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A Literature Review on Multimedia Learning Device for Dyslexic Students

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Abstract: Multimedia learning device is part of a new era in technology innovation learning culture. It is for students and implemented by teachers. In order to obtain the best results upon using multimedia learning device a comparisons among d-learning, e-learning and m-learning were conducted. Hence, it was decided that m-learning was an effective device to act as a tool for learning because it is efficient and easily accessed. Technologically advanced could act as a theory of multimedia learning which is presented to trigger learning process that will make dyslexia students more creative and enhance their critical thinking according to their ability. However, developing multimedia learning materials for this device is not as easy as it sounds, especially when the user is a special and unique person. Therefore, this research will illustrate the idea of designing device-based learning elements of multimedia specifically for dyslexic students. The aim of this research paper is to improve the knowledge via new strategies in teaching and learning skills by using a variety of approaches that is required in a multimedia learning device for dyslexic students. Thus, educators must need to create their own multimedia learning using the best devices in teaching and learning process, in which the use of multimedia is as an effective tool for dyslexic students.

Key words: Multimedia · Learning Device · Mobile Learning · Dyslexia · Technology

INTRODUCTION

The Government of Malaysia, through the goals of Vision 2020 hopes that everyone will be able to accomplish literacy competence one hundred percent in education [1]. In fact, parents and teachers expect students and their children will be able to acquire basic 3M skills, the skills of reading, writing and calculating at a given period. This is because 3M skills are the basic skills for an individual to acquire that are next in the curriculum provided. However, the 3M skills cannot be easily mastered by all the students. This is supported by Julina Johan [2] stating that the main reason for the students to face difficulty on mastering the basic skills in primary schools is that 3M have severe developments of cognitive memory of dyslexic children.

International Dyslexia Association [3] reported that 10% -15% of children worldwide who are suffering from dyslexia is school children and the numbers may be higher due to cases that cannot be detected. In Malaysia, the Department of Statistics, Statistics of Special Education, Ministry of Education through the President of the Dyslexia Association of Malaysia, Sariah Amirin [4] estimated that about 50 percent of more than 90,000 children suffered from learning difficulties since the age of five to six years old stemming from dyslexia. Moreover, a higher incidence of dyslexia occurs in boys as compared to girls, at a ratio of 2: 1 to 5: 1 [4, 5]. High population is also presented by the President of the Malaysian social Harmonic Association (PSHM), Nordin Ahmad [6], through association study found that 10% -15% of primary school children across the country are dyslexic and majority of them are Malays.

One of the dyslexia intervention approaches is to employ an educational approach using multimedia learning applications. This statement was proven by Ronaldi Salleh *et al*. [1], it is believed that countries of the European Union are already using multimedia as a tool for teaching and learning for students with dyslexia. According to Ronaldi Salleh *et al*. [1], another approach to education through multimedia applications can also be produced in the form of smart phones, tablet computers

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and even on the portable console (PSP) and personal computer (PC). These innovative products have won the Gold medal and Special Award Design Competition in world-class EUREKA 2010 in Brussels, Belgium.

Dyslexic children need a wide range of teaching and learning methods utilizing all the multimedia elements such as sound, video, graphics and animation. The method in use is more appropriate and relevant for the use of multimedia elements which will make it easier for dyslexic children to repeat a desired content at certain time so that they can comprehend the true concept of the value of money. Besides, multimedia learning device is a tool in which it assists children with dyslexia by measuring their understanding, mastery and achievements and make the learning process more interesting, interactive, well organized as well as motivate dyslexic children and provide the experience, space and time to remember [7]. Therefore, usability is identified as a major issue when dealing with efficiency, effectiveness and satisfaction of the products to be developed.

The objective of this study is to evaluate the usability of interactive multimedia based interactive multimedia learning device. Multimedia learning device was designed for children with dyslexia of any race and gender. In addition, it is used as a learning tool for children with dyslexia as it provides interaction with the components that will be developed on device. Furthermore, teachers can also use this device as a multimedia learning tools and teaching materials in the classroom.

This research may provide a possibility that by employing multimedia learning device it will help dyslexia students. An investigation on the development of Interactive Multimedia Learning Object (also known as MLO) for dyslexic children, Fadilahwati *et al* [8] have found that learning with MLO is fun and easy as well as helps and motivate students to comprehend the topics effectively. Dyslexic children need to be guided and encouraged to learn about something they love. Next, Ronaldi *et al* [1] in his study of animation in special teaching for dyslexic children have suggested considering the characteristics of dyslexic children, the topic recognition problem and identify learning strategies.

What is dyslexia?: According to the Institute of Neurological Disorders and Stroke, National Institutes of Health [9] conveyed that dyslexia is a specific disorder in which the brain damages one's ability in learning. Siegel, LS [10] explained that these individuals typically read at levels significantly lower than expected despite having normal intelligence. Many children face dyslexia but learning problems may vary. A common characteristic among the dyslexia individuals is the difficulty in processing phonological (the manipulation of sounds), spelling, counting and visual-verbal (Institute of Neurological Disorders and Stroke, National Institutes of Institute of Neurological Disorders and Stroke, National Institutes of Health [9].

According to Peterson *et al*. [5], the problem of dyslexia is often detected at school. The learning problems may include difficulty in spelling words, reading quickly, writing the word, reading aloud and understanding what is read by someone [9]. Dyslexia is problem in learning which is different with hearing problems, vision problems, or inadequate teaching [5].

Dyslexia is a learning disability that is most common in all regions of the world [5, 11]. Handler *et al*. [12] states that suitable teaching methods are treatments to meet the needs of dyslexia. Although it does not cure the basic problem faced by dyslexia individuals, but with good teaching methods it can reduce the number of dyslexia in Malaysia. This is evident when Pennington *et al*., [5] and Kooij *et al*., [13] described that 3-7% of the dyslexic population in London is reduced when using multimedia as a teaching method.

It was also stated by the American Psychiatric Association [14] that the latest technology is a strategy that can be used to help dyslexic children learn and at the same time encourage their future success. Current technology may require self-training by children at home or outside the school in order to become a supporter of effective classroom [14].

Theory of Multimedia Learning for Dyslexia: According to Elias, Cresent and Lee [15] there are many benefits available through the use of multimedia for example, by learning through a variety of devices. In addition, the learning content can be delivered in a creative way by using animation, graphics and so on. It was also noted that learning through a variety of this device can bring new technology into the classroom. For example, mobile learning can be used to diversify the types of learning activities to students.

Parette [16] mentioned that animations have the ability to effectively attract attention to the critical dimension of students with disabilities and can provide the correct response on a visual quickly. However, researchers believe that by identifying characteristics of dyslexia, the animation will be more effective.

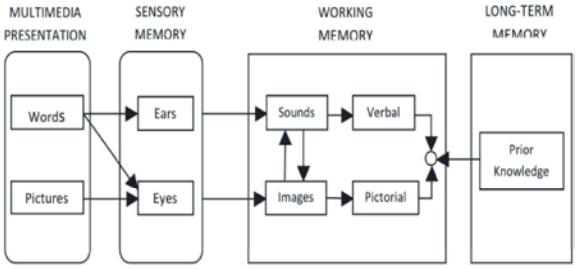

Fig. 1: R.E. Mayer's Cognitive Theory of Multimedia Learning

Specialists such as Bradford [17] was also taken into consideration, the text and the background using bright colors dark colors to avoid visual sensitivity dyslexic students. Such techniques can also avoid the problem that the texts appear to move. The font such as "Arial" is also suitable to be used in order to avoid the same problem. Such letters have a clear and simple form. In addition to text, the use of visual can also be emphasized. Visual specially designed to facilitate understanding of the text, content and also the concept of learning [18].

The review of this theory is important for strategy approach or teaching methods that will be presented in the design of multimedia learning device for dyslexia students. These are some of the major theories of learning that provide profound implications in the process of designing an application-based multimedia. Examples of these theories includes behaviorism theory, cognitive theory, constructivist theory and neuroscience theory, however, there is a top priority of cognitive theory usage in multimedia learning.

In multimedia learning, information is presented to learners in two or more formats, such as in words and in pictures [10]. Selected frames from a short animation depicting a cause-and-effect explanation of how the forms along with corresponding on-screen text which provides the explanation in words. To design effective multimedia presentation learning, it is useful to understand how learners integrate words and pictures. The purpose of this study is to contribute to multimedia learning theory by testing a dual-processing theory of working memory [19]. It is evident that the use of cognitive theory for multimedia learning is corresponded to the learning approach for students with dyslexia in accordance with their abilities and capabilities. This can be completed by example of R.E. Mayer's Cognitive Theory of Multimedia Learning are presented in " Figure 1".

Based on the Cognitive Theory of Multimedia Learning (Figure 1), multimedia device is a computer hardware designed to display, store, record or play multimedia content such as photos, music and videos [20]. A multimedia device is designed to display, store, record or play multimedia content such as photos, music and videos [21]. In addition, a multimedia device also allows a person to deal with a variety of these media during the teaching and learning process for dyslexia students. Examples of a popular multimedia device is using mobile [22].

Studies the Comparison of Multimedia Device: The traditional education is made in classrooms where the teacher presents the learning material to a group of students. The traditional classroom education has many disadvantages. For example if the student has no ability to take part in some lesson he or she will miss the training material [23]. Therefore, this situation is not suitable for students with dyslexia because they have characteristics of short term memory and difficult for the brain's ability to receive and process information quickly.

These disadvantages lead to search for new and more effective educational methods. In reviewing the relevant literature, the existing devices includes distance learning (d-learning), electronic learning (e-learning) and mobile learning (m-learning) offer methods, which decrease the limitations of traditional education [23]. Comparisons between these existing devices are described with advantages and some work has been conducted to overcome these disadvantages as shown as in "Table 1".

Table 1: Comparisons between d-learning, e-learning and m-learning

d-learning	e-learning	m-learning
Limited bandwidth: the capacity of the communications links	The bigger size: Slow modems hamper the delivery of sound, video and graphics.	Environmental-friendly: Smaller size and light weight than laptop and computer
Student-to-student and Student to tutor and institution interactivity	Lack of equipment : Home and school	Time-saving: People can now study when they are traveling
Learner success depends on technical skills in computer operation and	Technical defect: When technical defect occurs, Internet navigation. Costly: E-learning is more costly than traditional education. Stressful and consumed more time.	E-learning stops. On-time: Opportunities for learners to give immediate feedback on their learning experience. Increased mobility: It can be used anywhere at any time (Free in Play Store). Interactive: Fun, enjoy and interesting apply the techniques of multimedia learning.

Based on Table 1 comparisons between d-learning, e-learning and m-learning, it can be concluded that m-learning is more effective. Students have also reported wanting to have varied options to make learning tools convenient so they can study when and where they want. Survey of the results on mobile learning in classroom settings will be different when the dyslexia students have a choice to use mobile devices or something else outside the classroom as well.

CONCLUSIONS

This research is to improve the knowledge via new strategies in teaching skills by using a variety of approaches that is required in a multimedia learning device for dyslexia students. The multimedia learning device environment m-learning can be solved easily by using all elements of multimedia which is applied in teaching and learning process. Designing the m-learning is very important so that the problem of the subject can be delivered easily to the student. Then, the content is based on Cognitive Theory of Multimedia Learning which is the best effect when merged together with the basic concept of the design of multimedia learning. This is because of the nature or characteristics of dyslexic students who require audio, visual and kinesthetic learning in order to understand.

In conclusion, Multimedia learning device is an effective tool in education towards integrating technology in teaching practice, especially in designing m-learning. The most obvious result is when dyslexia students are able to use the technology at home at any time. Therefore, the implication of this study will assist dyslexic students with their learning as well as overcome short-term memory problems by implementing all the multimedia elements which is used in the teaching and learning process through m-learning. In addition, it will also provide awareness to the teachers so that they are able to develop their own device for teaching and learning, particularly for students with dyslexia.

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