Essentials of Pre-Braille Skills in Braille Learning: A Literature Review

Alya Qasdina Ng Ai Lee[1], Kway Eng Hock[1] & Hasrul Hosshan[1]
[1,2,3] Department of Special Education, Faculty of Human Development,
Universiti Pendidikan Sultan Idris, Tanjong Malim, Perak, MALAYSIA
*Correspondence email: kway.eh@fpm.upsi.edu.my

ABSTRACT

Pupils with visual needs have a difficult time acquiring tactile reading. For tactile reading, the dexterity of the fingertips influenced the reading pace. The primary objective of this article is to discuss the essentials of pre-braille skills in the early stages of braille literacy and to gain insight into instructional practises in Malaysia's bilingual classrooms in comparison to other nations, including India, Spain, and the United States of America. This paper is intended to provide an enhanced view on pre-braille skills through literature review and revising the conventional instructional practice which emphasises more on rote learning. Henceforth, pre-braille skills are fundamental for consistent and systematic practices during the initial stage of braille literacy. The consequence of this paper will result in pre-braille skills will be prioritised before pupils with visual needs are exposed to more advanced braille literacy. Additionally, the gathered and arranged knowledge may serve as an inspiration for future study.

Keywords: Early Braille Literacy; Fluency; Tactile Reading; Pre-Braille Skills; Visual Needs

INTRODUCTION

Braille is a literacy medium for pupils with visual needs (Radojichikj, 2015). Braille reading refers to the process of tactile input, the integration of input with semantic memory, and all higher levels of language processing such as phonological, semantic, and syntactic processing (Martiniello & Wittich, 2020). From a neuroscience perspective, there are three main components in the braille reading process viz., basic somatosensory processing of tactile information under passive stimuli, assimilated with basic somatosensory via active pattern recognition, i.e. linking braille dot position with related braille code to produce braille image, which forms in parts of the brain for subsequent reactions.

In the context of Malaysian braille literacy instructional practices, the modules presently available emphasise the learning of Grade One (G1) braille literacy (Alphabetic Braille), followed by Grade Two (G2) braille literacy through memorisation (Ahmad Yunus Mohd Noor, 2016; National Council For The Blind, Malaysia (NCBM, 2020). G1 braille is a letter-for-letter translation for the printed version. This is the recommended code for beginners since it enables pupils to get acquainted with and identify many elements of the codes while learning to read braille. The G2 braille system employs "contractions," which substitute shorter sequences for the whole spelling of frequently occurring letter groups. G2 braille is the most frequently used kind of braille coding and may be found in a variety of places, including textbooks, toiletries, and public signs. It is composed of 26 basic alphabetic letters, punctuation, and contractions. For academic purposes, pupils in a bilingual setting in Malaysia will need to acquire several braille codes, including contractions for two languages. Examples of G2 braille for Malay Language (L1) and English Language (L2) are provided in Table 1.

Table 1. G2 braille (contractions) for L1 and L2

Alphabet	Contractions	
	L1	L2
b	*bahawa*	but
c	*contoh*	can
d	*dengan*	do
e	*erti*	every
f	*faedah*	from
g	*guru*	go

Scheller et al. (2019) stated pupils with visual needs who have lost their capability to see may depend on other modalities to develop a sensation of the environments in order to fulfil their various special educational needs. The whole process of braille literacy learning should begin with the pre-braille skills which emphasis on multisensory approach (Argyropoulos & Papadimitriou, 2017). Pre-braille skills include sensory-motor exercises, particularly involving the hands and fingers, as well as tactile awareness to improve finger dexterity so that pupils with visual needs may accurately identify the position of the braille dots (Brown and Palmer, 2013). According to Floyd (2019), pupils with visual needs must receive systematic and consistent interventions on pre-braille skills together with meaningful language literacy activities to prevent experiencing difficulties throughout the subsequent braille literacy processes.

Conventional Instructional Practices of Prebraille Skills

A review of many studies conducted over the last two decades demonstrated the importance of consistently and systematically initiating pre-braille skills at the early stages of braille learning (Argyropoulos & Papadimitriou, 2017; Brown & Palmer, 2016). Numerous assessments and checklists have been used to determine if pupils have acquired significant pre-braille skills prior to applying such skills to more complex braille codes (Sewell, 2020). In a nutshell, pre-braille skill is the first step in instructional practices in braille learning. In consequence, the researcher will compare instructional practices for pre-braille skills by listing the content accessible on pre-braille skills modules in Spain, India, the USA, and Malaysia.

Pre-braille skills are taught in Spain through the Braitico Programme, which is a braille learning and literacy curriculum (National Organisation of Spanish Blind Persons [ONCE], 2020). Five research centres and 23 support teams cooperate to ensure that 99 percent of pupils with visual needs are included in mainstream settings. Braitico's braille literacy concepts are inclusive, accessible, creative, inspiring, and adaptable. In general, the Braitico module consists of four modules. Pre-braille skills are embedded in Module 1 and Module 2 are used to teach early braille literacy to infants with visual needs as young as 0-24 months. Module 1 is also known as Manitas focuses on psychomotor coordination, basic concepts, sensory perception, and phonological awareness. Following that, in Module 2- Punto, the intervention will concentrate more on braille pre-reading and pre-writing.

Meanwhile, pre-braille skills are included in the Visual Impairment Training Module in India (Abiyah, 2020). This module is a collaborative effort between the Department of School Education and Literacy, and the Ministry of Education India. The module is divided into 15 sections, with Section 4 devoted to Sensory Training using a multisensory approach and Section 9 to Braille Teaching emphasising on pre-braille skills. Teachers were equipped with a well-structured pre-braille skills teaching module and were accountable for implementing the modules on a consistent basis.

Similarly, in the United States, pre-braille skills are taught as a curriculum that pupils with visual needs must acquire before moving on to learn more complex braille literacy (Brown & Palmer, 2013). The Pre-braille Curricula was developed by Cindy Reed-Brown and Peggy Palmer who are also Preschool Education Consultants, Board of Education and Services for the Blind and sponsored by Perkins School for The Blind. The pre-braille curriculum is developed based on a multi-sensory approach (Brown & Palmer, 2013). The strategies emphasised in this module focus on the objective of encouraging interest in reading among pupils with visual needs (Brown & Palmer, 2013). The

curriculum was also followed by a Pre-braille Skills Assessment adapted from an instrument developed by the Texas School for the Blind and Visually Impaired (Bishop, 1996; Sewell, 2020).

In Malaysia, The Code of Practice for Special Education serves as a guide and point of reference for all stakeholders on the procedures for the administration of educational services for pupils with special needs within the jurisdiction of the Ministry of Education Malaysia (Special Education Division [BPKhas], 2015). The Code of Practice was initiated in conjunction with Malaysia Education Blueprint 2013-2025 to ensure human capital among pupils with special needs to obtain equal opportunities and quality in the education system. According to the Code of Practice for Special Education, preschool-age for pupils with special needs begins at four years old and continues for an additional two years throughout the education term (BPKhas, 2015).

The *National Standard Based Curriculum for Special Education Preschool* (KSPKPK) *Visual Impairment Category* serves as the primary reference for preschool teachers who teach pupils with visual needs in MOE's accredited national schools. In the *Communication Pillar* of KSPKPK, *Pre-Reading Skills* content standards require pupils to state symbols and embossing that lead to a specific meaning. *Fine Motor Development* is a content standard in the *Pillars of Physical and Aesthetics Development* viz., *Orientation and Mobility (O&M)* which demands pupils to handle a range of items, use tactile senses, and eye and hand coordination in fine motor tasks. Simultaneously, in *Field 2: Braille Code, Tactile Graphics, and Assistive Device,* pre-braille skill is added as a content standard in Year 1 subject i.e., *Basic Skills of Individuals with Visual Impairment* embedded in the *Standards-Based Curriculum for Special Education Primary Schools* (KSSRPK) *Visual Impairment Category*, (BPK, 2018). In general, textbooks are provided to Malaysian pupils in primary and secondary schools. The content about pre-braille skills was conveyed in the textbook with only one page (Mohd Fawzy et al., 2016). Table 2 shows the Comparison of Conventional Instructional Practices of Pre-braille Skills in Malaysia and other nations.

Table 2. Comparison of Conventional Instructional Practices of Pre-braille Skills in Malaysia and other nations

Countries	Module	Curriculum	Assessment	Focus
Sepanyol	●	-	-	● Sensory perception (haptic, tactile, auditory).
India	●	-	-	● Sensory Training and Braille Instruction.
The United States	●	●	●	● Tactile perception and pre-braille skills must be acquired before more complex braille literacy skills are introduced.
Malaysia	-	-	-	● Embedded as content standards in KSSRPK (Revised 2017).

Eventually, pre-braille skills are seen as the foundation for braille literacy development. As a result, Spain, India and the United States developed specialised modules and curricula to teach these vital skills. However, in Malaysia, pre-braille skills are embedded as content standards in KSSRPK and applied implicitly in the relevant pillars in KSPKPK. Pre-braille skills are overlooked in terms of implementation. Malaysian studies on braille literacy frequently relate pupils' inability to learn a braille code to cognitive problems viz., memorization problems; teachers credibility; time constraint; and learning environment (Ahmad Yunus Mohd Noor, 2016). In conclusion, pre-braille skills are expected to get considerable attention, and as a result, improper teachings may lead to fundamental issues of prebraille skills acquisition.

Fundamental Issues of Prebraille Skills Learning in Malaysia

Pre-braille skills provide the foundation for developing more advanced braille literacy skills. As a result, such mechanical skills must be reinforced and taken seriously by all parties (Radojichikj, 2015). Nevertheless, reviewing through the pre-braille skills content in the KSPKPK *Teacher's Guide*book and the textbook viz., *Basic Skills for Individuals with Visual Impairment Year 1* (Mohd Fawzy et al., 2016), the pre-braille activities suggested in the texts have been briefly recommended as the initial process

before the onset of academic literacy skill. According to Ee (2019), the lack of consistent training interventions of motor-sensory development from an early age is a weakening element in tactile perception for the pupil with visual needs in Malaysia. Admittedly, numerous studies published over the past two decades indicate that developing braille literacy should begin with pre-braille skills in which a multisensory approach is used in conjunction with scaffolding to improve finger dexterity and further build tactile reading skills among pupils with visual needs (Chen & Dote-Kwan, 2018; Argyropoulos & Papadimitriou, 2017; Holbrook et al., 2017; Swenson, 2016)

Apart from that, one of the main challenges that pupils with visual needs eventually face is the fingertip's dexterity (Chen &Dote-Kwan, 2018). A study conducted at a Malaysian special education school discovered that pupils with poor finger dexterity are unable to perform a competent tactile reading. As a result, academic performance was adversely affected. The National Reading Panel (2000) stated that efficient tactile reading encompasses reading speed, reading accuracy, and having the correct expression of the text being read. According to Rex et al. (1995), when typical pupils focus their attention on two to ten letters at a time, pupils with visual needs can detect just a single-cell braille code. This may occur when tactile readers are not given appropriate interventions to enhance the dexterity of their fingertips; tactile readers seem to read at a considerably slower pace than visually reading pupils (Khochen, 2011).

Ahmad Yunus Mohd Nor (2016) stated that Malaysian pupils with visual needs were unable to acquire braille literacy in certain subjects was primarily due to weak metacognitive abilities to recall the specific braille code. Furthermore, the local production of braille learning materials was published with a greater emphasis on rote learning viz., memorisation and physical drilling (Mohd Fawzy et al., 2016; Mohd Jais, 2019; Kway, 2008). These conventional practices are contradicted with the instructional practices in other nations that define pre-braille skills as a comprehensive course to be completed before learning G1 and G2 braille codes. Likewise, these conventional practices have indeed resulted in pupils with visual needs being competent at brailling the text but unable to properly detect braille dots during tactile reading (Ee, 2019). Day and McDonnell (2008), on the other hand, stated that memorising braille code was one of the instructional techniques that needed to be changed since it was not supported by empirical data.

Meanwhile, Kao & Mzimela (2019) stated that braille instructors are the most significant independent variable that affects braille literacy learning. A braille instructor in other nations work on an itinerant basis, visiting schools to offer braille learning interventions. Similarly, in Malaysia, this role has been taken over by Braille Code Teachers (GKB) appointed by the MOE (BPKhas, 2015). However, it seems that not all special educational programmes (PPK) in Malaysia are provided with GKB (BPKhas, 2015). The GKB is exclusively allocated in special education schools (SPK) (BPKhas, 2015). As a result of these circumstances, the role of GKB in the Special Education Integration Programs (PPKI) and Inclusive Education Program (PPI) may be occupied by regular academic teachers (GAB) who are inexperienced and incapable of managing braille literacy intervention (Ahmad Yunus Mohd Noor, 2016; Roe, Rogers, Donaldson, Gordon, & Meager, 2014). Likewise, teachers in Taiwan acknowledge a lack of expertise in supporting special education preschool pupils, particularly in early braille literacy. The instructional practices in the conventional classroom were based on the initiative of teachers through self-learning or based on referrals to more experienced senior teachers (Hung, 2008).

In summary, the fundamental issues concerning pre-braille skills learning, have prompted this article to discuss the pivotal role of implementing pre-braille skills during the early stages of braille literacy to facilitate the acquisition of basic braille literacy and hence improve tactile reading among pupils with special needs.

Essential of Pre-Braille Skills to Enhance Basic Braille Literacy

In contrast to the visual sensory modality, touch is a slower modality with less information. Katz (1989) stated that touch operates by integrating different sensory functions and it is likened to the pupil's 'eyes.' Heller & Balesteros (2015) stated that pupils with visual needs i.e., blind rely more on tactile perception to acquire information than peers, who rely more on visual perception. Tactile reading is closely related to the sensitivity of the finger pads. Diverse tactile experiences may increase finger sensitivity and facilitate the acquisition of braille literacy (Wong, Gnanakumaran, & Goldreich, 2011).

Revesz (1950) compared tactile perception and visual perception to determine the difference between visual and tactile recognition of an object. This outcome is essential for teachers, since tactile readers may derive different information from the stimuli provided. Subsequently, the process of language acquisition for pupils with visual needs is more complex and challenging rather than their typical peers (Azizah Jaafar, et al., 2015). Figure 1 illustrates the comparison of tactile perception and visual perception which was adapted from McLinden & McCall (2002).

Figure 1: Comparison of tactile perception and visual perception
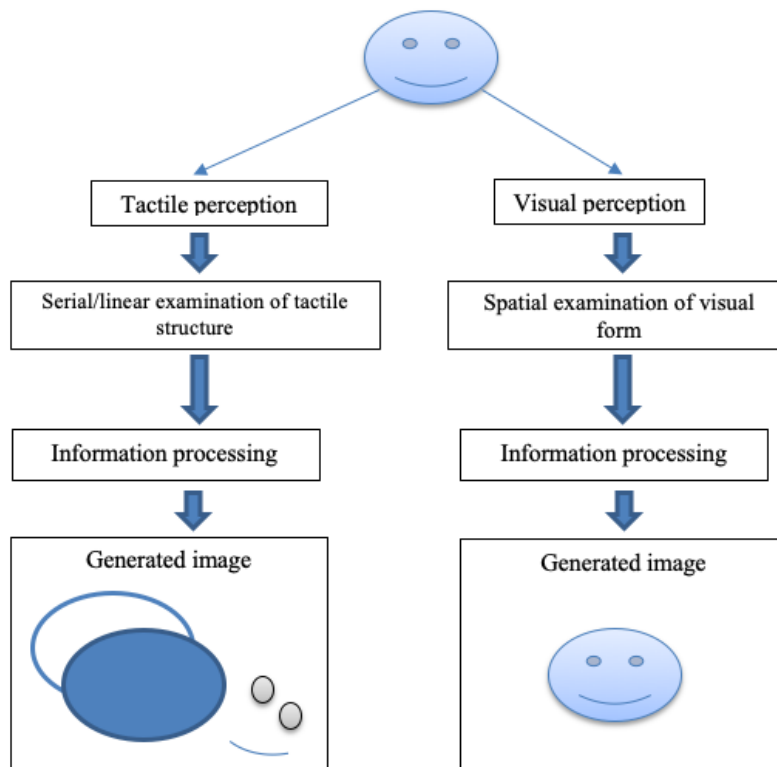
The study discovered that identifying an object through haptic touch is a unique and challenging procedure since it requires manual analysis to determine the physical connection between the object's features. Therefore, the images produced in the brain as a result of various perceptions are distinct.

Ely & Ostrosky (2018) stated the necessity for pre-braille skills interventions to solve tactile reading problems among pupils with visual needs. Interventions in the form of enhancing finger dexterity should be implemented gradually to allow pupils with visual needs to detect the position of braille dots before being exposed to the learning of G1 and G2 braille codes. Thus, visually impaired children must be trained to engage their tactile perceptions effectively (Mohd Zuri Ghani, 2014). In this context, pre-braille skills embrace elements of motor-sensory training beginning with the palms, thumbs, and fingers, bilateral hand use, clockwise and counterclockwise movements, motor strength in the hands and fingers, light touch, and tracking, as well as tactile perception and braille dot detection skills (Bishop, 1991; Brown & Palmer, 2013; Mangold, 1994). According to Fadjectic (2011), pre-braille skills serve as a foundation for the development of further braille literacy skills.

Pre-braille skills must be incorporated with a more meaningful literacy experience (Swenson, 2016) i.e. by integrating pre-braille skills with language literacy activities based on a whole-language approach (Ashton-Warner, 1963). In addition, Holbrook et al. (2017), Baker et al. (1994) and Stratton, & Wright (1991) stated that early braille literacy learning for pupils with visual needs should begin with braille dot detection exercises followed by the application of haptic touch and eventually accomplished with language literacy activities i.e., letter recognition and letter sounds to pﬡoduce the basic reading skills (Mahzan Arshad, 2019). A similar statement was also featured by Toussaint & Tiger (2010) and

noted that the difficulty to master the basic skills that will affect the reading braille text more complex and include produce and combine sounds of the letters.

Pre-braille skills interventions should be implemented consistently for at least half an hour to one hour a day and practiced collaboratively between all parties, especially therapists, parents or guardians, and teachers (Holbrook & Koenig, 2000). Additionally, Fanshawe (2017) added pre-braille skills help pupils in developing self-reliance and confidence while engaging in an inclusive education together with their typical peers.

In essence, 27 research studies had been conducted in the early 1960s with the "First Grade Studies funded by the United States Office of Education to determine the most effective method of teaching beginning braille. In short, these studies concluded braille that (1) there is no one-size-fits-all method for teaching early braille reading skills and (2) the classroom teacher is the most important variable in determining effective reading instruction (Rex, et al., 1994).

DISCUSSION

The learning process can be performed only when pupils have acquired adequate relevant experience to obtain new knowledge. Pre-braille skills are enriched with the exploration of the available senses and to be done by actively engaging pupils via multi-sensory approach. Pre-braille skills elements include interventions to improve finger dexterity starting with the palms, thumbs, and fingertips, bilateral hand use, clockwise and counter clockwise movements, hand and finger motor strength, light touch, and tracking, as well as tactile perception and braille dot detection skills which are implemented in step-by-step basis viz., from basic to complex and from concrete to abstract (Gagne, 1970). The interventions are meticulously sequenced into task analysis in order to get a comprehensive understanding of how pupils complete their tasks and accomplish the learning objectives. In this case, consistent drillings may also help pupils to remember previously acquired concepts by constructing meaningful context.

Teachers play an important role as facilitators in helping pupils in learning and using effective approaches throughout the implementation process of pre-braille skills. According to social constructivist development theory, learning and development are cooperative social engagements that need the collaboration of individuals with expertise in a particular field of knowledge. Teachers are important in this context because they establish an effective learning environment and optimize pupils' performance. To create developmentally appropriate learning objectives, each pupil's zone of proximal (ZPD) must be identified (Swenson, 2016). In the meantime, the learning process of pre-braille skills is dynamic, and pupils acquire new knowledge by linking to their prior knowledge.

Behavioral learning theory is often used in special education research studies (Papazoglou, 2020). The applied behavioural analysis (ABA) is a systematic and consistent teaching technique which divides complicated tasks into smaller units (Kearney, 2015). Consequently, pre-braille skills teaching process has a systematic framework that includes successive elements, components, and units. Pupils get hands-on instruction from the arm to the palm of their hand and all the way to the tips of their fingers. Each pre-braille skill component is assessed using validated formative assessment, and instructors will offer guidance to help pupils to improve their performance effectively.

On the other hand, the study about the dimension of early braille literacy skills viz., pre-braille skills in Malaysia is very limited. Table 3 shows the literature review matrix which summarises studies on pupils with visual needs published between 2012 and 2019 in the journal databases of three Malaysian universities, notably UKM, UPSI, and USM. These institutions were selected because they offer Special Education Programmes for both undergraduate and postgraduate levels.

Table 3: Studies on pupils with visual needs between 2012 and 2019

Authors	Constructs						
	EBLM	BL	IC	ADT	CP	TE	TP
Ee, 2019	●	●		●			
Kway et al., 2019		●		●			
Mai Shihah Abdullah, 2019	●			●			
Hammad Mohd Saidi et al., 2018			●		●		
Aizan Sofia Amin & Badri, 2018			●			●	
Norliza Mohammad Fadzil et al., 2017				●			
Nurul Asmak Liana Bakar, 2017			●				
Ahmad Yunus Mohd Nor, 2016		●	●				
Fatimah Nazihah Mohd Nazir, et al., 2016		●					
Abdul Rashid Mohamed et al., 2015		●				●	
Alya Qasdina Ng Ai Lee & Kway, 2015		●					●
Manisah Mohd. Ali & Noorfaziha Hassan, 2014							●
Kway, 2012		●		●			●

Note: EBL= early braille literacy/motor skills, BL= braille literacy, IC= issues and challenges, TE= tertiary education, ADT=assistive devices/ technologies, CP= career path, TP= teachers' participation

Comparatively, the majority of research focuses on the acquisition of braille literacy for functional purposes, the issues and challenges, the comparison of conventional and adapted methods of assistive devices or technology, career paths, tertiary education, and, finally, teachers' perceptions of pupils with visual needs across all disciplines of knowledge. Although the concept of pre-braille skills has received inadequate attention from local researchers, the problem of tactile reading among pupils with visual needs should be addressed seriously by all parties, as the importance of pre-braille skills has been well described in this paper.

CONCLUSION

This article will make a valuable contribution for all stakeholders, especially preschool teachers and teachers of braille code who teach early braille literacy skills. This article is intended to make teachers aware of the significance of pre-braille skills. Pre-braille skills help develop fundamental braille literacy and therefore improve tactile reading. The researcher hopes the stakeholders, particularly BPKhas, BPK, Educational Resources, and Technology Division (BSTP), will utilise the conclusions reached to apply pre-braille skills consistently and systematically in the KSPKPK and KSSRPK. Subsequently, the researchers urged parents or guardians to continue teaching their children at home in enhancing their metacognition concerning newly acquired early braille literacy skills. This research calls into question teachers' long-held belief that the only accurate way is for pupils to memorise braille alphabet letters. Finally, this paper is very significant and contributes to the discipline of knowledge studied. Currently, research on early braille literacy is very limited and has garnered less attention from Malaysian scholars. In a nutshell, this paper offers new insights to researchers who want to further deepen the scope of the study in the field of early braille reading especially pupils with visual needs. Teachers in Malaysia need a systematic module to teach pre-braille skills holistically, as other countries accomplish.

REFERENCES

Abiyah, S. S. (2020). *Training Module on Visual Impairment Under SSA.* Retrieved from Department of School Education & Literacy Ministry of Education Government of India

Ahmad Yunus Mohd Noor. (2016). Cabaran dalam pengajaran dan pembelajaran Al- Qur'an braille di Kompleks Malaysian Association for the blind (MAB). *Islamiyyat : Jurnal Antarabangsa Pengajian Islam, 38*(1), 15-24.

Aizan Sofia Amin, & Badri, R. N. (2018). Issues and Challenges of Students with Visual Impairment at Higher Learning Institution. *Jurnal Psikologi Malaysia 32 (3) ISSN-2289-8174*, 131-145.

Azizah Jaafar, Lutfun Nahar, Eistiak Ahamed, & Kaish. (2015). Design of a Braille Learning Application for Visually Impaired Students in Bangladesh. *Assistive Technology: The Official Journal of RESNA, 27:3,* 172-182. https://familyconnect.org/blog/uncatagorized/from-toddler-to-teen-braulle-success/

Bahagian Pembangunan Kurikulum. (2018). *Kurikulum Standard Prasekolah Ketidakupayaan Penglihatan (Semakan 2017): Dokumen Standard Kurikulum dan Pentaksiran.* Putrajaya: Bahagian Pembangunan Kurikulum, KPM.

Bahagian Pembangungan Kurikulum. (2018). *Dokumen Standard Kurikulum dan Pentaksiran: Kurikulum Standard Prasekolah Kebangsaan Ketidakupayaan Penglihatan Semakan 2017.* Putrajaya, Putrajaya, Malaysia: KPM.

Bahagian Pendidikan Khas. (2015). *Kod Amalan Pendidikan Khas.* Putrajaya: Kementerian Pendidikan Malaysia.

Bishop, V. E. (1996). *Preschool Children with Visual Impairments.* Retrieved from Texas School for The Blind and Visually Impaired: https://www.tsbvi.edu/curriculum-a-publications/3/1069-preschool-children-with-visual-impairments-by-virginia-bishop

Brown, C. R., & Palmer, P. (2013, November 22). *Pre-Braille.* Paths to literacy for students who are blind or visually impaired.

Chen, D., & Dote-Kwan, J. (2018, September-October). Promoting Emergent literacy Skills in Toddlers with Visual Impairments. *Journal of Visual Impairment and Blindness*, 542-550.

Day, J. N., & Mcdonnell, A. P. (2008). Teaching Beginning Braille Reading Using an Alphabet or Uncontracted Braille Approach. *Springer Science and Business Media*, 253-277.

Ee, N. S. (2019). Sensitiviti Pengamatan Sentuhan Terhadap Ketepatan Kemahiran Membaca Kod Braille Murid Ketidakupayaan Penglihatan. *Responding to the Challenges of Globalisation* (pp. 160-167). Selangor: Kuala Lumpur International Communication, Education, Language & Social Science Conference

Ely, M. L., & Ostrosky, M. M. (2018). Applying the Foundational Concepts from Early Intervention to Services Provided to Young Children with Visual Impairments: A Literature Review. *Journal of Visual Impairment & Blindness, May-June 2018*, 225-238.

Fajdetic, A. (2011). Pre-reading of visually impaired children (tactile and visual experience). In M. (. Anca, *sycho-pedagogical evaluation and intervention. Integrative Perspectives, Special Psychopedagogy Studies.* (pp. 176-192). Cluj-Napoca: Presa Universitara Publishing House.

Fanshawe, M. (2017, Jan). Lighting the Way Through the Home: Development of Early Braille Literacy. *Melissa Fanshawe SPEVI Presentation*. The University of Queensland.

Fatimah Nazihah Mohd Nazir, Latifah Abdul Majid, & Tengku Intan Zarina Tengku Puji. (2016). Ciri-ciri penulisan Jawi Braille bagi Murid Berkeperluan Khas Masalah Penglihatan di Malaysia. . *Journal Al-Turath ; Journal of Al-Quran and Al-Sunnah, 1 (1). ISSN 0128-0899*, 44-56.

Floyd, J. (2019, January 22). *Teaching Basic Concepts and prebraille skills.* Retrieved from Paths to Literacy for Students who are Blind or Visually impaired.

Hammad Mohd Saidi, Aizan Sofia Amin, Nur Saadah Mohamad Aun, Mohd Nasir Selamat, & Mohd Iqbal Haqim Mohd Nor. (2018). Employment Issues and Challenges of Persons with Visual Impairment in Malaysia. *Jurnal Psikologi Malaysia 32 (4) (2018): 55-65 ISSN-2289-8174*, 55-65.

Holbrook, M., McCarthy, T., & Kamei-Hannan, C. (2017). *Foundations of Education Third Edition Vol 1: History and Theory of Teaching Children and Youths with Visual Impairments.* New York: AFBPress.

Hung, H. Y. (2008). Teachers' Perspective about Braille Literacy in Taiwan. *Dissertation*. USA: The Ohio State University.

Juppri Bacotang, Zainiah Mohamed Isa, & Mazlina Che Mustafa. (2016). Aplikasi Model ADDIE dalam Pembangunan Modul Literasi Awal (Modul LIT-A) untuk Awal Kanak-Kanak. Jurnal Bitara Edisi Khas, 1-10.

Kao, M. A., & Mzimela, P. J. (2019). They are visually impaired, not blind … teach them!': Grade R in-service teachers' knowledge of teaching pre-reading skills to visually impaired learners. *South African Journal of Childhood Education*, 2223-7674.

Katz, D. (1989). Der Aufbau der Tastwelt. Zeitschrift für Psychologie, 11. In L. Kruger, *The World of Touch.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Kearney, A. (2015). *Understanding Applied Behavior Analysis: An Introduction to ABA for parents, teachers,*

and other professionals (2nd ed). London: Jessica Kingsley.

Khochen, M. (2011). Reading Through Touch, Importance and Challenges. *World Congress Braille 21, 28-30 Sep 2011.* Leipzig, Germany: German Central Library for the Blind (DZB).

Koenig, A. J., & Holbrook, M. C. (2002). Literacy Focus. In R. L. Pogrund, & D. L. Fazzi, *Early Focus: Working with Young Children Who Are Blind or Visually Impaired and Their Families, 2nd Edition* (pp. 154-187). New York: AFB Press.

Kway, E. H., Nurbieta Abdul Aziz, Norani Mohd Salleh, & Rosadah Abdul Majid. (2019). THE A-J+3+6 METHOD OF BRAILLE WRITING USING THE SLATE AND STYLUS. *Jurnal Pendidikan Bitara UPSI, 6(1)*, 91 - 98 .

Mahzan Arshad. (2019). *Pendidikan Literasi Awal Kanak-Kanak: Teori dan Amali.* Tanjong Malim, Perak: Universiti Pendidikan Sultan Idris.

Mai Shihah Abdullah. ((2019).). *Calculator To Estimate Motor Skill Intervention Time (Cemsit) Among Persons With Albinism In Malaysia.* Retrieved from Retrieved from https://ejournal.upsi.edu.my/index.php/JPB/article/

Martiniello, & Wittich. (2020). The association between tactile, motor and cognitive capacities and braille reading performance: a scoping review of primary evidence to advance research on braille and aging. *Disability and Rehabilitation*, 1-22.

McLinden, M., & McCall, S. (2002). *Learning Through Touch.* London: David Fulton Publishers.

Mohd Fawzy, Suzana Aziz, & Mohamad Saifuddin. (2016). *Kemahiran Asas Individu Ketidakupayaan Penglihatan Tahun 1.* Kuala Lumpur: Dewan Bahasa dan Pustaka.

Mohd Jais Ismail, Suzana Aziz, & Alya Qasdina Ng Ai Lee. (2019). *Kemahiran Asas Individu Ketidakupayaan Penglihatan Tahun 4.* Kuala Lumpur: Dewan Bahasa dan Pustaka.

Mohd Zuri Ghani. (2014). *Pendidikan Kanak-kanak berkeperluan khas.* Tanjong Malim: UPSI.

National Council for The Blind Malaysia. (2020). *Kod Braille Bahasa Melayu Pindaan 2020.* Kuala Lumpur: National Council for The Blind Malaysia.

National Organisation of Spanish Blind Persons (ONCE). (2020, February 19). *Braitico: Literacy and Learning of the Braille Reading and Writing System.*

National Reading Panel (NRP). (2000). *Teaching Children to Read: An Evidence-Based Assessment of the scientific research literature on reading and its implications for reading instruction.* Washington D.C: National Institute of Child Health and Human Development (NICHD)

Norliza Mohammad Fadzil, Nursyuhada Jamaludin, & Zainora Mohammed. ((2017)). Latihan penggunaan alat bantu penglihatan terhad dalam kalangan murid ketidakupayaan penglihatan oleh guru pendidikan khas. . *Jurnal Sains Kesihatan Malaysia, 15 (2(SI))*, 109-114.

Nurul Asmak Liana Bakar. (2017). Cabaran Bagi Golongan Oku Penglihatan Dalam Melaksanakan Ibadah Solat.. *Al Hikmah, Jilid 9 ISSN 1985-6822 2017M No. 2 1439* , 3-15.

Papadimitriou, V., & Argyropoulos, V. (2017). The Effect of Hand Movements on Braille Reading Accuracy. *International Journal of Education Research*, 43-50.

Papazoglou, E. A. (2020). *Don't Wait and See!: A Neuropsychologist's Guide to Helping Children who are Developing Differently.* UK: Oxford University Press,

Radojichikj, D. D. (2015). Students with Visual Impairments: Braille Reading Rate. *International Journal of Cognitive Research in Science, Engineering and Education Vol. 3, Issue. 1,*, 1-6. & Putrajaya International Conference on Sports Sciences, Fitness and Health.

Revesz, G. (1933). Psychology and Art for the Blind. Dalam D. F. desTastsinnes, *The Hague.* New York: Longmans, Green, and Co.

Rex, E. J., Koenig, A. J., Wormsley, D. P., & Baker, R. L. (1994). *Foundations of Braille Literacy.* USA: AFB Press.

Scheller, M., Proulx, M. J., De Haan, M., Dahlmann-Noor, A., & & Petrini, K. (2019). *Late- but not early-onset blindness impairs the development of audio-haptic multisensory integration.* Cold Spring Harbor: Cold Spring Harbor Laboratory Press.

Sewell, D. (2020, December 01). Pre-Braille Evaluation Form TSBVI. *Prebraille Assessment*. Texas, America: Texas School For The Blind and Visually Impaired.

Stanfa, K., & Johnson, N. (2015). Improving Braille Reading Fluency: The Bridge to Comprehension. *Journal of Blindness Innovation and Research*, 5-83.

Swenson, A. (2016). *Beginning with Braille: Firsthand experiences with a balanced approach to literacy.* New York: AFB Press.

Toussaint, K. A., & Tiger, J. H. (2010). Teaching Early Braille Literacy Skills within a Stimulus Equivalence Paradigm to Children with Degenerative Visual Impairments. *Journal of Applied Behavior Analysis*, 181-194.

Wong, M., Gnanakumaran, V., & Goldreich, D. (2011). Tactile spatial acuity enhancement in blindness: evidence for experience-dependent mechanisms. *J. Neurosci. 31,* 7028–7037.