This activity assists language development and early understanding of causality in story-telling.

Children naturally use two hands to investigate the “feely” books, which is good practice for future braille reading. It also helps to develop pincer grip, finger strength and scanning techniques. Book handling skills grow as children learn to turn the sturdy handbook pages and the orientation of a page by the left binding of all books, just like print and braille books.

Tactile graphicacy skills development

In order to develop a child’s independence in using tactile graphics, many hands-on experiences must be provided in the early years and continue through to latter years. The first exposure to tactile books can never begin too early.

In practical terms, there are specific skills that are needed for tactile readers, as described in the sections below. These are the skills that we aim to establish in our children who are blind or have low vision by the time they reach mid primary school years. They do not need to be learned sequentially, and many are generalised skills needed for multiple developmental areas. Many are skills that are also required for braille reading (McCominskey, 2014).

Motor Skills

Children first need to develop the requisite motor skills to achieve effective tactile exploration of the page. Touch perception relies on movement (Gibson, 1962) and different manual exploratory motions are required according to the object being felt and the information being sought (Lederman & Klatzky, 1987). Instruction and training on optimal movements and strategies for tactile exploration improves tactile reading performance (Hatwell, 2003). This is particularly important for children who

are born blind, as they do not spontaneously explore with their hands unless actively encouraged.

A. **Book handling skills** like turning pages, and orienting front and back.
B. **Searching tactually on a page** to find a picture and text, and to systematically explore all parts of a picture (Wilkinson & Hasty, 2012).
C. **Line tracing**. Children should first be taught how to trace a straight line from left to right. Later, curved lines and zigzag lines can be introduced (Aldrich, Sheppard & Hindle, 2002; Mazella et al, 2014; Wilkinson & Hasty, 2012).
D. **Fine motor skills** (Wilkinson & Hasty, 2012). This can be encouraged by providing small objects that need to be manipulated, for example wooden jigsaw puzzles, playdough and Lego. Some suggestions for adding manipulatives to tactile graphics are given in section 3 of this document.

Haptic discrimination skills

Haptic discrimination skills are the ability to differentiate between different features by touch. There is evidence that practice can improve touch perception through brain plasticity (Sathian, 2000).

A. **Texture discrimination** (Aldrich, Sheppard & Hindle, 2002; Mazella et al, 2014). Support understanding and discrimination of textures by using a variety of descriptive words when exploring tactile pictures and real world objects that are scratchy, hard, soft, fluffy, rubbery, etc.
B. **Shape discrimination** (Aldrich, Sheppard & Hindle, 2002; Mazella et al, 2014). It is recommended to use solid objects to start, beginning with the square, circle and triangle (Hinton, 1991). Once these have become established for a child they can start to identify these forms in their everyday experiences.
C. **Size discrimination** (Mazella et al, 2014). Again, start with everyday objects. Nesting tables, nesting saucepans, or nesting measuring cups are a good start. Then move to raised tactile images of big, small and in-between. Having an early understanding of size discrimination is important to grasp the meaning of many fairy tales such as “Goldilocks and the three bears”. Further, it is the grounding for early mathematical concepts.

Cognitive Skills

A. **Spatial awareness** (Aldrich, Sheppard & Hindle, 2002; Wilkinson & Hasty, 2012). This begins with awareness of one’s own body in space then orientation of objects in space and orientation to page layout (Mazella et al, 2014). Children must understand concepts such as close, far, over, under, in front, behind, top, bottom, left, right, etc.

B. Understanding of **object permanence** (Wilkinson & Hasty, 2012), i.e. understanding that an object continues to exist even when it cannot be seen or felt (Piaget, 1954).
C. **Short-term memory**. This includes memory for location (Wilkinson & Hasty, 2012) and memory of what has already been scanned but is not currently under the fingers.
D. **Part-to-whole assembly** (Wilkinson & Hasty, 2012). Children who have vision will look at an overall picture and then look for the detail. However, children who are blind or have low vision can access only a small piece of the picture at a time. This is why very young children benefit from the use of a simple feature to represent a whole. Parents and educators can support understanding with verbal explanations, by labelling the whole and linking the graphic to the story or the child's experiences.

Tactile concepts

A. **Book concepts** such as book orientation (Wilkinson & Hasty, 2012), pages, the front cover, reading from beginning to end, and page numbering.
A. Consistency of presentation is important to assist in learning about the orientation of a book. Picture story book collections can employ indicators such as a ribbon or cut corner always in the same position. All school books have page number in the top right corner in Australia (Holloway, 2016) and bottom right corner in New Zealand (BANZAT, 2014).
B. **Language of line** needs to be developed to allow concepts of straight, curved, wavy, solid, dashed and circular patterns.
C. Children need to have a **tactile lexicon** to assist them in interpreting symbols. Language skills are the basic building blocks for tactual integration of meaning. Parents and educators must therefore constantly verbalise the experiences that the blind or low vision child is engaged in. This language will support the child in literacy and tactile interpretation (Erickson & Halton, 2007; Frankel, 2012; Wilkinson & Hasty, 2012).

Concept development

Concept development is the process of gaining an understanding of the world, including the self, others, objects, categories and the environment. Without access to the visual world, children who are blind or have severe low vision require additional support to build up concepts, beginning with concrete experiences with the real world before moving on to pictorial representations. Children must be able to reference previous experience in order to make sense of a tactile picture. "It is essential that the child's tactile (and other sensory) experience should be as rich as possible from the earliest years" (Hinton, 1991, p79). It is always advised that meaningful experiences scaffold the understanding of the tactile symbols. Conversely, once the basics have been understood, tactile pictures can be used to further build on

knowledge of important concepts. Immersion in tactile graphics at an early age creates a solid foundation for future concepts (Gool, 2015).

For example, a child may first learn about horses through smelling, hearing, or touching (a small part of) a real horse; by touching a toy horse; and understand the size of a horse in relation to their own height or the height of objects around them. Their learning can then be furthered by listening to a story about a horse accompanied by a simple tactile diagram that relates to one aspect of a horse, for example its bridle or its mane. An older child may expand their learning using a series of tactile graphics showing the horse standing, trotting and galloping.

Tactile symbols

The first tactile picture books often avoid use of symbols, instead featuring real objects attached to the page. Story boxes, bags or boards can also be used to collect a variety of objects all relating to a concept or story.

When introducing symbols and representation using tactile graphics, move from the concrete to the abstract. Begin with real-world objects, the same objects attached inside a book, the same object thermoformed, then represented with collage, followed by more abstract representations.

By school age, basic shape concepts like square, circle, triangle and rectangle are needed so that early maths concepts can be presented in tactile graphics, but hands-on 3D examples must be available as well.

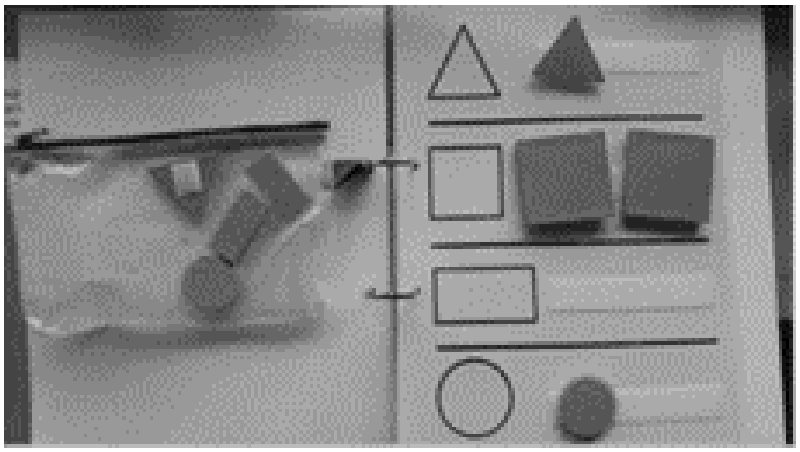


Figure 1: 3D shapes to be matched to tactile pictures

Older children will require an understanding of the conventions used in different types of diagrams, for example thick lines for axes and dashed lines for grids on graphs; and standard symbols used in maps.

Drawing

All children love to draw, regardless of their level of vision. Creating your own marks is an essential aspect of literacy as it enables two-way communication (Aldrich, Sheppard & Hindle, 2003) and reinforces understanding of language conventions

through active learning. Children who are blind or have low vision enjoy using raised line kits and are able to draw 2D representations of a solid object that they have held (Picard & Lebaz, 2012). Some methods for children to create their own tactile drawings include tracing, colouring within raised lines, Wikki Stix, mylar film, tactile drawing boards, a Perkins brailler, collage materials, magnetic shapes, Lego, a cork board with pins and rubber bands, and so on.

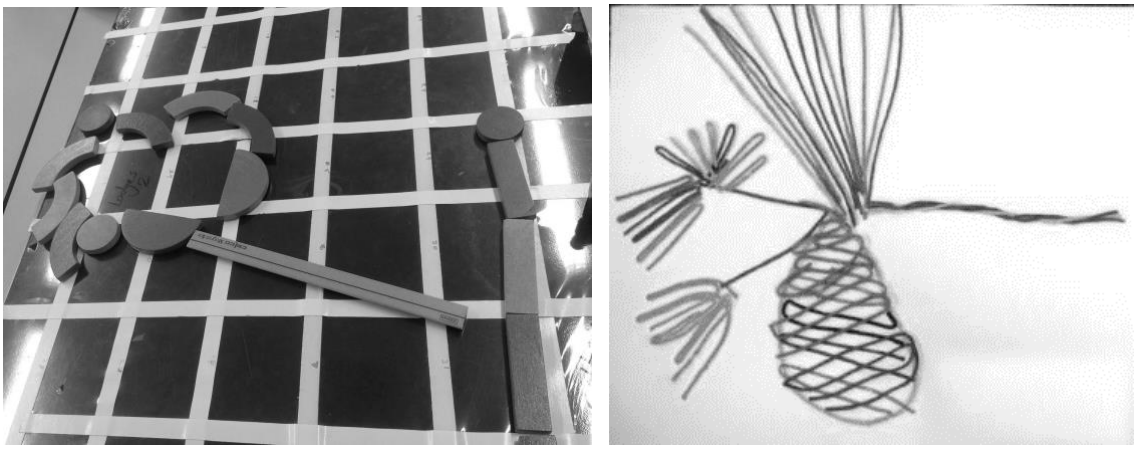


Figure 2: Drawings by children with vision impairments: (1) A simple classroom map constructed with wooden shapes and (2) a pinecone created with Wikki Stix.

Production considerations

Tactile pictures for young readers should be designed specifically with the touch reader in mind. A simple translation of the original print graphic is almost never suitable. Instead, consider the skills that the child already has, what skills and concepts need to be developed, and how the tactile picture feels rather than how it looks.

Creating tactile picture books for young children

- Keep graphics at a reasonable and meaningful **size** for two hands to investigate. Large tactile pictures are too difficult to explore and interpret.
- **Simplify**. A single object or concept on each page is usually sufficient.

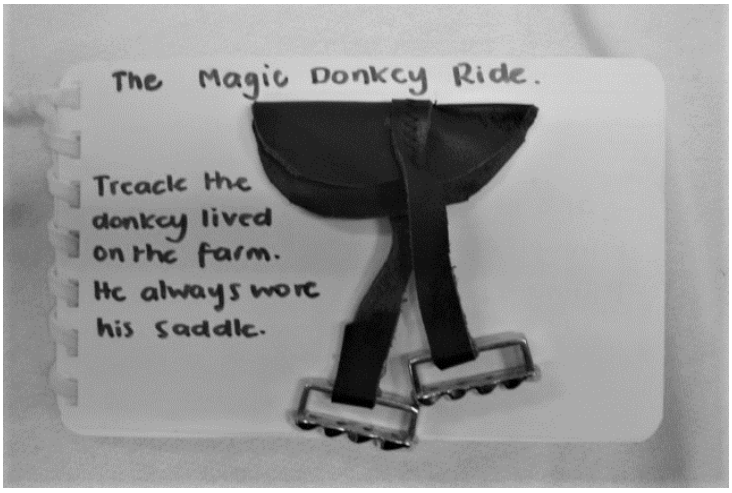


Figure 3: Tactile book page depicting only a single object.

- Use **real-life objects** if possible and appropriate. Items that can't easily be adhered to a page can instead be put in fine gauze bags and then attached to the page. Rocks, weighted items and sand can be included in this way.
- **Consistency**. If using symbols or textures, keep them consistent throughout the book or series.
- **Contrast**. The foreground and background should be very different in terms of feel and appearance. Use contrasting textures, heights, colours and brightness. Each texture or symbol must be identifiable and meaningful in the context of which it is used (Hinton, 1991). For this reason, collage is ideal for young children. A variety of different lines can be created using Perkins brailler, spur wheels, glued string, hot glue, or even just running a pen across the back of the page.
- Use **filled shapes** rather than outlines. Raised line drawings are generally difficult to interpret, with filled shapes much easier to understand (Thompson, Chronicle & Collins, 2006).
- **Avoid visual conventions** such as 3D shapes or obstructed views. Separate objects so they can be shown in full and show all legs on animals.

Figure 4: Dog collar used as a symbol for a dog.

Creating tactile graphics for school children

In primary and secondary school, tactile materials are often computerised rather than hand-made due to time and volume restraints. The PIAF machine is popular as is the Tiger embosser and, now more rarely, the thermoform machine.

- **Outlines** can be introduced if careful approaches have been used in preschool years to learn the basics of the language of line.

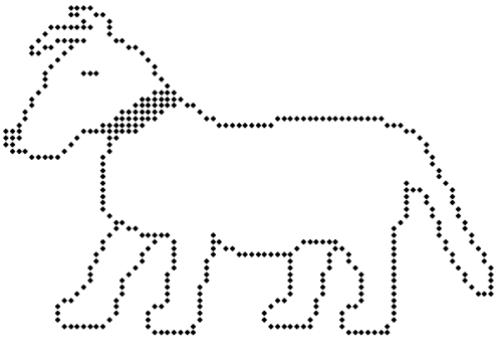


Figure 5: Slob the dog, as illustrated in the Ozzie Dots books

- Precede diagrams with a meaningful **title** or text.
- It is often helpful to include a brief **description** of the graphic in braille to assist in interpretation. For example, it may include the type of diagram (bar chart, concept map, etc), the direction in which the diagram should be read and the main features to look for.

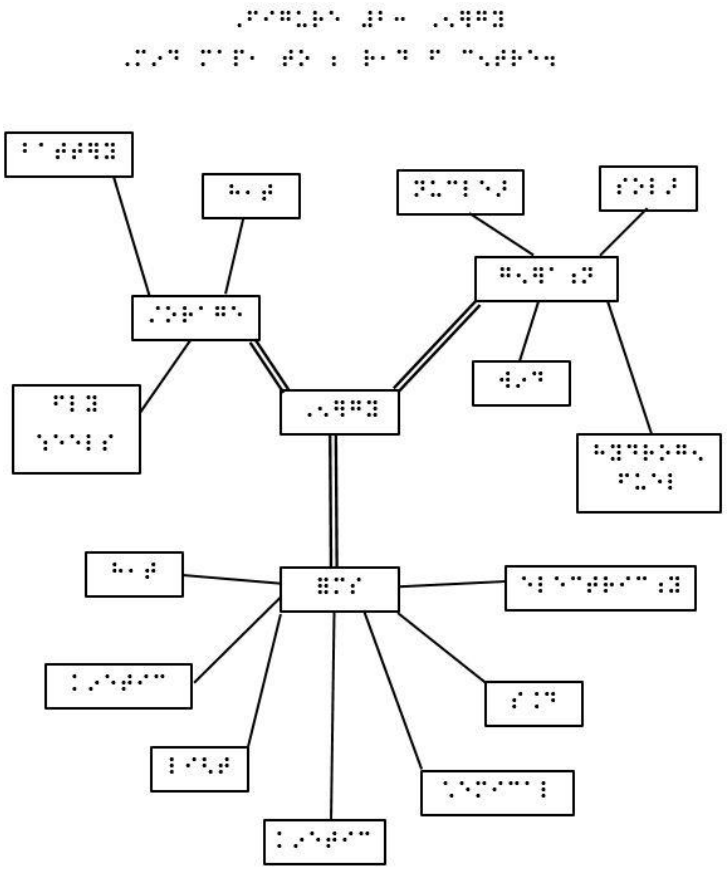


Figure 6: Diagram with description for type of graphic (mind map) and reading order (from centre).

- **Consistency** of presentation will allow students to more quickly navigate and understand a tactile graphic. Follow the ABA ‘Rules and Guidelines for Formatting Braille’ (Holloway, 2016) or the ‘Essentials of Braille Formatting’ (BANZAT, 2014) i.e.:

    - Always include the page number in the top right corner of the page in Australia or the bottom right corner of the page in New Zealand.
    - The diagram title and caption should be kept together and given before the tactile diagram or description.
    - If a key is required, it should be given before the tactile graphic.
    - Avoid the need to flip pages, for example by using facing or fold-out pages.

- Thoughtful use of **braille labels**
    - Where possible, avoid the use of vertical braille labels.
    - Use a key if braille labels will not fit on the graphic. Braille key items should consist of two braille cells representative of the word and with

dots in the upper and lower cells, for example VC (vc) for vacuum cleaner.

- Continue to **simplify.**
  - If necessary, split a graphic into its most important components and spread them across multiple pages.
  - Separate objects for clarity. For example, add space between the bars in a bar chart and add white space around the most prominent lines whenever two lines intersect.

Adding interaction

Kinaesthetic learners will be advantaged by having moving parts in their tactile pictures like an interactive button and buttonhole sequence for a book about dressing, or a moving bead along an elastic for a travelling story. Offer a range of tactual experiences to allow variety in interpretive play and extraction of meaning.

Simple collage items

A number of simple collage items can be added to a tactile picture to provide sounds and interactions that encourage more active exploration.

- Simple ways to provide audio feedback for a young child in early tactile books include bells, squeakers, bear growlers and noise buttons that play tunes like a lullaby.
- Characters or objects attached to the page with elastic, string or velcro can be moved in/out, up/down, over/under or to illustrate the story as it is told.

Figure 7: “Two little dickie birds” attached with velcro so they can “fly away” and “come back”

- Things like buttons, zippers and lacing boards are great for encouraging manual dexterity and are especially suited to stories about getting dressed.
- Flaps or doors can be opened and closed to reveal items underneath.

Figure 8: A simple flap to hide fish that are being searched for in the story.

- Sealed laminating pouches or sewn channels can be filled with objects like marbles and stones that can then be moved around inside the page.
- Cellophane enclosed in a fabric pocket is ideal for crinkly leaves or wrapping paper.

For school students, embossed or swell paper diagrams can be enhanced simply with moveable additions attached with string, split pins, etc. This has the added advantage of making the diagrams re-usable for a range of different questions and tasks.

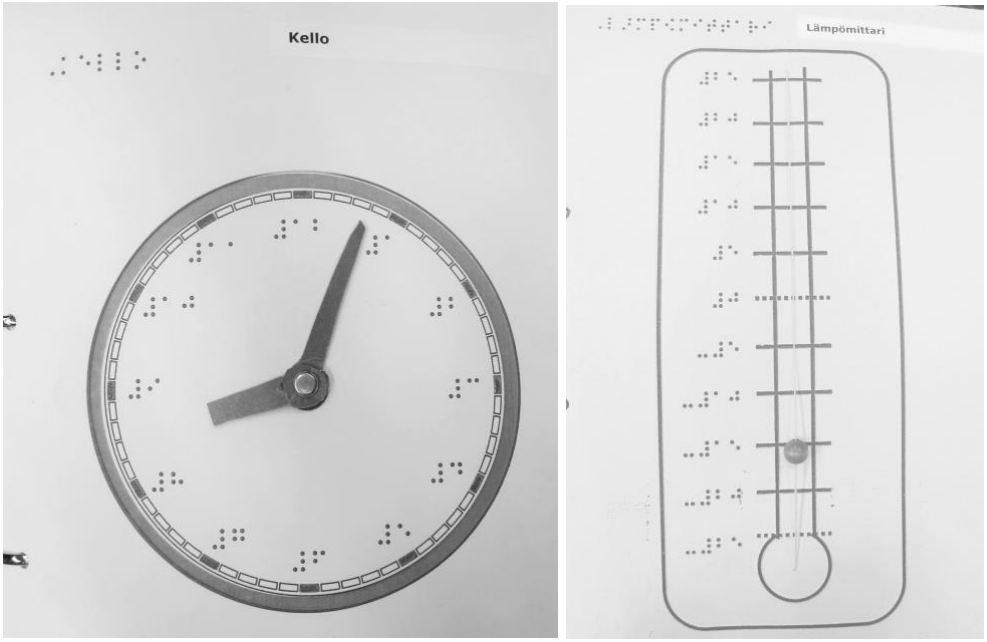


Figure 9: (1) Clock with added hands attached with a split pin and (2) Thermometer with bead on a string to slide up and down.

Audio labels

Some children’s books come with embedded sounds or audio labels and can be adapted with the addition of braille labels and some simple collage. Audio labels can also be created simply using talking tins, talking labels and similar commercial

products allowing simple audio recording and playback. Pen friend and other similar commercial products use a small sticker that activates an audio label using a hand-held device. QR codes are a free option that can be used with a mobile phone. Audio labels can also be helpful for older students when lengthy labels are required.

eTextiles

eTextiles are a new maker technology using electrical circuits to generate sensorimotor experiences. Buzzers can provide small reverberating sensations combined with a tactile cue above it, or small lights can shine from a hole in a tactile cue. A buzzer under a bell will also provide sound. For added interaction, the circuit can include a switch that the child activates by manipulating the graphic, for example patting a cat or moving the hands on a clock. Such pages could be included in a tactile book or used as individual story mats.

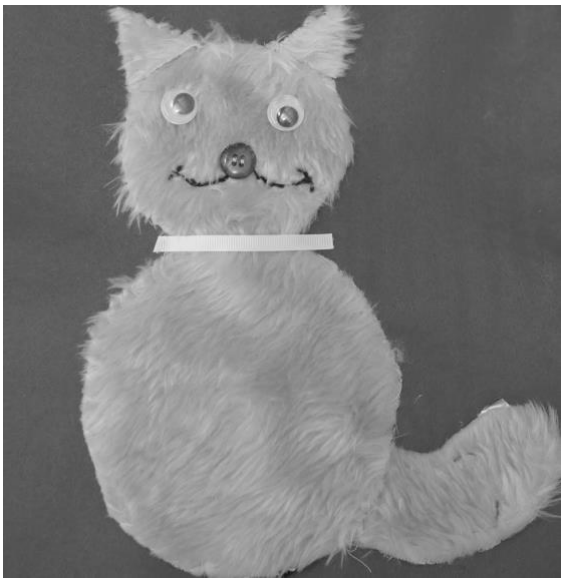


Figure 10: Furry cat with eTextiles circuit.
When the tail is patted down it completes the circuit
and the cat “purrs” via a buzzer under its collar.

References

Aldrich, F., Sheppard L. & Hindle Y. (2002). First steps towards a model of tactile graphicacy. *British Journal of Vision Impairment 20*(2): 62-67.

BANA. (2012). *Guidelines and Standards for Tactile Graphics*. The Braille Authority of North America.

BANZAT. (2014). *Essentials of Braille Formatting.* Braille Authority of New Zealand Aotearoa Trust.

Bell, E. C., & Mino, N. M. (2013). Blind and visually impaired adult rehabilitation and employment survey: Final results. *Journal of Blindness Innovation and Research*, *3*(1). Retrieved from https://www.nfb.org/images/nfb/publications/jbir/jbir13/jbir0301tc.html

Butler, M., Holloway, L., Marriott, K. & Goncu, C. (2017). Understanding the graphical challenges faced by vision-impaired students in Australian universities. *Higher Education Research and Development, 36*(1): 59-72.

Chen, D. & Downing, J. E. (2006). *Tactile Strategies for Children who have Visual Impairments and Multiple Disabilities*. New York, American Foundation for the Blind.

Dixon, J. M. (2000). *Braille: Into the Next Millennium*. National Library Service for the Blind and Physically Handicapped, Washington D. C.

Erickson, K. A. & Hatton, D. (2007). Expanding understanding of emergent literacy: empirical support for a new framework. *Journal of Visual Impairment & Blindness, 101*(5): 261-277.

Frankel, L. (2012). *Tactile Accessibility Guidelines*. Smarter Balanced Assessment Consortium.

Gale, G. (2005). *Guidelines on Conveying Visual Information.* Round Table on Information Access for People with Print Disabilities Inc. Retrieved from http://printdisability.org/guidelines/guidelines-on-conveying-visual-information-2005/

Gardiner, A. & Perkins, C. (2002). *Best practice guidelines for the design, production and presentation of vacuum formed tactile maps.* Tactile Book Advancement Group (TBAG).

Gibson, J. J. (1962). Observations on active touch. *Psychological Review 69*(6), 477 - 491.

Gool, G. (2015). *Tactile Graphics.* Premier's IOOF Centre for Educational and Medical Research Itinerant Support Teacher (Vision) Scholarship.

Hatwell, Y. (2003). Manual exploratory procedures in children and adults. Touching for knowing. In Y. Hatwell, A. Streri & E. Gentaz (eds), *Cognitive psychology of haptic manual perception*. Amsterdam, John Benjamins Publishing Company.

Hinton, R. A. (1991). First introduction to tactiles. *British Journal of Visual Impairment 9*, 79-82.

Holloway, L. (2016). *Australian Braille Authority Rules and Guidelines for Formatting Braille*. Round Table on Information Access for People with Print Disabilities Inc.

Holloway, L. & Lewis, D. (2018). Preparing for higher education: Readiness of vision impaired students for access to materials. *Journal of the South Pacific Educators in Vision Impairment, 11*(1):12-25

Lederman, S. J. & Klatzky, R.J. (1987). Hand movements: A window into haptic object recognition. *Cognitive Psychology, 19*, 342-368.

Mazella, A., Labardin, M., Mesnieres, S., Albaret, J. & Picard, Delphine (2014). Construction of a 2D haptic tests battery for use with children and adolescents with and without visual impairment. *Terra Haptica International Journal of Visual Disability and Inclusive Practices, 4*, 65-73.

McComiskey, A. (2014) Braille Readiness Grid, Center for the Visually Impaired Inc. Available at http://www.tsbvi.edu/attachments/BrailleReadinessGrid.pdf.

Piaget, J. (1954). *The Construction of Reality in the Child*. New York, Basic Books.

Picard, D. & Lebaz, S. (2012). Identifying raised-line drawings by touch: A hard but not impossible task. *Journal of Visual Impairment & Blindness 106*(7), 427-431.

Ryles, R. (1996). The impact of braille reading skills on employment rates, reading habits, education levels and financial self-sufficiency of visually impaired adults. *Journal of Visual Impairment & Blindness 90*, 219-226.

Sathian, K. (2000). Practice makes perfect: Sharper tactile perception in the blind. *Neurology, 54*(12), 2203-2204.

Silverman, A. M. & Bell, E. C. (2018). The association between braille reading history and well-being for blind adults. *Journal of Blindness Innovation and Research 8*(1). Retrieved from https://www.nfb.org/images/nfb/publications/jbir/jbir18/jbir0801tc.html

Theurel, A., Polato, E., Caldironi, P., Lanners, J., Claudet, P., Caldin, R., & Gentaz, E. (2010). The effect of joint reading on the tactile comprehension of a tact-illustrated book by early blind children. *Terra Haptica International Journal of Visual Disability and Inclusive Practices 1.*

Thompson, L. J., Chronicle, E. P. & Collins, A. F. (2006). Enhancing 2-D tactile picture design from knowledge of 3-D haptic object recognition. *European Psychologist, 11*, 110-118.

Wilkinson, D. & Hasty, L. (2012). Teaching tactile graphicacy: Reading more than words. ATIA Orlando 2012. Orlando, Florida, USA. Retrieved from www.tactilegraphics.org/teachingtgs.html

Resources

Australia and New Zealand Accessible Graphics Group – Sharing news and tips for accessible graphics, including tactile diagrams. http://printdisability.org/about-us/accessible-graphics/

Guide to Designing Tactile Illustrations for Children's Books (2008) by Suzette Wright, American Printing House for the Blind (APH). http://www.aph.org/research/illustration/

Mylar film – Thin plastic sheets that pucker up and form a raised image on the drawing side when placed on a rubber mat and drawn firmly with a stylus or ball-point pen. Also known as **German film** or **plastic embossing film**.

On the Way to Literacy sets – Story books with tactile graphics. https://shop.aph.org

Ozzie Dots – Australian illustrated book series to introduce braille and tactile graphics. http://svrc.vic.edu.au/educational-programs/ozzie-dots/

So What About Drawing? – Instructions for using a braille writer to create tactile graphics. http://mountbattenbrailler.com/Docs/graphics/Marie%20Porter%20Braille%20Drawings%20Book.pdf

SQUID Tactile Activities Magazine - https://shop.aph.org

Telling Stories Through Touch (2005) by Neil Johnston, ClearVision – Principles for clear, meaningful tactile representations. http://tactilebooks.org/making/telling-touch.pdf

Tactile drawing boards – Can be used with ordinary paper to form raised lines on the drawing side using a ball-point pen. For example, the Sensational BlackBoard: http://www.sensationalbooks.com/products.html#blackboard

Touch and Learn Tactile Activity Book –Tactile graphic workbook for pre- and early-braille readers. https://www.cal-s.org/touch-and-learn-activity-book.html

The Typhlo and Tactus guide to children's books with tactile illustrations (2008) by Phillipe Claudet and Patricia Richard (eds.). http://www.tactus.org/guide_lines_typhlo_anglais.pdf

Wikki stix – Re-usable wax-coated string that can be pressed onto the page to create straight and curved tactile lines. Available for purchase through http://www.wikki-stix.com.au or you can make your own.

Louise Curtin
louisecurtin1951@gmail.com

Leona Holloway
Monash University

Debra Lewis
Statewide Vision Resource Centre

Correspondence

Leona Holloway
Monash University
Leona.holloway@monash.edu
042 042 6823

Permissions

Figure 1: Photograph taken by the second author. Sample exhibited by the National Institution for the Blind, Visually Impaired and Deafblind, Iceland at the 2017 Tactile Reading Conference.

Figure 2:
(1) courtesy of Kerri Weaver, Eyes and Independence
(2) courtesy of Michael Donnelly, SVRC Support Skills Program

Figure 3: Photograph taken by the first author. Tactile version of “The Magic Donkey” by Giles Andrae from the Feelix Library collection, Vision Australia.

Figure 4: Photograph taken by the first author. Tactile version of “Duck on a Bike” by David Shannon from the Feelix Library collection, Vision Australia.

Figure 5: Image supplied by the third author. Slob the Dog from the Ozzie Dots collection, produced by Statewide Vision Resource Centre.

Figure 6: Image created by the second author.

Figure 7: Photograph taken by the second author at a workshop run by the first and second authors.

Figure 8: Photographs taken by the first author. Tactile version of “Magic Beach by Alison Lester from the Feelix Library collection, Vision Australia.

Figure 9: Photographs taken by the second author. Samples exhibited by the Valteri Center for Learning and Consulting (Finland) at the 2017 Tactile Reading Conference.

Now you see me…now I see myself. A sequential guide to teaching portraiture to students who are blind and vision impaired.

Lily Gower

The “visual” arts provide a fantastic opportunity for students to develop their understanding of spatial/relational knowledge and to practice their tactile graphics skills. A necessary skill, not just relevant to the arts, but for interpreting illustrations, tactile graphics and diagrams such as in maths and science, geography, and orientation and mobility (Marek, 1997). As the music and creative arts teacher at a school for blind and vision impaired students this poses a question; ‘how do I make the “visual” arts curriculum accessible to blind and vision impaired students?’

At the beginning of 2019 I set out to draw self-portraits with my students (aged from 5 to 13). I had been consulting with my contact at the Art Gallery of South Australia (AGSA) and I knew there were some interesting portraiture exhibitions coming up and I thought this would be a nice way to tie in a visit to the gallery. Always eager to assess students’ prior knowledge so that their existing skills can be built upon; the first task I set them was to draw a self-portrait using whichever means and medium they so desired. I was instantly surprised by the spatial/relational difficulties demonstrated by many of the students when faced with this task. When asked to draw a face, many students drew a circle, two dots for eyes and curved line for the mouth, the nose and ears were rarely represented. Sometimes the features of the face were located nowhere near the circle representing the head and the eyes, nose and mouth were not placed in any position relational to one another. Students with low vision were predictably more advanced compared to their blind peers however many still demonstrated deficits in their spatial/relational knowledge.

Having studied visual art at secondary school and as a part of my teaching degree I knew about the basic guidelines many art teachers and instructional drawing books use to teach sighted people how to draw faces with accurate proportions, placement of facial feature and so on. However, I was not aware of any such resource for blind and vision impaired art students. I began conducting research into the existence of any guides that might be able to help me. There are some fantastic resources available to help blind students develop their line drawing skills, tactile map and diagram reading, their understanding of the transfer of 3D to 2D representations (Marek, n.d.), but I found nothing about how to draw a face specifically. I decided I needed to devise a resource to assist blind and vision impaired students to understand how to represent the reality of the human face in pictorial form.

I originally worked from a basic guide about how to draw a human face step-by-step (Bluprint, n.d.). I re-drew each step by hand, trying to make each image as un-

cluttered and simple as possible, with only the relevant information presented in clear bold lines. My intention was to photocopy my drawing using swell paper and I would then have a resource that could be used immediately. I am in the fortunate position of having an extremely knowledgeable alternate format production team on site. When I consulted with them about my design, they were very interested and whilst praising me on my artistic efforts, politely informed me that my drawings would not transfer nicely and would not be user friendly for the blind user. My colleague Janet Turner then set about helping me to develop a more effective resource, she used Adobe Illustrator to create and manipulate very clean images. Together we devised an 8-step guide to drawing an accurate face. Beginning with a basic face outline each of the 8 steps adds one more detail to the face. Dotted guidelines have been added to help the reader determine the accurate positioning of the facial features (e.g. the eyes are typically half way down the face, the mouth is typically half way between the bottom of the nose and the chin). With a resource ready to go (in theory) it was time to test it out.

Students were guided through the resource, examining each step and discussing as a group. Students were encouraged to feel their own faces as a reference point and, if vision permitted, use a mirror. They were then given their preferred drawing medium; raised line drawing kit (RLDK) or dark pen and paper, and asked to draw their own self-portrait, following the steps in the resource. The success of the resource was immediately evident and profound. The accuracy of the drawings being produced by the students, compared to those they had produced just weeks before, was amazing. Furthermore, the students themselves were so excited and pleased with what they were able to create. One student who had no vision was so impressed with his own self-portrait he told me “it’s so good it’s like looking at a photograph!”

Students using the facial representation resource

Over the next few weeks the students continued to practice portrait drawing, each developing their own portfolio of work. Towards the end of the term each student was asked to produce a “good copy”, a portrait that would be framed and put on display in the school. For most of the students with low vision this was a fairly straight-forward request and they set about their work. The blind students however were faced with a question … “where to after the raised line drawing?” Students

were encouraged to use their own creative ideas to answer this question. One student asked me to photocopy his raised line drawing and then had a teacher's aide assist him to make the lines tactile by applying wiki-stix (wax coated wool/twine). He then added other tactile materials to complete his portrait. Several students asked me to photocopy their raised line drawing and then re-print it onto swell paper. They then added other tactile materials, and even paint, to complete their portraits. Others simply wanted to mount their raised line drawings. Regardless, by the end of the unit, each student in the school had created a self-portrait that they were proud of, and that demonstrated significant growth across the term.

A student's self-portrait drawn using RLDK (right) and his tactile good copy (left) created using wikistix and other tactile materials.

Student self-portraits. Originally drawn using RLDK then transferred onto swell paper and finished using tactile materials.

The learning process didn't stop there of course! The older students went on to study Pablo Picasso and thoroughly enjoyed experimenting (and deconstructing) the rules of the face. And we did end up visiting AGSA and participating in an audio described tour of the Ben Quilty exhibition and participated in more self-portrait making in the gallery's studio space. This time, with Audio Describer and Educational Support Officer Ryan Sims guiding them, students used plasticine to construct a tactile self-portrait upon the back of a bowl or plate. Already having a well-developed understanding of the features of the face and their location, this process drew students' attention to the contours of the face i.e. which bit stick out and which bits poke in? Finally, to come full circle from 3D to 2D and back to 3D again, the students created their own sculptural self-portrait using clay.

Students working on their plasticine faces at the AGSA workshop.

The feedback received from students about this process was over-whelming positive. One 12-year -old boy telling me that he had always wanted to be able to draw an accurate face but he never knew how. It's easy to forget how much incidental learning a blind child misses out on. Sighted children often start to draw, and scribble as soon as they can hold a drawing implement. They copy drawings they see in books, drawings by other people, and they draw the faces that they see every day around them. It is essential to explicitly teach skills and concepts that can be "missed" due to a child having a vision impairment. Most children want to draw, most children enjoy the process, and all children deserve the opportunity to learn and to express themselves creatively. This is a philosophy that constantly challenges and informs my teaching.

References

Bluprint. (n.d.). Drawing heads and faces that look totally real (just don't do this to the hair). Retrieved from https://www.mybluprint.com/article/drawing-heads-and-faces-that-look-totally-real-just-dont-do-this-to-the-hair

Marek, B. (1997). *Before a Blind Child Can Read a Map*. International Council for Education of People with Visual Impairment (ICEVI), ICEVI's 10th World Conference, Sao Paulo, Brazil, August 3 – 8, 1997.

Marek, B. (n.d.) Hungry Fingers: educational tools for special needs. Retrieved from http://www.hungryfingers.com/index.html

With thanks to Janet Turner (SA School for Vision Impaired, Alternate Format Production) and Ryan Sims (Art Gallery of South Australia).

Lily Gower

Music and Creative Arts Teacher, Advisory Teacher – Statewide Support Service, SA School for Vision Impaired

Lily.gower464@schools.sa.edu.au

Critical Reflection on Working with Students with Vision Impairment and Complex Needs

Lindsey A Patti

Critical reflection is a tool that can be used to guide practice, especially for practitioners working with complex individuals who may feel ineffective and unsure in their practice, and be fearful of making mistakes (Fook & Gardner, 2007). Although complexity and uncertainly may be necessary within some roles, organisational requirements have also become more rigid and stringent and with this increase in rules, procedures, and inevitable paperwork, practitioners feel less freedom in making decisions that could potentially be perceived as incorrect (Fook & Gardner, 2007). This tension, as Fook and Gardner (2007) describe, can be the driving force behind critical reflection in complex practises.

The purpose of this paper is to detail a personal experience of critical reflection and how that assisted me in improving my own professional practice.

Models of Reflection

I found it useful to begin my critical reflection by thinking of an event in my practise in working with complex individuals. I recalled a scenario that left me feeling outside of my comfort zone, and I used critical reflecting to delve deeper into the reason behind my discomfort when remembering this event. Moon (2007) discusses the process of beginning with a descriptive event, usually in a written representation, and the benefit of then moving to a second or third stage of reflection where this event is looked at in more depth. She discusses a framework with four particular stages: descriptive writing, descriptive writing with additional reflection, and reflective writing in two different stages (Moon, 2007). Moon (2007) also notes, “Reflection is not a precise art” (p. 194).

Following the framework provided by Moon (2004), I began my reflection with a written recollection of an event that occurred in the past. I chose this particular event as I felt I had a great deal to reflect upon with this incident. ‘Reflection on Action’ (Sclater & Minocha, 2006) is a model designed to promote deeper levels of reflection by examining parts of a Basic Reflection (Observe, Notice effects, Report self-awareness, Identify own position, and Improve) and Deeper Reflection (Contextualise, Identify causes, Relate to practice, Connect to theory, and Justify changes).

I came across a piece titled, “Facilitating Reflection on Practice” (Babu, n.d.) where the author developed several questions based around Reflection on Action (2006) as well as the 5rs (Bain, Ballantyne, Mills & Lester, 2002) which is a well-established method of reflection. Using both these closely related models of reflection, Babu (n.d.) developed several questions that helped guide my thinking for this critical

reflection. Being able to think more in terms of Sclater and Minocha's Reflection on Action (2006), I was able to create a meaningful reflection that critically examined my thoughts while at the same time, connected my reflection to the theory.

My Critical Reflection

I recalled an event that occurred several years ago while just beginning my work with Kilparrin Teaching and Assessment School in South Australia. Working with the Statewide Support Service, I was part of advisory team that visited country areas to consult with and support schools and early education centres in educating students with sensory impairment and additional disabilities. In a country town in South Australia, I visited a technical high school for a student, Ryan (names changed to protect the identity of the students involved). Ryan has vision impairment as well as physical and cognitive impairments and receives support from Kilparrin for vision, as well as Guide Dogs SA/NT for orientation and mobility. Ryan's vision was severe enough to qualify for services, but he was also able to see enough for him to get by quietly and not let anyone know he has a vision impairment. Ryan had a diagnosis of Optic Nerve Hypoplasia with a visual acuity of around 6/60 and small field deficits

During Ryan's preparation for Year 12, I was asked to meet with his Year 11 administrator to discuss what Ryan requested as the topic for his Year 12 research project. When I arrived, I was taken to a meeting with the Deputy Principal, Ryan's Year 12 administrator, and his current Year 11 administrator. This leadership team greeted me and had someone send for Ryan. He came into the room with us and we began the meeting. At the meeting, the leadership team informed me that Ryan had requested Furniture Building as his Year 12 project. I thought it was a fantastic idea and I expressed my thoughts on that to the group. The leadership team in the room told Ryan that he should choose something "less dangerous" and decided that furniture building would be far too difficult for him. They suggested he try something like Computer Graphic Design, because he had an interest in computers. After a bit of discussion between the team and myself, they emphasised that they would not let someone with Ryan's vision operate a lathe or other power tools needed for furniture building. I began to discuss the options of modifications or alternate assessments with them, but the leadership team unfortunately had made their mind up and refuted every option I gave. Ryan, being the people-pleaser that he is, agreed to try something with computers for his research project.

Following this meeting, I felt like I failed Ryan. I consulted my deputy principal and he agreed it was unfair but that there was no point to push the issue. The school had made their minds up and alternative assessments and modifications for Ryan was not going to work. I felt it was inappropriate for me to push further, so I let it go. I helped Ryan in the next year find ways to modify and accommodate his learning in his classes and with technology needed for his post-school learning.

Looking back at this initial description of events, it follows along with what Moon (2004) explains will occur in the initial description of events. I have explained what happened while recalling the past and thinking about the future and have made references to my emotions throughout but I did not explore these emotions deeply (Moon, 2004). In order to delve deeper into the event, I used the Reflection on Action (2006) model and questions developed through Facilitating Reflection on Practice (Babu, n.d.).

While considering my strengths and areas for improvement in working with individuals with complex needs, I came to the following conclusions:

1. I consider myself to have a strong sense of empathy for my clients. I feel a great deal of concern and closeness to each of my clients as a person. When I wasn't able to help Ryan, I felt like I had personally failed him and felt the need to "make it up to him" by helping him more in other areas and ensuring he was indeed happy with his research project. I feel confident in my ability to empathise with him and the rest my clients.

2. I do not feel as confident in my ability to advocate strongly enough for my clients in the face of a strong dissenting opinion. When meeting with a group who felt one way, I felt it difficult to assert myself confidently in the other direction. This is not ideal when working with vulnerable individuals.

3. I do not feel confident in expressing the knowledge that I have regarding complex individuals and their needs. Upon reflection, I did not feel like I contributed to the meeting adequately enough. If the leadership team understood Ryan's vision and physical needs better, perhaps they would have allowed him to work in his chosen area with certain modifications. This is a failure on my part in expressing this knowledge. While I am continuing my education in that area currently, I realise it is still a work in progress.

Advocating for Complex Individuals and Improving Knowledge

In a qualitative study published in the *Journal of Medical Ethics and History of Medicine*, Davoodvand, Abbaszadeh and Ahmadi (2016) examine how two particular ideals contained together are necessary for patient advocacy. They claim one must have a feeling of empathy and a need to protect the patient in order to successfully advocate for them (Davoodvand, et al., 2016). While the results of this study were conclusive to nurses and those in the medical industry, advocacy for a client or patient can be interchangeable among those working with complex individuals. When working with vulnerable individuals either in the field of nursing or education, the concept of empathy and the need to protect would be the same.

Davoodvand, et al. (2016) analysed statements provided through interviews of a sample of 15 nurses. The results were analysed into the following themes and categories (Table 1):

Theme	**Categories**
Empathy with the patient	Understanding the patient's condition
	Showing compassion
	Feeling close to the patient
Protecting the patient	Taking care of the patient
	Being a patron to the patient
	Commitment to completing the care period
	Protecting patient rights

Table 1: Results of themes and categories from *Patient advocacy from the clinical nurses' viewpoint: a qualitative study.* Reprinted from Davoodvand, S., Abbaszadeh, A., & Ahmadi, F. (2016). Patient advocacy from the clinical nurses' viewpoint: a qualitative study. Journal of Medical Ethics and History of Medicine, 9, 5.

As mentioned previously, my critical reflection affirms my confidence in my ability to empathise with my clients throughout my profession. Davoodvand et al. (2016) assert that the necessary parts of empathy include understanding the patient's condition, showing compassion, and feeling close to the patient. While my reflection and my feeling confirm the compassion and closeness to my clients, I know I have been falling short through communicating their conditions. The process of having a firm mental grasp on the client's condition helps to improve the relationship between care giver and the one being cared for (Davoodvand, et al., 2016).

One way I know I can improve my understanding of client conditions is to continue my post-graduate study in vision impairment. I am working to complete the study and to practically apply my knowledge in the field.

Davoodvand, et al. (2016) also agree that part of being a suitable advocate for a patient is to protect the patient by taking care of them, being a patron, commitment to completing the care period, and protecting the patient rights. Upon reflection, I feel I can improve within the area of protecting the patient/client rights, specifically. While the saying goes, "you don't know what you don't know", I would have been better equipped to protect Ryan's rights as a student with vision impairment if I better understood what his rights were that needed to be protected. While part of me thought the school was discriminating against Ryan and not letting him do something he wanted based on misconceptions about his vision impairment, I wasn't certain

what the rules were in the end. I didn't understand enough about my client's rights that needed protecting.

My falling short in the areas of understanding Ryan's condition as well as understanding and protecting Ryan's rights have left me ill-prepared to be an appropriate advocate for him. While I recognize these as my shortcomings, I understand exactly what I need to remedy for the future. Continuing my education in vision impairment in addition to continuing to familiarising myself with student rights will help me to be a better advocate for my students.

While this incident happened years ago, I feel I have grown in leaps and bounds in the area of working with complex individuals. While I know compassion can only go so far, understanding of client conditions and the laws surrounding vulnerable individuals is something researchable and can be learned and practiced. This reflection has helped me to see that even though this incident occurred years ago and Ryan may have forgotten all about it, I still imagine the ways in which I could have improved. Ryan completed an outstanding research project and I think back to the meeting while doubting my ability. Looking at the research, I'm not as ill-prepared as I felt I was years ago.

References

Babu, J. (n.d.). *Facilitating reflection on practice*. Retrieved 26 November 2019 from https://www.academia.edu/5735937/Facilitating_Reflection_on_Practice

Bain, J.D., Ballantyne, R., Mills, C. & Lester, N.C. (2002) *Reflecting on practice: Student teachers' perspectives*, Post Pressed: Flaxton, Qld.

Davoodvand, S., Abbaszadeh, A., & Ahmadi, F. (2016). Patient advocacy from the clinical nurses' viewpoint: a qualitative study. *Journal of Medical Ethics and History of Medicine, 9,* 5.

Fook, J., & Gardner, F. (2007). *Practising Critical Reflection: A Resource Handbook*. Berkshire, England: McGraw Hill.

Moon J. (2004). *The Handbook of Reflective and Experiential Learning*. London: Routledge Falmer.

Moon, J. (2007). Getting the measure of reflection: considering matters of definition and depth. *Journal of Radiotherapy in Practice, 6*(04), 191-200. doi:10.1017/s1460396907006188

Porter, J., Morphet, J., Missen, K., & Raymond, A. (2013). Preparation for high-acuity clinical placement: confidence levels of final-year nursing students. *Advanced Medical Education Practice, 4*, 83-89. doi:10.2147/AMEP.S42157

Sclater, N. (2008). *Reflecting on Reflection.* Retrieved from http://sclater.com/blog/reflection-on-learning/.

Sclater, N. & Minocha, S. (2006) *Reflection on Action*. Retrieved from http://www.open.ac.uk/opencetl/files/opencetl/file/ecms/web-content/Sclater-and-Minocha- (2009)-Leaflet-Reflection-on-action.pdf

Lindsey Patti

Statewide Support Services Advisory Teacher – South Australia

Lindsey.Patti1@gmail.com

South Australian School for Vision Impaired Braille Butterflies Program: The metamorphosis to braille proficiency through a whole school approach to literacy

Skye Jones and Sharon Rattray

Students at South Australian School for Vision Impaired (SASVI) are legally blind. The school comprises of small, composite year level classes. Teachers use multi-modal approaches to develop students' literacy: in braille, print or a combination of both.

The philosophy behind teaching Braille at SASVI has evolved to bring together students who are blind and those with limited functional vision, together in groups of similar developmental stages. Learning Braille occurs in the classroom environment with a qualified teacher of vision impairment. Learning is structured to include a broad and balanced approach to pre-braille and beginner braille reading activities in the following five areas; tactile exploration, fine motor skills, mathematical concepts, spatial awareness and group work. As students progress with these skills, the focus of the program moves towards the intricacies of the UEB Literary Braille Code; identifying letters, contractions and word signs, punctuation and rules associated with the code. Simultaneously, students experiment and engage with Braille technologies.

Since the inception of Braille Butterflies in 2010 at SASVI, a whole school approach to literacy has evolved: 'SASVI Spelling Rules: A Whole School Approach to Literacy for Braille and Print Readers'. This holistic program was devised and used by teachers to ensure both print and braille readers were learning spelling, reading and writing simultaneously. This program is structured around the RNIB Braille for Infants Reading Scheme (Association for the Education and Welfare of the Visually Handicapped (Great Britain), Infant Level Working Party & Royal National Institute for the Blind, 1993) order of letter introduction, and aligned with an explicit and systematic approach to phonics instruction: early, emergent, developing and advanced stages of phonic awareness. Evidence collected by SASVI teaching staff over the past six years, through the use of annual standardised tests and diagnostic assessments (listed below), shows that this approach is an effective and efficient way of learning for all students, regardless of the medium they learn through.

Through the evidence we have collected we believe that Braille Butterflies is an effective tactile reading program because:

- Students are taught in class, by a qualified teacher of Vision Impairment, as part of the whole class group.
- Students are immersed in tactile experiences and develop strong pre-braille skills.
- Students are taught to read contracted braille from a young age and contractions are discussed as they appear in a text, even if they have not yet been formally taught.
- Students are immersed in braille throughout the school day and have access to resources in their preferred medium in all subject areas.
- Students with residual vision are encouraged to wear a blindfold for formal braille learning activities.

Annual standardized and diagnostic tests include:

- Tooze Braille Speed Test (Tooze, 1962),
- Lorimer Braille Recognition Test (Lorimer, 1962),
- Neale analysis of reading ability (NARA) braille version (Hill, Long, Douglas, Tobin & Grimley, 2005),
- Progressive Achievement Test (PAT) Reading 5th Edition,
- NAPLAN Reading, Spelling, Grammar and Writing (Australian Council for Educational Research (ACER), 2019).

South Australian School for Vision Impaired students are successful braille readers due to the introduction of:

- A broad and balanced approach to teaching pre-braille reading and skills in the areas of: tactile exploration, fine motor skills, mathematical concepts, spatial awareness and small group work.
- A cohesive reading, writing and spelling program for emergent literacy in the early years of schooling followed by an explicit, systematic spelling program at a pace determined by individual students throughout their primary years.
- A daily 30-minute community-reading block, which is embraced by the whole school.

Braille Butterflies: Pre-braille Program

The aim of the pre-braille Braille Butterflies program is to develop tactile sensitivity in the hands and fingers, through a variety of structured activities, leading to successful braille reading. This also strengthens wrists and fingers in preparation for using the Perkins Brailler, SMART Brailler and eventually a BrailleNote. Each day a specific theme is followed in order to give students a wide range of experiences in both pre-braille and tactile concepts. Tracking activities are integrated into every session. Students being introduced to Braille at any age engage in these activities which integrated into cross-curricular learning.

Monday: Tactile exploration

Scanning an object, learning to use hands and finger tips enables the child to gain a complete picture of the item – its shape, size, texture, temperature, features, functions, comparison between objects. Students can use Moon-sand, sorting trays, feely bags, play dough, tinkering box and plasticine. Students are encouraged to use light touch with their fingertips.

Tuesday: Fine motor

Students develop wrist strength and finger dexterity through a range of activities including, pegging wet clothes onto a line, threading beads, opening jars and containers, copying patterns using magnetic and felt boards, hole punching, threading and finger puppets. The Perkins Brailler and SMART Brailler play are also included.

Wednesday: Tactile maths concepts

The program incorporates a variety of mathematical concepts such as matching 2D and 3D and tactile shapes, sorting, counting and grouping like objects, puzzles, water temperature, time and clocks, measurement using tactile rulers, making comparisons of different size shapes and tactile graphics activities.

Thursday: Spatial concepts

The development of sound spatial knowledge and concepts are essential to students with vision impairment. Students can play games such as Simon Says to develop body awareness, directionality and crossing of the mid line. While looking at tactile maps, students use their knowledge of the points of the compass (N, S, E, and W) to navigate around continents, countries and find capital cities. ‘Teaching Touch’ by Lois Harrell (2002) is a program that emphasises the building of a solid foundation for learning by touch. This is through different activities to develop and refine scanning skills to quickly trace, locate, identify, match, count, and compare simple patterns and characters in a logical format. All these concepts form the foundations for successful navigation around a braille page and book as well as links to orientation and mobility (O&M) and looking at braille around the school.

Friday: Literacy activities

Sense Sacks are used to reinforce the skills covered during the week. For example, ‘Possum Magic’ (Fox, 1983) gives students the opportunity to use their four senses, touching puppets and toys, exploring tactile maps, hearing the CD of original author reading the story, smelling and tasting Anzac biscuits. Students are actively involved in conversations about the story and encouraged to ask meaningful questions to reinforce their conceptual knowledge. Based on ideas from Gayle Lamb (1996), students create their own tracking stories using known fairy tales such as ‘The Three Little Pigs’ and ‘Three Billy Goats Gruff’. These tracking activities are meaningful as

the students begin to recognise characters as they become familiar with the story and children begin to predict and 'read'.

Braille Butterflies: Early Braille Literacy Learning

Students are now at an early braille literacy stage of the Braille Butterflies program. We use the 'Braille for Infants Braille Reading Scheme' (Association for the Education and Welfare of the Visually Handicapped (Great Britain), Infant Level Working Party & Royal National Institute for the Blind, 1993) to develop a cohesive reading, writing and spelling program for our students. Students have the opportunity to read whole words and books after learning just a few letters. The Braille for Infants series introduces letters in the following order: **a, m, g, b, t, l, s, l, c, h, e, p, d, y, u, n, f, o, w, x, k, v, r, j, q, z.** Students learn to recognise the letter and memorise its associated wordsign. Simple punctuation such as **capital indicator**, **full stop**, **numerical indicator**, and **question mark** are introduced early on. Two letter shortforms such as **little**, **good**, **said**, **could**, and **would** are introduced as soon as the student has learnt the necessary letters. Wordsigns **the**, **and**, **for** are also learnt. Students are taught how to read and write numerals, which is important when looking for particular page numbers, writing the date and recording answers in mathematics.

Once students can confidently read and write using letters, wordsigns and simple punctuation, they begin the 'South Australian School for Vision Impaired Spelling Rules for Braille and Print Readers' (Rattray & Jones, 2013). They are introduced to two letter consonant blends including the contractions **ed**, **in**, **en**, **st**. Followed by the consonant digraphs **th**, **sh**, **ch**, **wh**, and their contractions, and **ck**, **ph**. Students have a strong foundation for reading, spelling and writing and are now able to access many age appropriate texts.

Braille Butterflies: Fluent Readers

Students who use large print and those who use braille work with each other on a range of literacy learning activities. 'Reading with Phonics – Phonics in Context' (Shephard, 1999) is a textbook which is clearly set out and requires very little adaptation for low vision students. The stories and activities have been transcribed into braille and students are exposed to contractions within the context of fictional stories and associated spelling activities. Once all contractions have been introduced, we move our focus to the letter-by-letter spelling of words. Students will have the opportunity to write words letter for letter when they are using a QWERTY keyboard on computers with screen reading programs.

For more information about the Ozzie Dots series of books, please contact the Statewide Vision Resource Centre http://svrc.vic.edu.au/educational-programs/ozzie-dots/

For more information about South Australian School for Vision Impaired, visit our website http://www.sasvi.sa.edu.au/

References

Association for the Education and Welfare of the Visually Handicapped (Great Britain), Infant Level Working Party & Royal National Institute for the Blind (1993). *Braille for infants: a pre-school and infant reading scheme.* London: The Institute.

Australian Council for Educational Research (ACER). (2019). *Progressive Achievement Tests in Reading.* Retrieved from https://www.acer.org/au/pat/tests/reading

Fox, M. (1983). *Possum Magic.* Malvern, South Australia: Omnibus Books.

Greaney, J., Tobin, M.J. & Hill, E. (1998). *Neale Analysis of Reading Ability - University of Birmingham Braille Version*. London: Royal National Institute for the Blind.

Harrell, L, (2002). *Teaching Touch: Helping children become active explorers of tactual materials*. American Printing House for the Blind.

Hill, E., Long, R., Douglas, G., Tobin, M. & Grimley, M. (2005). *Neale Analysis or Reading Ability for readers with low vision: A supplementary manual to aid the assessment of partially sighted pupil's reading using the Neale analysis of reading ability (NARA).* Edgbaston, Birmingham: University of Birmingham School of Education, Visual Impairment Centre for Teaching and Research.

Lamb, G (1996). *Fingerprints: a whole language approach to braille literacy*. Homai Vision Education Centre, Research and Development Committee

Lorimer, J. (1962). *Lorimer Braille Recognition Test - A Test of Ability in Reading Braille Contractions*. Bristol, College of Teachers of the Blind.

Statewide Vision Resource Centre. (n.d.) Ozzie Dots. Retrieved from https://svrc.vic.edu.au/support/ozzie-dots/

Shephard, S, (1999). *Reading with Phonics : Phonics in Context*. Balcatta, Western Australia: RIC Publications Pty Ltd. Available at http://www.ricgroup.com.au/product/reading-with-phonics/

Rattray, S. & Jones, S. (2013). *South Australian School for Vision Impaired Spelling Rules for Braille and Print Readers*. Park Holme, South Australia: South Australian School for Vision Impaired

Tooze, F. (1962). *The Tooze Braille Speed Test - A Test of Basic Ability*. Bristol: The Royal School for the Blind.

Sharon Rattray

Deputy Principal, SASVI

sharon.rattray98@schools.sa.edu.au

Skye Jones

Highly Accomplished Teacher, SASVI

skye.jones207@schools.sa.edu.au

Report: Sonokids' Ballyland Apps Update – Olé, and Get Coding!

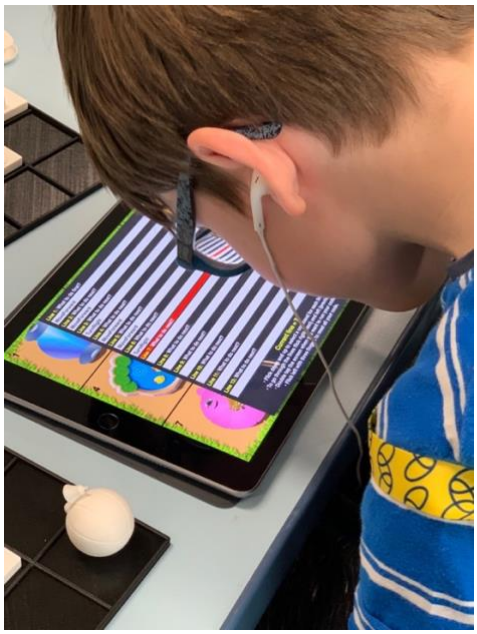
Phia Damsma

Ballyland educational software and apps uniquely support development of essential digital skills by students who are blind or vision impaired. Currently available: Ballyland keyboarding software for PC's and Mac computers, and apps for iPad: Ballyland Magic (VoiceOver gestures), Ballyland Rotor (Rotor gesture and Sequencing), Ballyland Sound Memory (digital grid), and Ballyland Stay Still, Squeaky! (Cause & Effect, finger drag, 3+). VO Lab is another app by Sonokids, developed specifically for adolescents.

New iPad apps:

- **Ballyland Geluiden Memory** (Ballyland Sound Memory in Dutch version)
- **Ballyland Magico!** (Ballyland Magic in Spanish version)
- **Ballyland Audio Based Coding apps**

'Ballyland Code 1: Say Hello' 'Ballyland Code 2: Give Rotor' 'Ballyland Code 3: Pick Up'.



Ballyland Code apps teach students who are blind or have low vision basic coding concepts and skills that will be applicable to any programming language.

The game apps are suitable for beginner users of VoiceOver and Coding (5+). The apps range from easy to moderate level of difficulty and should be played in order.

These apps have demonstrated to help prepare young students to move into Apple's Swift Playgrounds accessible coding app (working with the Dash robot).

Audio description, built-in speech, and great audio effects create unique accessibility for learners with vision impairment. The student needs to code commands to make Wheelie, the little car from Ballyland, move around a digital game grid, on a mission to reach a target (while avoiding obstacles).

Ballyland tactile learning tools

Tactual exploration in a tactile grid with moveable pieces can be a great preparation for taking on the Coding Challenge in the digital game grid on the touch screen. Sonokids has designed 3D print packages for optional learning tools with each of the Ballyland Code apps. You can print them at school, in the library, or 3D printshop.

Image: Tactile game grid, with moveable Ballyland characters and obstacles, plus matching Coding Challenge in digital game grid on iPad.

The 3D print files are available from the Sonokids website: https://www.sonokids.org. The site also offers downloadable 3D print files for large size models of all five of the Ballylanders, as well as free files to print 2D tactile images of the Ballylanders.

Phia Damsma
Creative Director of Sonokids
SPEVI Co-President
Contact: phia@sonokids.com

Report: Monash University ARC project investigating 3D printing for accessible graphics

In a 3-year Linkage Project that began in October 2018, our research team at Monash University is investigating the use of 3D printing for touch access to graphics. The project aims to identify when 3D prints can be most helpful for touch readers, and to provide guidelines for their production and use. In the education sphere, our focus is on the use of 3D prints to support tactile literacy development, as well as the use of 3D prints for teaching science and technology subjects that rely on complex diagrams.

The project is funded by the Australian Research Council in partnership with the Round Table on Information Access for People with Print Disabilities (including SPEVI), Department of Education and Training Victoria (including the Statewide Vision Resource Centre), Royal Institute for Deaf and Blind Children, Guide Dogs Victoria and The Royal Society for the Blind. We are grateful for input already provided by SPEVI members and are keen to hear from others who are able to share their ideas or trial our prototype materials.

More information about the project, including monthly updates, can be found at http://accessiblegraphics.org/research/3dprints/arc/.

Other projects by the Inclusive Technologies research group

The Inclusive Technology team formed in 2019 as a new subgroup within Monash University's Faculty of Information. Led by Dr Kirsten Ellis, this group of researchers and students explores the use of emerging technologies for use by and for people with diverse needs. To date, projects have included the use of e-textiles to make interactive story book pages for children with vision impairments, the creation of a bespoke one-handed braille keyboard, an upside-down braille keyboard for sighted learners, accessible gallery experiences for people with vision impairments, interactive audio labels on 3D models, and virtual reality for O&M training. To ensure that our research is community-driven and participative, we invite the ideas and involvement of students with vision impairments, their teachers and families.

More information is available at https://www.monash.edu/it/our-research/strengths/chic/research/inclusive-technologies.

Leona Holloway
Research Assistant
Inclusive Technologies
Faculty of Information Technology
Monash University
leona.holloway@monash.edu

Report - Braille education using accessible inclusive digital technologies

Frances Gentle, RIDBC Renwick Centre

Non-profit organisations such as the Royal Institute for Deaf and Blind Children (RIDBC) have identified the opportunities offered by accessible digital technologies to deliver online information and training programs. During 2019, RIDBC released two online mathematics training programs in Unified English Braille. These programs address primary and junior secondary mathematics, and build upon RIDBC's existing online literacy training modules in Unified English Braille (UEB) – see https://uebonoline.org. RIDBC plans to release a third braille training program addressing senior secondary mathematics in early 2020.

The challenges faced by the RIDBC design team included how to create a fully accessible website that enabled subscribers to progress through a series of braille lessons and exercises at their own pace, using any computer with an internet connection, from anywhere around the world. The RIDBC team has incorporated the following design features into the braille literacy and mathematics training programs that are offered via the UEB Online website:

The RDIBC design team has selected use of a computer (PC or Mac), QWERTY keyboard, and internet connection (e.g. Internet Explorer, Firefox) as the means of subscribing and completing the online braille training programs.

The diversity of access needs of subscribers was addressed by providing visual and non-visual access options on the UEB Online website. Visual access mode consists of regular and high contrast access options; and non-visual access mode consists of audio access using a screen reader (e.g. JAWS, NVDA), with the additional option of using a screen reader in conjunction with a refreshable braille display.

Potential location or financial barriers are minimised by providing free online registration. Each subscriber is requested to create a profile and personal password. Once registered, subscribers can work at their own pace through the lessons from any computer that has an internet connection.

Subscribers learn about traditional braille writing methods by using six key entry to complete the print-to-braille exercises. The RIDBC design team created a digital braille cell consisting of six keys on the QWERTY keyboard (that is, keys s,d,f and j,k,l). These keys represent the six dots of the braille cell. Lesson completion includes the pressing of different combinations of keys on the keyboard to create all braille signs in UEB. Subscribers are required to complete an online keyboard check before commencing the lessons, as not all QWERTY keyboards allow for the simultaneous pressing of multiple keys.

To enable subscribers to independently progress through the braille lessons, the UEB training programs are coded to provide instant feedback when errors are made during lesson completion. Each error must be corrected before the program allows the subscriber to continue. The RIDBC team provides email support via the “help” email listed on the UEB Online website.

Information sharing and support is provided to subscribers through the UEB Online website, including a wealth of resources and common questions and answers (Q&A).

RIDBC believes the UEB Online training programs in braille literacy and braille mathematics promote equitable access to education for children and young people who use the medium of braille, regardless of their geographical location or social circumstances. Braille is recognised in the UN Convention on the Rights of Persons with Disabilities (UNCRPD) as an important means of communication and social inclusion for persons with blindness or vision impairment. The Convention includes an emphasis on the teaching and production of braille by competent people who have appropriate skills and experience. The UEB Online braille training programs address this emphasis by providing professionals and families with an effective means of acquiring the required braille knowledge to assist braille users to access the full curriculum on an equitable basis with their sighted peers.

We extend our thanks to the UEB Online Team and sponsors who have contributed to the UEB Online website and content.

Dr Frances Gentle AO
RIDBC Renwick Centre
Email: frances.gentle@ridbc.org.au

Report: International Council for Education of People with Visual Impairment

Ben Clare and Frances Gentle

The International Council for Education of People with Visual Impairment (ICEVI) is a global organisation that shares with SPEVI the goal of promoting equitable access to quality education for children and young people who are blind, have low vision, deafblindness or additional disabilities. ICEVI collaborates with its partner members, the World Blind Union, the International Agency for the Prevention of Blindness, United Nations agencies, the World Health Organisation, and government, civil society, parent and disability organisations that support children and young people with vision impairment or other disabilities.

This report presents an overview of ICEVI activities during 2019 in the Pacific Region and globally. The report commences with Ben Clare's account of his Pacific activities as Regional President of ICEVI Pacific. Ben's report is followed by an overview by Frances Gentle of global initiatives that have taken place during the year.

Pacific Region

Pacific Regional Conference on Disability

The 6th biennial Regional Conference on Disability, hosted by the Pacific Disability Forum (PDF), took place in Nadi, Fiji from 25 February to 1st March 2019. PDF is an umbrella organisation for Pacific Island organisations of persons with disabilities (DPOs). ICEVI is an affiliate member and was represented at the Fiji conference by Ben Clare. The event brought together over 200 persons from 20 countries in the Pacific region, including experts in the areas of education, rehabilitation and advocacy, representatives of United Nations bodies, indigenous groups, and government and nongovernmental organisations working in the disability sector. The conference theme was "From Recognition to Realisation of Rights: Furthering Effective Partnership for an Inclusive Pacific 2030 for Persons with Disabilities". Delegates explored how the Sustainable Development Goals have impacted on people living with disability in the Pacific region and what is likely to happen as the SDGs progress.

The following Pacific Island activities in the area of vision impairment were also undertaken by Ben Clare during 2019.

Braille embosser maintenance workshops

A series of braille embosser maintenance workshops were conducted by Index Braille in Fiji, Tonga and Samoa. The workshops were hosted by United Blind Persons of Fiji, the Tongan National Visual Impairment Association, and the Samoa Blind Persons Association. Participants learnt how to perform basic and advanced repairs on Index Braille embossers, and discussions are underway to offer similar workshops in Papua New Guinea, New Zealand, Vanuatu, Solomon Islands and Kiribati.

Tonga capacity building in the area of disability

In August 2019, Ben Clare conducted capacity building workshops in Tonga in the areas of disability advocacy, funding proposal construction, inclusive education and utilising social media to promote the work of DPOs including the Tongan National Vision Impairment Association. These workshops were part of a wider initiative that is co-sponsored by the Tongan Government, the Australian Department of Foreign Affairs and Trade (DFAT), Scope Global, and an Adelaide-based organisation known as the Lifetime Support Authority which promotes the needs of people with disability, specifically acquired brain injury. Ben Clare also led a team of four young Australian

adults with recently acquired brain injury to Tonga to capacity build with several Tongan-based organisations of persons with disabilities (DPOs).

Monitoring and Evaluation of Kiribati Education Facility

The Kiribati Education Facility has witnessed the successful integration of students who are blind or have low vision into regular school and higher education settings. Recently, the first class of students with vision impairment graduated in ICT as part of a regular class at the Kiribati Institute of Technology, while three other students with vision impairment have secured fulltime employment in the private sector. In October 2019, Ben Clare conducted program monitoring and evaluation on behalf of DFAT, and it is hoped that the Kiribati program may be expanded in the future.

ICEVI Global initiatives

One of ICEVI's priorities is to foster global cooperation and innovation in teacher training and disability-inclusive curriculum design. We have utilised inclusive digital technologies to develop a range of open access resources, including (1) joint position statements on education and braille with the World Blind Union; (2) thematic accessible editions of ICEVI's publication, *The Educator*; (3) a start-up teacher training curriculum for countries with limited pre-service or in-service training programs in the field of vision impairment; and (4), a textbook entitled "Mathematics Made Easy for Blind Children", that was jointly published in 2003 by ICEVI and the Overbrook-Nippon Network on Educational Technology (ONNET). The mathematics textbook is used by educators around the world to assist in providing quality instruction and educational resources for children with visual impairment.

Launch of instructional mathematics videos via YouTube

ICEVI recognises mathematics as a core learning area. Mathematical knowledge is required to study the additional STEM subjects of science, technology and engineering, and is increasingly becoming an essential requirement in employment and everyday life in the 21st Century. During 2019, ICEVI released a series of open access instructional mathematics videos via its dedicated YouTube channel, https://www.youtube.com/watch?v=kyAMYBIwqYU.

The open access instructional mathematics videos build on the concepts presented in "Mathematics Made Easy for Blind Children", and have been developed in response to requests from teachers and school administrators to provide additional support in the area of mathematics. In releasing the videos, ICEVI acknowledges the dedication of our Chief Executive Officer, Dr M.N.G. Mani, who has led the international advisory committee and every aspect of the project since its inception in 2016. Dr Mani has brought together some of the world's most qualified and experienced professionals in the field of mathematics and visual impairment, and the team plan to release more than 200 mathematics videos before the joint WBU-ICEVI General Assembly in June 2020.

Joint WBU-ICEVI General Assembly, Madrid Spain, June 2020

As reported in the 2018 volume of JSPEVI, ICEVI and the World Blind Union (WBU) are partnering with ONCE, the National Organisation of the Blind in Spain, to host the third joint WBU-ICEVI general assembly at the Marriott Hotel in Madrid from 19th to 24th June 2020. ONCE is a valued international partner member of ICEVI and a leading world organisation in the field of visual impairment. ONCE has given the event the title of World Blindness Summit.

The six-day program commences with the WBU proceedings on 19th and 20th June, followed by joint ICEVI-WBU sessions on 21st to 22nd June. The ICEVI opening session will take place on 21st June, and will be followed by a grand event organised by the ONCE to raise public awareness about the abilities of people with visual impairment. Following the WBU-ICEVI joint days on the 21st and 22nd June, the ICEVI paper presentation days will take place on 23rd and 24th June. ONCE is also planning to organise a concurrent technology exhibition at the Marriott Hotel that will showcase technology devices being used in the field of disability.

To register for the 2020 WBU-ICEVI general assembly, please visit ONCE's dedicated website, https://www.worldblindnesssummit.com/en.

Other global initiatives

Other initiatives during 2019 include the ICEVI-Nippon Foundation higher education and employment program in East Asia, implementation of the country champions program across ICEVI's seven regions; regional and conferences, and collaboration with UN agencies and global disability networks. In October 2019, the ICEVI Executive Committee approved a Governance Framework that will guide the global and regional bodies of ICEVI in achieving the organisation's Vision, Mission and Vision and strategic goals.

The ICEVI leadership team acknowledges the contributions of our members and partners in promoting and supporting the right to quality, equitable education for children and young people with vision impairment.

Ben Clare
Chairperson, ICEVI Pacific, and Member, SPEVI Committee of Management Sydney Australia Email: bwclare@gmail.com

Dr Frances Gentle AO
President, ICEVI, and Co-President, SPEVI
Email: frances.gentle@ridbc.org.au

Report: UsherKids Australia

Emily Shepherd

Usher syndrome is a genetic condition characterised by congenital hearing loss or deafness, progressive vision loss caused by an eye condition called retinitis pigmentosa, and in some cases vestibular dysfunction. It is the most common cause of deafblindness, affecting an estimated 400,000 people worldwide.

UsherKids Australia was established in 2016 as a parent led support group to enhance the lives of children diagnosed with Usher syndrome and their families in Australia. UsherKids Australia's mission is to ensure children diagnosed with Usher syndrome and their families have access to an informed, committed and caring community of clinicians, service providers, educators, researchers and peer support networks to allow them to thrive in their everyday endeavours.

As well as providing direct support to children with Usher syndrome and their families, UsherKids Australia works to create a conduit for clinicians, researchers, service providers, educators and the general public to come together in the care for children with Usher syndrome, and to further educate them on their specific clinical, educational and social needs.

Advancements in genetic and genomic testing make earlier diagnosis of rare genetic conditions such as Usher syndrome accessible to more and more children born with a hearing loss in Australia. This earlier diagnosis leaves a distinct gap in the provision of services and support for families, as well as an evidence-based clinical pathway for clinicians to guide their care for children with Usher syndrome in Australia.

This earlier diagnosis of children with Usher syndrome can also be well before the onset of the functional impact of retinitis pigmentosa. This has created an opportunity to provide these young children with the building blocks required to have the skills necessary to cope with the deterioration of their vision loss. The long term goal is to make an impact on the capacity of children with Usher syndrome to have the skills and knowledge to engage in education, employment and community activities, and therefore increase their independence and quality of life into adulthood.

UsherKids Australia will continue to collaborate with the various stakeholders involved in the community in which we seek to serve and welcomes any opportunities to broaden this collaboration.

UsherKids Australia will host a Transitions Conference in Sydney in September 2020, which aims to bring together both families and professionals involved in the care, education, and support of children with Usher syndrome in Australia. After the success of our Connections Conference in Melbourne in 2018, we will further explore some of the strategies of better managing crucial stages of transitions to and from

early intervention, to and from primary and secondary school, as well as into higher education and the workforce.

More details are available on our website www.usherkidsaustralia.com or by contacting the team via email info@usherkidsaustralia.com.

Emily Shepherd

Emily@usherkidsaustralia.com

Report: Vision Australia – Implementing our Four Pillars 2020

Education **Employment **Independence **Social Inclusion

Redesigning Children Services

In late 2018, Vision Australia embarked on a significant consultation to redesign our services for children, young people and their families. We engaged extensively with internal and external stakeholders and the latest research with the aim of developing a contemporary service that is valued by clients, leads to evidenced outcomes (particularly around employability statistics and experiences), and enables us to deliver high quality services and maintain and grow paediatric expertise in the new funding environment.

The resulting model focuses on meaningful participation and promote future employability, recognizing that this is the best way for us to have a unique and meaningful impact on those aged 0-25 and their families. We will be using the SPEVI-endorsed components of the Expanded Core Curriculum to develop a set of learning pathways that guide a deliberate teaching of areas contingent on incidental learning.

Throughout 2020 we will be refining and rolling out our new approach and service offerings, working closely with the key stakeholders in a child's life – in particular their families and educators – to create meaningful resources and services.

For further information, please contact **Polly Goodwin,** Service Designer - Education - Service Innovation, Polly.Goodwin@visionaustralia.org

Vision Store – Learning through Play

Vision Australia has partnered with blindness and low vision specialty organisations around the world to ensure the very best products for education through learning and play are available in Australia.

Examples of these partnerships include Microsoft and American Print House for the new Code Jumper education kit in 2020, followed by a range of educational toys and teaching aids from American Print House. Additionally, the Royal National Institute of the Blind have also launched innovative braille education kits and a range of fun toys that are available from Vision Store (http://www.shop.visionstore.org) for the 2020 school year.

Vision Australia is also pleased to be a partner of the LEGO Foundation and LEGO Braille Bricks. LEGO Braille Bricks is a playful tool to teach Braille to blind and visually impaired children. The toolkit comprises of adjusted LEGO bricks that correspond to Braille and each colourful brick has a printed letter or symbol allowing the sighted and blind to interact and play on equal terms.

LEGO® Braille Bricks is developed by the LEGO Foundation, LEGO Group and partners from the blind community. This program is launching internationally through 2020 and will be implemented in Australia from January 2021.

For further information, please contact: **Tony Wu**, Product Advisor, Vision Store: tony.wu@visionaustralia.org.

Report: CVI Community Australia

Dr Bronwen Scott, Heidi Zec and Natalia Kelly

Cortical vision impairment (CVI) is a leading cause of vision impairment in children in developed countries (Philip & Dutton, 2014). CVI Community Australia is an online initiative established in 2019 which aims to create a community where parents, health and education providers and the wider community can connect and share knowledge and ideas, to ensure that Australians with CVI benefit from the latest research and best practice.

Our mission is to provide accurate, up to date information and to connect individuals via regular blog posts and a community discussion forum.

CVI Community Australia was founded by Heidi Zec, who is a parent of a young son diagnosed with CVI, and Bronwen Scott, an O&M Specialist with training and experience in conducting the CVI Range Assessment (Roman-Lantzy, 2018). We have also welcomed aboard Natalia Kelly, an orthoptist with extensive experience in assessing and providing intervention to children and adults with neurological impairment.

Individuals are welcome to subscribe to the regular blog, and to connect via a closed FaceBook community. Information about how to connect can be found on the CVI Community Australia webpage: https://www.cvicommunityaus.net/

References

Philip, S.S., & Dutton, G.N. (2014). Identifying and characterising cerebral visual impairment in children: a review. *Clinical and Experimental Optometry, 97*(3), 196-208.

Roman-Lantzy, C. (2018). *Cortical visual impairment: An approach to assessment and intervention*. (2nd ed.). New York: AFB Press.

Dr Bronwen Scott

bron@options4mobility.com.au

Heidi Zec

Heidi.s.zec@gmail.com

Natalia Kelly

visionmatters@outlook.com

Vale Nicole Donaldson

On Friday, 21 June, 2019, Nicole Donaldson lost her life-long battle with a congenital heart condition. Nicole was a tireless advocate for and educator of children with a vision impairment. Her distinguished teaching career took her all over Queensland where she supported children from infancy to the end of their schooling and beyond. Nicole's love of braille was legendary. She was often heard to say that the whole world should be in braille.

Nicole had great respect for the lived experience of blindness and never missed an opportunity to have her students mentored or taught by blind adults. As an office holder for SPEVI and the Australian Braille Authority, Nicole was never too busy to share her knowledge and experience with her colleagues. Although she battled with serious health problems throughout her life, she always had a kind word and a smile for everyone she met.

Nicole is at peace now but will live on through the lives of the many students, teachers and parents she touched with her special brand of humility, wisdom and kindness.

Julee-anne Bell

Vale Diana Braun

Diana Braun, aged 81, was a long-standing and active member of the Association of Blind Citizens of NSW/ACT and Blind Citizens Australia. She also was very supportive of the work of the Round Table on Information Access for People with Print Disabilities INC in the early years of its existence and served on Royal Blind Society of NSW Library Services consultation groups as a consumer representative.

Regarding her involvement with the Association of Blind Citizens of NSW: Diana played a pivotal role as its Librarian (a position she held in a paid capacity for many years). Material located in the Association's Library was not only available to blind/vision impaired adults residing in NSW, some of this was sourced in the early days by itinerant support teachers for blind school students. I am reliably informed Diana also transcribed by hand some material for access by Braille readers. Diana was a presenter on Outlook (the Association's weekly radio program), served on the organisation's Management Committee after retiring from her paid employment and worked hard to raise funds to support the organisation's work - often opening up her home for this purpose.

In later years, Diana played a very active role in the BCA Sydney Branch undertaking fundraising activities and serving as President for at least 2 terms.

Diana was instrumental in highlighting the challenges unique to blind/vision impaired women in Australia and overseas with her work culminating in

establishment of the BCA National Women's Branch. Some of you may have fond memories of the Branch's inaugural publication - Women in Touch - an audio magazine including interviews on a variety of topics, recipes and other items of interest to female members. Diana was central to compiling information for inclusion in this publication and interviewing many of its contributors. Concerned to ensure availability of information on home nursing and parenting based on the lived experiences of blind/vision impaired women, she initiated publication by the National Women's Branch of booklets on these subjects which benefited many.

Diana dedicated much of her life to improving quality of life for people with blindness/vision impairment. She valued Braille highly and recognised its importance as a key to literacy. Diana was an avid reader of Braille and audio books. She enjoyed sharing her reading experiences with others.

Those who knew Diana were impressed by her passion for whatever cause with which she involved herself. While at times forthright, she was also very caring.

Diana passed away on April 12 after a long illness. She will be fondly remembered and sadly missed by those who knew her. We thank her for her passion, tireless efforts to improve opportunity for people who are blind/vision impaired through promotion of literacy and reading, and support through her fundraising and advocacy work. Diana is survived by her husband Leo.

Sondra Wibberley

About SPEVI

The South Pacific Educators in Vision Impairment (SPEVI) Inc. is the major professional association for educators of students with vision impairments in Australia, New Zealand and the South Pacific region. SPEVI acts as the professional body in matters pertaining to the education and support of persons who are blind, have low vision, deaf-blindness, or additional disabilities. SPEVI membership is open to educators, professionals and parent groups who support and promote education for persons with vision impairment.

SPEVI Inc. is an Association incorporated under the laws of NSW, Australia – Registration number INC9889733.

SPEVI Vision

To promote educational systems in Australia, New Zealand and the South Pacific in which diversity is valued and disability is not viewed as a characteristic by which to judge a person's worth.

SPEVI Mission

To stimulate professional and public debate and action on vision impairment issues and change which affect, or have the potential to affect the daily lives of persons who are vision impaired, while emphasising concepts of inclusive, responsive educational communities and interdependence between learners and families within those communities where all people are valued.

SPEVI Aims

- To be recognised as the professional body of educators whose specialty is in matters pertaining to the education of persons with vision impairment in Australia, New Zealand, and Pacific Island Countries.
- To advocate on behalf of members, persons with vision impairment and parents/carers for equitable education access and participation, in accordance with international and national disability anti-discrimination legislation.
- To encourage the highest standards in the educators of persons with vision impairment by promoting research and professional training for general and specialist teachers.
- To promote and facilitate the interchange of information and collaboration among educators, professionals, parent groups and the broader community concerning education and equal opportunity for persons with vision impairment.
- To encourage the use of appropriate mainstream and assistive technologies, resources and optical and non-optical aids, in the education of persons with vision impairment, and to promote teacher education programs in the use and care of existing and new techniques and technology.

SPEVI Structure

SPEVI operates at two levels:

- National level, by means of the Committee of Management;
- Local level (state/territory), by means of a Branch comprising SPEVI Councillors and members who reside in the location.

SPEVI Code of Ethics

- All members of SPEVI will:
- Work for the good of SPEVI and actively support and promote its Aims as defined in the SPEVI Constitution;
- Act honestly and with respect and integrity at all times;
- Provide leadership for all members of SPEVI to foster high ethical standards;
- Act to enhance public awareness of SPEVI's objects; and

- Maintain transparency of decision-making within SPEVI.

Committees of Management

SPEVI is managed at the national level in Australia and New Zealand by a Committee of Management. The national Committees, subject to SPEVI's Constitution and to any resolution passed by SPEVI in general meeting, are responsible for the governance and management of the activities of the Association and its members. The Australian Committee manages and supports Australian and the Pacific Island members.

Australia Committee of Management, 2019 - 2020

Presidents: Phia Damsma, Frances Gentle. Emails: phia@sonokids.com; frances.gentle@ridbc.org.au

Vice-President: Melissa Fanshawe. Email: Melissa.fanshawe@usq.edu.au

Convening Editor: Bronwen Scott, JSPEVI. Email: bronscott@iinet.net.au

Immediate Past President, Secretary and Membership Secretary: Carly Turnbull. Email: carly.turnball.spevi@gmail.com

Treasurer: David Rice. Email: davericesydney@gmail.com

Public Officer: Sue Silveira. Email: sue.silveira@ridbc.org.au

Director: Pranitha Moodley. Email: Pranitha.moodley@ridbc.org.au; Paul Pagliano. Email: paul.pagliano@jcu.edu.au ; Jillian Hart

Access Coordinator, Web and List administrator: Phia Damsma. Email: phia@sonokids.com

SPEVI Representative, International Council for Education of People with Visual Impairment: Ben Clare. Email: bwclare@gmail.com

SPEVI Facebook Editors: Ben Clare and Linda Flavell. Emails: bwclare@gmail.com; linda.flavell@blennz.school.nz

SPEVI Representative, Round Table on Information Access for People with Print Disabilities: Phia Dasma. Email: phia@sonokids.com

New Zealand, 2017-19

President: Sharon Duncan. Email: sharon.duncan@blennz.school.nz

Treasurer: Ernie Belk. Email: ernie.belk@blennz.school.nz

Secretary: Jude Shelley. Email: judeashelley@gmail.com

Co-Editor, SPEVI Facebook page: Karen Gilligan. Email: karen.gilligan@blennz.school.nz

For a list of SPEVI Councillors, please visit the SPEVI website: www.spevi.net

Journal of the South Pacific Educators In Vision Impairment Volume 12, Number 1, 2019