

Mobile Interactive Courseware for Dyslexic Children

By

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Dissertation submitted in partial fulfillment of the requirements for the

Bachelor of Technology (Hons)

(Business Information System)

JANUARY 2012

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CERTIFICATION OF APPROVAL

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Approved by,

(Dr. Suziah bt Sulaiman)

Universiti Teknologi PETRONAS

Tronoh, Perak

JANUARY 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.

(LUQMAN AFIQ BIN RAZALI)

ABSTRACT

The importance of education shown through words of Barack Obama, President of United States of America, when he said, 'In an economy where knowledge is the most valuable commodity a person and a country have to offer, the best jobs will go to the best educated - whether they live in the United States or India or China'. The word shows very important and obvious message of the need of education in someone's life. The 'Mobile Interactive Courseware for Dyslexia Children' project is a proposed project for Universiti Teknologi PETRONAS undergraduate final year project. Also known as 'YoungLexic', it offers a learning experience for dyslexic children by taking standard learning method that are recommended by Government for dyslexia children to mobile phone. YoungLexic also hoped to benefit the child directly, on the other hand to help parents so that they involve more to their dyslexic child learning process. Using Android OS as the platform of the courseware, the module of 'World of Knowledge' had been chose from a survey done to a group of parents with dyslexic children and topic of "Let's Go to the Farm" hope to make learning more meaningful and purposeful. The relevancy of the project is accepted with the evidence of a survey done to a group of Android developers and a group of parents with dyslexic children that shows that the courseware is attractive, interactive and suitable to be use by dyslexic children. This document elaborates on the scope and purpose of this project as well as the theory and methodology used in developing it.

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CHAPTER 1

INTRODUCTION

1.1 Background

Reading is a very important skills for a human being, it's almost always assumed that an individual who has a certain level of intelligence i.e. has been schooled etc. should be or have the ability to read. However, for someone who suffers with the condition Dyslexia this can be a very daunting experience fraught which difficulties. In order to understand the difficulties they face, we must first understand the condition. Only then, can we begin to cater for their particular needs. Thus it is imperative to read as much Literature on the subject to acquire a broader understanding of the difficulties they face and the solutions which are available to them.

Dyslexia refers to difficulties in learning which include reading, writing and spelling. A lot of research and studies has been made to come out with the most practical ways to help the dyslexic. It's important to treat dyslexic from young age; effective treatment can be given if the dyslexia is recognized sooner. Reading problem can be overcome if the treatments are start at young age, though not as a whole but effective change can be seen in which the child aware of and understands things. With the correct way of teaching – most preferably on mobile device, dyslexia can be treated anywhere, anytime to prepared the dyslexic for standard education in future.

Nowadays, we can see a wide gap of digital divide between those with disabilities and normal people in the sense that much information is still is not very accessible to the former. The use of technical aids to help disabled people is now a common practice. The level of technology employed varies considerably, as does the application for which it is used. With the advancement of mobile phone technologies, people started to believe that mobile phone will someday becoming a small size personal computer. From contacting friends to texting, people are eager to see how far mobile phone technologies can assist them in their life. Mobile applications are thought to have significant potential to transform ways in which technology and curriculum works and relate with each other.

The intention of creating ‘YoungLexic’ is to give more interactive, portable and exciting ways for dyslexia people to learn. The target is for parents of known Dyslexic children that preferably using Smartphone to teach their children. The application system is going to be built on mobile phone that runs on Android OS. Using the linux-based mobile phone operating system (OS), Android, the application can be used in various type of phones in the current market. Besides that, it also aims to redefine learning experience for better learning. It is hoped that the implementation using mobile application is a better approach to citizens, domestic and global.

1.2 Problem Statement

Many applications or courseware that comes compliment with dyslexia books that available for nowadays is undeniable are useful and very helpful. Most of them are fun and comes in many structures like story and games whether it is card games or board games. The use of story-structured and game-structured applications to help children with Dyslexia to overcome the symptoms is supported by every major Dyslexia group. But the problem is, most of these courseware comes in a not portable platform for example, on computer or in CD that to be play on television that are less portable to be compare to mobile phone.

The problem with not being portable is, parents are lacking of informal ways to interact or to help their dyslexic children to studying the same material their children studying at school. There are a lot of other sources that can be used by them to involve themselves in education their own children, but the syllabus might be different from what being teach in school.

There are not much mobile applications that are available in the market that are built specifically for dyslexia children. On top of that, most of these applications are not attractive and doesn't provide the same syllabus as what being taught in school makes parents of dyslexic children hard to be involved in their children's education.

1.3 Objective and Scope of Study

1.3.1 Objectives

- To identify suitable module that can relate to dyslexia children.
- To develop a mobile courseware according to the module.
- To evaluate the courseware with suitable test subjects.

1.3.2 Scope of Study

The scope of study is focusing on the development of mobile courseware that can provide user with suitable module that are provided by Minister of Education Malaysia on Android mobile phone

Since the project is technology based, the author need to do extensive research about the latest trend and behavior of users in different environment with regards to what technology can offer. The most suitable platform to develop this application has also been specified and validated as the project goes along.

1.3.3 Target User

YoungLexic system involves two types of user: Parents and children. The main focus of this project is on preschool children that have difficulties in learning new alphabet that called Dyslexic children. Main propose of this project is to design a courseware that based on Android OS that specially design for dyslexic children at the age of 5 – 10 years old. The student involvement will focus on how they can fully utilize the system in helping them to improve their basic skills at home; besides at school, so that they will be able to cope out with the normal students. Parents can monitor the performance of all students by guiding their children throughout the activities.

All topics in the application will only cover up to preschool learning stage. The information provided would be the most current information produced in an attractive environment that would allow for easy understanding of the material. English language is use as a learning medium.

This courseware not limited for dyslexic children but also for normal children to learn English in a better way and at the same time for parents and teachers.

1.4 The Relevancy of the Project

It is believed that this project is very relevance and can be implemented to benefits pre-school dyslexic. The interactive features of the Android application could assist the children to overcome the symptoms and learn faster in the process. The application will also added more purpose on the usage of conventional Android mobile phone. Last but not least, this project can help many people, not even people who suffer from Dyslexia but also people around them.

Benefits of YoungLexic to children:

- Attractive, fun and educational learning method to ensure understanding and focus.
- Can improve student's learning skills (read, spell and write).
- The lessons, exercises and quizzes provided are very useful which quiet similar to normal school education scopes.
- Improved their motor skills.
- More interaction with parents while they explore YoungLexic.
- Learning On-The-Go

Benefits of YoungLexic to parents:

- An informal educational tool to supplement text books.
- Offers portability; can teach anywhere

1.5 Feasibility of the Project within the Scope and Time Frame

The application shall be completed on time as the author has 2 semesters to complete the whole project. The time span of two semesters is divided into two parts, the report, and implementation. During the first semester, the author focuses more towards the research and the report whilst during the second semester; it is the time for the project design and implementation. This is very crucial moment where the author needs to be able to come out with a working application.

CHAPTER 2

LITERATURE REVIEW

2.1 Dyslexic

The first case of unexpected reading difficulty in childhood was described over a century ago (Morgan, 1896) , but the definition of dyslexia continues to be debated (Lyon, 1995) (Stanovich, 1994) (Tonnessen, 1997). Neurological disorder that interferes in the general ability to read also can be included as the definition of dyslexia. People with dyslexia can be categorized by poor decoding and their poor spelling abilities, that shows in the meaning of the word ‘Dyslexic’ itself, which consists of two Greek words ‘dys’ which mean poor or inadequate and the word ‘lexis’ which mean words (British Dyslexia Association, 2008). To treat dyslexia, counseling sessions or medicines does not involve.

There seems to be general consensus among researchers and educators that dyslexic having difficulties in certain areas. Some symptoms of the speech/hearing deficits and dyslexia that they shared (Wikipedia: Dyslexia):

- Differentiating left from right
- Difficulty in reading
- Difficulty writing words
- Difficulty recognizing or constructing rhyming words, or counting syllables in words (phonological awareness)
- Difficulty with manipulating sounds in words (phonemic awareness)
- Difficulty to differentiate sounds in words (auditory discrimination)
- Difficulty in remembering the sounds of letters (In alphabetic writing systems)

Van Hattum (1980) said that the difficulty to read happened to the dyslexia kids caused by weakness operation of central nervous system. The system for processing audio and visual of dyslexic people are usually 27% smaller than normal people, as explained by Gallaburda and Tallal (1991) in their report title Evidence for Aberrant Anatomy in Development Dyslexia. Although they have intelligence of normal people, these individuals usually have difficulties in reading. It is caused by impairment in the brain's ability to translate images received from the eyes or ears into understandable language. It does not result from vision or hearing problems. It is not due to mental retardation, brain damage, or a lack of intelligence.

Studies shows that dyslexia can be inherited and number of genes are identified to be possible for dyslexia to be carried around in family line. If one or both of a child's parents are Dyslexic the odds are 50% their children will be Dyslexic too. Dyslexia can also skip generations from grandparent to grandchild. There is a gene in human body that indicates Dyslexia (Cause of Dyslexia of Chromosome).

Children with dyslexia have difficulty in learning to read despite traditional instruction, at least average intelligence, and an adequate opportunity to learn.

2.2 Categories of Dyslexic

In 1964, Ingram stated that all dyslexics did not possess the same set of symptoms. Thus, he suggested dividing dyslexia into three categories: visuo-spatial difficulties, speech-sound difficulties, and correlating difficulties.

- **Visual Dyslexic**

Dyslexics suffering from visuo-spatial difficulties fail to recognize groups of letters. They attempt to guess words by shape and not context. This type of Dyslexic refers to person that has troubles in recognizing alphabet, sentences and remembering it. People with this form of dyslexia may also confuse reversible letters like 'b' and 'd' and 'p' and 'q', transfer order of letters in syllables and syllables in words and words in phrases. They may also read words backwards. They have trouble reproducing letters in writing and may confuse letter, syllable and word order.

- **Auditory Dyslexic**

Difficulties in hearing and vision are not the cause of problems in language. Patients who are suffering from auditory dyslexia have difficulties that related to the auditory processing of language. Dyslexics suffering from speech-sound difficulties have problems understanding spoken language. Difficulties arise when breaking words into symbols and forming sentences. These might include difficulties with remembering the sounds that individual letters represent, difficulties with problems with mixing individual words into sounds or processing fast changing sounds, or problems with blending individual words into sounds, problems with remembering the sound of the alphabet, sentences and arranging a full words and sentences. They also have problems in recognizing the sound of the vocal and consonant.

- **Correlating Dyslexic**

Dyslexics suffering from correlating difficulties are unable to correlate appropriate speech sounds to individual letters. This is the worse category of dyslexic where the child have disabilities in processing the alphabets, words, or sentences visually or auditory. Its more or less the combination of both visual and auditory problems.

Example of reading offense by Dyslexic children

- 'ba' read as 'da'
- 'bu' read as 'du'
- 'ja' read as 'ga'
- 'gi' read as 'ji'
- 'su' read as 'cu'

Examples of mistakes in arranging alphabets to make a word

- 'tisu' spell as 'suti'
- 'pasu' spell as 'supa'
- 'buta' spell as 'tabu'
- 'buka' spell as 'kabu'

Example of mistakes in leaving alphabets when spelling difficult words

- 'biola' spell as 'bila'
- 'piano' spell as 'pino'
- 'pisau' spell as 'pisa'

2.3 Dyslexic problems in writing

Apart from communicating verbally or through reading, human do communicate orally. Moreover, oral communication is the highest communication structure and is the most complex of all. Writing skills incorporate visual aspect, motor aspect and ability to form concepts aspect. According to, writing is the main channel for students to show their highest understanding in a subject learnt (Hughes, Mercer, Lenz, & Hoffman, 1991) .

Before anyone can use writing as communication media, they need to master the ability to write in mechanist first, and then they can use writing as communication media with other people. An individual write to express his/her idea and their feeling or anything that they want to convey to others so that it can be read and understandable to anyone.

- Difficulties in using alphabets



Figure 2.1 Example of dyslexia's handwriting

- Difficulties in making syllables

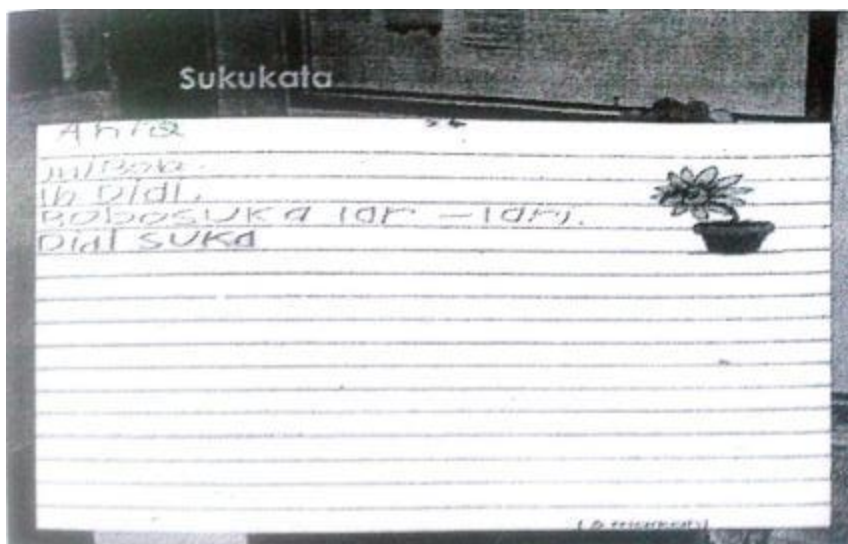


Figure 2.2 Example of dyslexia's work

- Difficulties in making words
- Difficulties in building a complete sentence or paragraph.

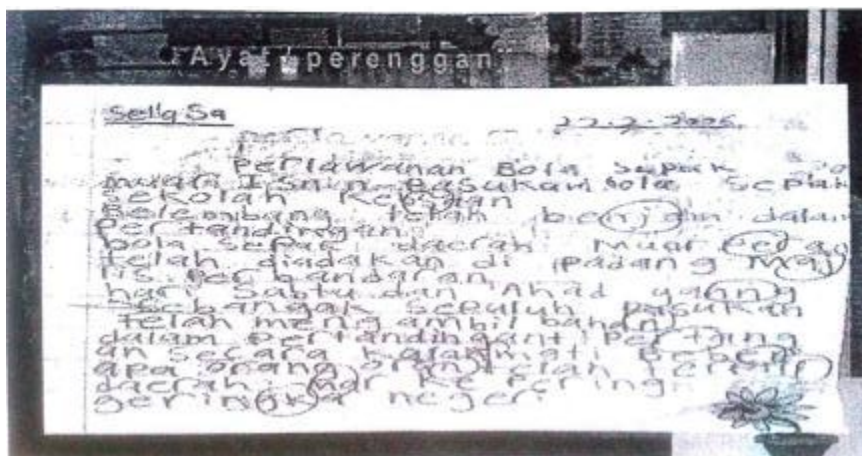


Figure 2.3 Example of dyslexia's essay

- Problems in essay writing

In early stages, there are some problems in Dyslexic children's writing that need to be look into by teachers. Keminsky and Powers (1981), had identify five problems shown by Dyslexic children when writing:

- Visual perception disorder or inability to remember how an alphabet looks like and to write back the alphabet.
- Failure in combining an alphabet visual image with hand motor movement.
- Not good or weak in controlling hand's inner muscle making it hard to write.
- Motor memory is not perfectly synchronized with the brain activities.
- Difficulties to understand the words.

2.4 Different methods to teach Dyslexia

Games

Al Wabil, Meldah, Suwaidan, AlZahrani (2010) comes out with a game called Memory Challenge that uses combinations of audio and visual cues. According to them, children with Dyslexia and attention deficit hyperactive disorders (ADHD) usually have problem of short term memory, yet through remembering, it can be benefit for their learning strategies. Prior to development of the game, an approach has been taken to develop Dyslexic's cognitive skills to design the game. The main focus of the game is developing cognitive skills by teaching children creating strategies to improve working memory.

Adriana, Trentin (2011) prefers games that enable to work with a lot of moving form, the question that search for multiple answers, which it can happen in a group of people. James Ohene-Djan and Rahima Begum (2008) come out with a thesis on Multisensory Games for Dyslexia Children. The strength such as creativity and stronger sensory receptors, that dyslexia have over normal are to be used as part of teaching/learning process when using multisensory teaching as method of teaching.

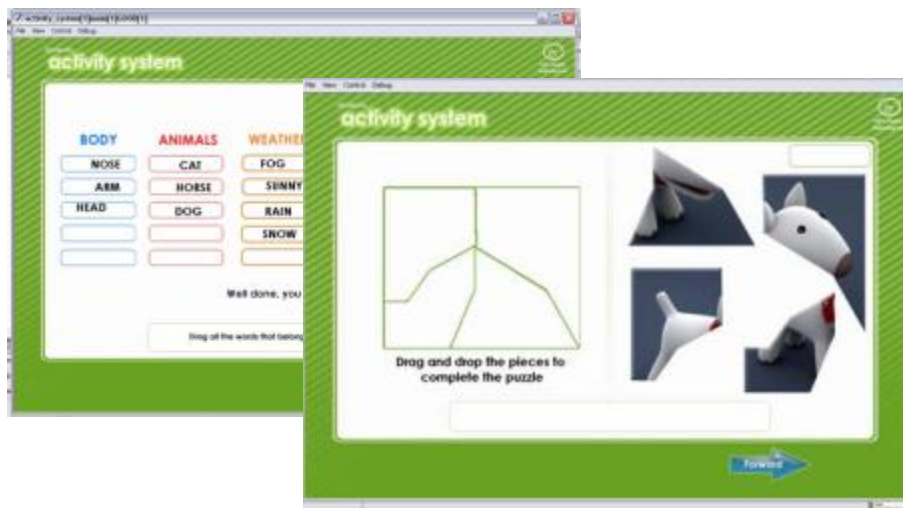


Figure 2.4 Screenshot of Multisensory Games for Dyslexia

Multimedia Courseware for computer

Computer technology has transformed society in many ways. For better or worse, the increasing pervasiveness of computer technology is a reality no one can ignore. Computers are fast becoming integrated into nearly every aspect of daily living. The effects are covering most people nowadays, even people with disabilities. Children are spending an increasing amount of time with computers at school and at home, either normal or Dyslexic children. For Dyslexic children, computer has increase their interest and help in engaging their attention towards acquiring knowledge (Rozita & Azizah, 2011).

Rozita and Azizah (2011) in their report said that the current traditional teaching methods are not suitable for dyslexia. Dyslexia children need to be taught using alternative teaching technique to attract their attention. Rozita and Azizah has comes up with their own courseware using Adobe Flash for children with dyslexia in Bahasa Malaysia.



Figure 2.5 Screenshot of dyslexia multimedia courseware

2.5 Mobile phone technology for the Dyslexia






Rapid adoption by dyslexia of mobile phone, coupled with explosive growth mobile technologies, is forcing developers to develop applications that can help dyslexia. Example of technology implies in mobile that can help dyslexia is, OCR. The system allows machine to automatically recognize character of printed material through an optical mechanism and is converted into an electronic format that can be edited. When it comes to reading, OCR technology has become a high tech tool for helping dyslexia read documents that they have difficulty before (Optical Character Recognition, 1991).

Text-To-Speech technology converts normal language text into speech. Systems for converting from ordinary text into speech were first completed in the 1970s, with MITalk being the best-known such system (Jonathan Allen, M Sharon Hunnicutt, Dennis, Robert C Armstrong, & David Pisoni, 1988). Many projects in text-to-speech conversion have been initiated in the intervening years, and papers on many of these systems have been published. Android has also implemented this technology in their operating system (Wikipedia: Android (Operating System)).

The last application to be discussed is Speech Recognition Software. The software works by converting air compression wave produce when a person talking to digital text in computer. Speech recognition software has been used widely by dyslexia to help them write text messages without any hassle (Wikipedia: Android (Operating System)).

2.6 Mobile Phone Application for Dyslexic Children

As technology evolves, many parents of dyslexic children are looking for support with mobile phone. Mobile applications appear to help in many different ways and are developed by wide range of developers. Some apps have helped family to improve communication, other have benefited the child directly. But apparently, there's only a few mobile application in the market that are built specifically for dyslexic children. Others are usually focusing on normal children but could bring benefit to the dyslexic too. Below are some examples of applications that built for normal children but at the same time could benefit the dyslexic in some ways (DyslexiaHelp: Apps for Dyslexia and Learning Disabilities):

APPLICATION NAME	DESCRIPTION	ICON	MAR KET AVAI LABI LITY
Alphabet Zoo	Alphabet Zoo built to teach children letters and the sound of the letters.		Apple
Bob Books	Learn about connection between letter and sound, learn simple word and spelling.		Apple
Bugsy Pre-K	Children can learn about colours, shapes, letters, phonics, numbers, counting and vocabulary		Apple
Find the Letters HD	Can help to improve child's reading skill, concentration and attention, and position in space.		Apple
First Words Sampler	First Words Sampler teaches kids about letters, how letters relate to sounds, and even how to spell words.		Apple




<u>iWriteWords</u>	Teaches your child handwriting while playing a fun and entertaining game.	 The icon for iWriteWords is a green square with rounded corners. It features a yellow pencil character with a smiling face and a crown on its head, positioned diagonally. To the right of the pencil is a white lowercase letter 'a' on a green circular background.	Apple
Montessori Crosswords	Helps kids develop their reading, writing, and spelling skills by building words	 The icon for Montessori Crosswords is a blue square with rounded corners. It is divided into four quadrants: the top-left quadrant shows a black and white cat's face, the top-right quadrant shows a red uppercase letter 'C', the bottom-left quadrant shows a blue lowercase letter 'a', and the bottom-right quadrant shows a red lowercase letter 't'.	Apple
Spelling Bee	Spelling Bee helps children to spell words	 The icon for Spelling Bee is an orange square with rounded corners. It features a cartoon bee with a yellow and black striped body, white wings, and a smiling face.	Andr oid

Table 2.1 Example of mobile applications suitable for dyslexic children

CHAPTER 3

PROJECT METHODOLOGY

To make the project more organized, the project has used framework that comprises of five (5) phases which are the planning phase, analysis phase, design phase, development phase and the evaluation phase.

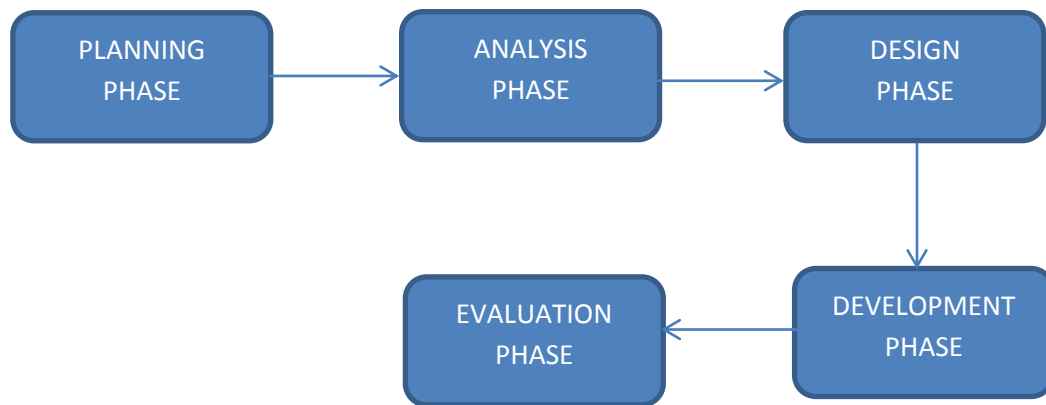


Figure 3.1: Project Methodology

3.1 Planning Phase

In this phase, we only focus on looking for information in regards to the project title. Journals, previous research papers, web-site articles, and books are widely used in this phase to strengthen the knowledge about the subject of this project and research scope. The main resource of journal and research papers comes from IEEE website www.IEEE.org, Wikipedia www.wikipedia.com and ACM provided by UTP information Resource Centre (IRC). In this phase also, we set our plan on the application need to be develop and come out with ideas that can be passes to the development phase.

The planning activities from this phase used as the baseline to monitor the project progress by stages. A Gantt chart on the project schedule is crafted to ensure enough time is given for specific task and project would be able to be completed in time projected.

3.2 Analysis Phase

The purpose of doing analysis is we want to analyze and organize the data and information that has been gathered. When the analysis of the project has ended, the designer should know what prototype will look like and its function. This should give guidance to the developers when developing the product. The author had analyzed current applications (mobile apps, computer courseware) related to the topic and find the most suitable method to be implement in the application. During analysis phase, several steps are taken into consideration.

- Information gathering are done by making interview and distributing surveys about the most suitable module to be used in the application.
- The author analyzed current applications (mobile apps) and other suitable courseware related to children with dyslexia and sees whichever method that suitable to be used in the planned courseware.
- The author used Youtube website www.youtube.com to gather information about dyslexia too. The information gather usually comes from Youtube channel 'dyslexiamom'.

3.3 Design Phase

The info in the analysis phase will be used in the design phase where users and technical resources will be involved throughout the process to ensure all requirements are incorporated into the design. This is vital because the design has to be valid according to what users prefer and the nature of the scope.

3.3.1 Graphical User Interface

Graphical user interface is very important when building an application/courseware for children to attract their attention, and its far crucial if the application/courseware are meant to be built for dyslexia children. The GUI has to capture user interest to use it. Before the applications are built, the system flow design and design prototype are drawn into a piece of paper and evaluated by author's Android developer cliques to ask about suitability of the GUI to children.

3.3.2 Physical Design

The project is going to be built on author's personal computer DELL Inspiron 15r that running on 2nd generation i5 processor. The choice of browser to build the courseware is Google Chrome. Adobe Photoshop is used to create an attractive user interface for its picture editing capabilities.

3.4 Development Phase

In the development phase, all the deliverables that is gathered in the design phase will be converted to a complete and executable prototype. Given the architecture document design and analysis phase, we should build exactly what has been requested, though there is still room for innovation and flexibility. The prototype developed will be tested by stages in a systematic manner. The project has adopted the methodology of Rapid Application Development (RAD) prototyping to develop the system. The reason of using RAD is to respond to the need to deliver the project fast due to time constraint. This methodology is usually used when process likely to be changed as the project proceed.

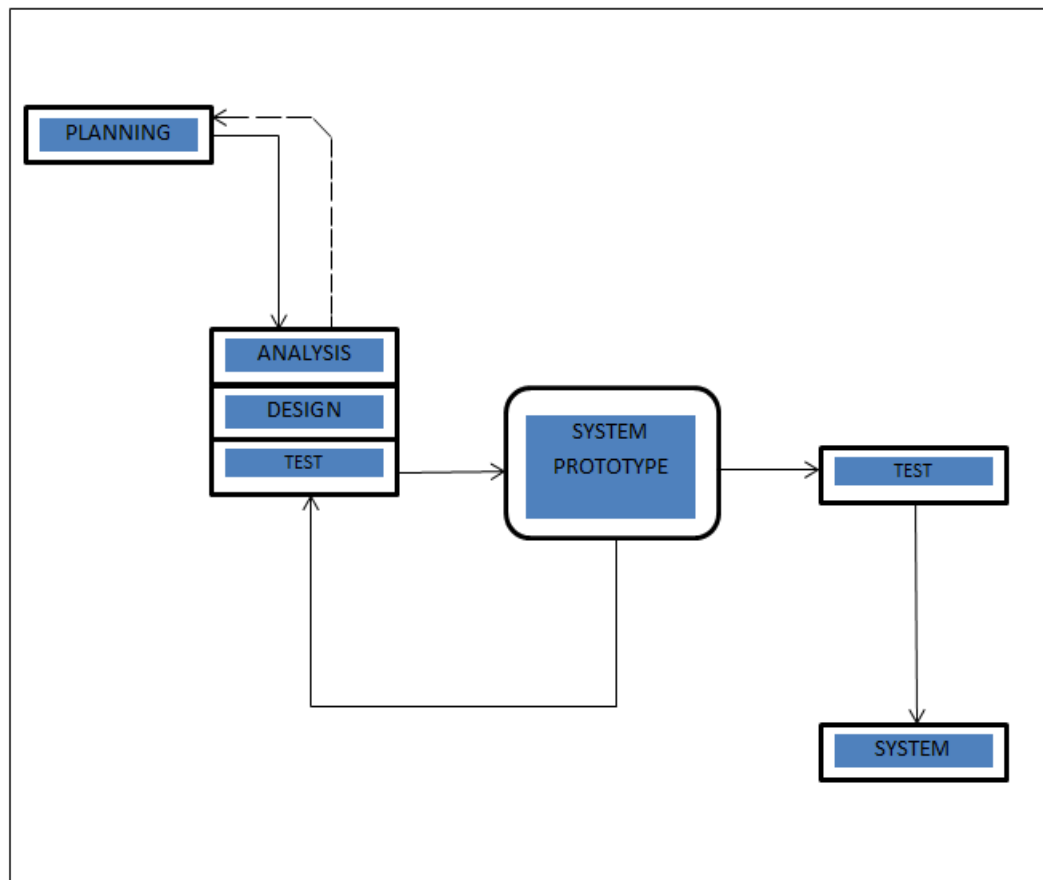


Figure 3.2 RAD Prototyping

The development process starts with planning where we mainly focus on gathering critical information in regards to the project.

The analysis, design and implementation phases performed at the same time and on each cycle in producing a prototype of the project. In these stages, requirements are verified using prototyping, eventually to refine the data and requirements gathered.

These stages are repeated; further development results in a technical design statement to be used for constructing the project.

The purpose of doing analysis is we want to analyze and organize the data and information that has been gathered. The phase provides extensive information gathering and analysis of each details of the project. The final stage of the analysis is to organize the information into documents that will guide the works during the rest of the project implementation.

When the analysis of the project has ended, the design suitable for the prototype should be available. This design is crucial in order to further support the system development, where the design will be used as blueprint for the development of the overall system. The info from analysis phase will be used in designing the product where users and technical resources will be involved throughout the process to ensure all requirements are included in the design.

Test phase is the phase where the project is going to be forwarded to evaluation phase of project development and going to be put on tested on several printed documents and text signage and compares the results. The angle of the pictures taken is going to be taken as consideration when going on with the test.

The project is also hope can tested on several subjects that suffered from dyslexia. The advantage of using prototyping is that, developer will be able to modify the system at an early stage of system development to overcome any shortcomings, and enable them to test the prototype continuously.

3.5 Evaluation Phase

In this phase, the prototype developed from the development stage will be evaluated by the target audience which is the dyslexia. The purpose of this phase is determined the value or worth of the instructional program. This phase is actually conducted during and between all the other phases.

3.6 Project Activities

The beginning of the project has been involved with activities on theoretical reading to increase knowledge and understanding about the project. During the stage, some effort are being used to get familiarize with Android application development. Mobile application inventor namely AppInventor are made into subject as platform to build the application. There are also several activities done to ensure relevancy of the courseware built to the user.

a. Interview

Interview is the most common and direct method to gather information and play a very important part of research. Interview with parents of dyslexic children brings a lot of important information for the development of the courseware. Interview with some Android developers helps author in many ways including motivating and help in development. The interview make with fellow Android developer give an idea to author to use AppInventor as platform to develop the application.

b. Discussions

Throughout the development of the courseware, discussion has been made with some parties mainly with the supervisor of the project itself which brings a lot of positive impact to the development of the courseware. Other discussion include with some parents of dyslexic children to get some information about dyslexic and to conduct survey regarding the project. Also to be included is discussion with fellow Android developer to ask for advice on developing the courseware. The activity is important to ensure the project feasibility.

c. Gathering Information

Information used in the development of the courseware comes in many sources. Most information comes from literature review to understand dyslexia at the first place. The usage of internet has helped a lot to gather information for survey and interview as mainly of those activities are done through internet. Author had watched a lot of Youtube videos regarding dyslexia to gather more information on it.

d. Development of the Courseware

One of the biggest challenges faced by author throughout the project comes from the development of the courseware itself. Data gathering from other activities are used to develop the product. A lot of help needed to build the application mainly comes from sources from the internet or tutorial provided by experts on Youtube.com.

3.7 Key Milestone

Below are the key milestone that need to be achieve throughout both of the semester of final year project 1 (FYP I) final year project 2 (FYP II).

Semester 1

Milestone	Week
Project Proposal	Week 3
Extended proposal (10%)	Week 6
Proposal Defense (40%)	Week 9
Interim Report (50%)	Week 11

Semester 2

Milestone	Week
Progress Report (10%)	Week 7
Pre-SEDEX (10%)	Week 10
Dissertation (40%)	Week 12
VIVA (30%)	Week 13
Technical Report (10%)	Week 14

3.7.1 Gantt Chart

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Items	21/5 - 25/5	28/5 - 1/6	4/6 - 8/6	11/6 - 15/6	18/6 - 22/6	25/6 - 29/6	2/7 - 6/7	9/7 - 13/7	16/7 - 20/7	23/7 - 27/7	30/7 - 3/8	6/8 - 10/8	13/8 - 17/8	20/8 - 24/8
Planning														
Discussion with SV														
Prepare/ edit Gantt Chart														
Data collection														
Interview with social traveller/tourists														
Distributing survey questions														
Data compilation and result identification														
Data documentation														
System analysis														
Understand the current tourism websites														
Evaluate the feasibility of proposed system														
Design and development														
Draft the system flow														
Design system components														
Design system prototype														
System testing														
Evaluate the system														
Progress report														
Pre-SEDEX														
Dissertation														
VIVA														
Final dissertation														

Table 3.3 Gantt Chart

3.8 Tools and Equipment used

3.8.1 Hardware

This courseware is going to be developed on affordable, multifunction Android smart phone. Samsung Google Nexus S running on Android version 4.1 JellyBean is going to be used for development of the system but there is still room for more advancement to change, like for example, using latest Android version or using Galaxy Tab in the future.

Android is a linux-based operating system (OS) that is designed and published by Google, a search engine and internet giant (Wikipedia: Android (Operating System)). By providing an open development platform, Android offers developers the ability to build innovative applications. Developers are free to take advantage of the device hardware. Most mobile phone and smartphone manufacturers nowadays choose to develop their mobile phone to work on Android OS. The main advantage of Android based mobile phone is the OS is offered in various kind of nowadays popular mobile phone brand, mainly like HTC, Motorola and Samsung.



Figure 3.3: Android OS on various brands of mobile phone

Android was listed as the best-selling smartphone platform worldwide in Q4 2010 by Canalys with over 200 million Android devices in use by 2011. As of December 2011, there are over 700,000 Android devices activated every day (Wikipedia: Android (Operating System)).

3.8.2 Software

- 1) Google AppInventor (Beta Version developed by Google Inc but now maintained by Massachusetts Institute of Technology)
- 2) Adobe Photoshop CS3
- 3) Microsoft Office 2010
- 4) Android Software Development Kit (SDK)
- 5) Google Mail (gmail) – for survey purposes
- 6) Windows 7 Home Basic Operating System

3.8.3 Android Development using MIT AppInventor

For this project, all development of the courseware is built using MITAppInventor. App Inventor lets people to develop applications for Android phones using a web browser and either a connected phone or emulator. The App Inventor servers store the work and help to keep track of the project.

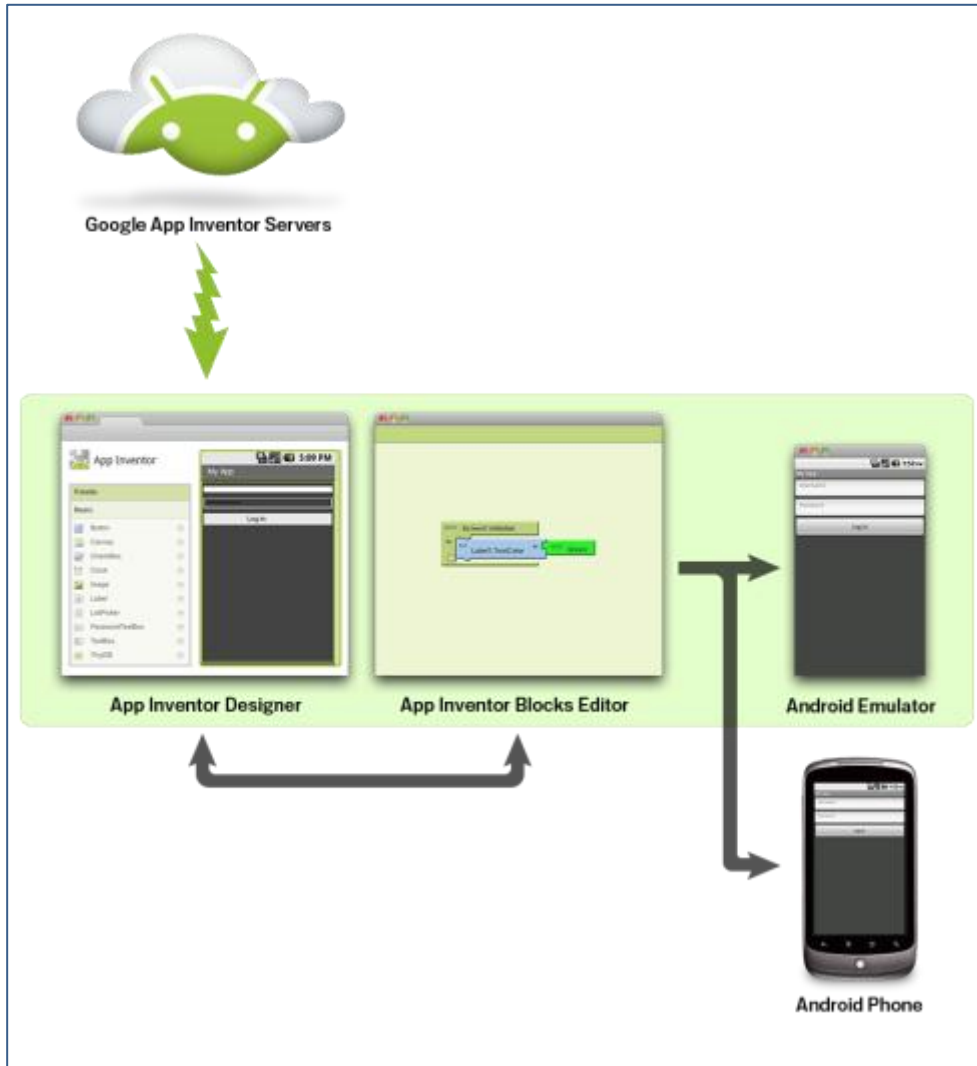


Figure 3.4 AppInventor process flowchart

Source: <http://explore.appinventor.mit.edu/content/what-app-inventor>

With AppInventor, applications are built by working with the App Inventor Designer. Designer section is where developers select components for the app.



Figure 3.5 AppInventor Designer

For the design to work, App Inventor needs the App Inventor Blocks Editor; where the developer assembles program blocks specify how the components in the designer should behave. The assembling process is like fitting pieces of puzzle together. All actions are saved in AppInventor server.



Figure 3.6 AppInventor Blocks Editor

CHAPTER 4

RESULT AND DISCUSSION

4.1 Interview – Phone Interview

4.1.1 Method

Interview is the most common and direct method to gather information. Analysis of user requirements is gathered by using interview technique, so that the initial concept of the whole system can be figured out. This includes improving the existing software for dyslexic children and what the system should do.

The information obtain from the interview will be the basis of the functionalities of the courseware built. The result will be fleshed out further in the system, analysis and design.

The objective of having interview was to find out basic requirements needed for the courseware in order to provide an effective learning tool for dyslexic children. The form of interview is open ended with several parents. The author also suggest some possible method that can be used in the courseware that are gathered from various sources; ie:- Youtube.

As part of the study, all interviewees are kept anonymous and no personal identity is kept. Each interviewee will be recognizing with an ID for analysis purpose.

The methodology of the interview is as follows:

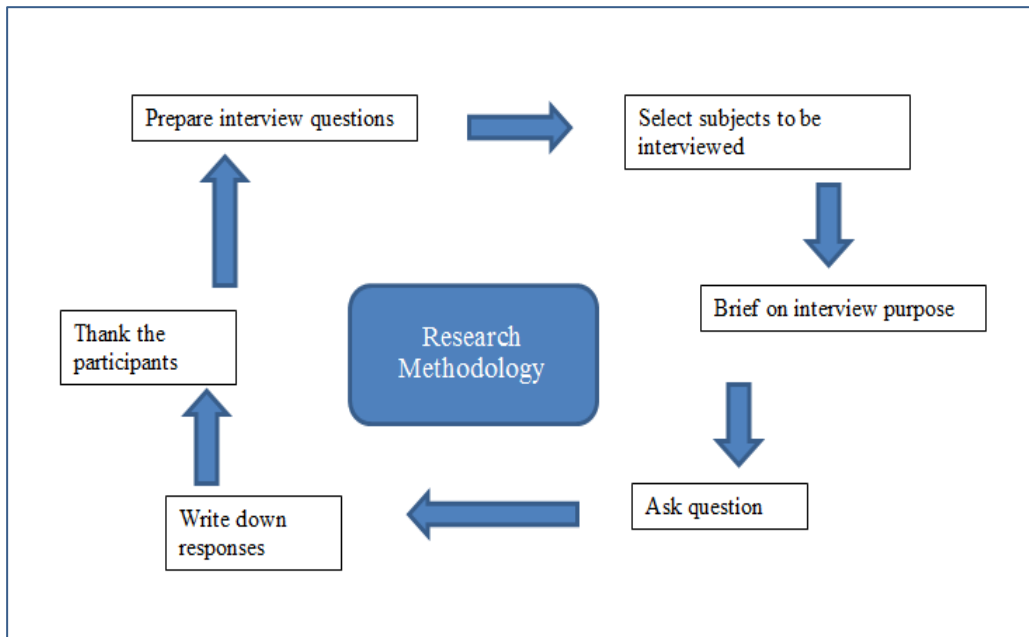


Figure 4.1 Interview Methodology

1. Prepare Interview Questions

The interview questions are selected based on requirement of developing application or courseware of dyslexic children.

The method chosen for interview is Structured Questions with Open-Ended Questions. There are also question about their acceptance to author's suggested method that are possibly going to be used in the courseware. Participants are also will be given a chance to come out with any idea of method that they think will be beneficial to the dyslexic children.

METHOD SUGGESTED	SOURCE
Remind Back Technique	<u>Modul Kursus Pendedahan Bermasalah Pembelajaran Spesifik Disleksia Kementerian Pelajaran Malaysia</u>
Discrimination Technique	<u>Modul Kursus Pendedahan Bermasalah Pembelajaran Spesifik Disleksia Kementerian Pelajaran Malaysia</u>
Connect The Dot (Copying)	<u>Modul Kursus Pendedahan Bermasalah Pembelajaran Spesifik Disleksia Kementerian Pelajaran Malaysia</u>
Arrange Word	http://www.lda-dyslexia.org.uk/
Spelling Technique	Youtube: Spelling Technique for Dyslexic Source: http://www.youtube.com/watch?v=-CpZAH6eIlc

Table 4.1 Method Suggested

2. Select Individuals for Interview

Selection of the interviewees is made through contacts from author's friends. Author contact those selected interviewees via the phone. The participant should possess an Android mobile phone to try out the prototype of the courseware.

3. Brief on Study Purpose and Consent

A briefing of general information on the objectives of the study is given to the participants, and the consent form is given saying that no personally identifiable information will be kept.

4. Ask Questions

Initial questions are prepared based on the requirement and participant will be given some amount of time to answer the question given.

5. Write down responses

The information given by the participants is recorded. Each of these records will be linked to a participant record ID.

6. Thank the participant

. **See Appendix A – Interview Questions**

4.1.2 Interview Result

The participants involved in this interview are parents of dyslexic children. The author asked question based on the preparation made in the methodology.

Most participants interested to try to use the mobile application to their children and agreed that mobile application is one of the technologies that they are eager to tried on to their child. They believe with mobile application, their dyslexic child can overcome their problem faster.

Participant 1 emphasized on the importance of the courseware builds to be attractive to catch the children attention. He mentioned that he tried several mobile applications that are available in the Android market but he not really satisfied with the applications available is not attractive enough and easily bores his dyslexic child. He agreed to the purposed method suggested.

Participant 2 also emphasized on the importance of building an attractive courseware. He also mentioned that most available mobile application that are based on game is quite interesting, something that the author should tried on, but the objective of the courseware build is an educational courseware that to replace the old ways of using CD that comes as compliment when buying books, so it is not suitable to make a game-based application. He agreed to the other purposed method suggested.

Participant 3 emphasized on the importance of using sound to stimulate the brain of the dyslexic children. For her, sound has help her dyslexic child learnt faster. She also added the aid of picture will be helping a lot too. He agrees with most of the method suggested but not agrees with the idea of using discrimination method and reminds back method.

Participant 4 also agreed on the idea of make it interesting by putting more graphics because children will definitely like it. He also adds that more exercise added would be good. He rejected the idea of make it mobile as he still prefers using books. But the author explained that the projects can be continued in the future to add more exercises to make it more resembles dyslexic exercise books in the form of mobile. He agrees with the methods suggested by author.

Choose suitable module/theme for the courseware

The objective of this section is to choose suitable module based from module listed by Minister of Education Malaysia in order to make learning more meaningful and purposeful that most suited to the need of dyslexic children. The module is going to be the backbone of the courseware build.

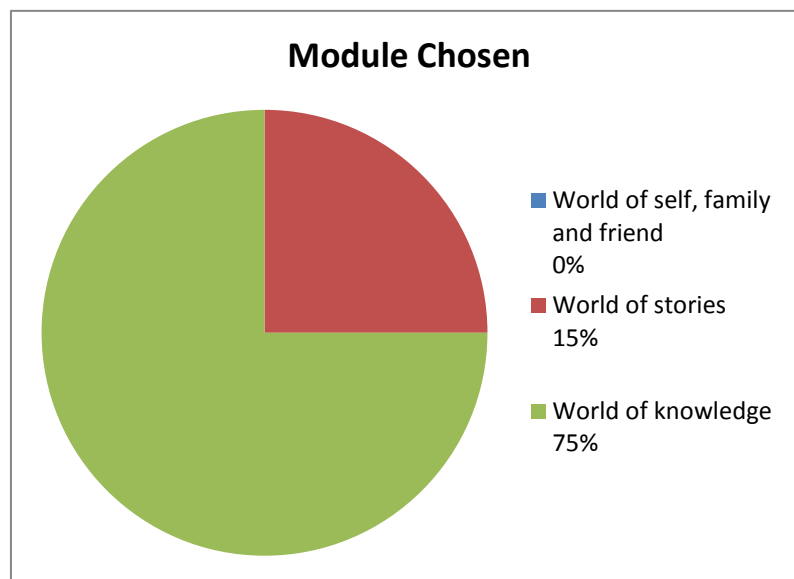


Figure 4.2 Module chosen by participants

4.2 Data Analysis

Requirement Analysis

The analysis of the data for the interviews brought me to several conclusions about the chosen requirements.

Feature	Participant ID			
	1	2	3	4
Implementation of Sound and Image				
Acceptance to method suggested				
Attractive/World of Knowledge				
Mobile				

Table 4.2 Tabular Analysis of Interview for Requirements

1. Implementation of Audio and Image

All of the participants agree that implementation of image and sound can help the dyslexic children to overcome their problem faster that could impact in the rate of learning. Sound and image will have to be integrated through the system through either sound of the image or narration throughout the courseware. Some of the quotes highlight the importance of sound and image:

“An example that I can give about sound and image implementation is when there’s an image of a guitar, the system can make the sound of the guitar while the children learn about guitar. Narration throughout the courseware would also be good.” –participant 3

Implementation of sound in the application needs a lot of recording and it’s going to require a lot of memory space from the AppInventor.

Iteration 1: **Requirement is feasible for implementation, and is accepted.**

Iteration 2: In the 2nd iteration, this requirement has been analysed in terms of the AppInventor allowed memory size. AppInventor only allows size of application built to be under 5mb. The implementations of images are already taken a lot of space so it is impossible to add a lot of sound to the courseware. Sounds are implemented in certain part of the courseware. The requirement is changed to ‘**Requirement is Change and Complete**’ from current prototype, and highly recommended to enhance it in the future.

2. Implementation of methods suggested by author to be used in the courseware

The next requirement is the most important requirement of all. The methods suggested by author are widely being used to teach dyslexic children. Most of the participants involved with the interview agree with the method suggested by author to be used in the courseware.

Iteration 1: **Requirement is feasible for implementation, and is accepted. All of the methods suggested is suitable to be use.**

Iteration 2:

After much consideration, all the method suggested is going to be implemented in the 2nd iteration. Another method suggested by a participant also going to be added in this version which is 'Mix-Match', where the user has to mix-match the picture of animal with its respected name provided. The requirement is changed to '**Requirement is Change and Complete**'.



Figure 4.3 Screenshot of Mix-Match activity

3. Implementation of ‘World of Knowledge’ module

In order to make learning more meaningful and purposeful, the courseware should be presented under themes and topics which are appropriate to the children. For that, the next requirement, just like being said before, is going to be the backbone of the courseware. The courseware is going to be build based on ‘World of Knowledge’ module or theme.

Iteration 1: **Requirement is feasible for implementation, and is accepted.**

Iteration 2: After much consideration of the topic that should be choose under the module ‘World of Knowledge’, the author have chosen the topic ‘Let’s go to the Farm’ for the courseware where the user learnt about animals that are in a farm. This **Requirement is implemented throughout the courseware.**



Figure 4.4 Screenshot of main page

4. Mobility

All the participants involved in the interview agree with the initial objective of the project, to make the courseware mobile. Most of them believe that mobile application or courseware can help the children to learn more, anywhere and anytime. This could give advantage to the parents as well as they can spend more time to observe how well the kids do at school by mentoring the children while they using the courseware/application.

Iteration 1: **Requirement is feasible for implementation, and is accepted.**

Iteration 2: **The completed prototype is built on Android mobile phone.**

4.3 Comparison of YoungLexic with current available mobile applications.

YoungLexic is compared with current available applications that are suitable to dyslexic in the market. Although there are a lot of applications that are suitable to be use by dyslexic children to assist them in learning, but as discuss in literature review, apparently, there's only a few mobile application in the market that are built specifically for dyslexic children. One example of mobile application that is built specifically for dyslexic children is 'Dyslexia Like Me' that is only available for Apple market. But the application is not for educational purpose. 'Dyslexia Like Me' is an interactive children's book about understanding and overcoming dyslexia.

There are some applications that are not specifically build for dyslexic children but can also be applied for the educational purpose of them. Most of these applications are focusing on teaching the children about words by providing exercises that based on introduction to alphabets and word spelling. The examples of these applications are AlphabetZoo, Bob Books, First Word Speller and iWriteWords Lite. The applications mentioned are only available in Apple market only. Below are the screenshots of AlphabetZoo and Bob Books app and some points that can be enhanced to make the courseware more focusing on dyslexic children.

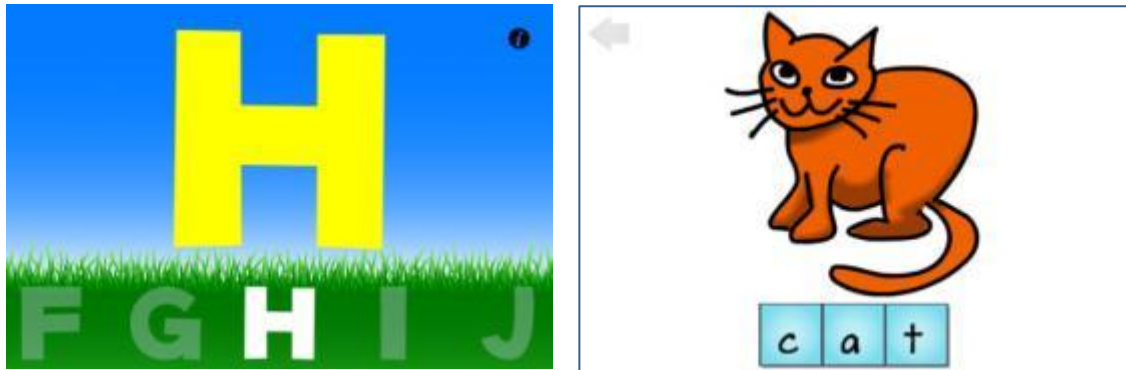


Figure 4.5 Screenshot of Alhabetzoo and Bob Books

From the applications explained above, studies have to be made to make sure the YoungLexic is more focusing and more useful to dyslexic children. Although the concept of teaching dyslexic children and normal children are quite the same, YoungLexic have to focus on applying the most suitable learning method for dyslexic children. That is why YoungLexic has a more unambiguous and clear objective to develop mobile application courseware to be in-line with school syllabus as a start. More activities should also be included in the courseware built to make it more attractive and fun.

4.4 System Use Case

For this use case, the actors that are going to be involved are the user of the courseware which will directly access it. The courseware will allow the user to choose activities. User main actions would be answering the questions provided in the courseware.

Iteration 1:

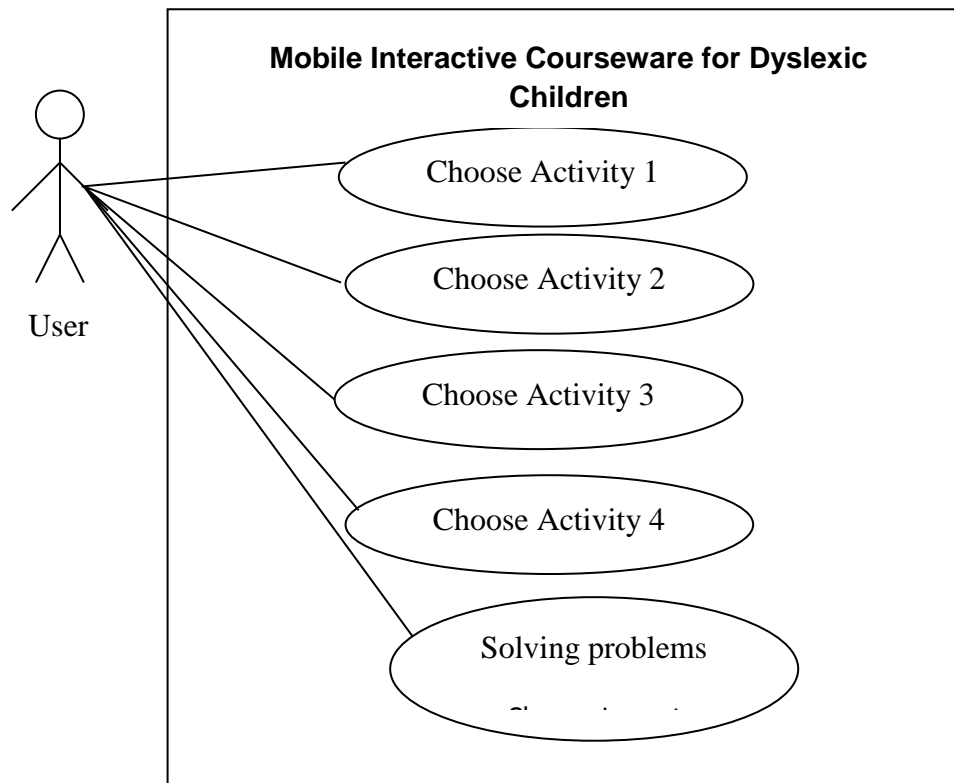


Figure 4.6 Use Case for prototype (Iteration 1)

The user can perform 4 functions within the system

1. Choose Activities 1 – A button click by user will link to Activity 1
2. Choose Activities 2 – A button click by user will link to Activity 2
3. Choose Activities 3 – A button click by user will link to Activity 3
4. Choose Activities 2 – A button click by user will link to Activity 4
5. Answering question

Iteration 2:

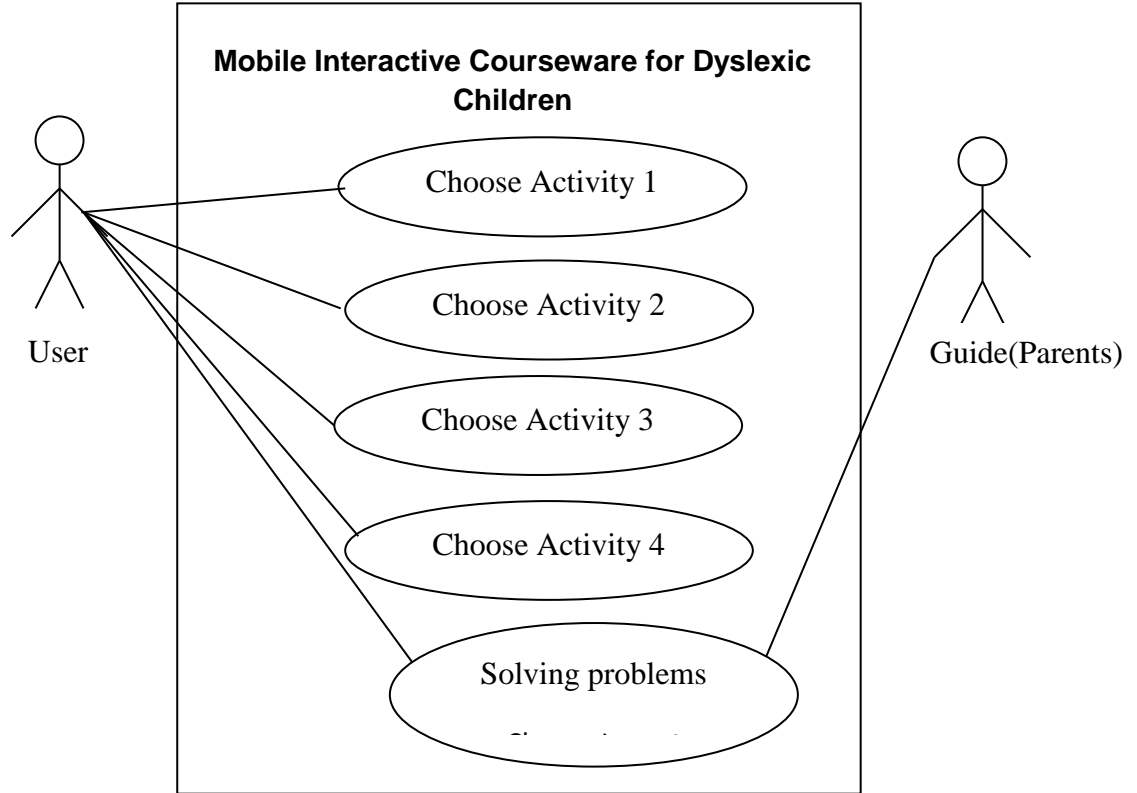


Figure 4.7 Use Case for prototype (Iteration 2)

In iteration 2, it is refined that the users are divided into 2, where there is a blind user as well as a guide to help the blind user.

The guide can perform a action within the system:

1. Solving Problem – The guide/parent help user to solve problem.

The blind user can perform other functions within the system:

1. Choose Activities 1 – A button click by user will link to Activity 1
2. Choose Activities 2 – A button click by user will link to Activity 2
3. Choose Activities 3 – A button click by user will link to Activity 3
4. Choose Activities 2 – A button click by user will link to Activity 4
5. Answering questions

4.5 System Flowchart

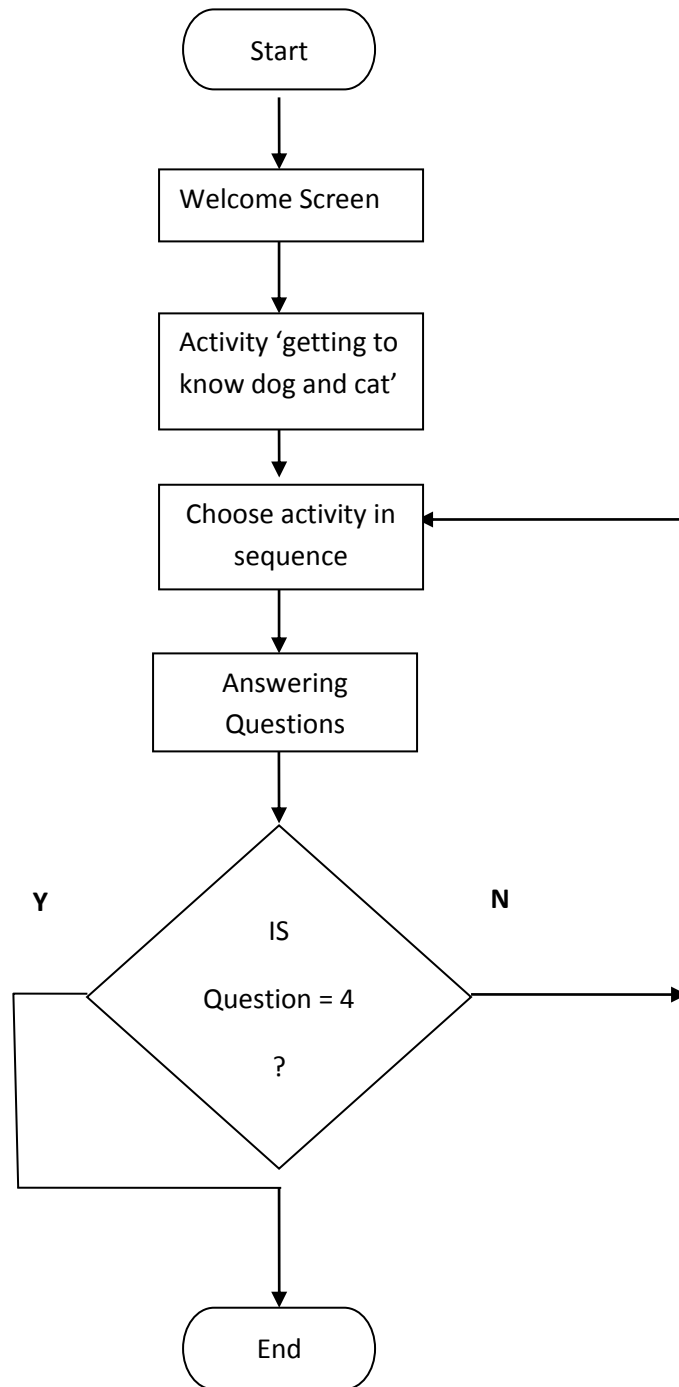


Figure 4.8 System Flow Chart

The process begins with the user accessing the courseware, which will bring to the Welcome screen. From there, the user would click start button and will be presented with Introduction page where the user will started to know two animals, dog and cat. In this section, the user will have to go through first activity which is connecting the dot. Guide/parent can assist the user in the activity. After that user will be lead to Choose Activity page where the user has to choose activity based on sequence from 1 to 4. The guide will assist the user in those 4 activities. After finishing all 4 activities, Finish page will appear and the user can exit the program.

4.6 Storyboard Interface

4.6.1 Starting Page

Welcome Page

The system starts out in the welcome page which contains the title of the courseware. The user clicks 'start' to continue.

Iteration 1:



Figure 4.9 Screenshot of Welcome Page (Iteration 1)

Iteration 2: Make changes with the UI to make it more interesting



Figure 4.10 Screenshot of Welcome Page (Iteration 2)

The welcome page is the most important page of the courseware. It is the page to briefly explain the objective courseware. The title of the courseware is clearly shown in the introduction page. The objective of choosing a module to be use in the courseware is achieved. The background of the page and also for the whole courseware should be suitable with the topic and module to make it more interesting.

Introduction Page 1

Iteration 1:



Figure 4.11 Screenshot of Introduction Page 1 (Iteration 1)

Iteration 2: Improved UI and navigation button



Figure 4.12 Screenshot of Introduction Page 1 (Iteration 2)

Introduction Page 2

Iteration 1:



Figure 4.13 Screenshot of Introduction Page 2 (Iteration 1)

Iteration 2: Make changes to the UI and navigation button



Figure 4.14 Screenshot of Introduction Page 1 (Iteration 2)

Introduction Page 3/Activity connect the dot or 'copying'

Iteration 1:

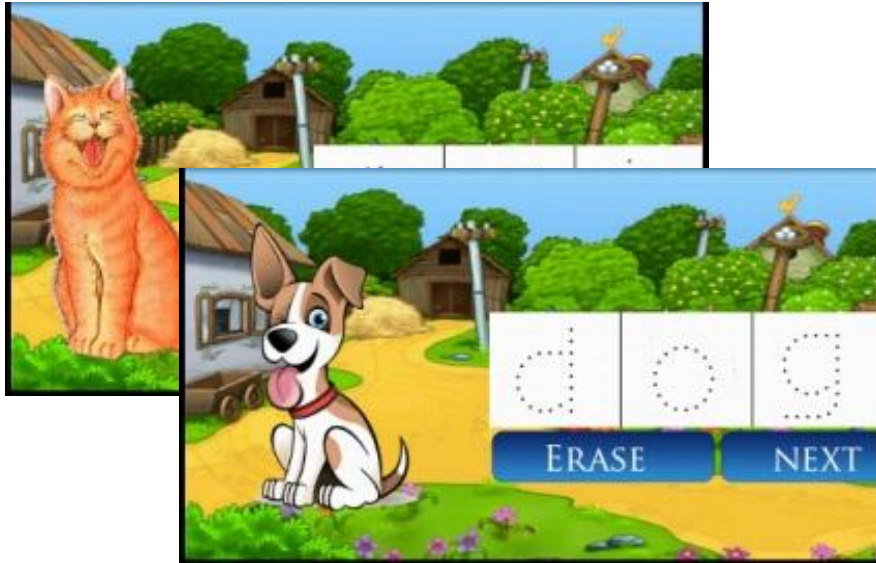


Figure 4.15 Screenshot of Introduction Page 3 (Iteration 1)

Iteration 2: Make adjustment to the UI. Increase the size of work area.

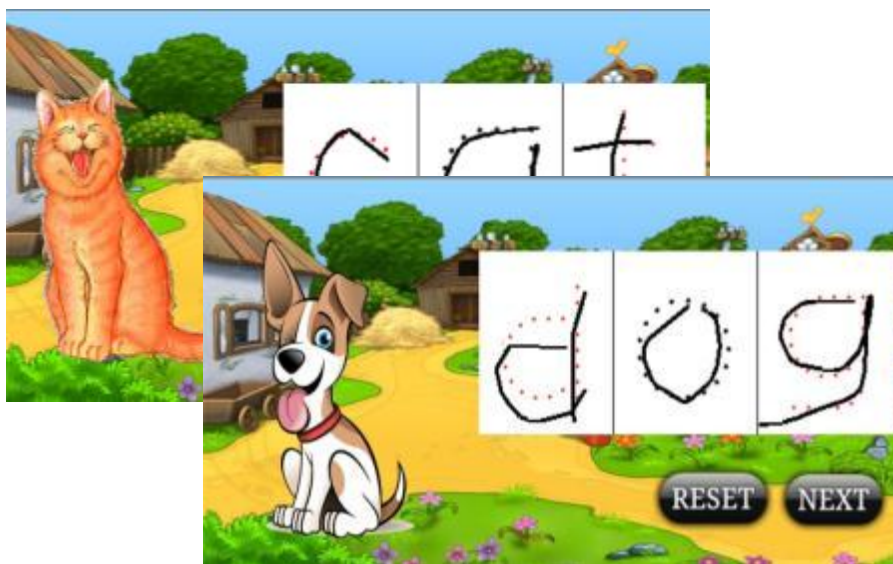


Figure 4.16 Screenshot of Introduction Page 3 (Iteration 2)

4.6.2 Choose Activities

Activity 1: Connect the dot/copying

Iteration 1:



Figure 4.17 Screenshot of Activity 1: Connect the dot (Iteration 1)

Iteration 2: Make adjustment to the UI. Increase the size of work area. Change the first and last alphabets into different colour.

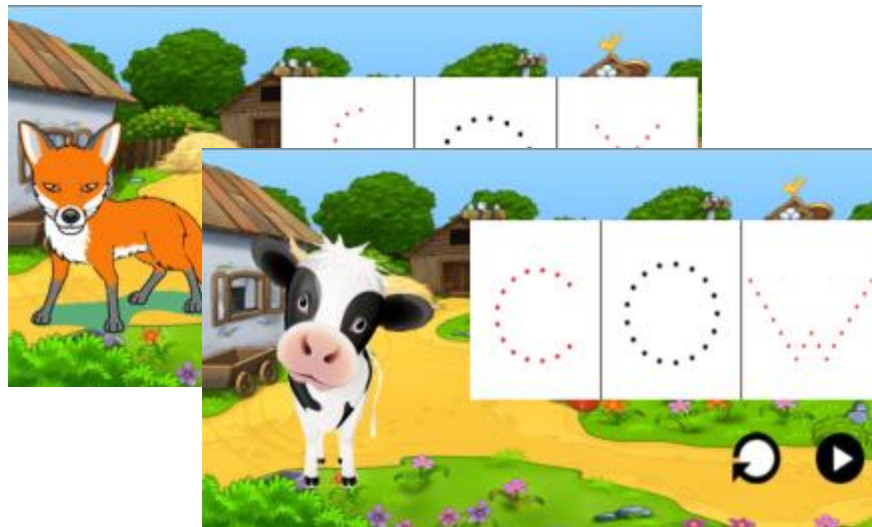


Figure 4.18 Screenshot of Activity 1: Connect the dot (Iteration 2)

Activity 2

Remember Me 1: Fill in the Blank

Iteration 1:



Figure 4.19 Screenshot of Activity 2: Remember me 1 (Iteration 1)

Iteration 2: Make adjustment to the UI. Increase the size of work area.



Figure 4.20 Screenshot of Activity 2: Remember me 1 (Iteration 2)

Remember Me 2: Drag alphabet and arrange it to form word

Iteration 1:



Figure 4.21 Screenshot of Activity 2: Remember me 2 (Iteration 1)

Iteration 2: Change the UI. Change the first and last alphabets into different colour.



Figure 4.22 Screenshot of Activity 2: Remember me 2 (Iteration 2)

Activity 3: Mix-Match the Pictures According to their Names

Iteration 1:



Figure 4.23 Screenshot of Activity 3 (Iteration 1)

Iteration 2: Change the UI

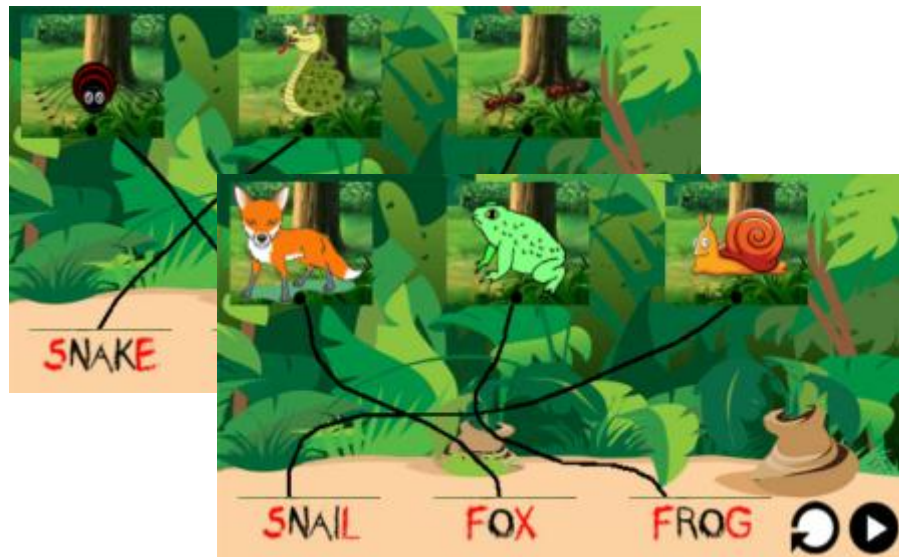


Figure 4.24 Screenshot of Activity 3 (Iteration 2)

Activity 4

Discrimination

Iteration 1:

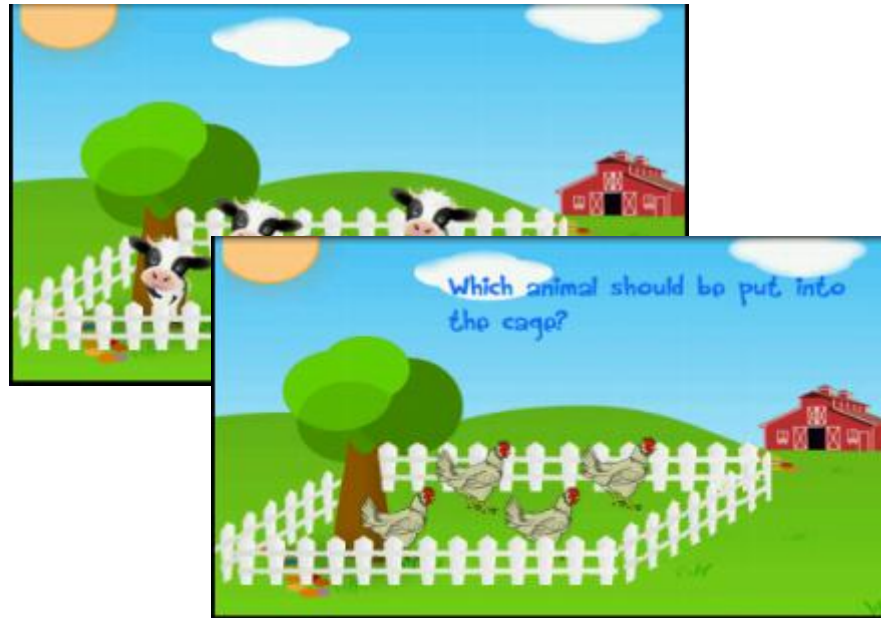


Figure 4.25 Screenshot of Activity 4: Discrimination (Iteration 1)

Iteration 2: Change the UI to make it more attractive



Figure 4.26 Screenshot of Activity 4: Discrimination (Iteration 2)

Remind Back

Iteration 1:



Figure 4.27 Screenshot of Activity 4: Reminds back (Iteration 1)

Iteration 2: Change the UI



Figure 4.28 Screenshot of Activity 4: Reminds back (Iteration 2)

4.6.2 Last Page

No changes made to this section.



Figure 4.29 Screenshot of Finish Page

4.7 Prototype Study

For this section, author had invited 5 Android developer cliques to test the prototype. After the participants have tried the prototype, they were given 2 Question to answer. These questions aim to improve the prototype model in order to help the end product meet the requirement. The question asked is listed below. Participants have to rate based on 0 to 5 scales for 0 to be 'not agree' and 5 for very good.

Prototype Feedback Form

1. What do you think about the GUI. Is it suitable to children?
2. How easy do you navigate through the courseware?

The analysis from the feedback is stated below:

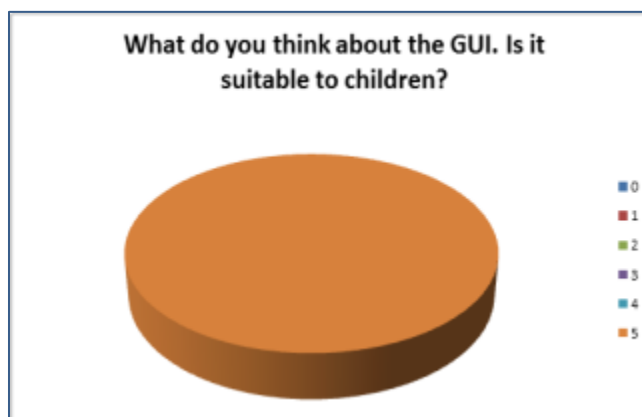


Figure 4.30 Prototype feedback (Question 1)

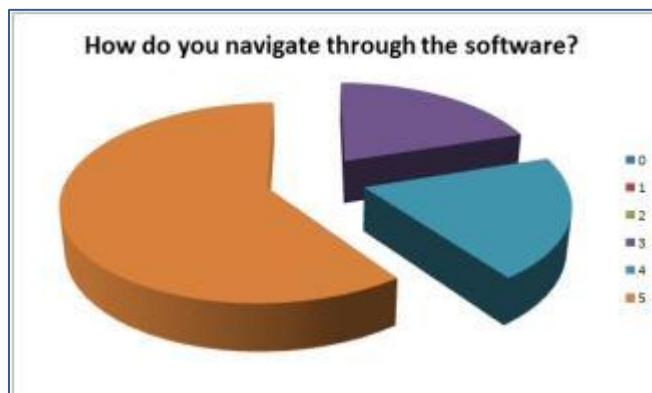


Figure 4.31 Prototype feedback (Question 2)

4.8 Post-Survey

Because of time limitation to visit them, the post survey has to be done online where the same 4 participants involved in the pre-survey are given with the screenshots of the whole flow of the courseware and were asked with a set of question provided by the author. All participants are aware with the objective of the project as it's already been briefed before. The questions aim to measure effectiveness of the project in order to reach the objectives.

The question of the post-survey are listed below:

1. Do you think the courseware is attractive, interactive and suitable for dyslexic children? Agree or Disagree
2. Do you think the courseware would help dyslexic children to learn? Agree or Disagree
3. As a parent, do you think this courseware would benefits you? Agree or Disagree

The results are shown below:

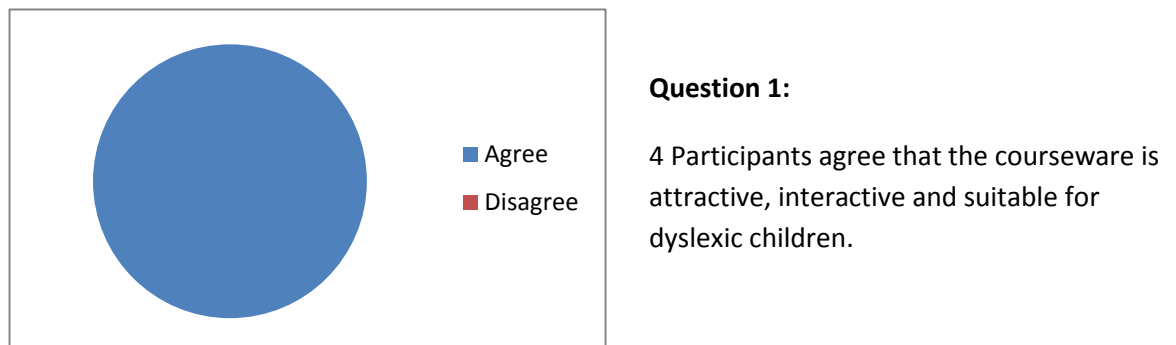


Figure 4.32 Post Survey feedback (Question 1)

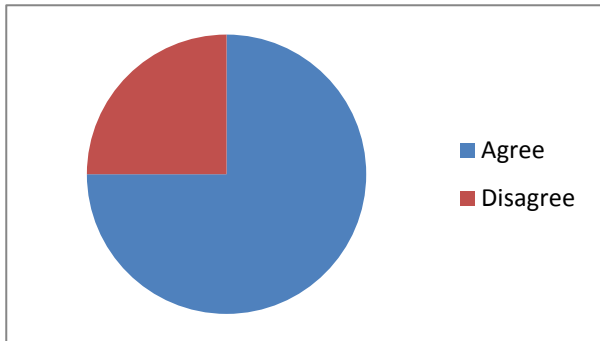


Figure 4.33 Post Survey feedback (Question 2)

Question 2:

3 Participants agree that the courseware would help dyslexic children to learn. 1 participant disagree

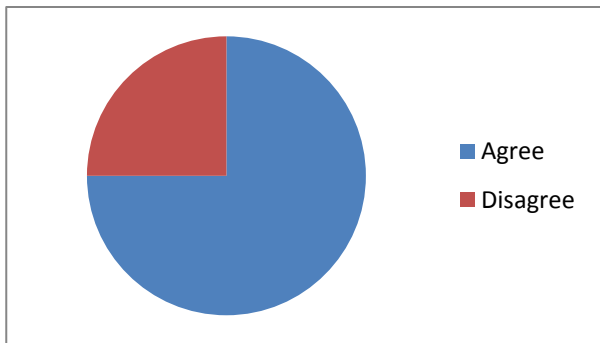


Figure 4.34 Post Survey feedback (Question 3)

Question 3:

3 Participants agree that the courseware would benefit them. 1 participant disagree

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This project has given the author exposure to how to develop Android based courseware for the dyslexic children to learn. From the readings and interviews done, the teaching tool developed could be useful or the dyslexic to use in. The project is found as feasible and can give benefit to dyslexic children.

Based on the 3 main objectives of the project:

- To identify suitable module that can relate to dyslexia children.

I have distributed survey about the most suitable module to be used in the courseware to make learning more meaningful and purposeful. The module of 'World of Knowledge' was chosen for the courseware and the topic of 'Let's go to the Farm' had been used for the 'back bone' of the courseware.

- To develop a mobile courseware according to the module.

The prototype of the courseware had been successfully built using MIT AppInventor. Throughout the project, 2 versions of prototype had been built; the 1st prototype was used as reference to make the 2nd prototype which is the final prototype for the project.

- To evaluate the courseware with suitable subjects.

A group of Android developer cliques has been chosen to evaluate HCI studies for the project and garnered encouraging feedback from the participants.

5.2 Recommendation

There are still rooms for improvement to be done in the future. Some of recommended works are:

- More sounds and narration would help improve this project in the future
- To develop application using other platform besides AppInventor because of its limitation.
- Add more activities to the courseware
- Develop courseware that suitable to be use on tablet

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APPENDIX

Appendix A

Interview Questions

All personal information will be kept confidential, as per the consent form. Please feel free to ask questions pertaining to this.

Participant:

Questions

Question 1. Have you ever tried other mobile application for dyslexic to be used to your children?

Question 2. What do you think about the available mobile application that available to dyslexic children nowadays?

Question 3. What do you think a courseware/application for dyslexic children should emphasize on?

Question 4. Do you agree that this suggested method being use in the courseware?
(explain to them)

1. Remind Back Technique
2. Discrimination Technique
3. Connect the dot (Copying)
4. Arrange word