Faculty of Cognitive Sciences and Human Development

SIGHT WORD READING USING READ FOR FUN MOBILE APPLICATION AMONG CHILDREN WITH READING DIFFICULTIES

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SIGHT WORD READING USING READ FOR FUN APPLICATION AMONG CHILDREN WITH READING DIFFICULTIES

CHAN JYE MING

This project is submitted
In partial fulfilment of the requirements for a
Bachelor of Science with Honours
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The project entitled 'Sight Word Reading Using Read For Fun Mobile Application Among Children with Reading Difficulties' was prepared by Chan Jye Ming and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

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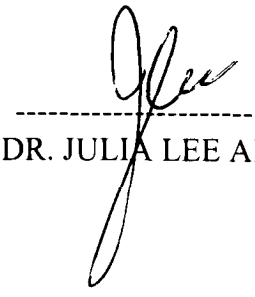

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ABSTRACT

Sight words are words that are usually very familiar and readers have read the words accurately previously. A strong sight word vocabulary is important because children can read the words from their memory automatically and accurately. This study focused on the performances of children with reading difficulties in sight word reading who are 5 years old. Sixteen children were divided randomly into intervention group (n=8) and control group (n=8). Intervention group received intervention with the use of *Read For Fun* mobile application. Mann-Whitney U test was used to analyse the data collected to compare the performances of two groups in sight word reading. It showed that participants in the intervention group improved after the intervention was completed. Therefore, mobile devices are effective to children in learning sight words to improve their literacy and reading.

Keywords: sight words, mobile devices, children with reading difficulties

ABSTRAK

'Sight words' ialah perkataan yang biasa digunakan dan pembaca telah membaca perkataan tersebut dengan tepat beberapa kali. Perbendaharaan kata yang kukuh dalam 'sight words" penting kerana kanak-kanak dapat membaca perkataan tersebut dari ingatan mereka dengan automatik dan tepat. Kajian ini memberi tumpuan kepada kanak-kanak yang berusia 5 tahun yang menghadapi masalah pembacaan dalam 'sight words'. Enam belas kanak-kanak telah dibahagikan kepada 2 kumpulan, iaitu kumpulan intervensi (n = 8) dan kumpulan kawalan (n = 8). Kumpulan intervensi akan menerima intervensi dengan menggunakan 'Read For Fun' aplikasi fon. Ujian 'Mann-Whitney U' telah digunakan untuk menganalisis data yang telah dikumpul untuk membandingkan pencapaian antara dua kumpulan dalam pembacaan 'sight words'. Kajian ini menunjukkan pencapaian kumpulan intervensi dalam pembacaan 'sight word' telah meningkat. Oleh itu, alat mudah alih adalah efektif bagi kanak-kanak untuk belajar 'sight words' untuk meningkatkan prestasi mereka dalam literasi dan pembacaan.

Kata kunci: 'sight words', alat mudah alih, kanak-kanak yang menghadapi masalah pembacaan

CHAPTER ONE

INTRODUCTION

Readers who can identify words accurately are able to understand the ideas conveyed on the printed page and thus able to construct meaning about the text (Just & Carpenter, 1987). For the fluent readers, they may take a very short time (i.e., only a fraction of a second) to convert the printed page with understanding. Children who are not fluent in reading may master the skill of understanding speech, but they are slow in word recognition. Students who have severe difficulties in learning to read will lack fluency in word reading and thus influence their reading comprehension (Compton & Carlisle, 1994). Hulme and Snowling (2011) stated that reading comprehension relies on word recognition and these two skills are interrelated to each other. There will be children who are lack in either one of the skills. Most children will learn at an optimal level with effective reading instructions (Lyon & Moats, 1997). Children who can decode accurately, read fluently and understanding much of what they read will be a proficient reader (Snowling & Hulme, 2011).

Specific reading disability (also known as dyslexia) is a problem in reading which is associated with basic decoding, spelling skills (Snowling & Hulme, 2011). They are the terms which used interchangeably for the difficulties in reading (Vellutino, Fletcher, Snowling, & Scanlon, 2004). Their reading problems are not caused by socioeconomic disadvantage or sensory acuity problems (Vellutino et al., 2004). Gough and Tunmer (1986) explained that reading (R) equals to the product of decoding (D) and oral language comprehension (C), $R = D \times C$. Decoding is more to word recognition rather than sounding out the words. Gough (1996) described reading consists of two parts, which are recognizing the words on the page and the understanding of the words after you recognize them. Learning to speak is universal but literacy is not. Despite teachers' efforts to teach the children, there are many children who still fail to learn to read. An inability to decode, comprehend or both are the three types of

reading disability and reading ability can only result from the combination of decoding and comprehension (Gough & Tunmer, 1986).

Learners with dyslexia face the literacy skills barriers which related to: remembering printed words, number reversal (6 for 9 or 12 for 21), letter reversals (b for d or p for q), change in order of letters in a word (tar for rat or quite for quiet), omission of letters, confusion of the sounds of vowels, substitution of one consonant for another, persistent spelling mistakes, writing difficulties, deficiency in phonological skills such as breaking up a word into syllables, onset-rime and phonemes (Ndombo, Ojo, & Osunmakinde, 2013).

Early identification and prevention should be carried out to prevent reading failure and disability. Delayed identification and intervention may result in very intensive treatments in order to help children achieve adequate levels of reading accuracy (Torgesen, 1998). Thus, providing the right and high quality intervention to the children in need of such intervention at the right time is crucial in preventing reading difficulties (Torgesen, 1998).

Sight Word Reading

Sight words are words that readers have read accurately previously (Ehri, 1995) Sight words are words that are usually very familiar and can be read as whole units. For example, *they, the, there, them, what, this, that, when* are the sight words which cannot be decoded and must be read as whole units. The visually encoded string of letters in the sight words can activate the word representation in the lexicon. Compared to decodable words, readers can read sight words more rapidly and directly from their memory (Torgesen, Waters, Cohen, & Torgesen, 2016). In Groff's (2016) research, children who learn to read must first learn to identify words by "sight". "Sight" words are a precursor which is required in the phonics learning. Reitsma (1983) explained that children may learn the overall visual form of the words, for instance the shape or outline of the words but the identification of the letter in the words does not involved. Furthermore, readers may gradually store information about the

unique spelling of the words in their word memory. Hence, in Reitsma's (1983) research, it showed that words that children have seen previously will be read more quickly than those words they have not seen previously.

Understand how word recognition can be done accurately and automatically can shed light into how beginning readers develop their reading skills. One of the ways to read words is by memory or sight. Readers can just look at the words and their brains recognize those words, provided that the readers read the words before. Unitization is another important property of sight word reading that words come to be read as single units with no pauses between word parts (Ehri, 2009).

Ehri (2009) argued that sight word should not be referred only to high-frequency words or irregularly spelled words. Sight words are any words that are read sufficiently from memory. Word reading occurs unconsciously if the readers can recognize the sight words automatically as they read the printed text. Apart from reading words by sight, word reading also depends on the readers' conscious attention. If readers try to decode words, to analogize or to predict how to sound the words, they have to identify the words and this will interrupt their comprehension since their attention is less focused on the text but on the word. Obviously, readers who have a good sight vocabulary and able to read words automatically and unconsciously from memory will require good text-reading skill (Ehri, 2009).

Hence, sight word reading is crucial for children because most of the children's reading materials contain sight words. If children have a strong sight vocabulary, they able to read the words automatically and accurately from their memory without facing difficulties. Their attention can be used to comprehend and learn other non-familiar words.

The importance of sight word reading. Gough and Walsh (1991) stated that readers must be able to read most of the words easily in order to read and understand the text. This is called knowing the words by sight. Since some English spellings not decodable perfectly, for

instance *you, fly, long, upon* and the content words such as *enough, have, new* are not easily guessed; thus, readers tend to store and retrieve those words from their lexical memory when they read the text. As readers' sight vocabularies continue to expand, they will read a greater number of words and tougher text. Furthermore, Ehri (2009) stated that word reading becomes much more accurate and readers will seldom confuse with the similarly spelled words if readers read the sight words completely from memory.

Hence, sight word reading is essential for children who have just started to learn to read. Children will not face serious difficulties when reading the text because they have gained the basic sight words knowledge which they will usually encounter in their story books and other reading materials. For example, the word *pretty* can be frequently found in story books and it is a sight word. If children are able to remember and store the word *pretty* in their memory, they can read this word automatically and accurately from their memory next time when they are asked to read again.

Findings related to sight word reading. Ehri (2009) carried out an experiment on reading familiar object words (*book, man, car, tree*), consonant-vowel-consonant (CVC) nonwords (*baf, jad, nel, des*), and naming single digits (4, 6, 3, 9). She found out that younger-skilled and older less-skilled readers read the familiar object words much faster than the unfamiliar nonwords. This shows that reading familiar words from memory is much more efficient than the unfamiliar nonwords. Besides, from the findings, Ehri also observed the fluent readers at both grade levels (second and fourth grade) read the words as quickly as they named the single digits. Thus words were read as whole units, which shows that unitization is the important attribute of sight word reading.

Sight Word Learning

Sight word learning starts as a non-alphabetic process with connections between selected visual cues and words in memory. As soon as readers gain some knowledge for the

alphabetic writing system, sight word learning switches to an alphabetic process where letters in written words and sounds in their pronunciations are connected. After the alphabetic system is fully acquired, complete connections can be formed between graphemes in spellings and phonemes in the words pronunciation (Ehri, 1995).

Ehri (2009) explained that pre-alphabetic, partial, full and consolidated alphabetic phases are the four phases which characterize the course of development of sight word learning and they are separated according to the type of alphabetic knowledge used to form connections.

During the pre-alphabetic phase, beginners form connections between selected visual attributes and the pronunciations or meaning of the sight words and store them in their memory (Ehri, 1995, 2009). Gough and Hillinger (1980) described this stage as paired associative learning while Ehri and Wilce (1985) recognized this stage as visual cue reading. For example, apple with a little stick on top and it is red in colour or wings which make birds can fly. Children at this stage know little about the alphabetic system and thus they use visual cues to read and remember words.

Partial alphabetic phase starts when children learn the names or sounds of alphabet letters and they utilize these to assist themselves in remembering how to read words. Children form connections between only some of the letters and sounds in words; probably only the first and last letters sounds, they are easy to detect (Ehri, 2009). For instance, the letters *t* and *e* to read *the*, but they tend to confuse between *the* and *three* as both words have the same boundary letters. Ehri and Wilce (1985) defined the second stage as cipher learning.

During the full alphabetic stage, beginners are able to form complete connections between letters in spellings and phonemes in pronunciations (Ehri, 2009). They can eliminate the confusion that occurs during the partial alphabetic stage because readers in the full alphabetic stage can distinguish easily among similarly spelled words (Ehri, 1995).

Critical period for language acquisition

According to Lenneberg (1967), language acquisition begins at about the age of two, when the brain has reached some 60% of full maturity. However, language acquisition usually decreases after the age of puberty (i.e, between the age of 12 or 13). This can be observed in the learning of a second language. At the age of three or four, every child entering a foreign community learns to speak the new language swiftly and without a trace of an accent. However, this facility declines with age. Children who speak the second language with an accent tends to increase, but very slowly, perhaps 1% or 2% pronounce words differently from native speakers by about the age 12.

The critical period for language acquisition is usually explored in terms of second language acquisition. Lenneberg proposed that during the critical period which begins at the age of two years and ends in puberty, the natural acquisition of language, either first language or second language from mere exposure happens. There is a period where language is obtained more naturally and accurately, and this period has a certain onset and offset (Friedmann & Rusou, 2015).

Cognitive Theory of Multimedia Learning

Mayer (2002) indicated that multimedia learning takes place when a learner forms a mental representation from words and pictures presented. Thus, multimedia instructional messages or multimedia presentations of materials using words (such as spoken or printed text) and pictures (narration and animation) fosters the learning process (Mayer, 2002, 2003). A cognitive theory of multimedia learning can be used to examine how people learn from words and pictures in multimedia environments. It draws on dual-channel theory, cognitive load capacity theory and constructivist learning theory (Mayer & Moreno, 2002).

In dual-channel theory, human beings have information processing systems which consists of two separate channels, the visual (or pictorial) channel and auditory (or verbal)

channel (Mayer & Moreno, 2003). The visual/pictorial channel processes visual input and pictorial representations as proposed by Baddeley (1992) in the theory of working memory. Whilst the auditory (or verbal) material for processing auditory input and verbal representations was proposed by Paivio (1986) in the dual-channel theory.

Chandler and Sweller (1991) stated that cognitive load theory focuses on the manner where cognitive resources are emphasized and used during learning and problem solving. According to the cognitive load theory, information should be presented in ways that do not involve a heavy extraneous cognitive load. Humans have limited capacity to process information in each channel at one time and displaying too much material on the screen at one time will cause the visual or pictorial channel and auditory or verbal channel to overload. On the contrary, the constructivist learning theory suggests that learners actively select relevant information, organize it into coherent mental representations, and integrate mental representations with other knowledge (Mayer & Moreno, 2002).

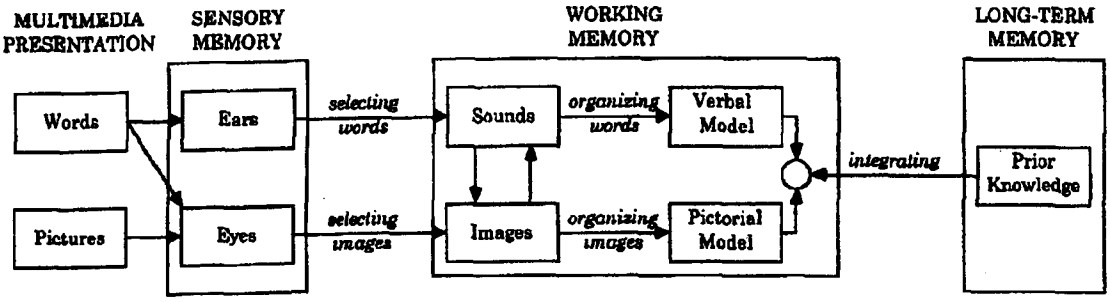

Figure 1. A cognitive theory of multimedia learning. From "Multimedia Learning" by Mayer, R. E., 2002, *Psychology of Learning and Motivation, 41*, p. 19. Copyright 2001 Cambridge University Press. Reprinted with permission.

Figure 1 displays the cognitive theory of multimedia learning. The top row represents the auditory or verbal channel while the bottom row shows the visual or pictorial channel. In first column, it shows the material in a multimedia presentation, such as words or pictures whereas the second column displays the learner's sensory memory, namely sensory images from the eyes or ears. The third and fourth columns show processing in working memory. In

this column, the mental representation of sounds and visual images are situated at the first column, whereas the second column is the mental representation of verbal and pictorial models. The last column represents the learner's prior knowledge that stored in long term memory (Mayer, 2002).

Assistive Technology

Assistive technology can be described as any technology that can enhance the performance of persons with disabilities. It provides a wide range of alternatives, including both "low" technologies and "high" technology devices which intended for people with disabilities as well as generic technologies designed to be used by general public (Lewis, 1998). Currie and Drewry (2011) explained that assistive technology is able to enhance the performance of children with special needs in learning and physical disabilities.

Findings related to assistive technology. Mobile application, also known as mobile apps are software programs developed for mobile devices such as smartphones and tablets (Viswanathan, 2017). Reid, Strnadova and Cumming (2013) pointed out that not only mobile applications are inexpensive and can be easily downloaded and used on the devices, they also have unlimited potential for individualising teaching, learning and communication. Students with reading difficulties can learn more efficiently and kinaesthetically when they interact with the material. As a result, using multisensory techniques to help learning can be useful for the students. Tablet computer devices provide the children with auditory, visual, kinesthetic and tactile input to make their learning fun and interesting. There are many educational mobile applications that are available for downloading that allow students with reading difficulties to have individualised technology toolkits at the fingertips.

Besides, an educational app The Sight Words: Kids Learn App for iPad which included 300 sight words from Fry's list was used in the interventions carried out by Musti-Rao, Lo and Plati (2015). Children able to read, listen to the word, write the word, use their

own voice to record the word and replay the word using the app. Torgesen et al. (2016) used the computer program called "WORDS" to present instructions and practices.

Controversial issues on assistive technology. It is evident that modern definitions of reading include the abilities to read texts on screen and also on printed text. Bearne, Clark, Johnson, Manford, Mottram and Wolstencroft (2007) showed that children at age of 5 show expertise in on-screen reading. It is an undeniable fact that technologies play a significant role in reading among children, youth and adults. Moody (2010) pointed out that educators are keen in using reading technologies to encourage reading among readers with difficulties in reading. In research carried out by Burnett (2010), some have argued that new technologies are unhealthy, unnatural and developmental inappropriate for reading. Young children may access unnecessary content, developing relationships with strangers which are harmful for them.

Education in Malaysia

In Malaysia, students with special needs are students who have been diagnosed as suffering from physical-sensory deficiencies and learning disabilities. Students with learning disabilities are placed in the integration programme in the mainstream schools (Ali, Mustapha, & Jelas, 2006).

An educational intervention programme, Literacy Intervention Programme (LBI) 2.0 which is an extension of the Literacy, Numeracy and Screening (LINUS) was implemented on 2013 which intended to strengthen the rate of literacy in English language among lower primary English as a second language (ESL) learners in Malaysia. The contents in LINUS (LBI) 2.0 emphasize phonics, phonemes blending and segmenting of the letters and sounds. Listening, speaking, reading and writing are the four skills focused on the activities in the module. Other than that, the modules also include some important sight words which are

taken from Kurikulum Standard Sekolah Rendah (KSSR) (Rosseliiah, Sabariah, & Heng, 2015).

Elements in the *Read For Fun* Mobile Application

There are various elements being included in the *Read For Fun* mobile application. Figure 1 shows one of the sight word pages in this mobile application. There are sight word, an audio icon , a picture that illustrates the word and a sample sentence for the word.

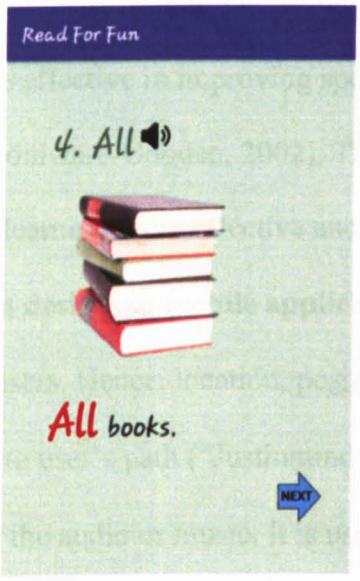

Figure 2. One of the sight word pages in *Read For Fun* mobile application.

Samuels (1970) reported that less able readers use pictures as cues when they were having difficulties to identify the words. The presence of pictures did interfere with learning sight vocabulary. Besides, Matsuzaki, Isozaki, Kojo and Ueno (1985) found out that picture condition is way better than no picture condition in terms of the retention of reading of words. Context cues such as pictures and sentences ease the beginner's effort to identify words (Mason, Herman, & Au, 1990). As a result, pictures are added in the mobile application as a cue to help children identify the sight words when they are unable to retrieve the words from memory. The audio icon is added to provide children an accurate pronunciation of the sight words and it is taken from the online Cambridge Dictionary. It

helps children to pronounce the words. Miller and Piller (2005) mentioned that when auditory and visual information was presented simultaneously, learning was strengthened. When the same content is presented with more than one modality, for instance visual and audio are provided at the same time for that particular content, readers can gain the greatest benefit and comprehension of the content. Other than that, audio and visual are considered as multisensory approaches. Multisensory approaches comprise of auditory, visual, kinesthetic and tactile with direct explicit instruction to the reading content. It was found that multisensory approaches are effective in improving spelling, phonological and decoding skills (Joshi, Dahlgren, & Boulware-Gooden, 2002). Therefore, audio and picture are put in the application to make the learning more effective and beneficial.

Cognitive aspects in designing mobile application. Buttons should stand out and provide visual feedback to users. Hence, location, position and order are the main issues to place the buttons according to user's path ("Justinmind", 2017). The audio button has been universally accepted to play the audio or music. It is used in the *Read For Fun* application to indicate users its function is used to play the pronunciation of the words. The buttons are placed at the position where users can easily locate and see (Babich, 2016). Thus, by design, the audio icon was positioned beside the words so that the users could directly tap on the audio icon to listen to the pronunciation if they wish to do so.

The font used in *Read For Fun* is sans-serif typefaces. There is an ongoing debate among designers whether serif or sans-serif is ideal for website design. Choosing suitable typefaces is important so that the fonts used are sharp and easy to read on the screen (Cousins, 2015). According to Cousins (2015), children prefer sans-serifs typefaces. Besides, sans-serifs can evoke a feeling of modernity, straightforwardness and sensibility and sans-serifs work well in digital design. Sans-serifs are found to stand out better and is readable regardless of distance ("DVG", 2017). According to Rello and Baeza-Yates (2013), sans-serif

fonts such as Arial, Comic Sans, Verdana or Tahoma are better for learners with reading difficulties and sans-serif can significantly increase the reading performance.

The use of colour will evoke different emotions such as excitement, calmness, alertness, energy. Given that the users for *Read For Fun* are children, colour plays a crucial role in enhancing learning (Gutierrez, 2016). For example, red colour is used to draw attention on a particular important item (Olurinola & Tayo, 2015). Izzo (2012) also elaborated that red colour can be used to grab attention and induce a passionate response. As a result, the sight words in the sample sentence are in red colour and in larger font size to draw the children's attention. Red colour allows children to focus on the sight words, which help them to recognize and remember the words easily.

Apart from that, the background colours of each sight word pages are focused on lighter yellow, green and blue. Gutierrez (2016) indicated that green colour encourages restfulness and calmness, and it can improve efficiency and focus. As a result, green is an excellent colour to enhance concentration. Blue is effective for learning situations to improve reading comprehension. It promotes a peaceful mind and serenity. Lighter yellow is best to encourage friendliness, happiness, sun and attention.

The sample sentence below the picture matches with what the picture is trying to convey. It is used to let the children know how to apply the sight words. The sight words are in red and bold to attract the attention of children when reading it. Preece, Rogers and Sharp (2002) stated that the information should made salient for someone to pay attention to it. By using colour, spacing, underline the information stands out. It is about human cognitive processes that allow the relevant information to be focused. As a result, the spacing between the sight word and pictures, pictures and sentence are appropriate so that all the information can be viewed clearly.

The icon  is used to represent *next.* Icons used must allow users to readily perceive and understand what they are intended to represent so that they are easily distinguished from one another (Preece, Rogers and Sharp, 2002). To help overcome the ambiguity faced by the users when dealing with the icons, the label "NEXT" is present alongside the right arrow to clarify the meaning in the context (Harley, 2014). Babich (2016) indicated that the use of icons is prevalent because icons are simple, friendly, visual pleasing and they are better in replacing a long descriptive group of words. However, icons also caused usability problem when users associate different things with each icon based on their culture or past experience. One way to overcome this issue is to include a visible text label to emphasize the clarity of the icons and thus reducing the time and effort for users to guess.

Theoretical Framework of the Sight Word List in *Read For Fun*

A word family comprises a base word and all its derived and inflected forms which can be understood by a learner without having to learn them separately. The concept behind a word family is that when a learner knows the base word or even a derived word, he requires little effort to recognize other words of the family. There are several criteria to decide whether the level at which a particular affix should be placed. Frequency, meaning recognize the frequent affixes will be useful for a learner to read any text, for instance *-ly* is a frequent suffix, *-ock* is a less frequent suffix as in *buttock*. Productivity is the frequently used affix to form new words, for instance *-er*, *-ful* are frequently used to form words, *fore-*, *-ern* are less likely to be used. Predictability is how well readers can predict the meaning of the affix, for example *-er* is commonly used as comparative while regularity is when the affix is added, readers can predict the change in the written form of the base, for instance *comfort + able* (Bauer & Nation, 1993).

The sight word, for example *the* has the onset (the *th* of *the*) and rime (*-e* of *the*). Onset is the initial consonant before the vowel while rimes are the vowel and what follows in