

Dyslexic Children: The Need for Parents Awareness

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Abstract

Dyslexia is a life-term disability which can affect both children and adults. Studies show that dyslexic children face many difficulties in their educational interactions and social surroundings. Also, they suffer from frustrations and low self-esteem because of the lack of achievements, particularly in academics, which may affect their long-term life opportunities. Parents' awareness about dyslexia and its impact on their children is imperative in ensuring sustainable development of the children. Thus, parents need to be made aware of their children conditions as early as possible so that appropriate intervention could be taken, for the wellbeing of both parties. In this paper, we examined the awareness level of parents with dyslexic children, in Malaysian context. The results indicate the need to promote parents awareness and to provide a support system in dealing with children with dyslexia.

Keywords: Dyslexia, Parents Awareness, Dyslexic Children, Supportive Model

1. Introduction

Dyslexia referred to as a hidden disability, which does not have physically visible signs that can be detected (Soriano-Ferrer & Echegaray-Bengoa, 2014). It's symptoms can be found in both children and adults, but it is more likely to be detected in the childhood (Leekam, Nieto, Libby, Wing, & Gould, 2007) because they are less likely to hide their difficulties and differences. The most common symptoms for a dyslexic child are the difficulties in learning, speaking, as well as difficulties with phonological processing like the manipulation of sounds and spellings. In addition, a dyslexic child may experience poor performance in phonological memory and vocabulary which will result in poor social skills and short concentration span (Campbell & Butterworth, 1985). Therefore, most dyslexic children are facing with many difficulties in their educational interactions and social surroundings (Dyson, 1997). These children may have demonstrated an exceptional intuition, high visualisation potential, originality, creativity and a strong global comprehension ability and initiative could the disability be identified and treated from the early stages.

Most of the Malaysian young adults that had dyslexia during their childhood managed to overcome their difficulties (Hazawawi & Hisham, 2014a). However, their childhood was filled with shame and discriminations. Also, they were usually misunderstood as lazy and disobedience due to their difficulties in word recognition and poor spelling ability (Hazawawi & Hisham, 2014b).

While there exist awareness campaign for the dyslexic children in Malaysia (Hazawawi & Hisham, 2014a), the awareness regarding its impacts on young adults is insufficient. Additionally, most parents do not have sufficient knowledge of dyslexia and its symptoms.

This leads to the difficulties of the dyslexic children of not receiving specialised treatments such as attending extra classes provided by special educators, thus hindering them from having an equal opportunity for a good quality of education. Therefore, the sooner the dyslexic children are identified and diagnosed, the higher the chances of getting a proper treatment, such as a proper learning education (J. Hamid, 2012).

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Another critical concern is that most clinics and private centres do not provide rehabilitation services to dyslexic children (Tan, 2016), apart from the limited number of the government health centres to support large number of Malaysia growing population. In this paper, we examined the awareness level of Malaysian parents with dyslexic children. The remaining sections of this paper are organised as follows. A detailed description of dyslexia and the impact of parent awareness is presented in section 2. Section 3 provides descriptions and comparisons between some existing systems for identifying and diagnosing dyslexic children. A brief conclusion and suggested future work are then presented in section 4.

2. Dyslexia and Parent Awareness

2.1 Definition of Dyslexia

The term 'Dyslexia' was first coined by Berlin, a German doctor in 1887 (Hazawawi & Hisham, 2014a), to describe word blindness that came from two Greek words 'Dys' defined as difficulty and 'Lexia' defined as words (Alexander-Passe, 2015).

Dyslexia is a reading and learning disability caused as a result of a defect in the brain processing of graphic symbols, which alters the way brain processes written materials. It is associated with the aberrant structure and function of the left hemisphere brain that is involved in the reading and language networks (Peterson & Pennington, 2015). Children with this disability usually have difficulties in word recognition, spelling, decoding and reading comprehension (Vellutino, Fletcher, Snowling, & Scanlon, 2004).

Furthermore, according to (Nergård-Nilssen & Hulme, 2014), dyslexia is a neurological and often genetic condition that is passed from parents to their children and can also be caused by non-linguistic factors such as deficiency of cognitive resources that can block the cognitive process from reaching a maximum level and causing comprehension difficulties (Kornev & Balčiūnienė, 2014).

Differently, Alias & Dahlan (2015) considered dyslexia to be a subtype of Specific Learning Disability (SLD) that is characterised by difficulties in recognising words accurately, spelling, reading, writings and decoding abilities, which affects both children and adults (Skiada, Soroniati, Gardeli, & Zissis, 2014).

Meanwhile, the Malaysia National Dyslexia programme panel defined 'Dyslexia' or 'Disleksia' in Bahasa Malaysia as children who have a general level of performance like other children but with significant difficulties in word reading and spelling. According to the Malaysia Ministry of Education, about 290,000 students had Specific Learning Disabilities (SLD) in the year 2001, and the number is still increasing (Yazid & Yin, 2015).

2.2 Characteristics of Dyslexic Children

According to Subramaniam (2008), some of the common traits found in most of the dyslexic children are the difficulties in spelling, reading, writing, doing a simple calculation, and in differentiating words in reverse such as was-saw or on-no. Children with dyslexia tend to read quietly and have poor handwriting (Tops, Callens, Van Cauwenberghe, Adriaens, & Brysbaert, 2013). Other symptoms include; difficulties in learning, speaking disabilities (Peterson & Pennington, 2015), difficulties with phonological processing like the manipulation of sounds and spellings (Skiada et al., 2014), reduced performance in phonological memory and vocabulary (Moll et al., 2016).

Furthermore, children with dyslexia are characterised by difficulties in visual object recognition and vision problem with light and concentration (Salih, Abdul-Kahar, Zahari, Khalid, & Rahim, 2015). In addition, dyslexic children may experience mathematical difficulties such as sequencing and directional confusion, and the inability to perform mental calculations (Chinn & Ashcroft, 2006). These difficulties usually made dyslexic children to have poor social skills and short concentration span (Parhiala et al., 2015), which resulted in difficulties in their educational interactions and social surroundings. Moreover, dyslexic children can suffer from frustrations and low self-esteem because of the lack of achievements, particularly in academics (S. S. A. Hamid, Admodisastro, & Ghani, 2015), and which may affect their long-term life opportunities (Hazawawi & Hisham, 2014a).

The reason why dyslexic children have difficulties in word recognition, poor spelling and decoding abilities is as a result of deficits in the phonological component of language that is connected to the cognitive abilities (Soriano-Ferrer & Echeagaray-Bengoa, 2014). The writing difficulties are a result of high neural activities that are found on the right brain hemisphere compared to the left-brain hemisphere, which suggests the neurobiological compensation pathway in the right brain hemisphere during reading and writing (Mohamad et al., 2015).

2.3 Types of Dyslexia

According to Alsobhi, Khan, & Rahanu (2015), there are three different types of dyslexia, namely; visio-spatial, speech sound, and central or surface dyslexia. Each individual may experience unique difficulties regarding literacy, numeracy, and memory (Baker, 2006).

- a. **Visio-spatial:** Dyslexic children that are visio-spatial are more likely to understand the ideas through their feelings and mental images compared to sounds or words (Yeo, 2008). This is due to the fact that children with this type of dyslexia find it hard to develop an adequate understanding of words and symbols, making the standard educational settings a disadvantage to them. This set of children prefer sensory over auditory learning experiences. Hence the majority of the assistive technologies aim to aid this type of dyslexic children with an emphasis on translating visual messages into sensory experiences such as text-to-speech readers.
- b. **Speech-sound:** Children with speech-sound dyslexia tend to stutter in a stressful situation and may mispronounce multi-syllable words when speaking (Moreland, 2015). Therefore, they usually avoid any task that involves explaining or discussing a topic. These children tend to work more efficiently in isolation or one-to-one setting (Alsobhi et al., 2015). Speech-sound dyslexia is also called peripheral or letter position dyslexia (Whitney & Cornelissen, 2005). According to Friedmann & Coltheart (2016), children with peripheral or letter position dyslexia can identify letters correctly but unable to encode the order of the letters within the word. Its primary symptom is the migrations of letters within words (Kohnen, Nickels, Castles, Friedmann, & McArthur, 2012), for examples, words like ‘cloud’ may be mispronounced as ‘could’ and ‘dairy’ may be mispronounced as ‘diary’. Another difficulty faced by children with this kind of dyslexia is the omission of double letters (Selikowitz, 2012). For examples, they may pronounce ‘drivers’ as ‘divers’ and ‘baby’ as ‘bay’.
- c. **Central or surface:** Central dyslexia is a reading difficulty that occurs in stages of the lexical and sublexical routes. Surface dyslexia is a part of central dyslexia, and children with surface dyslexia usually read aloud through grapheme-to-phoneme conversations (Fawcett & Nicolson, 2017). These difficulties can cause several problems in reading such as regularisation errors in reading aloud like reading irregular words such as ‘stomach’ or ‘comb’ that have silent letters.

2.4 Parents Challenges and Treatments

Dyslexia is a life-long disability, and its symptoms vary from person to person, and can also vary at a different stage in a person’s life, but with appropriate intervention, it can produce a significant result (Skiada et al., 2014). The most important treatment for dyslexic children is the parents’ awareness about dyslexia and its impact on their children (Elbro & Petersen, 2004). Previous studies show that parents who are unaware of dyslexia often show negative feelings such as frustration, denial, and stress when their children do not meet their expectations (Ozonoff, Dawson, & McPartland, 2002). Furthermore, these parents tend to experience anxiety and low self-esteem regarding their children future life and academic performance. These behaviours do not only affect the children, but it also gives a negative impact on the parents’ life; for instance, excessive fatigue, lack of sleep and stress. Thus, parents need to be made aware of their children conditions as early as possible so that appropriate intervention could be taken, for the wellbeing of both parties. According to Alias & Dahlan (2015), parents that are aware of dyslexia experience two significant challenges in raising a dyslexic child, namely; ‘Difficult yet enduring’ and ‘Self-perseverance’. Each of the challenges consists of sub-challenges that parents usually faced in dealing with dyslexic children. Table 1 shows the category of the different challenges faced by the parents in raising dyslexic children.

Table 1: Category of the different challenges faced by the parents in raising dyslexic children

Superordinate Themes	Subthemes
“Difficult yet enduring.”	Time constraints Lack of knowledge Increased financial demand School issues
“Self-perseverance”	Negative feeling towards child’s condition High demand in the role as a mother Changes in life pattern

The most important thing to parents with dyslexic children is to give their child sufficient time while exercising patience in teaching them because they require more time and assistance. There is also need to send them for extra classes provided by special educators to learn more efficiently. Furthermore, the parents need to keep supporting and encouraging their children rather than scolding or pushing them, considering their nature in giving up, getting frustrated and becoming bored more easily. On the other hand, the process of teaching this type of children should include visual and storytelling aids to help in improving their studying abilities, as well as improving their attention spans (Yazid & Yin, 2015).

2.5 Effect of Social Media on Parents' Awareness

According to Merriam-Webster online dictionary³, social media is a form of electronic communication via an online community to share information, ideas, personal messages and other contents ("Merriam-Webster," 2004). Thus, social media is a great platform that can be used to increase parents' awareness regarding dyslexia. This can be achieved by getting a deeper understanding of the disabilities based on the shared information by those who have dyslexic children (Paquette, 2013).

Additionally, social media can improve reach and promote organisational campaigns and activities (Schein, Wilson, & Keelan, 2011). For instance, Nebraska Governor has proclaimed the month of October to be a dyslexia awareness month (Sanford, 2006). This proclamation aimed to encourage people to learn more about dyslexia, offer support to those affected by the disorder and recognise the efforts of the community (O'Neal, 2007).

Moreover, social media has become a tool for connecting health organisations with the public (Hawn, 2009). It helps the public to identify the health professionals and seek advice from other people on how to treat the disorder. In addition, social media connects health community with younger people, ethnic minorities, and lower socioeconomic groups by providing valuable social and emotional supports (Anand, Gupta, & Kwatra, 2013).

Social media such as Facebook, Twitter, and blog sites increase the awareness of the public or parents regarding the disorder by widening the access to tailored resources that may not be readily accessible via the traditional methods (Moorhead et al., 2013). Parents can also widen their access to information from various population groups regardless of age, education, race or ethnicity for a peer-to-peer discussion regarding methods and appropriate treatments (Anand et al., 2013).

3. Existing Support Systems

3.1 Web-based Screening System (e-ISD)

According to Malaysian Ministry of Education, Malaysian dyslexic children are diagnosed using two methods; a screening test and a checklist to identify the potential disabilities based on the children's weaknesses in academic achievements. Other methods include intelligence test (IQ), reading test and screening test. In 2004, the Special Education Department (SED) introduced Dyslexia Instrument Checklist which is a tool for screening dyslexic children. Unfortunately, the method is time-consuming and prone to errors (J. Hamid, 2012). This is because the results of the screening test are calculated manually which has a high risk of human errors. Therefore, a web-based screening system (e-ISD) for dyslexia has been proposed to replace the manual-based process with the primary aim of screening and identifying children with the potential dyslexia problem. According to Hamid (2012), the system is designed with the principles of decision support system (DSS), Analytical Hierarchy Process (AHP) model and Human-Computer Interface model based on Abowd and Beale Interaction model, which helps in managing the decision-making process. Figure 1 shows the e-ISD system conceptual framework.

³<https://www.merriam-webster.com/>

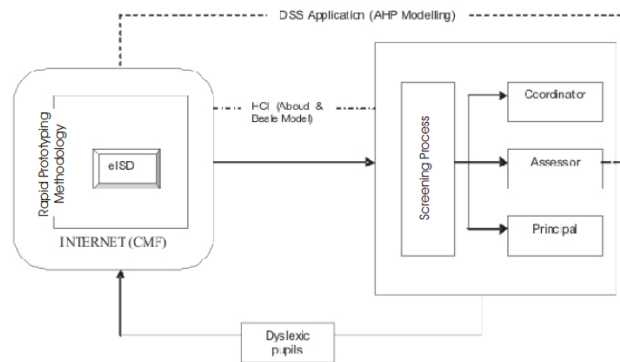


Figure 1: e-ISD System Conceptual Framework.

The AHP model helps the system in ranking and prioritising the decisions suitable for the children based on their distinct criteria. The system uses both DSS and AHP approaches to screen the dyslexic children based on three main criteria for computing the probability of having dyslexia. Also, the system incorporates Human-Computer Interaction (HCI) based on Abowd and Beale interaction model that consists of four essential components which are a user, input, system, and output as shown in Figure 2.

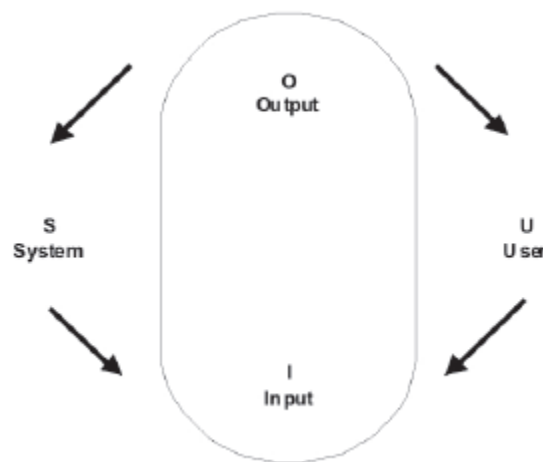


Figure 2: Abowd and Beale's Interaction model for e-ISD System

The main advantage of the e-ISD system is it is realistic. The e-ISD system automatically generates the probability of the children with dyslexia, and accurately document the results into a computerised system, and secure the data in a digital format (Hamid, 2012). Unfortunately, the e-ISD system is still under research, and the system is still in its prototype version. Moreover, the system can only diagnoses the children by using only a single factor which is the academic weakness (Hamid, 2012) and does not include some important factors such as the child’s concentration, environmental factors or background factors into its calculation which could affect the test performances.

3.2 Perceptron Based Learning Disability Detector (PLEDDOR)

Learning disabilities (LD) are divided into three types which are reading disabilities called *dyslexia* (Vellutino et al., 2004), writing disabilities called *dysgraphia* (Richards et al., 2015), and disabilities to do basic mathematics called *dyscalculia* (Shalev, 2004). Artificial Neural Network (ANN) is considered to be a suitable model for diagnosing learning disabilities (Amato et al., 2013), and which has been used by (Jain, Manghirmalani, Dongardive, & Abraham, 2009) to introduce a system called Perceptron based Learning Disability Detector (PLEDDOR). The system consists of two layers; input and output, in which the output is in binary, and outputs ‘1’ if the child is normal and ‘0’ otherwise. Figure 3 shows the general model of PLEDDOR.

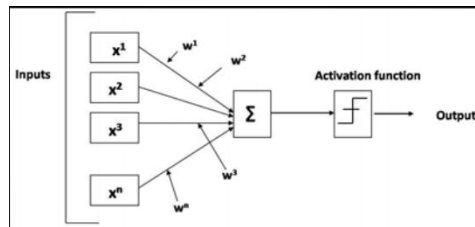


Figure 3: PLEDDOR General Model

According to (Jain et al., 2009), the most important part of the PLEDDOR is the factor that identified the LD. The system is categorised into three sections; essay, comprehension and spelling test for dysgraphia; reading and perception test for dyslexia; and basic computations, time and word problems tests for dyscalculia as shown in Figure 4.

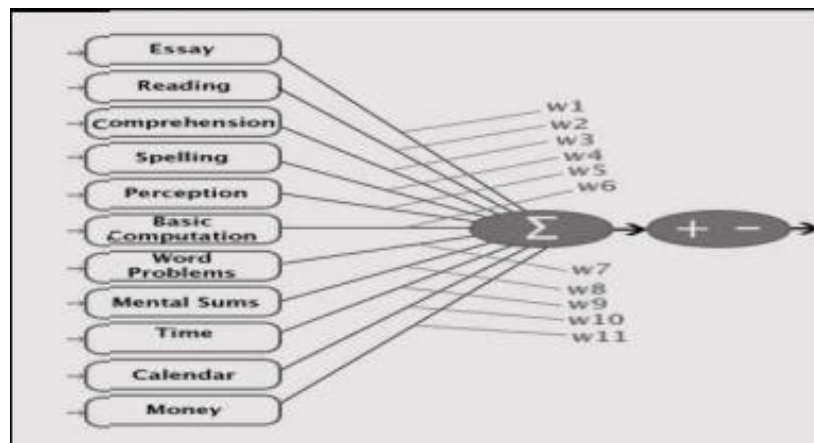


Figure 4: PLEDDOR Tests

The PLEDDOR method is simple, straightforward and easy to duplicate, but provide a general result such as “Normal” or “Learning Disability” rather than showing a more detailed type of LDs.

3.3 Lucid Adult Dyslexia Screening (LADS)

Lucid Adult Dyslexia Screening (LADS) is a computerised test designed based on the core cognitive deficits that are more sensitive to dyslexia (Singleton & Horne, 2002). It comprises three assessment modules; *word recognition* that involves recognition of real words from non-word, *word construction* that encodes non-words from syllables, and *working memory and reasoning* as shown in Figure 5.

LADS Test ↓	Cognitive skills being assessed		
	Phonological processing	Lexical access	Working Memory
Word Recognition	++	+++	+
Word Construction	+++		++
Working Memory			+++

Figure 5: LADS three basic cognitive tests

Both the word recognition and word construction use the Computerized Adaptive Sequential Testing (CAST) technique. This technique uses a fractionation algorithm that assigns a person to a specific category based on his/her performance, as shown in Figure 6 (Singleton & Horne, 2002).

No indications of dyslexia			Weak indications of dyslexia			Strong indications of dyslexia		
1	2	3	4	5	6	7	8	9

Figure 6: Fractionation algorithm indicator

The higher the score of the CAST, the higher the probability of dyslexia. However, before assigning the score into a specific category, the fractionation algorithm follows specific decision rules which determine whether the person falls into the specific categories or there is need to increase the level of difficulty before reapplying the decision rules (Singleton & Horne, 2002). Thus, the individual dyslexia-sensitive tests in LADS have high accuracy to differentiate between a dyslexic and non-dyslexic person, and is free of gender bias.

3.4 Comparisons and Limitations of the Existing Systems

In this section, we compared the three systems discussed in the previous section. The comparison is based on the aim, method or technique used in the implementation, factors considered in the calculation and analysis, and the results produced by each system. Table 2 presents this comparison.

Table 2: The comparison between Web-based Screening System (e-ISD), Perceptron based Learning Disability Detector (PLEDDOR), and Lucid Adult Dyslexia Screening (LADS)

	Web-based Screening System (e-ISD)	Perceptron based Learning Disability Detector (PLEDDOR)	Lucid Adult Dyslexia Screening (LADS)
Aim	To screen and identifies children with potential dyslexic problem	To diagnose Learning Disabilities via simple and straightforward method	A computerised test designed to screen dyslexic children
Method/Technique	Decision support system (DSS), Analytical Hierarchy Process (AHP) model, and Human-Computer Interface model of Abowd and Beale Interaction are used	Artificial neural network (ANN) is used.	Computerized Adaptive Sequential Testing (CAST) technique, and Fractionation algorithm indicator are used
Factors	The child academic achievement levels	Reading and perception level	Word recognition, word construction, working memory and reasoning
Results	Score data	Binary data: 1 = Normal child 0 = Has learning disabilities	Composite score that classifies into two categories: Not dyslexic Dyslexic

4. Conclusion and Future Work

Dyslexia is a life-term disability that is genetic and hereditary, and which can affect both children and adults. The first important intervention for dyslexic children can be done by raising parents’ awareness about dyslexia and its impact on their children. Parents need to be made aware of their children conditions as early as possible so that appropriate intervention could be taken, for the wellbeing of both parties. In this paper, we examined the awareness level of Malaysian parents with dyslexic children, and the results show the need to promote parents awareness and to provide a supportive model help them deal with difficult matters concerning the children learning disabilities. Our next line of research is to propose a supportive model for parents with dyslexic children, in order to improve quality of life.

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