I-eDysC: AN INTERACTIVE E-BOOK FOR DYSLEXIC CHILDREN

By

Nor Azri Syahirah Mohd Sabri

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Information & Communication Technology)

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CERTIFICATION OF APPROVAL

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Approved:

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TRONOH, PERAK

September 2012

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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Nor Azri Syahirah Mohd Sabri

ABSTRACT

This report discusses the research done on the chosen topic, which is **I-eDysC: An Interactive E-Book for Dyslexic Children.** This project shows that E-Book is one of the new high technology learning methods for dyslexic children in Malaysia. The objectives of this project is to investigate the interactive elements in the existing e-book for dyslexic children, design an E-Book that incorporates animation, audio, and interactive lessons for dyslexic children and also to develop and test the e-book for dyslexic children. The problem statements of this project are books which are static and contain words with long explanation can become too dull and difficult for dyslexic children to read and also the current E-book in the market also does not design for the dyslexic children. The scope of study for this project is flash and its ability to be used for interface development with the target users; dyslexic children, teachers at dyslexic school, and parents. The literature review component talks about all the research that has being done prior to the pre-development and post-development of the project. All about dyslexia and the research about using E-book as learning method for dyslexic children are further discussed in detail. In the methodology section, it is discussed about the software development methodology applied in developing this project which is Rapid Application Development. The project phases are also being discussed in detail. In the results and discussions section, the preliminary findings consist of the findings from literature review research, interviews and the storyboard of the E-Book. Then, the prototype development process and results together with the testing results will be discussed in detail. All the justifications are made clearly. In the recommendations section, all the related recommendations and some improvements that can be done for the future of this project are listed and elaborated. The conclusion section concludes the overall project.

ACKNOWLEDGEMENTS

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ABBREVIATIONS AND NOMENCLATURES

et al.   And others

etc.   Et cetera

CD   Compact Disc

VCD   Video Compact Disc

LCD   Liquid Crystal Display

CHAPTER 1
INTRODUCTION

1.1 Background of Study

Dyslexia is a common disorder that causes people to have difficulties with accurate or fluent word recognition and hinders the development of reading skills. The brain-based learning disability specifically impairs a person's ability to read. These affected individuals typically read at levels significantly lower than expected despite having normal intelligence. The best way to help dyslexic children in learning is using the right teaching methods to establish a strong learning foundation for the child, especially in the areas of spelling, reading and calculation. Once this foundation is built, most dyslexic children can go on to lead normal lives like their peers.

Specific teaching techniques have been shown to give positive results in helping a dyslexic child learn. Suggested teaching approach is by using multimedia in E-book, whereby the child is taught using more than one of his or her senses. For example, just reading or listening or doing work with their hands such as feeling letter blocks, separately might not be as effective as a combination of all. Technology is a miracle for many people with dyslexia. Word processing enables dyslexic people to write. E-book as reading machines turns the written word into spoken language, enabling many dyslexic children to read.

Furthermore, in teaching dyslexic children, interactive elements are important in the E-book for dyslexic children. For example, incorporate creative and fun methods

such as learning games or interactive lessons with animation and audio. Using different colors in developing an E-book for dyslexic children also help the child to learn better.

1.2 Problem Statements

The problem statements of this project are:

- Books which are static and contain words with long explanation can become too dull and difficult for dyslexic children to read.

- Current E-book in the market also does not design for the dyslexic children.

In this case, dyslexic children preferred interesting way to learn something. Books which are static and contain words with long explanation can become too dull for dyslexic children to read. Moreover if the topics are hard to understand, books are too difficult for dyslexic children in learning. Dyslexic children can understand easier with the help of effective visualization through animation and audio-visual presentations. All of this can be achieved by learning through E-book.

At the moment, an E-book design for dyslexic children has not yet been developed. There are a few existing E-book in the market but only contains the general information not interactive elements. The existing E-book does not design for the dyslexic children and does not stress on the importance of effective visualization. The graphics used to explain about certain topics are static and boring. There is only little or no use of animation to explain the lessons. The designs are not attractive and dull making dyslexic children lose interest to use it. There are little interactions thus dyslexic children will find it boring as the current E-book is no different from their textbook. The only difference is the medium being used.

Thus, as a solution to counter these problems, the E-book that will be developed will contain user friendly interface with interactive elements. User friendly feature is the most important element in an E-book. Users sometimes get frustrated when they are lost or do not understand the interface. This can interrupt their concentration and make them lose interest. Animation will be used to explain certain concept and principles in the lessons. Users do not have to wait for an animation or narration to end before proceeding to the next interface. They can navigate through the E-book according to their will. In this project, the E-book that will be developed will focus on four important factors which are; the contents of learning materials, the presentation of these materials, the way in which they are taught, and the overall functionality of the E-book. The contents of these materials have to be interesting. The learning materials will be taught using interactive multimedia elements such as graphics, audio, and animation. The overall functionality of the E-book has to be satisfying to the users.

1.3 Objectives and Scope of Study

The objectives of this project are;

- To investigate the interactive elements in the existing E-Book for dyslexic children

- To design an E-Book that incorporates animation, audio, and interactive lessons for dyslexic children

- To develop and test the usefulness of the E-Book in terms of supporting the learning process.

The scope of project is a boundary for the system. It is consist of function of the system, level of user and the workstation environment. The E-Book that will be developed is compliment to the existing English text book and will demonstrate lessons

for dyslexic children through animation and audios. This E-book also provides interactive lessons for dyslexic children and interactive activity sessions in learning.

The targeted users for this E-book are dyslexic children in primary school. Teacher in dyslexic school also can use this E-book to help them in their teaching and even parents also can use it at home for home lessons to their dyslexic children. There will be three modules in the E-Book which are; sound around us, all about me, and my school.

The last scope of the project is workstation environment. This term are referring to the place of implementation the system and the software that uses to run the system. The place to implement the system will do at any of dyslexic schools in Malaysia and the software platforms that will be use is Adobe Flash CS4 for develop the E-Book, Action Script 3.0 for the programming in flash and Adobe Photoshop CS4 for editing and design phase. Adobe Flash CS4 has been used because of its ability for interface development. Furthermore, with the help of Action Script 3.0 in flash, the interface development is made possible because it is better medium as it allows flash functions, animations and interactions to be used.

1.4 Project Feasibility

The benefit from this project is dyslexic school in Malaysia can cut down the oversized textbooks and cut cost. The term of cost here are referring to the cost of buying paper, file and cost to buy a cabinet to store all the textbooks needed. Furthermore, cost can also be derived from this project because it can save a lot of money from spend it to the expertise to build the E-Book. Oversized textbooks can be cut down because E-Book is portable way in learning and lightweight.

Other than that, the other benefit gives the impact to dyslexic children itself. Using the E-Book in learning, indirectly can reduce the time spend learning as the dyslexic children will grasp the concept of matter more quickly with the help of visualization.

Within eight months, this project can be completed at least to the minimum requirements. It also depends on the amount of scope creep that would be encountered which is inevitable. Due to the scope creep and testing difficulties, it is also difficult to gauge how perfect the system can be within the time frame.

CHAPTER 2
LITERATURE REVIEW

2.1 Understanding Dyslexia

2.1.1   Definition of Dyslexia

Dyslexia was first identified over 100 years ago. Literally 'dyslexia' means difficulty (dys) with words (lexis), and is derived from Greek. Dyslexia usually related with difficulty or problem with words thus implying concepts beyond reading, spelling and expressing thoughts on paper (Greene, 2006). The brain-based learning disability specifically impairs a person's ability to read. These affected individuals typically read at levels significantly lower than expected despite having normal intelligence.

Dyslexia is not a worst condition at all. Dyslexia also common among children and if it is not detected at the early stage, it may persist until the child has grown older. Dyslexia describes a group of different but related factors which affect an individual throughout their life. The dyslexic children may be mildly, moderately or severely dyslexic. One dyslexic may read quite well, but find it difficult to learn spelling or to express ideas clearly. Another may struggle with reading, but be very fluent when they speak. Each dyslexic has his own personal set of difficulties, but with appropriate help, most of them can learn to read and write well enough to become successful students.

2.1.2   Causes of Dyslexia

There is no single cause of developmental dyslexia. The way in which dyslexia affects people differs from individual to individual, as do the reasons for the specific difficulties experienced so causes of dyslexia can be answered in many different ways. Dyslexia is caused by subtle abnormalities in the brain. (Frith, 1995). According to Frith, any abnormality at the neurological level in a specific brain system would be expected to affect the mental processes subserved by this system. Dyslexia is a mild neurogical disorder that causes a deficit affecting an individual's ability to interpret the symbols of written language, and it is independent of intelligence (Cardinal et al., 1992).
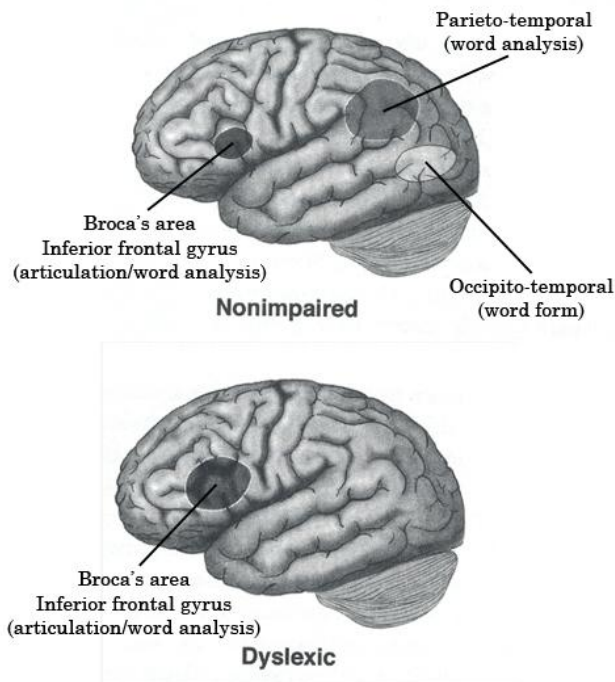
Figure 1: Areas of the brain affect by dyslexia.

Besides that, developmental dyslexia is most often thought to be connected to brain and chromosome differences (Wadlington et al., 1996). The

cortical areas of the brain have been the center of attention in many imaging studies aimed about the causes of dyslexia. Helenius, Salmelin, Service, and Connolly (1999) all conducted one of these imaging studies by comparing cortical activation processes of normal and dyslexic reading subjects. They believe that developmentally dyslexic children have an abnormal pattern of lateralization, which is the process of allowing the brain to use different hemispheres for different jobs or responsibilities. The study performed by Helenius et al. was designed to find whether or not the same brain areas in normal versus dyslexic subjects were similarly engaged in reading comprehension. The results showed that dyslexic children tend to fixate on one hemisphere of the brain when reading instead of using both hemispheres.

Furthermore, it is different for acquired dyslexia cases. Acquired dyslexia is the only type of dyslexia caused by brain damage. Children and adults with acquired dyslexia received substantial brain damage after learning how to read. People in this situation need to restart the process of learning to read and have difficulties doing so. The other theories for causes of dyslexia are related to developmental dyslexia, which constitutes the majority of those with this learning disability. Acquired dyslexia is a completely different issue and is a very rare occurrence.

Other than that, the dyslexic brains is slightly different in the anatomy, organization and functioning as compared to the non-dyslexic brain. Dyslexic children tend to be more right brain thinkers because their right brain is associated with lateral, creative and visual thought processes. Dyslexia is not cause by race, social background or intellectual ability but there is possibility that dyslexia was run in families and dyslexic children might be caused and inherited by family genetic.

2.1.3 Symptoms of Dyslexia

A wide variety of specific symptoms exist in children who have dyslexia. Dyslexic children often have common signs that may enable a parent or educator to realize that an action needs to be taken. Fluent reading depends on learning to translate the visual form of letters and their order in words (orthography) in the sounds that they represent (phonology). Wadlington et al. state, "Early signs of dyslexia may include difficulty in: learning to speak, remembering, pronouncing words clearly, expressing ideas meaningfully, and listening or following directions. Lower elementary school children may exhibit difficulty with the following (singly or in combination): learning the alphabet, sequencing, rhyming, word memory, reading, writing, and spelling." These symptoms are very general and often appear in children without dyslexia. However, these symptoms do often appear in children diagnosed with the disability.
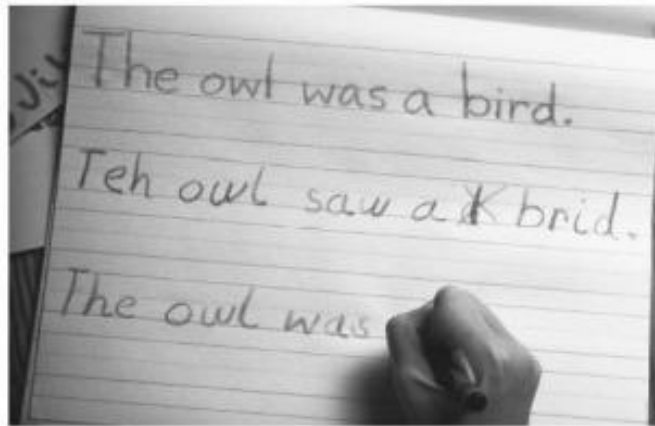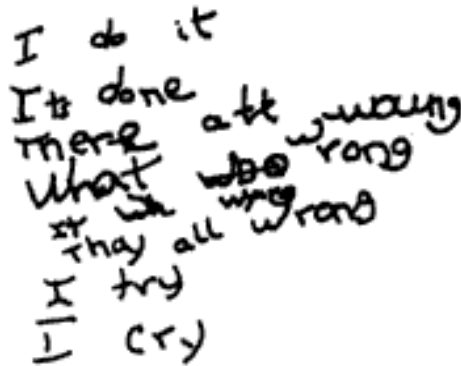
Figure 2: Image of a child's writing who is dyslexic

Although dyslexic children may show signs from the general list of symptoms, many experts believe that only one specific sign accurately indicates or predicts dyslexia. Troia, Roth, and Graham (1998) state, "Children at risk for reading failure and those identified with dyslexia perform significantly lower than their normally achieving peers on measures of phonological awareness."

Troia et al. believe that children who are suspected to have dyslexia need to be compared to their peers in the area of phonological awareness. These experts believe that a child with a level of phonological understanding significantly below peers most likely will be diagnosed with dyslexia.

Figure 3: The letters might look all jumbled up for dyslexic children.

For dyslexic children, they might see some letters as backwards such as the word "bird" looks like "drib" or upside down and text appearing to jump around on a page. In other case, they also might not be able to tell the difference between letters or words that look similar in shape and reading in the wrong or reversed order and mixing up numbers. For example, they might read "b" as "d", "p" as "q", "was" as "saw", "15" as "51" and "6" as 9". The letters, words and numbers might look all jumbled up, out of order or bunched together. Sometimes, dyslexic children might get a severe headache or feel sick on their stomach every time they try to read and they not are able to pronounce the words. Dyslexic children could have any of the above symptoms, or none of them.

2.1.4 Diagnosing a Dyslexic Child

Diagnosis of dyslexia is crucial in addressing this condition appropriately. This is especially so because a dyslexic child is often misdiagnosed, as some other conditions can present with similar signs and symptoms. Fagerheim et al. (1999) suggest that a molecular test for dyslexia would allow earlier diagnosis of children at high risk for dyslexia. Methods of diagnosis can vary and may also involve dyslexia screening which is a relatively simple, quick method of indicating whether a child might have dyslexia.

Moreover, diagnosis of the learning disability also can sometimes be difficult. Assessment procedures most often consist of numerous written and spoken tests and critical observations performed by specialists. Troia et al. explain a variety of tests that are often performed with the goal of possible diagnoses of dyslexia. The majorities of the tests are standardized and include rhyming, blending, and segmentation. These tests are all aimed towards the main goal of finding the level of phonological understanding that the child is at. For the rhyming tests, the child is asked to decide if given words rhyme. The blending tests consist of activities aimed towards the blending of syllables into words. The segmentation tests allow the children to break entire sentences down into words (Troia et al., 1998). Each of these tests requires a basic level of phonological understanding. Children with dyslexia have trouble on these tests because of their lack of strong understanding in that area.

Recommended that the best thing to do when a child presents with signs and symptoms of dyslexia is to approach a healthcare professional to confirm or eliminate the diagnosis. The earlier the diagnosis of dyslexia is made, would be the better. This is especially so because research has shown that the best outcome for a dyslexic child would be when the condition is detected and deal with early. Parents and educators need to work together in order to come to a

conclusion about what is best for the particular child in question. The needs and abilities of one child may be completely different from those of another child that is in a similar situation.

2.1.5 Treatment for Dyslexia

Dyslexia is not a disease, so is makes no sense to talk of a cure. Although it is a lifelong conditions, most dyslexic child learn to read and write well. Each dyslexic child difficulties are different and can vary from slight to very severe disruption of the learning process. There is no total cure for dyslexia but the effects of dyslexia can be alleviated by skilled specialist help and committed learning.

In order for a dyslexic child to succeed to the best of their ability, intervention and treatment procedures need to be put into effect immediately after the diagnoses of the learning disability. Troia et al. suggest extensive phonological awareness training for dyslexic children. They suggest extensive training in phonology because phonological awareness is the core area of concern for dyslexic children. This training can take on many different forms and variations. If parents and educators decide to adopt phonological training for a child, they need to choose a specific program that they believe will best benefit the specific child. This choice should not be easy and should take some careful consideration on the part of the parents and educators.

Furthermore, a parent may choose to put their dyslexic child into a classroom containing only learning disabled children. These programs are structured in ways that enable the children to build a more secure basis of phonological awareness and understanding, while also learning the basic information taught in a traditional classroom. Another parent may decide that their dyslexic child would be better supported by attending a regular classroom

and being pulled out two or three times a week for 20 minute sessions of phonological training either in a small group or individually (Troia et al., 1998). These are only a couple of the possible treatment or therapy situations available for dyslexic children. Because each program is unique in its teachings and structures, parents and educators need to fully examine a variety of programs before placing the dyslexic child.

Phonological training alone is not enough support for dyslexic children because dyslexic treatment programs also need to include carefully planned reading instruction. (Snowling, 1996). Snowling states, "It has been shown that training in phonological awareness combined with a structured reading intervention program is an effective form of treatment for poor readers and produces greater gains than training in either reading or phonological awareness alone." Parents and educators need to be aware of all available resources and choose one that best suits the unique needs of each individual child.

2.2 E-book for Dyslexic Children

2.2.1 Teaching a Dyslexic Child

To teach dyslexic child, the best way is using the right teaching methods to establish a strong learning foundation for the child, especially in the areas of spelling, reading and calculation. Once this foundation is built, most dyslexic children can go on to lead normal lives like others. Specific teaching techniques have been shown to give positive results in helping a dyslexic child learn. One commonly used teaching approach is the multisensory touch, whereby the child is taught using more than one of their senses. For example, just reading or listening or doing work with their hands such as feeling letter blocks etc., separately might not be as effective as a combination of all.

Dyslexic children have difficulty in focusing. Therefore, it is more effective to teach them with many short breaks in between compared to teaching continuously for long hours. When teaching dyslexia children, always incorporate creative and fun methods such as learning games or watching videos. These days many online or computer programs are available to provide such resources. Using different color markers, chalks, blocks or learning equipment also help the child to learn better.

Phonological techniques in helping the dyslexic children to learn how to read is the most famous way. For example, Siegal and Vanderwelden (1997) put children through a series of exercises over the cause of 12 weeks that were designed to facilitate the gradual expanding use of letter-phoneme relationships in early reading and spelling. When teaching dyslexic children, instruction need to give slowly and loudly to make sure the child understands and repetition may also be necessary. For example, when teaching the child similar sounding words and verbalize the words clearly and blend the sounds for them. But the most important thing is, when teaching dyslexic children patient and try different teaching methods to find the one that suits for the child are needed.

2.2.2   E-book Supporting Dyslexic Children in Learning

According to the Education Ministry, about 5 percent or 314,000 school-going children in Malaysia have dyslexia. (Manjit et al., 2011). In fact, more children may be dyslexic than asthmatic. A pilot study (Gomez, 2000) conducted in a representative primary school of 2000 pupils near Kuala Lumpur indicated that 7 percent of Standard 2 Malay pupils had marked phonological reading difficulties which is dyslexia. In order to help dyslexic children in learning, E-book with interactive elements will be a good solution.

E-books are forms of electronic text containing many features that can be classified as accommodations. E-book is ease in portability, lightweight, adjustable text size, highlighting and interactive. In the E-book for dyslexic children, it will contain graphic, audio, animation, and interactive lessons to help them learn better. Virtual colors will help dyslexic children to read better. Olive Mears (1980) reported that children's recognition of text and reading disorders were influenced by the characteristics of publication and that disability can be reduced if colored text is used and contrast is reduced.

Figure 4: Audio elements will help dyslexic children in learning

Other than that, the audio elements also will include in the E-book for dyslexic children to support them in learning. For dyslexic children, the best aid to reading and spelling is to learn the words with the audio elements and sounds the letters make by them. This will help dyslexic children to work out each word from the sound made by each individual letter. For example, 'B-O-Y' runs together to make 'Boy'. Books which contain only simple letter words without any audio elements can become stilted and boring for dyslexic children to read. By using the audio elements in E-book, these words are usually easy for dyslexic children to read and more exciting.

Furthermore, using graphic and animation, and also the interactive lessons to study will help much dyslexic children in learning at school because

dyslexic children preferred interesting way to learn something. Dyslexic children can understand easier with the help of effective visualization through animation, audio and other interactive elements. All of this can be achieved by learning through E-book.

2.2.3   Future of E-book for Dyslexic Children

Kids nowadays make up a large portion of the E-book audience. It is become very often when a parent buys devices for them whether a tablet, computer, laptop, smart phone, or ereader. The amount of electronic devices used by children is growing, and E-books seem to be the most easy and portable way in learning.

Using E-book as learning methods in teaching dyslexic children at school can cut down oversized textbooks, and simply provide a new method of delivering lessons. The E-book that being developed for the dyslexic children are interactive and dyslexic children will become more interested to study. For example, when there is a picture of cow, the cow wills makes a cow sounds, and if a dyslexic child wants to read the words, the letter will produce sounds to help them better in reading and spelling.
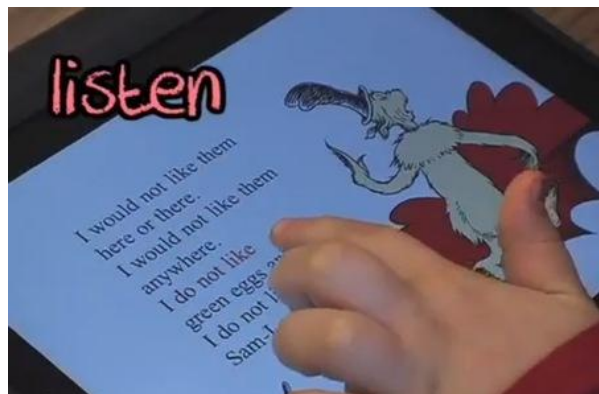
Figure 5: Dyslexic children improved reading using interactive E-book

Interactivity has always been something to strive for to keep children's interests going and the reading experience can be personalized for each dyslexic child. Colors, animation, sounds are not just for video games nowadays because E-book can have the same effect with interactivity elements that no textbook can compete with. Moreover, studies have shown that students become more motivated when technology and multimedia are allowed for their learning (Kozma, 2005).

CHAPTER 3
METHODOLOGY

3.1 Introduction

Methodologies mean ways of how the process of the system will be made. In process of making a system, there are numerous types of software development methodologies. Examples of the methodologies that are available are Structured Systems Analysis and Design Method (SSADM), Joint application Design (JAD), Prototyping, and Rapid Application Development (RAD). The methodology used in this project is combination of a Rapid Application Development (RAD) and waterfall model. All phases in waterfall model is included in RAD but at a compress and intensify rate. Phases in RAD are; Requirements Planning, User Design, Construction, and Cutover.

Figure 6: Rapid Application Development (RAD) Diagram

Rapid application design is an approach to the developing of the information system that do promise the better and cheaper system with rapid development by having system developers and end users work together jo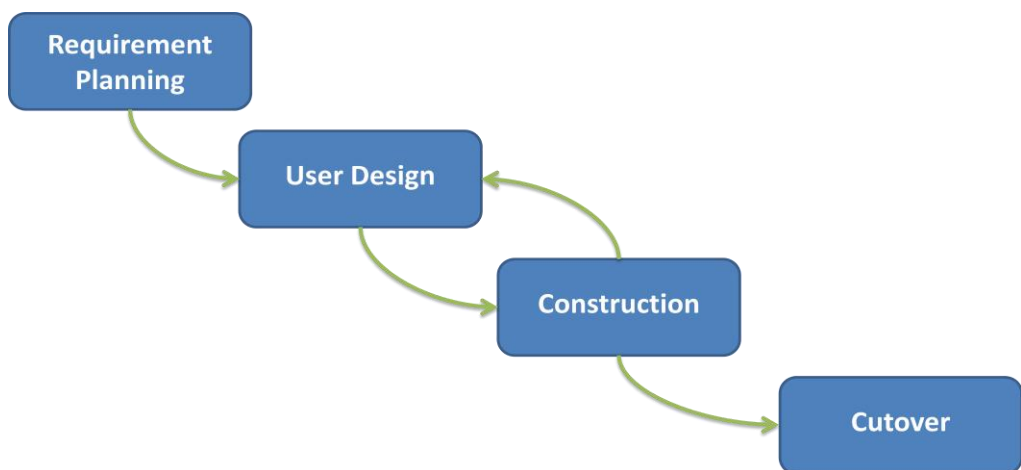intly in real time to develop system. It is perceived as a system methodology, a method for developers to change their development processes or as RAD tools to improve development capabilities (Beynon-Davies, 1999).

The ready availability of increasingly powerful software tools is created to support RAD also increased interest in this approach. RAD tools, and software created to support rapid development, almost provide for the speedy creation of Web-based applications. RAD the emphasis is low cost and fast delivery.

3.2 Project Phases

Phase1: Requirements Planning

In the RAD life cycle, requirements planning incorporate elements of the traditional planning and analysis phase. During this phase, knowledgeable end users determine systems requirements, but the determination is done in the context of a discussion of problem statement. Once specific systems have been identified for development, users and developer had discussion to reach agreement on system requirements. Interviews with Persatuan Dyslexia Malaysia and some of dyslexic school teachers will help the developer in this phase. The overall planning process is not all that much different form planning in the traditional waterfall model.

- Outcome
  i. An outline system area model ; entity and
     process models
  ii. A definition of the system's scope and requirements

Phase 2: User Design

During the second phase of RAD life cycle, end users and the developer participate in discussion, where those involved used integrated CASE tools to support the rapid prototyping of system design. Users and the developer work closely and quickly to create prototypes that capture systems requirements and that become the basis for the physical design of the system being developed. Users' signs off on the CASE-based design-there are no paper-based specifications. Because user design ends with agreement on a computer-based design, the gap between the end of design and the handing over the new system to users might takes several weeks.

- Outcome
  i. Storyboard diagrams
  ii. Preliminary layout of screen
  iii. Prototypes of critical procedures

Phase 3: Construction

During this phase, the developer who created the design now generates code using the Adobe Flash CS4 and Action Script 3.0. End users also participate, validating screens and other aspects of the design as the application system is being built.

- Outcome
  i. Design has been finalized
  ii. The system builds using the Adobe Flash CS4

Phase 4: Cutover

Cutover is the delivery of the new system to its end users. Planning for cutover must begin early in the RAD process because the RAD approach is so fast. Cutover involves many of the traditional activities of implementation, including testing the

system, training users, dealing with organizational changes, and running the new and old systems in parallel, but all these activities occur on a accelerated basis.

- Outcome

i. The new system been implemented and tested

ii. Managing the change to the new system environment

3.3 Key Milestone

Each of the activities is considered a milestone, in a waterfall sense that the first activity is finished before being able to continue to the next.

Activities (FYP1)	Week
Selection of Project	2
Planning and Research Analysis	10
User Design	14

Table 1: Key Milestone FYP1

Activities (FYP2)	Week
System Construction	11
System Cutover	14

Table 2: Key Milestone FYP2

3.4 Gantt Charts

A Gantt chart was created in the beginning, but after experiencing a number of unpredictable roadblocks, more rapid development model has been adapted in this project.

No.	Project Activities (FYP1)	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	**Selection of Project Title**	▓	▓												
	Search for Project Title	▓	▓												
2	**Planning & Research Analysis**			▓	▓	▓	▓	▓	▓	▓	▓				
	Conduct interview and questionnaire			▓	▓	▓	▓								
	Define system scope					▓	▓	▓	▓						
	Determine system outline							▓	▓	▓					
	Literature review research								▓	▓	▓				
3	**User Design**											▓	▓	▓	▓
	Design storyboard diagram											▓	▓		
	Preliminary screen layout												▓	▓	▓

▓ Process

▓ Suggested Milestone
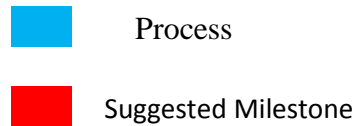
Table 3: Gantt Chart FYP1

No.	Project Activities (FYP2)	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
4	**System Construction**	■	■	■	■	■	■	■	■	■	■	🟥			
	• Build	■	■	■	■	■									
	Develop User Interface	■	■												
	Create pages in Flash according to storyboard			■	■										
	Write coding in Action Script 3.0				■	■									
	• Demonstrate						■	■	■						
	Run simple test to show the workability						■	■							
	Ensure all components interrelated and working								■	■					
	• Refine									■	■	■			
	Fix coding error									■	■				
	Reconstruct the system										■	■			
5	**System Cutover**												■	■	🟥
	Testing system functionality and usability												■	■	
	Check system specification aligned with requirements													■	
	System implementation														■

■ Process

🟥 Suggested Milestone
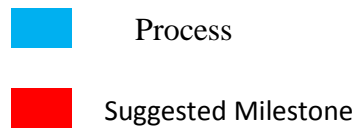
Table 4: Gantt Chart FYP2

3.5 Tools Required

To develop this project, there are several tools and requirements needs to be filling to run the system. Below is the minimum requirement and tools required:

- Personal computers with Windows platform, 1 GB RAM (minimum), 80 GB hard-disk space, including 115 MB of available space on the hard disk that contains the operating system.
- Adobe Photoshop CS4 for design
- Adobe Flash CS4 for develop system
- Action Script 3.0 for programming in flash

CHAPTER 4
RESULTS AND DISCUSSIONS

4.1 Data Collection and Research

4.1.1 Literature Review Findings

From literature review research, the findings are:

- Dyslexia is not a disease, but has difficulty in focusing in learning something.
- Specific teaching techniques must be use to give positive results in helping a dyslexic child learn.
- In order to help dyslexic children in learning, E-book with interactive elements will be a good solution as for teaching method.
- Interactivity has always been something to strive for to keep children's interests going and the reading experience can be personalized for each dyslexic child.

4.1.2 Interview Findings

In order to determine the requirements needed for the E-Book, short interviews had been conducted with Persatuan Dyslexia Malaysia and few dyslexia school teachers through telephone call and social media messages.

Below are the interview questions that has been asked to the Persatuan Dyslexia Malaysia and dyslexic school teachers through social media messages and telephone call, and also the results gathered through the interview session:

- **Questions**
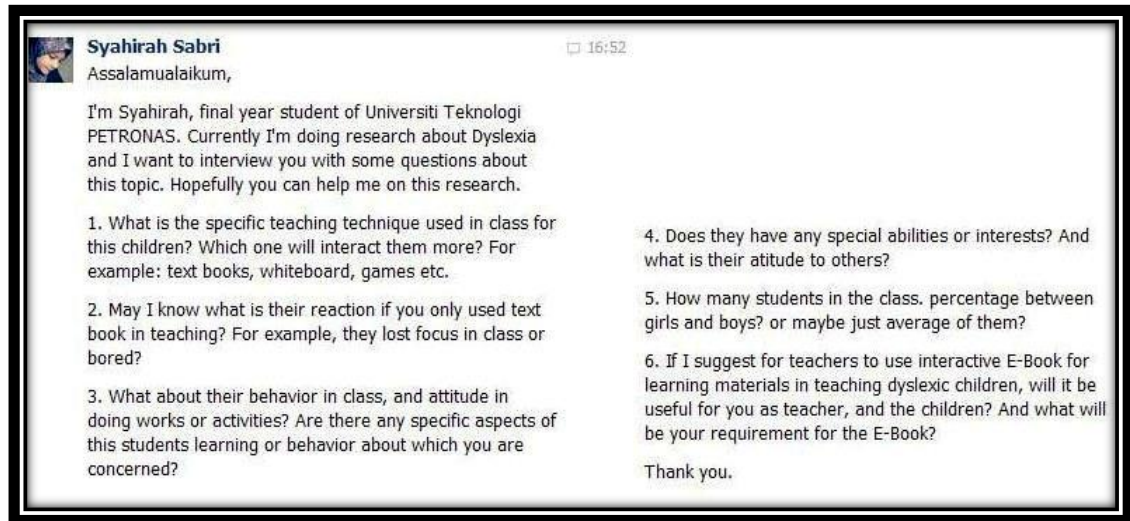
Figure 7: Questions for short interview session

1. What is the specific teaching technique used in class for this children? Which one will interact them more? For example: text books, whiteboard, games etc.

2. May I know what their reaction is if you only used text book in teaching? For example: they lost focus in class, bored etc.

3. What about their behavior in class, and attitude in doing works or activities? Are there any specific aspects of this students learning or behavior about which you are concerned?

4. Does they have any special abilities or interests? And what is their attitude to others?

5. How many students in the class, and percentage between girls and boys or average of them?

6. If I suggest for teachers to use interactive E-Book for learning materials in teaching dyslexic children, will it be useful for you as teacher, and the children? And what will be your requirement for the E-Book?

- **Persatuan Dyslexia Malaysia personnel**

  Personnel 1

  Organization: Persatuan Dyslexia Malaysia (Ampang Centre)

1. Currently, we are using text books, alphabets blocks, clay, colorful flash cards and computer games. Our learning centre focused on auditory, tactile, and the terms pronunciation which is each approach will be combined together so that they will received the message effectively.

2. Most of them have difficulty to scanning and reading the line of texts in text books. Thus, they are easily got bored and lost focus. When they started to lost focus, usually they will play among themselves and ignore the books.

3. Dyslexic children experience failure many times each day because their disability is not visible to teachers. Their self-esteem suffers and they come to think of themselves as stupid. It is important to recognize their efforts and praise small points about their work, even though the overall quality may be poor.

4. They are more interested with games and fun activities. So, to gain their interest and good mood, usually we will let them to play with computer games, or clay for 30 minutes before lessons start. They are very honest and sometimes their words can make us feel like anger and despair to teach them. Some among

them are shy and do not want to talk when we meet a new person, but due to the nature friendly, is not difficult for them to adapt.

5. There are only 5 students in each class, and 70% are boys.

6. Yes, it will be much useful in teaching purpose as they only interested with something that interactive and fun. For requirements in the E-Book, I suggest to put some interactive games or video in interval for each modules or exercise. This will help much to relax the children's mind before proceed to the next lessons.
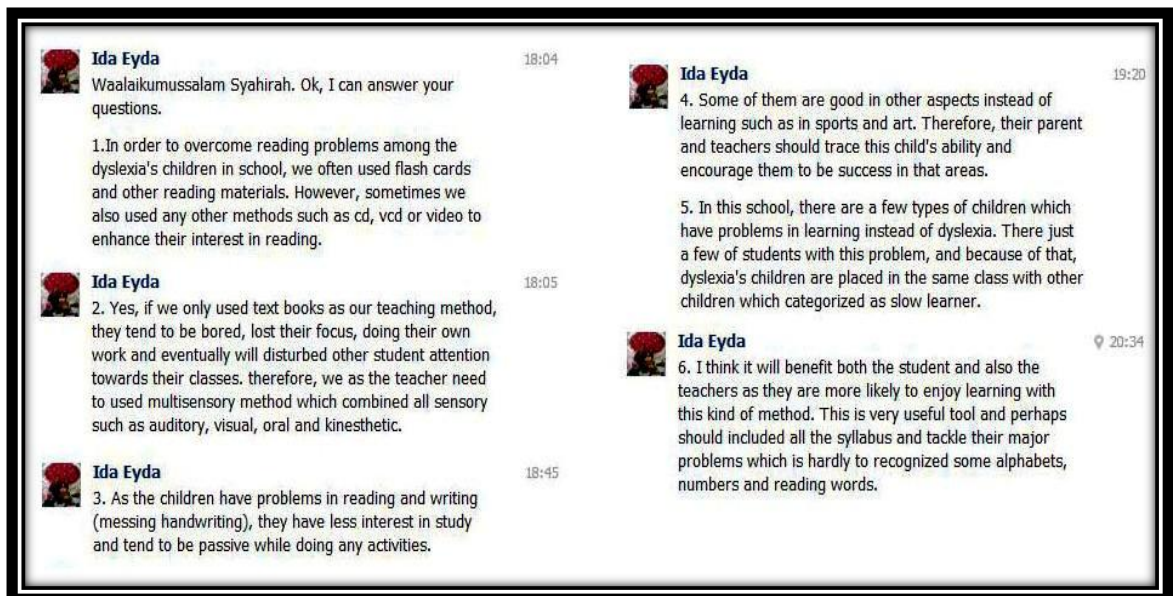

Figure 8: Answers by Teacher 1 in short interview session

Teacher 1

School: Sekolah Kebangsaan Jalan Enam, Bandar Baru Bangi, Selangor

1. In order to overcome reading problems among the dyslexia's children in school, we often used flash cards and other reading materials. However,

sometimes we also used any other methods such as CD, VCD or video to enhance their interest in reading.

2. Yes, if we only used text books as our teaching method, they tend to be bored, lost their focus, doing their own work and eventually will disturbed other student attention towards their classes. Therefore, we as the teacher need to used multisensory method which combined all sensory such as auditory, visual, oral and kinesthetic.

3. As the children have problems in reading and writing (messing handwriting), they have less interest in study and tend to be passive while doing any activities.

4. Some of them are good in other aspects instead of learning such as in sports and art. Therefore, their parent and teachers should trace this child's ability and encourage them to be success in those areas.

5. In this school, there are a few types of children which have problems in learning instead of dyslexia. There just a few of students with this problem, and because of that, dyslexia's children are placed in the same class with other children who categorized as slow learner.

6. I think it will benefit both the student and also the teachers as they are more likely to enjoy learning with this kind of method. This is very useful tool and perhaps should include the entire syllabus and tackle their major problems which are hardly to recognize some alphabets, numbers and reading words.
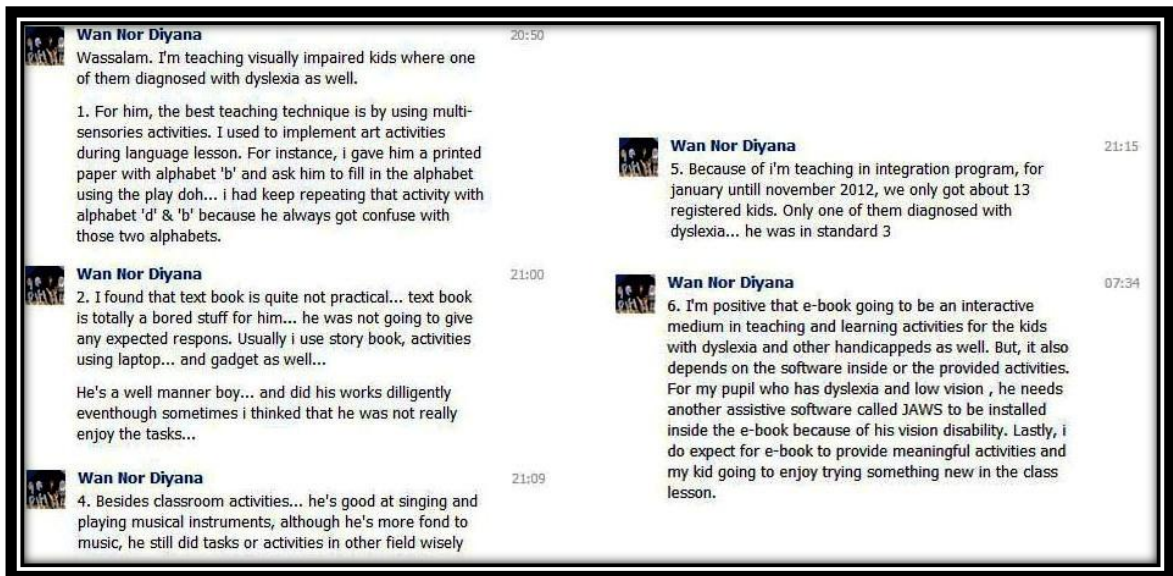
Figure 9: Answers by Teacher 2 in short interview session

Teacher 2

School: Sekolah Kebangsaan Klang, Selangor

1. I'm teaching visually impaired kids where one of them diagnosed with dyslexia as well. For him, the best teaching technique is by using multi-sensory activities. I used to implement art activities during language lesson. For instance, I gave him a printed paper with alphabet 'b' and ask him to fill in the alphabet using the play doh. I had keep repeating that activity with alphabet 'd' and 'b' because he always got confuse with those two alphabets.

2. I found that text book is quite not practical. Text book is totally a bored stuff for him. He was not going to give any expected response. Usually I use story book, activities using laptop and gadget as well.

3. He is a well manner boy and did his works diligently eventhough sometimes I think that he was not really enjoy the tasks.

4. Besides classroom activities, he is good at singing and playing musical instruments, although he's fond to music, he still did tasks or activities in other field wisely.

5. Because of I am teaching in integration program, for January until November 2012, we only got about 13 registered kids. Only one of them diagnosed with dyslexia. He is in standard 3.

6. I'm positive that e-book going to be an interactive medium in teaching and learning activities for the kids with dyslexia and other handicapped as well. But, it also depends on the software inside or the provided activities. For my pupil who has dyslexia and low vision, he needs assistive software called JAWS to be installed inside the e-book because of his vision disability. Lastly, I do expect for e-book to provide meaningful activities and my kid going to enjoy trying something new in the class lesson.

Cikguhijau.blogspot.com   21:34
1. Dua2, cepat bosan dan mudah hilang fokus
2. Sy menggunakan komputer, tayangan slaid powerpoint menggunakan LCD projektor, kad imbasan perkataan dan gambar, kad cantuman perkataan bergambar - mrd lebih berminat berbanding menggunakan buku sahaja.

Cikguhijau.blogspot.com   22:57
3. Majoriti mrd2 sy adalah aktif, malah kadag2 terlebih aktif

4. Budak2 suka benda2 grafik mcm animasi, kartun dsb. Mereka juga suka bersaing antara satu sama lain. Sesama mereka, selalunya mereka suka nak bergaduh dan berebut. YG lebih tua tu, adakah kawan2 mereka yg lebih tua atau org tua spt guru?

5. Sebenarnya mrd2 sy belum ada yg disahkan disleksia. Mereka cuma ada ciri2 disleksia shj.

6. Memang membantu. Halangannya mgkin dr segi kemudahn peralatan ICT spt komputer yg mencukupi, LCD. Wlpun ia e-book tetapi mrd2 masih memerlukan guru utk mengajar mereka. Mrd mgkin blh belajar buat sendiri bhgn latihan yg interaktif dan ini memerlukan peraltan berkaiatan yg cukup.

Figure 10: Answers by Teacher 3 in short interview session

Teacher 3

School: Sekolah Kebangsaan Bandar Baru Sri Damansara, Kuala Lumpur

1. Both, they will get bored and lose focus easily.

2. I am using computer related applications and hardware including PowerPoint slides, LCD projector and combined word-picture interactive cards. These methods are proven to gain more of their attention as compared to use books only.

Figure 11: Sample of text books use by Teacher 3

3. Most of my students are active, sometimes over-active.

4. Children like graphics and animation. They like to compete among each other too, until at one point they will fight with each other just to get what they want.

5. Actually my students are not verified as dyslexic children, they only portray the characteristics of dyslexic children.

6. It really helps. The challenges most probably come in terms of IT applications and hardware. Eventhough it's an E-Book application, the students will require the presence of a teacher to guide them through it. The students may be able to

do the exercises on themselves but then as I mentioned before, this will require sufficient IT support such as having a laptop or computer.

4.2 System Use Case

In this project, the idea is to allow the users to interact with the lessons and activities in the E-Book. Below is the system use case for this project:
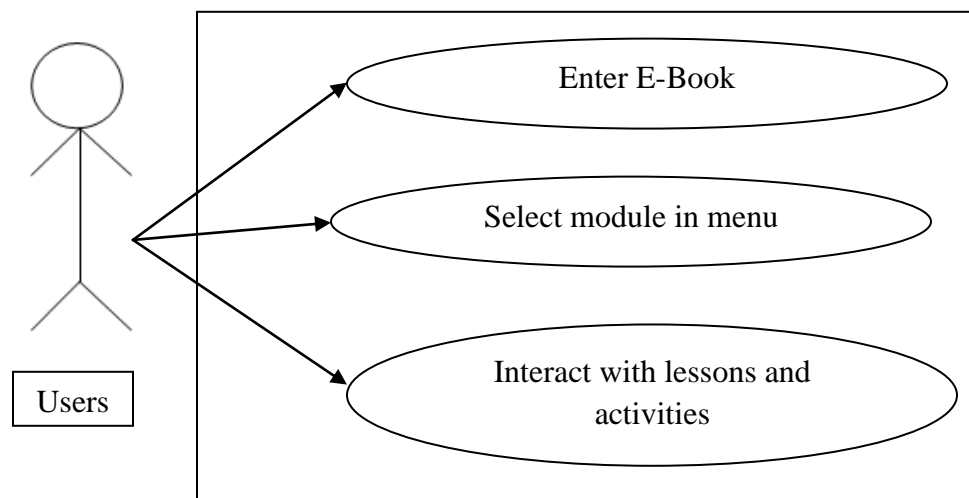

Figure 12: System Use Case

4.3 Storyboard

Figures below show that when user enters the system, the first page which is the welcome page will be displayed. Welcome page consists of label that will display the title of the system, and a button to enter the system. When user click the enter button, system will proceed to next page, which is menu page. Menu page consist of label for the page, and buttons that will proceed to next page which is activity or lesson page. Each button in menu page will display different type of activities. If user clicks the "X" button, the system will proceed to exit page. In activity or lesson page, it will display some graphics, text, or interactive lesson for user. And if user click the below button, it

will go back to previous page. In exit page, user needs to choose between two buttons which are "Yes" and system will terminate, or "No" and system will go back to previous page.
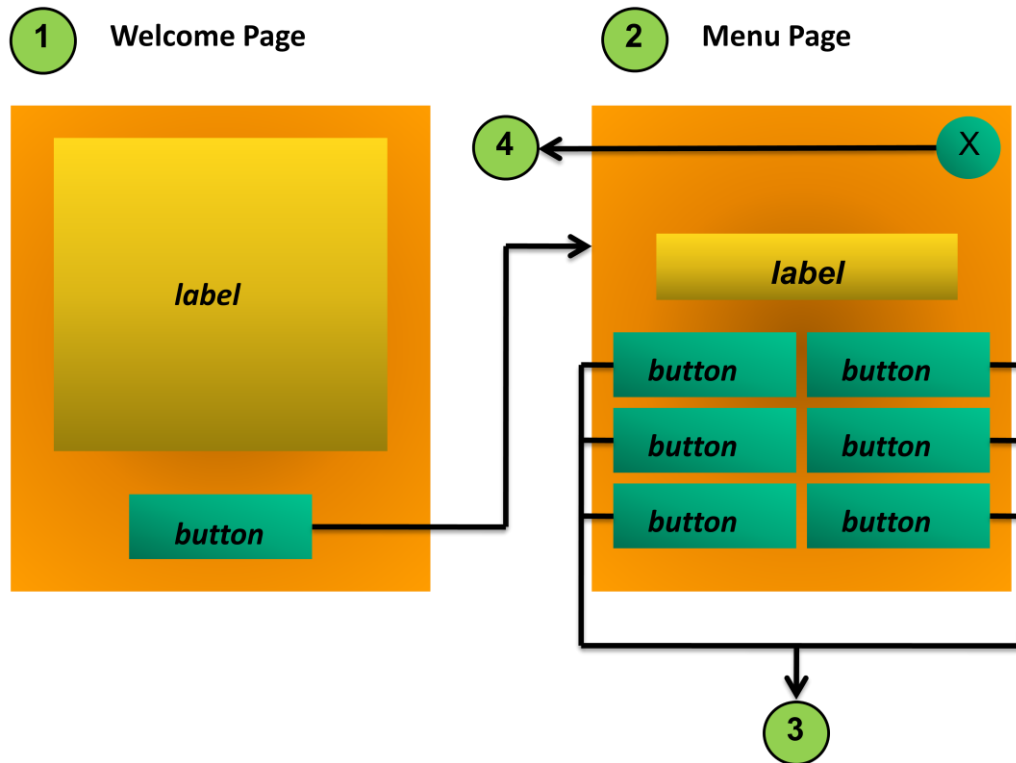

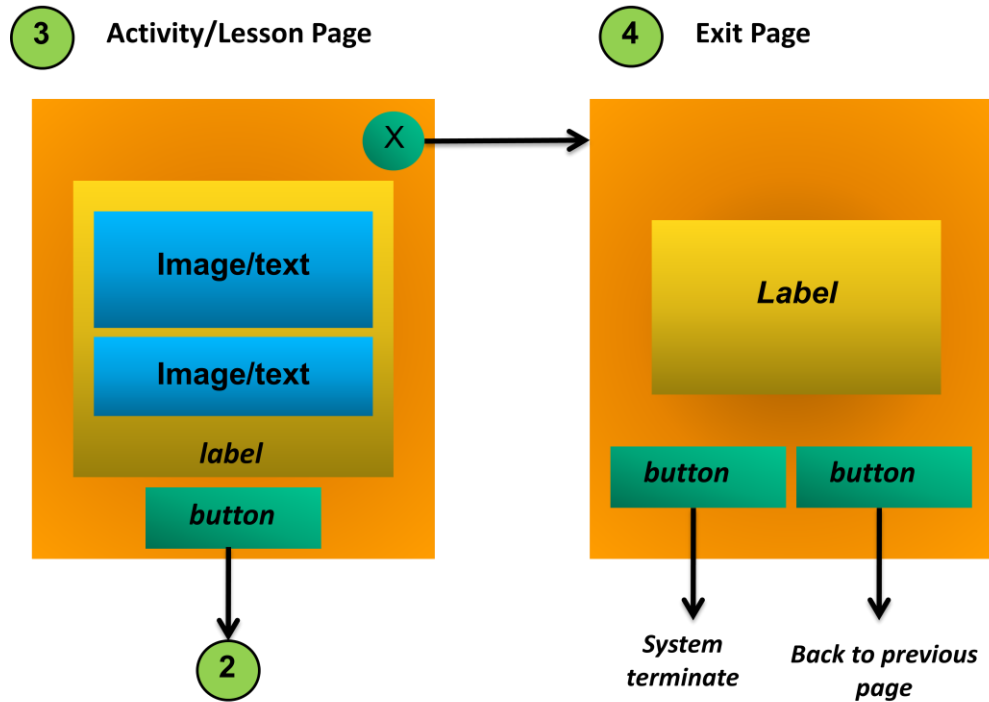Figure 13: Welcome page and Menu page

Figure 14: Activity/Lesson page and Exit page

4.4 System Development and Challenges

The project was started by redefining the literature review and some part of the problem statements, scope of study and methodology. After that the process of software development started. The main purpose of the software is to design an e-book that incorporates animation, audio, and interactive lessons for dyslexic children.

The initial storyboard prototype for the user interface has been completed in previous phase. The user interface had undergone preliminary development prior to the completion of the storyboard design. This user interface is developed using Adobe Flash CS4 and it is designed to be as friendly as possible for kids in general and for the dyslexic children specifically.
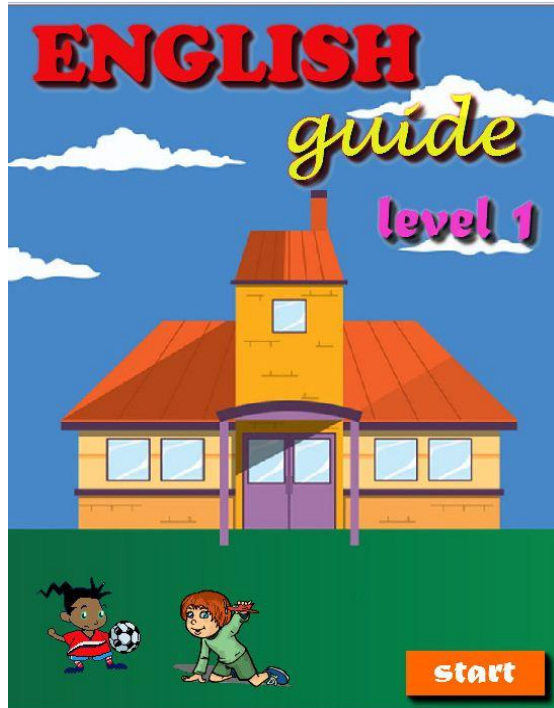
Figure 15: Welcome page

The main idea is dyslexic children will learn English using this E-Book. There will be some exercises like reading, listening, and many more so that the dyslexic children can do to know better about English. Basic English activities will be included in the E-Book that incorporates animation, audio, video, and interactive lessons for dyslexic children. This development is to encounter the problem stated before which is books which are static and contain words with long explanation can become too boring and difficult for dyslexic children to read.

As shown in figure 15, the first page is welcome page. Users will be guided to the E-Book through the 'start' button. The colorful words and photos were designed to suit children's interest and attention to colors. In this page, the design are simple, straight forward and do not involve complicated functions. It is only involves the drag and drop design-process in Adobe Flash CS4. The words and photos are animated by using motion tween function in Adobe Flash CS4, so that children can attract more to use this E-Book after look at the first page.
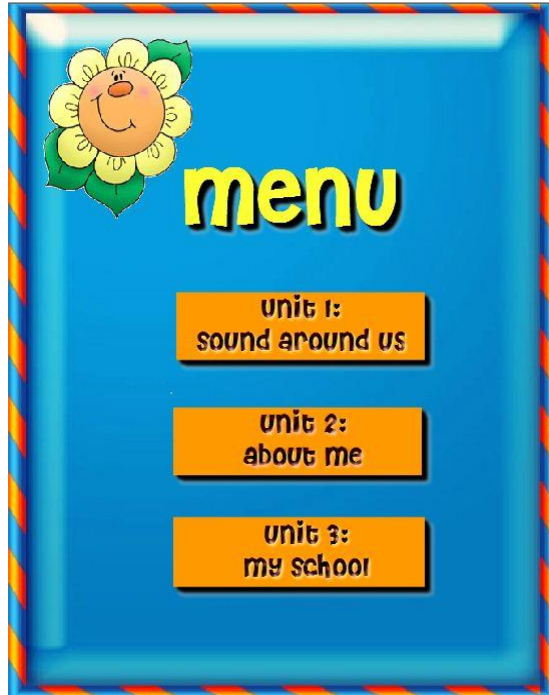
Figure 16: Menu page

In the menu page as shown in figure 16, there are 3 modules provided for users to choose which are; Unit 1: sound around us, Unit 2: all about me, and Unit 3: my school. The modules can be selected by the users by clicking the buttons, and it will lead the users to another page, which is lesson page. The button is being coded using Action Script 3.0. Below is the sample of code snippet for the button:

Figure 17: The button's code snippet

Figure 18: Lesson Introduction page

In the lesson introduction page as shown in figure 18 above, the rabbit character called Bunny is being used to attract children's attention while reading the instructions in the dialog box. There will also an audio for the Bunny's voice that will tell the instruction for the children. Thus, besides the dyslexic children will get bored if they read the instruction, the Bunny's voice will help much to gain their interest. There will 3 main buttons in this page which are; back button, home button and next button. All buttons are being coded using similar codes as shown in figure 17, by using Action Script 3.0.

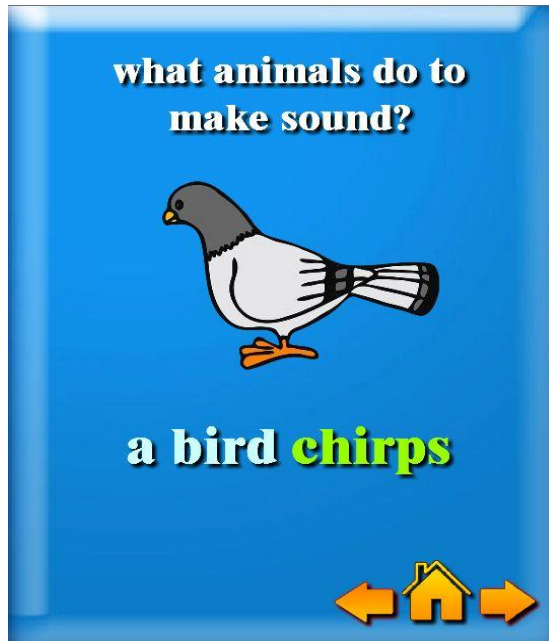Figure 19: Lesson page

As shown in figure 19, the lesson page will consist of colorful photo, a lessons, and buttons. For example, figure 19 shows lesson for the first module which is, Unit 1: sound around us. The lesson will teach the dyslexic children to get know about what animals do to make sound. Instead of just read the lessons, there are sounds that the children can hear during the lessons.
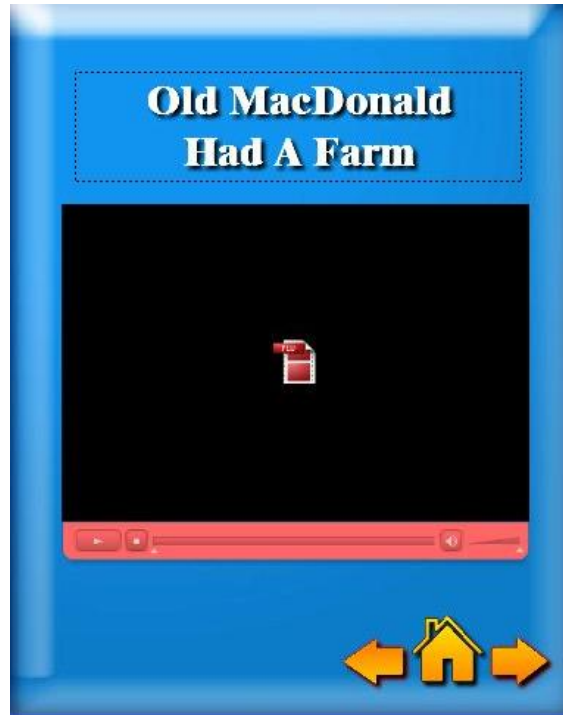
Figure 20: Activity page

Moreover, in figure 20, the activity page will consist of video, and buttons. There is video of nursery rhymes related to the lessons they learn in the lesson pages. The video were put within the interval lesson pages so that before the dyslexic children proceed to next lesson, there will be a short break for them to listen for nursery rhyme and sing together while watching the videos. This kind of activity will attract the children's interest and to make sure they will not lost their focus to learn.

There were few challenges during the development of this E-Book. One of the challenges is the content based itself. In order to put the contents in the E-Book, understanding on how to effectively transfer content knowledge to the dyslexic children is critical to effective multimedia E-Book development. Only few of the children might be exposed to computer-based learning. Therefore, they do not have the experience of using online materials to appreciate the impact of the materials on their fresh minds. So, the suitable, easy to understand and most interactive lessons and activities needed in the E-Book to interact them to use it.

Besides that, dealing with the issue of determining the right difficulty levels for material used in the E-Book also one of the challenges. Perception of levels is dependent on the context in which the E-Book is to be used. Sometimes, materials that are considered as for primary school may be considered as intermediate or even advanced. So, to solve this issue, the content of the materials were simplified, and shorter simple sentences were used. Graphics that illustrated the meaning of some words were also included to make sure that difficult words were explained easily to the dyslexic children.

Furthermore, the next challenge while developing this E-Book is the Action Script 3.0 in the Adobe Flash CS4. Sometimes, when the coding for the Action Script 3.0 got error in the output, the knowledge to solve it is important. The errors occur in the program using Adobe Flash CS4 might be always occurring and time-constraint might give pressure while developing the E-Book.

4.5 Testing Results

The preliminary tests were conducted with two group of tester. This preliminary test is conducted in order to get general opinions regarding the E-Book by people who are related to dyslexic children. The two groups are former dyslexic children who are now adults, and a group of dyslexic school teachers who have experience in handling dyslexic children.

Two adults, who are former dyslexic children and currently studying at Universiti Teknologi PETRONAS, have been asked to test the E-Book. This is done in order to get their opinions regarding the usability and suitability of the E-Book to support the learning process of dyslexic children. These adults are above 20 years old and they are all former Dyslexics, which means that they have experienced Dyslexia during their childhood and in fact, some of them still having minor symptoms of mild Dyslexia such as slow reading.

For the first testing session, these two testers have been asked to use and interact with the E-Book in one session. They will go through the E-Book and fully interact with all lessons and activities. After the testing session has ended, the testers will be interview to tell their experiences in using the E-Book. Below are the summary of their experiences and opinions:

- **Tester 1:** "I think that this E-Book would help the dyslexic children more interested to learn in class because of the excitement lessons and activities provided, rather than use static text book that are boring. It is something new in our education."

- **Tester 2:** "I enjoy using this kind of learning method. I am pretty sure that this is very useful product and dyslexic children will enjoy it too when using it for learning purpose"

For the second preliminary test, the testing session had been conducted with a group of dyslexic school teachers who have experience in handling or taking care of dyslexic children, through email. The previous dyslexic school teachers who had been interview before in research before system development were been communicate through email, and the working principles of the E-Book were explained to them with attached of the E-Book prototype. All of the aspects including the justifications regarding the characteristics of the E-Book, why E-Book is being used, how the E-Book will be used and why it is beneficial for dyslexic children were being explained. Below are the summary of their opinions after tested the E-Book:

- **Teacher 1:** "This is E-Book definitely will help much in learning process of dyslexic children. It is a new learning method, and high technology"

- **Teacher 2:** "It will be good for the dyslexic children and instead of I will give them playing games in the laptop to attract them, I might use this E-Book to teach them learn in class."

- **Teacher 3:** "It is really help me as teacher and useful for the dyslexic children. Both of teacher and children will get the benefit and enjoy using this E-Book."

The results from these preliminary tests shows some potential that the E-Book could support dyslexic children's learning and improve the learning method of education. Based on the opinions from the testers and teachers, it seems like the E-Book can be something complimentary to the current learning process for the dyslexic children. The technology introduced is new in this specific field, and the E-Book that incorporates animation, audio, video and interactive lessons for dyslexic children are elements to help them learn better.

The usability test of the E-Book with real end users will be conduct in upcoming week, because it just got the approval from Kementerian Pendidikan Negeri Perak. The test is planned to be held at a government Dyslexic school, SK Sultan Yusof, Batu Gajah, Perak.

CHAPTER 5

RECOMMENDATION AND CONCLUSION

There are several recommendations to be made regarding this project. Recommendations are not meant to be used to change this project wholly, but to allow improvements in certain aspects and to put some factors into considerations for the development of the E-Book.

One of the recommendations for future plan is to develop E-Book for other subjects and put more modules in the E-Book. By develop it for more subjects and not only focus for English, and also include more interactive modules in the E-Book, dyslexic children can learn more and improve better in their learning process. Text books will makes they bored, so that by using E-Book, teachers at dyslexic school also can replace the text book with this E-Book. This book can help them to cut down oversized textbooks, and simply provide a new method of delivering lessons.

Another recommendation for future plan of this project is, to investigate the effectiveness of the E-Book. After this E-Book has been developed, the effectiveness must be revising and consider the parts need to improve better. This would make the E-Book more successful and useful for future purpose.

As conclusion, the E-Book with animation, audio and interactive lessons has found useful for dyslexic children and it is hoped that the E-Book could support dyslexic children's future in learning, and will improve the learning method of education in Malaysia. By the end of the stage, the system should work fine as it is intended for and the objectives of this project shall be achieved successfully.

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APPENDIX