Lighting the way through the home:

Development of early braille literacy

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Emergent braille literacy is the earliest phase of language development where children, from infancy, are exposed to "direct, repeated and meaningful interactions with braille literacy materials and events" (Rex, Koenig, Wormsley, & Baker, 1995, p. 10). Activities such as shared reading of tactile books, scribbling on the braille machine, joint engagement in nursery rhymes, songs and chants help infants acquire cognitive concepts and develop physical skills to engage in braille. The process leads to the early development of literacy concepts including speaking, listening, reading and writing, as a foundation for braille literacy (Drezek, 1999).

Research has shown that young children who are exposed to early braille literacy have a better chance of success in education, employment and social interaction (Doepel, 2015; Janus, 2011; Makin & Spedding, 2012; McGee & Richgels, 2014; Salmon, 2014). Despite this evidence, the percentage of people with vision impairment using braille has declined significantly over the past few decades (Australian Blindness Forum, 2009; National Federation for the Blind, 2009; Toussaint & Tiger, 2010; Vision Australia, 2014; Wang & Al-Said, 2014). This paper will examine firstly, the importance of literacy; including how language is learnt and

the impact of vision impairment on language development; secondly, the importance of braille for literacy development; and thirdly, the perceived barriers to emergent braille literacy for children. The author will then highlight successful strategies to provide emergent braille literacy experiences for infants with vision impairment.

The importance of Literacy

The process of language development begins for a newborn through everyday shared interactions with people that love and care for them (Apel & Masterson, 2012; Brennan, Luze, & Peterson, 2009; Salt, Dale, Osborne, & Tadic, 2005). A baby innately possesses a unique temperament (Willoughby, Stifter, & Gottfredson, 2015), which combined with their family, social, cultural influences and functional need will impact their development (Rex et al., 1995). Learning takes place as a natural process through observation, imitation and exploration of their environment (Lamb, 1995; Makin & Spedding, 2012). It is further developed through social interaction in everyday routines, talking, listening, sharing reading experiences and modelling expected social pragmatics (Morrison & Wilcox, 2010; Wohlwend, 2011).

Vision is known as the co-ordinating sense which combines information gathered from all the senses to construct concepts about the environment (Thompson, 1998). For sighted people, most learning opportunities are obtained incidentally from visual information (Brennan et al., 2009; Ferrell, 2011; Rex et al., 1995; Steinman, LeJeune, & Kimbrough, 2006). Babies with vision impairment develop language through similar stages of language development (Geld, 2014; Steinman et al., 2006), but require direct, planned and repetitive contextual experiences (Ferrell, 2011; Stratton,

1996), providing auditory information to assist concept development (Lamb, 1995; Steinman et al., 2006). Children with vision impairments are at risk of being passive learners (Ferrell, 2011). Therefore fun, meaningful and play-based experiences to motivate children to interact with language are crucial (Hudson, 2015).

The *Melbourne Declaration on Educational Goals for Young Australians* (Australian Council on Education Employment Training and Youth Affairs, 2008) acknowledged literacy as the fundamental skill for success in education and employment. *The Australian Early Years Framework* (Department of Education Employment and Workplace Relations, 2009) believes children exposed to early, rich literacy environments develop confidence, a strong sense of identity and well-being, are involved and connected with their world to become effective communicators.

The aim of providing emergent braille literacy experiences, is to assist children to have the same level of independent access to literacy as their peers upon entering formal schooling, laying foundations for future success in employment (Doepel, 2015; Janus, 2011; Makin & Spedding, 2012; McGee & Richgels, 2014; Salmon, 2014; Zabelski, 2009).

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The importance of braille for literacy development

Despite Article 24 UN Convention of Rights of persons with disabilities (United Nations, 2006) recognising the importance of braille for access in education,

employment and community participation, statistics show a significant decline in braille readers (Toussaint & Tiger, 2010; Vision Australia, 2014; Wang & Al-Said, 2014). In Australia, it was estimated in 1997 that 290,000 people are legally blind and of that less than 10% are braille users (Arblaster, 1997).

According to Hatlen, (Hatlen & Spungin, 2008) braille has become redundant as adaptive technology devices such as magnification, screen readers and accessibility options in mainstream technology capture and read aloud text (Guerreiro et al., 2013). However, critical to development of literacy are the receptive and expressive processes of reading and writing, speaking and listening (Gentle, 2015b; Rex et al., 1995). It is argued acquiring information solely through auditory senses is demanding (Posey & Henderson, 2012) requires a large cognitive load (Charelle, 2013) and complex auditory processing skills (Argyropoulos & Papadimitriou, 2015). As sighted children read and write independently, it is importance for children with vision impairment to interact with braille so as to provide autonomous access to written communication (D'Andrea, 2009; Doepel, 2015; Maxwell, 2009).

Interacting with braille allows language acquisition though features of language, such the development of phonological awareness (Toussaint & Tiger, 2010), letter knowledge, sound segmentation (Hatton, Erickson, & Lee, 2010), graphemes, spelling (Argyropoulos & Martos, 2006; Guerreiro et al., 2013), punctuation and sentence structure (Bano, Syed Abir Hassan, Hashmi, Shaoukat Ali, & Shaikh, 2011). All of which can only be developed by written form (Monson & Bowen, 2008; Turnbull, 2012).

People with vision impairment have extremely high unemployment rates (Kaine & Kent, 2013; Posey & Henderson, 2012; Vision Australia, 2012a, 2012b, 2014). Australian studies of people with vision impairment who are employed showed over 85% read and write in braille (Blind Citizens Australia, 2013; Doepel, 2015; Vision Australia, 2012a, 2012b). It was found high levels of braille literacy skills are the strongest predictor for individuals succeeding in higher levels of education and employment (Guerreiro et al., 2013) and actively participating in the community (Silverstone, Lang, Rosenthal, & Eleanor, 2000).

Therefore, although technology is indeed important in the 21st century (Neumann & Neumann, 2014), technology must be used as complementary tools to access literacy, not to replace the essential skills of reading and writing provided only through braille (Monson & Bowen, 2008; Ryles, 1996; Turnbull, 2012).

Perceived Barriers to emergent braille literacy

The Family

Having a child with a disability places significant pressure on a family (Keilty & Kristin, 2006; McKee, 2015). Individual social, cultural beliefs, economic level, time constraints, household structure and attitudes towards disability will impact on the ability of the caregiver to provide emergent literacy experiences (Chen, 2004, 2014; Davis & Day, 2010; Salt et al., 2005; Zabelski, 2009). Furthermore, babies with

vision impairments may not be able to make eye contact with their carers, making it difficult to establish connection (Salt et al., 2005). Maternal responsiveness, or being able to intrinsically understand and connect with the needs of their child, has a profound influence on facilitating emergent learning experiences (Bambara et al., 2009; Murphy, Hatton, & Erickson, 2008).

In the *Parents' Perspectives on Braille Literacy: Results from the ABC Braille Study*, Kamei-Hannan and Sacks (2012) found that parents lacked confidence in their ability and did not feel they had access to information or equipment to teach their children braille. Provision of trained professionals to provide essential information and equipment is necessary to support caregivers to provide rich emergent braille literacy experiences (Craig, 1999; D'Andrea & Farrenkopf, 2000; Kamei-Hannan & Sacks, 2012).

The child

Like any skill, braille takes time and effort to reach proficiency (Guerreiro et al., 2013). Learning to read and write in braille is difficult if not exposed to early literacy experiences (Wormsley, 1997, 2000). Time is needed to develop tactile awareness, knowledge of letters and sounds (Gould, Northcott, & Mizera, 2004; Swenson, 1999) and spatial understanding of braille cells (Argyropoulos & Papadimitriou, 2015). Early access to braille has also been found to increase a child's positive feeling toward braille as a natural tool of literacy (Bardin & Lewis, 2011).

Approximately 85% of children who are legally blind have some useful residual vision (Toussaint & Tiger, 2010). Controversy to teach or not to teach braille to a low vision student arises from the easy accessibility of large print and high quality magnification tools (Toussaint & Tiger, 2010). Although magnification is easy to access, enlarging font impacts on comprehension, scanning and reading fluency (Farmer & Morse, 2007; Ianuzzi, 1996) and decreases literacy rates for students with low vision as they progress through school (Thompson, 1998).

Parents who have children with multiple disabilities may not feel literacy development is a priority, as medical interventions or emotional needs take precedence (Craig, 1996). Wormsley (2004) believes that children of all abilities need to be provided with a form of communication (Gentle, 2015a, 2015b; Sacks, Hannan, & Erin, 2011). Providing functional braille activities that enable children to connect with others and the environment is essential (Holbrook, 2009; McMillan, 2015).

Strategies for Emergent Literacy Experiences

Access to early intervention and resources
A timely diagnosis by medical experts and referral to early intervention is essential to allow children with vision impairment access to services to support physical, academic and social readiness for school (Anthony, 2014; Janus, 2011). The trend for ophthalmologists and other medical specialists to delay learning braille until visual

potential is reached is concerning for the provision of timely braille literacy experiences (Augestad, Klingenberg, & Fosse, 2012; Wilkinson, Olson, & Kuusisto, 2011). Massof (2009) believes education for ophthalmologists to understand the importance of braille in literacy is essential, as the medical personnel are trusted by the parent and in a position to enable early access to intervention.

For students with degenerative conditions or with low vision requiring significantly enlarged print, braille must be introduced as dual media to allow every possible opportunity for prebraille activities, tactile discrimination and letter recognition (Ianuzzi, 1996; Lusk & Corn, 2006; Toussaint & Tiger, 2010). Decisions regarding learning media should involve caregivers, therapists and specialist teachers: vision impairment as well as input from medical personnel (Ferrell, 2011). Ianuzzi (1996) urges decision makers to think ahead to higher education and employment when deciding on braille versus print.

For many children with vision impairment, parents may have many reasons to be unable to attend early intervention or may be unaware of services provided. It is important to make caregivers aware of the available services not only to promote early literacy experiences, but also because vision impairment puts the child's language, cognitive, motor, and social developmental milestones at risk (Salt et al., 2005). Compensatory skills through activities at the child's zone of proximal development (McGee & Richgels, 2014) will assist the caregiver to gain the knowledge and skills to motivate their child to interact with its environment and decrease the risk of potential delays (Salt et al., 2005). For those living in rural and

remote areas, access to a quality intervention program may be provided through online services such as *Teleschool* (McCarthy, 2012) with quality trained professionals who specialise in providing distance support to caregivers to develop emergent braille literacy (McCarthy, 2012).

Equipment, including braille machines, braille notes and magnifiers, for children with vision impairments may be prohibitively expensive, with braille writing devices ranging from $900 to $5000 (Turnbull, 2012). Training, ongoing repair and information on how to use it may also be time consuming (Australian Blindness Forum, 2009). The Better Start program can provide therapy and equipment for Australian children with vision impairment (Australian Government Department of Social Services, 2014). Experiences with current and emerging braille technology will assist the child to develop an understanding of the sense, purpose and tools of language to develop a foundation for future literacy use (Doepel, 2015; EIVI Training Center, 2005).

Family Partnership model
The family partnership model is a model of early intervention which aims to provide support to children by building the capabilities of the caregivers (Anthony, 2014; Fajdetic, Oberman, & Runjic, 2009). The partnership model recognises the crucial roles families play a role as "language role models" for children (Apel & Masterson, 2012) and as the child's first teachers. (Argyropoulos, Sideridis, & Katsoulis, 2008; Brennan et al., 2009; Craig, 1996; Sacks et al., 2011). The service provided by the specialist teacher: vision impairment is to provide information, resources and support

for parents to provide developmentally appropriate practices and routines based intervention in the child's natural environment (Anthony, 2014; Fajdetic et al., 2009). It works by building parent's capacity to interact with their child and interpret meaningful experiences to provide the best possible foundation for future literacy skills (Brennan et al., 2009; Craig, 1996; Kamei-Hannan & Sacks, 2012; McGee & Richgels, 2014; Salt et al., 2005).

Whole language development

Developing language through routines of everyday life (Curtin, 2015), teaches children the functional use of language (Fajdetic et al., 2009; Lamb, 1995) while developing vocabulary and constructing concepts relevant to their natural environment (Tanni, 2014). Literacy experiences must be fun to motivate children to become actively engaged in learning (Gentle, 2015b) and develop relevant vocabulary and functional use of language (Curtin, 2015; Fajdetic et al., 2009; Lamb, 1995; Tanni, 2014). Appendix 1 shows a list of activities to promote rich emergent literacy experiences collated by the author, categorised using Craig's (1999) framework of physical, functional, language and cultural contexts of emergent braille literacy. A rich array of experiences will provide scaffolding to develop knowledge of literacy concepts and provide opportunities to interact with braille (Steinman et al., 2006).

Conclusion

Braille is the single biggest predictor for success in education and employment for people with vision impairment. Providing fun, meaningful and developmentally

appropriate activities to foster emergent braille literacy skills are crucial for future independent access to reading, writing, listening and speaking (Hudson, 2015). Through a family partnership model of support, specialist teachers: vision impairment can support caregivers to cope and provide essential information and skills to support the child's development (Anthony, 2014). Rich emergent braille literacy experiences will provide opportunities for parents and children to engage in meaningful social interaction, develop a love of braille literacy and lay a foundation for successful participation in employment, education and the community.

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Appendix 1: Suggested strategies for rich emergent literacy experiences

Activities to promote rich emergent literacy experiences have been collated by the author, categorised using Craig's (1999) framework of physical, functional, language and cultural contexts of emergent braille literacy.

Physical context	Literacy materials in the home

Print rich environment – opportunities for tactile interaction, describing environmental print, braille print and signs (Brennan et al., 2009). Model making shopping lists in braille, label belongings (West & Cox, 2004) Real experiences, meaningful

Technology and tools that will be used for braille – braille machine, slate and stylus, braille note, braille labeller, iPad

Functional literacy	Literacy acts that happen

Reading books

> **Choice of book** needs to be exciting and stimulating, child's interests at their level (Gentle, 2015b; Hudson, 2015)
>
> **Print conventions** Purposeful, meaningful and early print – left to right, top to bottom, words are represented by a sea of letters, tracking, page turning, book position (Lamb, 1995) Symbols and books, (Drezek, 1999) talking about letters, sorting (Koenig & Holbrook, 2000; Swenson, 1999)
>
> **Tactile resources** to accompany book, book bags, *Feelix* library, fiddle cards (Curtin, 2015)
>
> **Shared reading experiences** graphemic and phonemic awareness, vocabulary, critical thinking skills (Brennan et al., 2009)
>
> **Receptive language** reading aloud, expression and fluency (Erickson & Hatton, 2007)

Prewriting/ Prebraille skills

> **Scribbling –** braille machine, slate and stylus (D'Andrea & Barnicle, 1997)
>
> **Functional writing** – lists, washing machine labels

Expressive language

> **Oral language** songs, chants, finger play Language play – rhymes, sound patterns finger plays, songs, ipads, listening games (Ferrell, 2011)
>
> **Verbalising routines** change time, bath time, meal time (Apel & Masterson, 2012)
>
> **Repeat** stories and recall experiences, name objects (McGee & Richgels, 2014)

Language context	Imparting skills concepts and literacy

Physical development

> **Finger strength**, differentiate between fingers to press in combinations. Pinch, swipe, rotor for technology
>
> **Hand skills** to handle books, tracking, hand movements for reading, asymmetry of brain (Argyropoulos & Papadimitriou, 2015) , reaching and grabbing , early exploration of objects, play and manipulation
>
> **Gross motor skills** Perceptual motor skills (Drezek, 1999). Standing, walking, running. Milestones slower.
>
> **Awareness of body in space** Postural control, coordination all important for braille literacy and access to physical, social and academic participation in school (Salt et al., 2005). Good posture (Lamb, 1995) integration of sensory information (Thompson, 1998).

Cognitive development

> Understanding of space, object and object relationships and permeance (Salt et al., 2005)
>
> Part to whole, develop different sequence. No incidental learning it needs to be pointed out, explicitly taught
>
> Abilities: Forewarning of dangers unexpected and frightening (Salt et al., 2005)

Cultural context	Values and beliefs of the parents that influence literacy

Emotional: attachment and ability of the caregivers to cope , sensitive parenting – increase interaction, interest and drive (Salt et al., 2005). Parent feels more confident when guided by professionals (Erickson & Hatton, 2007)

Beliefs: Importance of braille in social/cultural circles of caregivers. Caregivers value of literacy for child

Social skills: early social behaviours need to be taught. Silence, personal space and conventions for conversation are part of literacy (Thompson, 1998)