Development of Courseware for Slow Learner Children with Reading Difficulties ("my LINUS")

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A project dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Business Information System)

APRIL 2013

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ABSTRACT

It is well known that every child whether in pre-school or primary school have the difficulties to learn on how to read at the beginning of study. They do not recognize the alphabet thus making then hard to read and write. Initially, teachers will teach them and assist them until those children passed from the difficult stage after some time. But for some children, they will take longer to understand things than the average person at their age. They required multiple explanations and extra attention from teachers. This causes them to left out at school. This type of children are classified as slow learner children which significantly more slowly than the standard for his / her age. They are not eligible to educate under the special education as they do not have any specific factor of learning disabilities problem. So the project developed is a multimedia courseware to help slow learner children to overcome their reading difficulties problem in their learning process. This project presents the development of a multimedia courseware namely 'my LINUS' as a medium in teaching and learning specially designed for slow learner children who are having reading difficulties. The courseware will help slow learner children by approaching using a suitable technique/method with proper teaching materials necessary for them. The courseware integrates 'Literasi & Numerasi' (LINUS) Syllabus officially prepared by the Ministry of Education for primary school children between 7 – 9 years old with the learning multimedia theme. Mainly the "my LINUS" consists of 2 sections for modules and exercises. The modules consist of 3 modules. Each modules dedicated to teach in certain area start from Module 1 continue till Module 3. Module 1 teaches user on how to recognize and pronouncing a letter. Module 2 teaches user on how to combine letters to form a word. Then the last module teaches user on how to combine words and syllable to form a complete sentences. From the developed prototype, the user – acceptance test was conducted. The testing results help to support suitability and acceptability of the courseware for further improvement. The testing was conducted on two primary school situated around Kuala Kangsar, Perak. The final result shows positive feedback on the courseware towards them.

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ABBREVIATIONS AND NOMENCLATURES

LINUS	Literacy & Numeracy
ICT	Information and Communication Technologies
NUTP	National Union of the Teaching Profession, Malaysia
LD	Learning Disabilities
PPD	'Pejabat Pendidikan Daerah'
SKCG	Sekolah Kebangsaan Chegar Galah
SKT	Sekolah Kebangsaan Temong
NKRA	National Key Result Areas

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CHAPTER 1
INTRODUCTION

1.1 Background of Study

1.1.1 Project Background

Any parent or guardian who has a child who is slow learner will know how frustrating teaching them something simple like their ABC's can be. It was not that the child has a retardation or learning disability, but they are just a slow learner. Slow learner is a person who tends to take longer to understand things than the average person, or someone who requires multiple explanations before they get a concept (Shaky, 2011). Common characteristics of a slow learner are, their measured intelligence is 75% - 90% of the average child and the rate at which they learn is 4/5 to 9/10 that of the normal rate (Pengniza, 2009). Abstract thinking is difficult for a slow learner and their attention span is short.

The current advancement in Information and Communication Technologies (ICT), especially in the development of multimedia technology, has promoted the use of computers in the education setting. Research have found that multimedia courseware able to help students in their learning process by attracting and engaging the learners, longer learning retention time, making learners more independent and proactive in their learning and self-motivated. The intention of using the technology is not to replace the traditional ways of teaching and learning, but rather to provide an additional aided learning tool for some areas that require more attention, and those which have been identified as needing alternative methods, apart from normal way of teaching. According to a report in 2009 released by National Union of the Teaching Profession (NUTP) Malaysia, research was done on 143 primary school, and total of 75,699 students involved, there are 3,690 (4.87%) students who are not even recognize letters as well as mastering in their reading and writing skills yet.

The proposed project will be a development of multimedia courseware based on the LINUS module for slow learner children with reading difficulties during their learning process. The targeted users will be taught to recognize the letters and pronounce the words correctly through the suitable teaching approaches in the courseware. It is integrated with multimedia elements such as graphics, audio and video to make it more attractive to be used by children in their learning process. A research will be done in order to discover the suitable technique / method in teaching and learning process for the children.

1.1.2 About LINUS

LINUS is the Literacy and Numeracy Screening Program which established by Ministry Education NKRA at 2009 in order to ensure all children mastering in their reading, writing and arithmetic (3R) and also ensure that all Malaysian children without learning disabilities should be able to read and write Bahasa Malaysia and do basic mathematics by Year 4. There are 3 groups of students will be classified under the LINUS Program which are which is 'Arus Perdana', 'Linus' and 'Linus Tegar'. All Year 1 to Year 3 students have to undergo a LINUS test to determine their level of competency in reading, writing and arithmetic (3R) and the test results will identified the group of the students. Every year, the students will be screened three times – in March, June and September, in order to identify those who still do not meet the requirements to group under 'Arus Perdana'. If the students still not achieved expected levels of 3R skills at the end of their Year 3, the students will be bring to the doctor to detect specific factor for learning abilities in order to educate under special education. Therefore, the LINUS Program also helps in detection of dyslexic students at the early stage, thus help the dyslexic students received their special education for their learning process.

For the proposed project, it will only focus to the Literacy Part of the LINUS module for 'Linus' and 'Linus Tegar' students. Literacy is the student's capability to master in reading, writing and word arrangement including single sentence and compound sentence (using conjunctions) and as well as apply the knowledge lesson for their everyday communication (Ministry Education, 2010). According to Literacy Module Basic (2010), the goal of Literacy module is to ensure all students mastering in

their Bahasa Malaysia during Level 1 before started the difficult syllabus in their Level 2 except students that are educated under Special Education for Learning Disabilities (LD). After students undergo LINUS Program for 3 years, they will proceed to the Year 4 syllabus as usual without group classification in class.

1.2 Problem Statement

Students are subjected to the traditional way of learning which are textbooks and classroom methods. Since a teaching and learning process integrated with multimedia elements is proven to increase the motivation of slow learners, then a syllabus or module should be design with suitable approach so that slow learner children can understand easily and maintain their learning attention for long time span in their learning process (SEG Research, 2008).

The problem arise when not all current multimedia courseware in the market are suitable and acceptable for the users especially for slow learner users (Wahab & Zaman, 2007). There are no teaching and learning aids that can fulfill all types of learning styles at any one time. It is important in applying diversity of methods and approaches in the same class because there is a gap between the levels of learning ability amongst children and due to this, suitable teaching and learning methods have to be used according to their learning levels (Xu, 2010). According to Khan (2008), if only one method of teaching is applied by the teachers, the slow learner children in the class will leave behind and give up in their study. Therefore, some learning aids should be used by the teachers in order to peak their interest and help them for a brighter future. If the teachers able to peak their interest, they are more likely to retain the information faster.

During this project, a suitable method or technique of teaching slow learner children faster will be applied so they can be on their way to a brighter future. Overall, this research aims to highlight the importance of learning style modalities of learners in the process of solving reading difficulties problem among primary school students. Moreover, by engaging the learners with the right technique in their learning style may help them in their learning process for longer retention and attention in the learning environment.

1.3 Objectives and Scope of Study

1.3.1 Objectives

The objectives of the project are as follows:

- To research on the suitable technique / method in teaching and learning for slow learner children who are having reading difficulties.
- To develop a courseware that will help to increase reading abilities and children's interest during their learning process.
- To conduct the user acceptance test on the developed courseware.

1.3.2 Scope of Study

This study focus on primary school children who is between 7 – 9 years old (Standard 1-Standard 3) that has reading difficulties in their teaching and learning process. Main purpose of this project is to design and develop a courseware based on the LINUS module in order to make the learning process more interesting and attracting. The courseware is focus on the literacy module of students under 'Linus' and 'Linus Tegar' group which consisted of slow learner children with reading difficulties. The research also will be done to identify the best approach to be applied for the slow learner children in mastering their reading skills.

The study also conducted to analyze the suitable platform that will be used during the development of this courseware. Macromedia Flash MX, Microsoft Kinect SDK and Adobe Flash CS4 have been identifies as the suitable platform to work with. But, further research will be conducted to choose which one is the most suitable platform to work with.

CHAPTER 2
LITERATURE REVIEW

2.1 Slow Learner Children.

According to a study conducted by Chauhan (2011), there are two categories of slow learner children have been identified by her. Below are the categories:

i. **Children served in integrated (General Set-Up)** - Children who are having difficulties in numeric, reading and writing (Chauhan, 2011). Usually, these types of children does not learn successfully in their school, yet are not eligible for special education as they are not consider have any mental retardation (Malik, 2009). Their poor performance due to several factors such as socio-cultural problems, frustrating past language classroom experiences, lack of interest and unsuitable technique of teaching and learning strategies (Al-Hashmi, 2010).

ii. **Children who require separation (Segregated Set-Up**) - This category of slow learner children is the children who are educated under Special Education for Learning Disabilities (LD) and had recognized specific factor of learning difficulties (Chauhan, 2011). These children formally diagnosed as 'learning-disabled' by specialists in child psychology (Al-Hashmi, 2010). These can take the form of dyslexia, asperger's syndrome, aphasia, dysgraphia, autism and other problems (Al-Hashmi, 2010). Children who are educated under this second category are those who have been confirmed by medical doctor as having problem or difficulties not only in their learning process but also their speaking, social relationship development and behavior.

Teaching method is the most important factor contributes to the slow learning and that problem can be solve by a better teaching style which suit to the student need and mind (Khan, 2008). Khan (2008) also examined that teachers who use one method of

teaching will create slow learner student in the class because every student learn in different style and method. Mismatch of learning method will affect the learner's performance. Druin & Solomon (1996) examined that computer is the place where children can enjoy, emotionally involved with complex issues, and can find someone to talk to when feeling alone. Computers will never replace important of play and learning materials such as paint, flash cards, blocks and books but proved that using computer in classroom could increase children interest and help in engaging their attention toward acquiring knowledge.

2.2 Characteristic of Slow Learner Children

Bill Hopkins from State University of New York have been listed several characteristics and behaviors of slow learners during their learning process in classroom as shown below. The results referred from informal diagnostic profile by special education teacher.

Situation in classroom	***Characteristics / behaviors of slow learner children***
When teacher setting up the lesson.	• Child cannot find his / her materials (book, paper, stationary). • Child doesn't seem can recall anything about the previous lesson when teacher questioned them. • Child comes up with nothing when asked them to visualize something (low imagination ability).
When teacher presenting the lesson.	• Child does not seem to understand and interested what teacher is saying. • Child cannot follow the steps easily.
When there is independent practice after lesson.	• Child cannot remember how to do and what teacher already taught during lesson. • Child gets all the answers wrong and low marks.
When the lesson remembering session were conducted.	• Child cannot re-explain the lesson. • Child does poorly on tests and other assessments. • Child cannot relate and apply previous knowledge with the new lessons.

(Hopkins, n.d)

2.3 Reading Difficulties Problem.

In a research article by Lyon (2003), 10 – 15% of children who will eventually quit of school, more than 75% reported difficulties learning to read. Postnote (2009) revealed the government statistics for 2008 that showed 16% of children failed to achieve expected levels of reading skill by the ages of 7, 13% by ages of 11 and 31% by ages of 14 – that is they cannot read and understand a short paragraph at a very basic level. Then, Sinar (2012) reported in one article, a total of 48,250 students in Malaysia have difficulties in learning; 29,169 consisted of primary school children and the rest are secondary school children. Unfortunately, reading failure is excessively dominant among children living in poverty. The ability to read is the gateway to learning process in future, without it children cannot further access a broad and balanced curriculum in their learning process (Postnote, 2009). While in a research article by Westwood (2008), it shows that children who does not mastering in their reading skills well will not easily master in other skills and knowledge, and is doubtful to ever succeed in school or in their life.

Research done by Wahab & Zaman (2007) showed that, key of failure during children learning process is because there are differences in learning method among learners and it is important for teachers to identify the suitable learning method of their students; 'one size does not fix all'. Ineffective teaching method is one of the factor contribute to children's difficulty in learn how to read and write has been strongly confirmed (Westwood, 2008).

There are several characteristics of reading difficulties identified (Guide for Educators, 2004):

a) Difficulties in recognized letter or single word reading.
b) Difficulties decoding or sounding out words.
c) Difficulties reading sight words.
d) Difficulties with comprehension.
e) Expressive or responsive language difficulties.

f) Insufficient phonological processing: difficulties to understand that sentences are comprised of words, words are made up of syllables and syllables are made up of individual sounds or phonemes.

2.4 Multimedia – Based Learning As a Tool For Children Education.

Multimedia-based learning is one way to promote children's attention during their teaching and learning process, consequently reduce the risk of reading difficulties problem in future. Multimedia-based learning refers to the presentations involving words, pictures and animations that are intended to foster the learning process (Mayer, 2009). It helps in building mental representations from words and pictures. It is proven to be an effective tool of assisting slow learner children and benefits them in their learning process (Druin & Solomon, 1996). Druin & Solomon (1996) identified in their research that the multimedia elements could help in their ability to understand things easily and at the same time balance the needs of children with learning difficulties as the learning materials are present the same syllabus into different forms such as audio, animation, image and text which allow them to obtain multiple exposures.

Research done by Mayer (2009) also resulted that people learn better from multimedia elements such as pictures, animations and audios compared to from words alone. This hypothesis is the basis for the promise of multimedia learning. Wahab & Zaman (2007) founded in their research that the use of multimedia courseware for teaching and learning process have proved to be essential and more effective compared to traditional methods. Below are the several examples of the existing courseware using multimedia theme for learning:

2.4.1 Example 1: SmartKid - Entertaining Letters Description

In November, 2010, 1stEasySoft Company had introduced a multimedia courseware for children named SmartKid - Entertaining Letters Description that offer a fun and safe learning environment and encourages student to think and engage with educational activities. The program taught children on how to recognize letters arrange them into words and place them in alphabetical order. Below is the preview of the courseware:

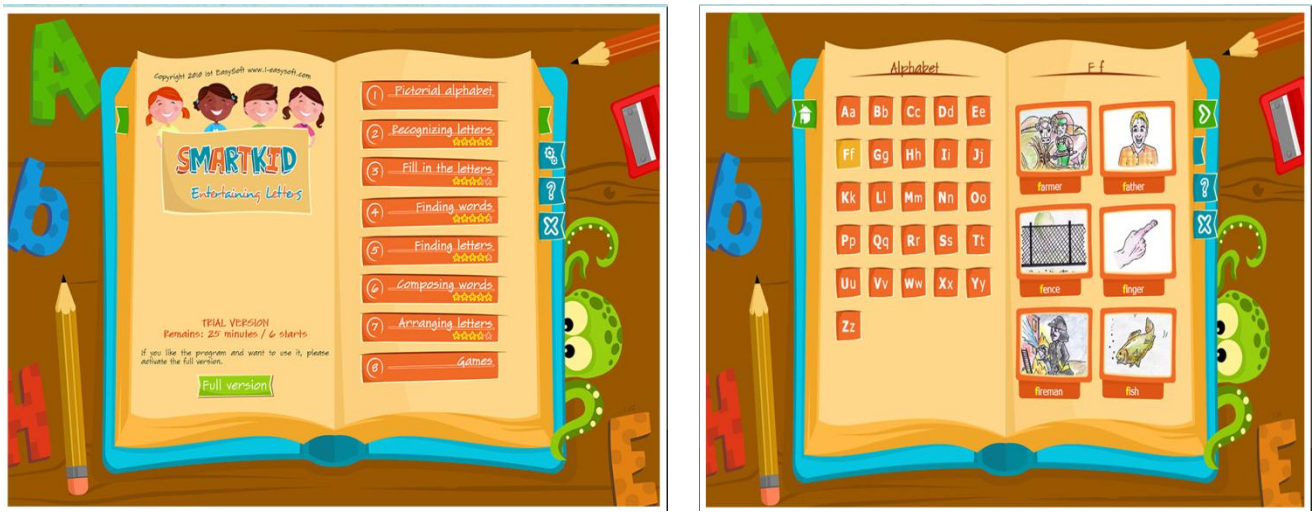


Figure 1: A preview of Multimedia Courseware, SmartKid - Entertaining Letters Description by 1stEasySoft Company

Figure 1 show a preview of a learning courseware that helps children overcomes their reading difficulties. Children can found almost 300 basic words accompanied by pictures and sounds and also integrated with several easy word games through this courseware. 1stEasySoft Company has been designed and developed the multimedia courseware since 2003 with the help of the latest technology with an emphasis on a user-friendly interface and ease of use. They do a study and doing research on how to introduce multimedia learning in classroom and at the same time not loses any interest and knowledge that should be gain from the students (EasySoft Page, 2010).

2.4.2 Example 2: Learning is fun with CJ the frog!

In May 2011, Focus Multimedia Corporation also introduced their learning courseware to teach reading for 6-7 years old children based on Year 2 syllabus. The courseware encouraged children to learn contractions, letter combinations, parts of speech, phonics, reading comprehension, sentences, spelling, verb tenses, vocabulary, writing, basic grammar and word classification in the exciting way (Focus Multimedia, 2011). The courseware name is 'Learning is fun with CJ The Frog' where children were learned by using game approach. Below is the preview of the courseware:

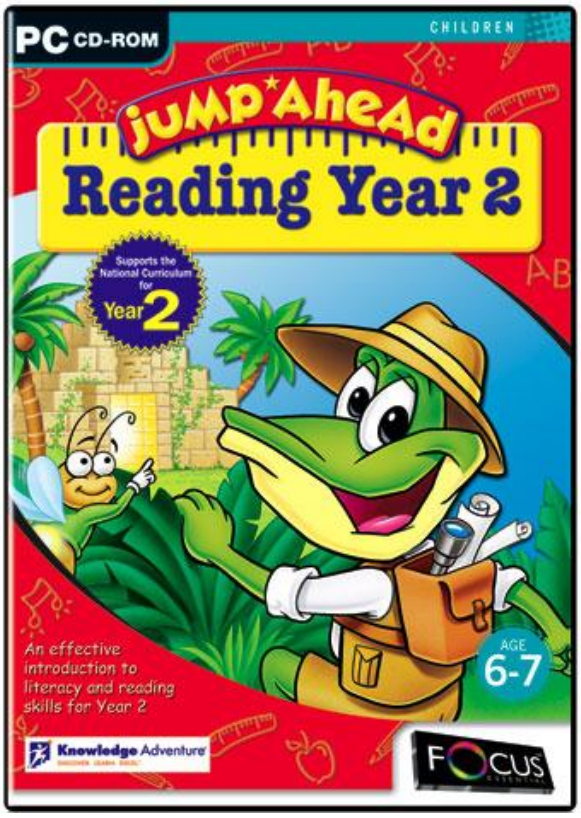


Figure 2: Homepage of multimedia courseware by Focus Multimedia Corporation - Learning is fun with CJ the frog!

Figure 3: Sample Game to master in reading skills by Focus Multimedia Corporation - Learning is fun with CJ the frog!

Focus Multimedia Corporation believed that children will learn and build critical reading skills through playing all the games such as climb mountains, explore dark caves and puzzle move (Focus Multimedia, 2011). The courseware contained 9 game modules with multiple difficulty levels to be taught to the children. All the games also assisted with the printable workbook for better understanding to the children.

2.4.3 Example 3: Color - Me Stories

Ruckus Reader Corporation had launched their e-book courseware named Color-Me Stories which helped children in mastering their reading skills. The courseware consisted of story books for 3-8 year old children and teaches them to improve their reading skills by using the story-telling approach (Ruckus Reader, 2012). There are 25 titles of books aided with video and games in order to make it more attractive. Below is the preview of the courseware:

Figure 4: Homepage of multimedia courseware by Ruckus Reader Corporation – Color - Me Stories

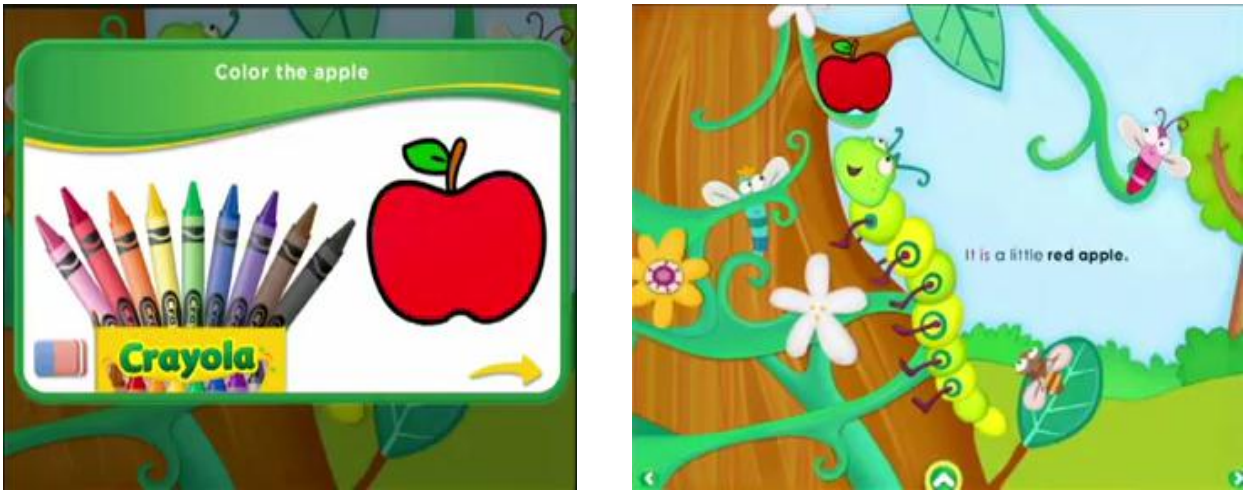


Figure 5: Sample Exercise - Color - Me Stories

Ruckus Reader believed that their product will enhance children's reading skills through fluency, alphabetic knowledge, sequencing and story comprehension where all that elements are add in the Color – Me Stories courseware (Owen, 2012).

Hence, it is obvious from the research study that students like to use the courseware to find out information and learn actively because the interactive nature of multimedia courseware is considered to be its most important learning element and enables students to get topic goals and to receive the education well (Aris, Ahmad, Shiong, Ali, Harun and Tasir, 2006). In addition, Borich (2000) stated in their book a research found that multimedia courseware be able to help children in their learning process by attracting and connecting the children, longer learning retention time, making the more independent, self-motivated and proactive in their learning.

2.5 Approach's to Teach Slow Learner Children to Read.

- **Cognitive Theory of Multimedia Learning**

The term cognitive is refers to perceiving and knowing, and cognitive scientists and researchers search for; to understand mind processes such as perceiving, thinking, remembering, understanding, language and learning (Sorden, 2005). The theory is concerned with providing a framework for instruction based on the idea that the working memory's storage capacity is limited (Nadaleen, 2006). Generally, the theory tries to address the issue of how to organize multimedia instructional practices and occupy more cognitive strategies to help people learn efficiently.

According to Sorden (2012), cognitive theory in multimedia learning which has been popularized by the research of Richard E. Mayer and others were successfully maximize people's learning effectiveness because Sorden (2012) founded that people learn more deeply from words and pictures than from words alone. Mayer & Moreno (2002) believed that learners should engage with three important cognitive processes which are selecting, organizing and integrating in multimedia learning.

i) **Selecting:** Applied to incoming verbal information to generate a text base and is applied to incoming visual information to generate an image base.

ii) **Organizing:** Applied to the word base to create a verbally-based model and is applied to the image base to create a visually-based model.

iii) **Integrating:** Occurs when the learner builds connections between corresponding events in the verbally-based model and visually-based model.

Then, Mayer (2003) does further research about process of cognitive theory in multimedia learning and he found that the multimedia learning can help students understand a scientific explanation and keeps the input for the long-term memory. Below are his results:

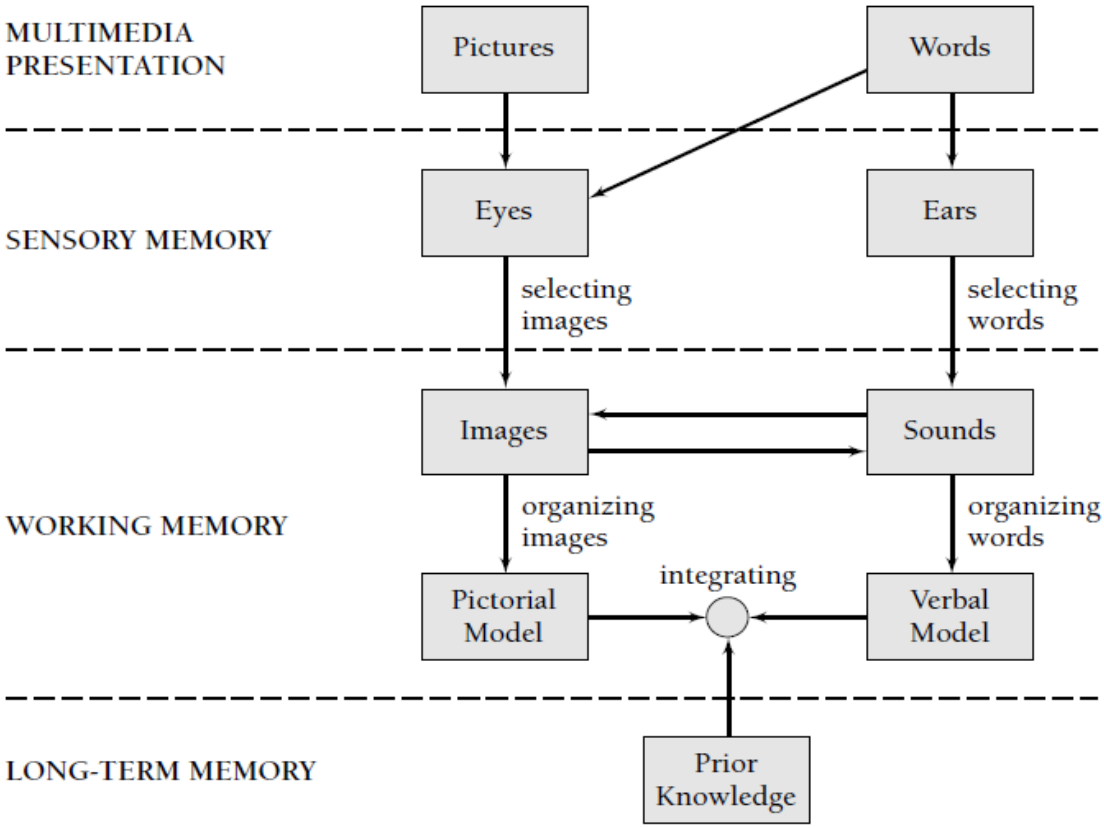


Figure 6: Cognitive Theory of Multimedia Learning (Mayer, 2003)

The right column of the figure represents the auditory-verbal channel and the left column represents the visual-pictorial channel. For the first layer, words enter the cognitive system through ears (if the words are spoken), and pictures enter through eyes. During the second layer when the selecting process occurred, by selecting words, the learner pays attention to some of the words; generate the structure of some word sounds in working memory. By selecting images, the learner pays attention to some aspects of the pictures; generate the creation of some images in working memory. Then, in the cognitive process of organizing words, the learner mentally arranges the selected words into a coherent mental representation in working memory that we call a verbal model. In the cognitive process of organizing images, the learner mentally arranges the selected images into a coherent mental representation in working memory that we call a pictorial model. When process of integrating, the learner mentally connects the verbal and pictorial models, as well as appropriates prior knowledge for long-term memory. Consequently, Mayer stated that the best way to present multimedia instruction is through visual graphics and sounds which benefited to both verbal and visual working memories without overloading one or the other.

- **Modality Principle Approach**

Modality principle stated that students will learn better from animation and narration than animation and printed text (Mayer, n.d). Animation refers to a simulated motion picture illustrating movement of drawn objects (Neill, Doolittle & Hicks, 2009). By referring to the modality principle for multimedia learning, the picture presented that accompany by audio will be more helpful compared to the picture that is presented in the printed text. According to Doolittle (2004), multimedia presentations involving both words and pictures should be created using auditory or spoken words, rather than written text that accompanied by the pictures. The theoretical basis is that the learner's visual channel might become overloaded when word and pictures are both presented visually, that is, learners must process the on-screen text and the animation through the eyes, at least initially (Doolittle, 2004).

Modality principle approach allows information to be presented both visually and verbally; allowing for connections to be made between each channel, and meaningful learning to occur (Mayer & Moreno, 2002). Thus, it increased the working memory storage capacity.

- **Multisensory Approach: VAK Model Learning Theory (Visual, Auditory and Kinesthetic)**

Generally, the theory of multisensory approach put together three learning styles which are Visual, Auditory and Kinesthetic and this approach is helping a child to learn through more than one sense at one time (Sharp, Bowker & Byrne, 2008). To teach slow learner children, it is not just limited to visual and auditory but the children itself must engage in their teaching and learning process (NYRC Handouts, 2010). They have to see what the teacher do, listen to teacher instructions and move hands or hold to something related to the teaching and learning process. According to Sabatova (2008), VAK Theory will put together the learners use all three modalities to receive and learn new information and experiences. VAK learning style appears dominated by primary school children (Sharp et al, 2008). The best teaching approach for children is to involve the use of the child's senses especially the use of touch and movement (Devi, 2002). Chen (2004), believed that, by applying VAK Model Theory in the multimedia learning increase the learning retention time of the children. Below is the further explanation each VAK elements:

> **Visual:** Visual elements make the teaching and learning process straightforward. The elements include text, color, simple shapes, depth, space and typography. These usually act as tools of instructional design in multimedia learning. Research done by Chen (2004), found that learning is improved by well-communicated images.

Auditory: They learn through hearing. Messages are interpret through the tone of voice, pitch, speech, music and speed. Children would like to learn from lecture, recording, storytelling, music, verbalization, questioning (National Strategy Guidance, 2004).

Kinesthetic: Kinesthetic elements create an active learning environment for children because the learner was involved actively through actions. The elements are including acting and role-play. Play is a natural and very important part of children's world and through play, children engage in representational and symbolic thoughts and actions (Alleyne. 2002)

In general, there is no children use one style of learning exclusively, but they do have preferred learning styles. It is therefore important to attempt for all learning styles during lessons to enable the most efficient learning to take place (Duckett & Tatarkowski, 2012).

2.6 LINUS Program: - Literacy

Literacy is the student's capability to master in reading, writing and word arrangement including single sentence and compound sentence (using conjunctions) and as well as apply the knowledge lesson for their everyday communication (Ministry Education, 2010). Through the LINUS Program, all Malaysian children without learning disabilities should be able to read and write in Bahasa Malaysia by Year Four.

For literacy part, there are 3 main objectives stated by Ministry Education:

i. Student able to recognize alphabet, spell words and pronounce open and close syllables.
ii. Student also able to read and write sentences consisted of open and close syllables.
iii. Student able to write and understand single sentence and compound sentence by using conjunctions of "dan".

By achieving all the objectives, students need to master 12 construct of literacy module and will be evaluated during the literacy screening process. The constructs are listed below (Manual Literasi Instrumen, 2011):

Construct 1: Ability to read and write vocal and consonant alphabet.

Construct 2: Ability to read and write open syllable.

Construct 3: Ability to read and write open word syllable.

Construct 4: Ability to read and write closed syllable.

Construct 5: Ability to read and write closed word syllable.

Construct 6: Ability to read and write word contained closed syllable 'ng'.

Construct 7: Ability to read and write word contained diftong.

Construct 8: Ability to read and write word contained related vocal.

Construct 9: Ability to write word contained digraph and combined consonant.

Construct 10: Ability to read and write word with prefix and suffix.

Construct 11: Ability to read and write simple sentence.

Construct 12: Ability to read, understand and write sentence according to object.

Students need to master all those constructs before pursue the Year 4 syllabus. The progress of children will be monitored by trained LINUS teachers and FasiLINUS (dedicated facilitators who provide professional support to LINUS teachers) and the Ministry.

CHAPTER 3
METHODOLOGY

3.1 Research Background

Generally, this project is to develop a multimedia learning courseware for slow learners who are having reading difficulties in their learning process. The framework for this project research is divided into three main stages as show in Table 1 below:

Table 1: Research Framework

Stage	Description
i	Preliminary Analysis
ii	Courseware Development Process (Analysis – Design – Development – Implementation – Evaluation)
iii	Courseware User Acceptance Testing and Evaluation Process

First stage consists of preliminary analysis phase whereby interview, survey and observations have been conducted. This stage also involves the readings on past researches on multimedia and courseware usage for slow learner children. Next stage consists of Courseware Development Process where the design and implementation process will be done. The development of the courseware based on the analyzed information gathered before; slow learner's learning characteristics, suitable approaches, theories and strategies. The information combined with suitable multimedia elements such as audio, video, picture and text in order to produce the prototype of the courseware for the user acceptance testing. Finally, the courseware's user acceptance testing and evaluation process were conducted once the prototype is completed. This testing phase also used to identify and fix any bugs that occur within the built application. Once the users satisfied with the prototype, the author will install the application to the users. The evaluation process were involved a total of 16 children.

3.2 Research Methodology

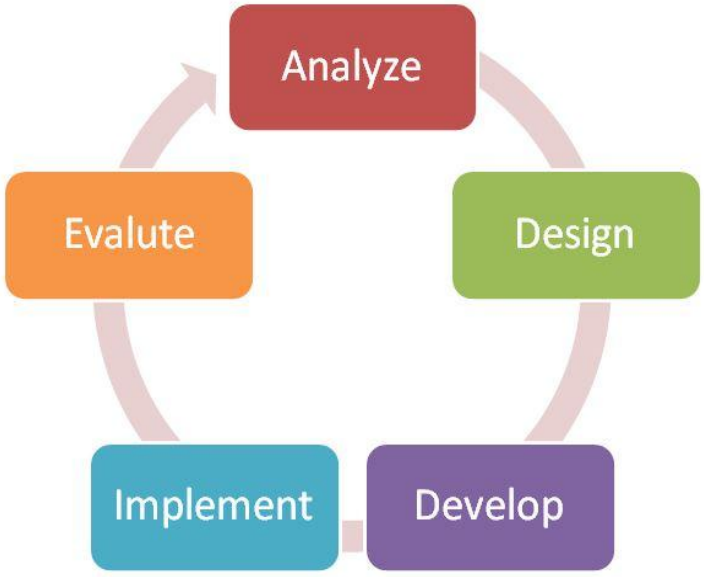


Figure 7: Methodology Diagram (ADDIE Instructional Design Model)

The ADDIE Instructional Design methodology is chosen for this project as illustrated in figure 7 above. This methodology is likely receiving continual or formative feedback when the prototype is being created. All the analysis, design, development and implementation stage performed at the same time before the prototype created for the evaluation process. The final prototype where all the requirements are accepted will be a product of courseware that will be evaluated during user acceptance test. The methodology is divided into five main phases as shown in Figure 7:

- Analysis of Information.
- Design of the Courseware.
- Development of the Courseware.
- Implementation of the Courseware.
- Evaluation of the Courseware.

3.2.1 Analysis of Information.

Analysis phase is the most important phase during the project development period. It identifies the main reason why the project should be proposed as well as understanding its requirements. During this phase, the author defines the scope of study: target user, project timeline, project complexity, project contents and technology. The author also identified the strength of this courseware and compared with the existing courseware in the current market. Generally, this phase is focus on collecting the data to be used in the next phase.

3.2.2 Design of the Courseware.

The data collected during previous phase were used in the design phase. The information gained helped to determine the suitable contents or modules to be attached and what kind of multimedia theme occupy for the interface design. The interfaces were designed by using Adobe Photoshop CS4 and Photoscape. The contents was evaluated and organized well to be used during the development phase. The suitability of the courseware contents with the slow learner children also had been approved by LINUS teachers from Kuala Kangsar, Perak.

3.2.3 Development of the Courseware.

All the interface design created in the previous phase are combined with suitable multimedia elements, the produces the prototype of this courseware. This phase involves the building of courseware using Adobe Flash Professional CS4, certain animation using Adobe After Effects CS4 and sound recording and editing using Audicity software.

3.2.4 Implementation of the Courseware.

This phase involved the delivery of the courseware for the first time during courseware testing. The author will ensure that the users will have appropriate instructions on how to use the courseware and explains all the functions embedded in the courseware. User Acceptance Testing is conducted to identify the acceptability and suitability of the courseware with the users as well as

identify and fix any bugs that occur within the built application. Below are the criteria involved during the user acceptance testing:

- Instruction Understandability.
- Ease of use / User friendly.
- Suitability of font sizes, pictures and modules.
- Amount of time for each module and activity.
- Effectiveness and efficiency of the courseware.
- Children response and behavior.

3.2.5 Evaluation of the Courseware

Evaluation phase is where all the feedback and review from the users are gathered during user – acceptance test to determine whether the courseware gives impact to the children in class or not. It will be evaluated base on these four aspects:

I. **Responses:** Do learners like the courseware contents?
II. **Learning:** Do learners achieve the learning objectives at the end of each section?
III. **Behavior:** Does the courseware change learner's behaviors during learning process in classroom?
IV. **Results:** Does the courseware help the school achieve 100% students mastering in reading skills?

3.3 Project Activities

There are 3 main activities throughout the project pre - development process. The activities include self-research, quantitative questionnaires and qualitative interviews.

- **Self-Research**

Self-Research helps to understand about slow learner children, multimedia-based learning concept and how multimedia elements integrate during the children teaching & learning process. The main purpose of this activity is to find out the suitable approach that can be used in teaching and learning process for slow learner children who are having reading difficulties. It involved the readings on the past researches on multimedia and courseware usage for children with learning disabilities particularly slow learners.

- **Quantitative questionnaires**

Questionnaire is a common tool to collect and record data about a particular issue of interest. It is mainly made up of a list of well-designed questions and gathers all the feedback from the respondents. For this project, the respondents include primary school teacher, primary school students and public people.

- **Qualitative interviews**

Interview is a one-to-one directed conversation with an individual using a series of questions designed in order to gather a qualitative analysis. Interviews allow the respondents to express their thoughts and experiences using their own words and thus are particularly valuable for gaining insight. For this project, the interviews will be conducted with primary school teachers and ‘Pejabat Pendidikan Daerah’ (PPD) staff.

3.4 Planned Gantt Chart

No	Activities	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1	[FYPI]Title selection / proposal 1.1 Assignment of supervisor 1.2 Project approval									
2	[FYPI]Extended research									
3	[FYPI]Submission of extended proposal : 3.1 Literature review 3.2 Identify project requirements									
4	[FYPI]Presentation 1: Proposal Defense									
5	[FYPI]Project work on interim report 5.1 Literature review 5.2 Design 5.2.1 Plan project 5.2.2 Project design 5.2.3 Interface design									
6	Project development									
7	[FYPII] Submission of progress report 1									
8	[FYPII]Testing 9.1.1 Project testing 9.1.2 User acceptance testing									
9	[FYPII] Pre - EDX									
10	[FYPII]Submission of dissertation - softbound									
11	[FYPII]Presentation 2 : Viva									
12	[FYPII]Submission of final disesertation - hardbound									

3.5 Key Milestone

3.5.1 Key Milestone for Final Year Project I (FYP I)

Activities	Month
Submission of Project Titles and Synopsis	Sept 2012
Submission of Extended Proposal	Oct 2012
Viva: Proposal Defense and Progress Evaluation	Nov 2012
Submission of Interim Report	Nov 2012

3.5.2 Key Milestone for Final Year Project I (FYPII)

Activities	Month
Submission of Progress Report	Feb 2013
Pre - EDX	Mar 2013
Submission of Dissertation - Softbound	April 2013
Viva	May 2013
Submission of Final Dissertation - Hardbound	May 2013

3.6 Tools

3.6.1 Hardware

- ✓ Personal Computer will be used as a workstation.

3.6.2 Software

- ✓ **Adobe Flash Professional CS4**: Main platform for the project development.
- ✓ **Adobe Photoshop CS4** : For interface design
- ✓ **Photoscape**: For interface design.
- ✓ **Audicity**: For sound recording and editing.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Data Collections (Courseware Pre – Development)

Data collections in this project are involve interviews, surveys, observation and collecting documents. During preliminary analysis phase, interviews have been conducted with LINUS teachers, survey issued to slow learner children and observations with slow learner's children in their classroom. The information collected used to improve the courseware impact.

4.1.1 Interviews Results

Interviews have been conducted with the two teachers who are engaged with the LINUS Program. During the interview session, there are list of suggestions that the teacher find suitable to be applied in designing the courseware content for slow learner children. The suggestions are listed below:

- Use eye-catching modules for presenting the LINUS syllabus in order to stimulate their senses thus increase attention.
- Provide practice in the end of each module in the form of test to help children recall the lessons back. Retrieves information back is one of the slow learner problems. It is easy to store information but difficult to retrieve back.
- Do a summary in the form of diagram at each end of the module. This is important to ensure that the children keep remember what they learned for long-term. Generally, people remember at the beginning and ending better rather than in the middle.
- Use pictures more than words in each modules to gain children's interest in their learning process.
- Provide some learning games for fun, like jigsaw puzzles and crosswords.

- Limit the steps and information, and always present in concrete and direct form. This is because slow learner children have very low imagination level. They come up with nothing if the teachers ask them to imagine. Therefore, information should be always presented in direct form.
- Plan the module in orderly sequence to prevent confusion in their mind.
- Always show directions in the courseware in order to balance the children's short-term memory limits.

The modules of the courseware also had been discussed with the teachers to know the suitability of the courseware content with the slow learner children's level. As a result, the courseware will be consisting of 2 main sections which are:

Section 1: Get to know letter, spell a word and form a sentence (Jom Belajar).

Section 2: Exercise (Uji IQ Anda).

4.1.2 Survey Results

Before the development phase of the courseware, a survey was done in order to know the level of interest slow learner's children towards the multimedia learning in their learning process. A set of questionnaire has been issued to 25 children under LINUS Program from the age 7 – 9 years old. The questions consisted of 3 questions and in the form of pictures and smileys to ensure that the children understand well what the questions about. The questions aim to confirm the acceptability of slow learner's children for multimedia learning in their education. Participants were given the questionnaire directly during the visit for observation of current way of their learning.

Below are the questions asked to the participants:

Question 1: Which learning platform do they like more? (Computer vs Book)

Question 2: Which learning element do they like more? (Static Picture vs Animation)

Question 3: Which learning activity do they like more? (Computer Game vs Class Activity)

The results of the questionnaire are shown in the pie-chart below:

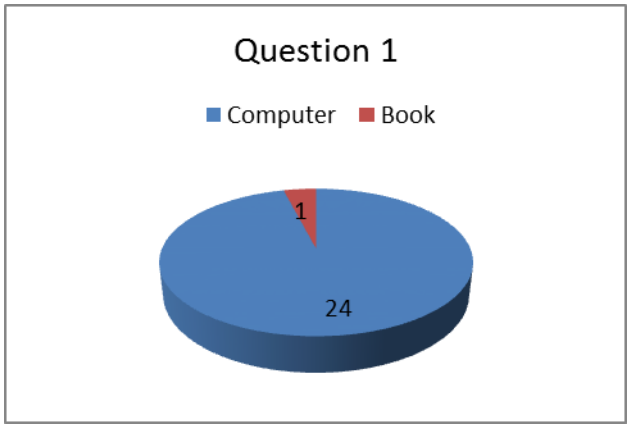


Figure 8: The pie-chart for Question 1

Analysis:

Almost all slow learner children under LINUS Program do like using computer than using book in their learning process.

Figure 8: Pie – Chart for Question 1

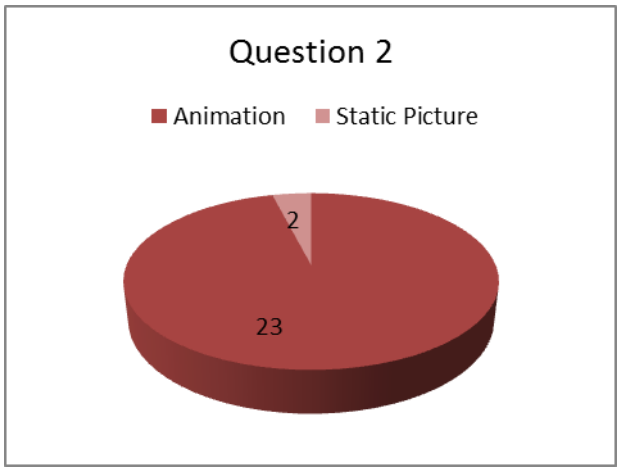


Figure 9: The pie-chart for Question 2

Analysis:

Most slow learner children under LINUS Program do like animation element in their learning materials compared to static pictures. They are easy to get bored with the anything static.

Figure 9: Pie – Chart for Question 2

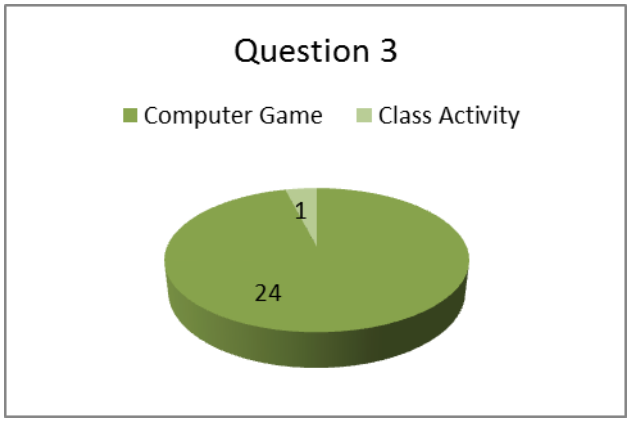


Figure 10: The pie-chart for Question 3

Analysis:

Almost every slow learner children under LINUS Program do like playing with computer games compared to involve with the class activity provided by teachers.

Figure 10: Pie – Chart for Question 3

Based from the survey, it can be conclude that almost every slow learner children under LINUS Program do attract and agree with multimedia learning to be implementing in their learning process. However there may need some work and additional elements to be done to convince and attract all children with multimedia courseware as their materials in learning process.

4.2 Courseware Navigation Structure

Figure 11 below illustrates the flowchart of the proposed multimedia courseware. Generally, this courseware has three main 2 main sections which are; Learning and Exercise. The learning section consisted of the syllabus that will teach children to recognize letter, spell a word and for a sentence. Exercise Section will provided the exercise related with learning section to be done by the children in order to have better understanding with the learning module. The exercise will be range from easy level to intermediate level and will be presenting in a fun way. Each page also will be provided with button linking to main menu and exit button.

Brief flowchart diagram of the courseware is drawn below:

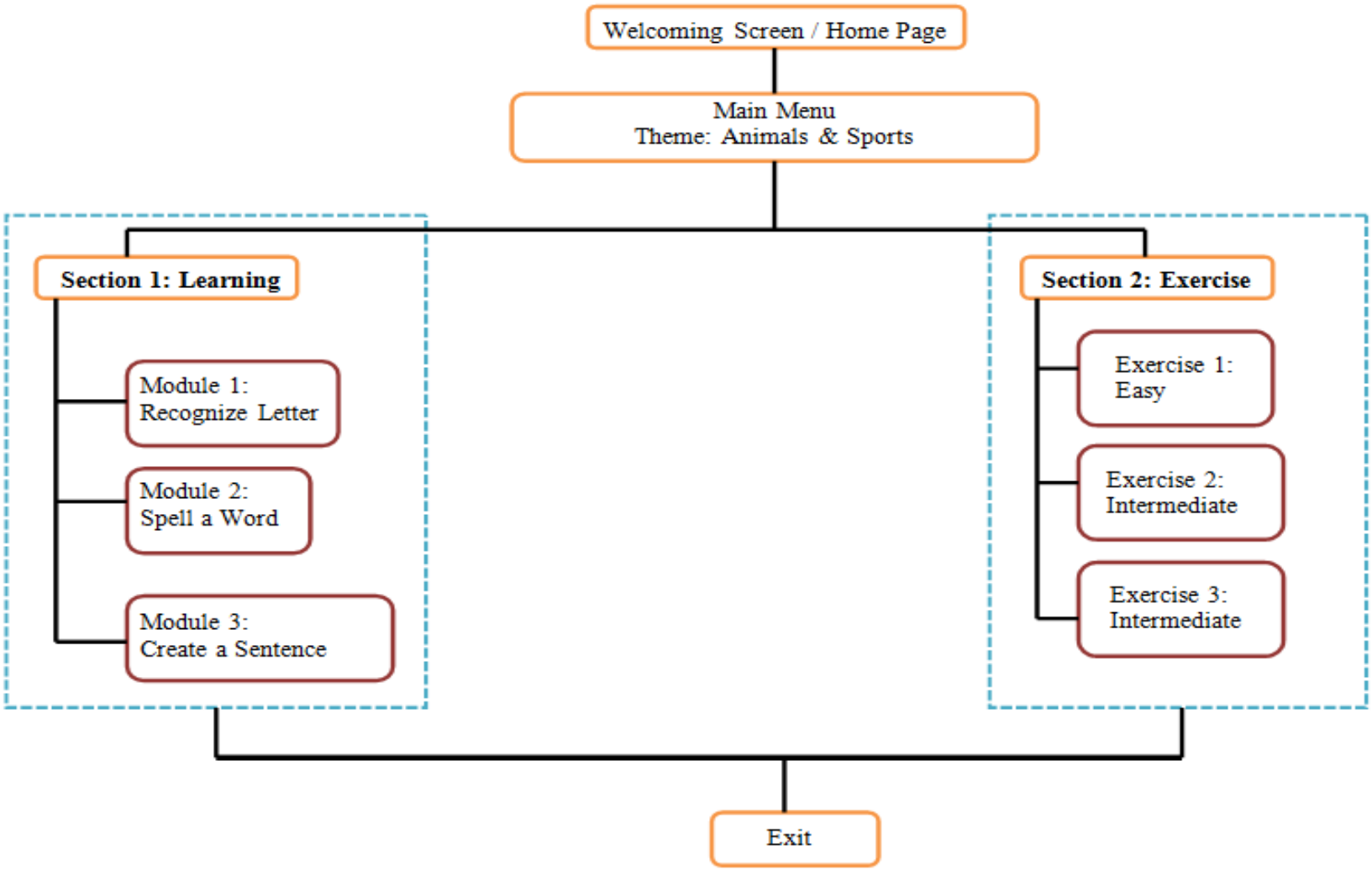


Figure 11: Flowchart of the Courseware

4.3 System Prototype

Users have to install the ‘my LINUS’ application using installation disc before begin the learning session. After done with the installation, user is now able to start the application by simply clicking the application icon the desktop. The splash screen will be shown to the user. User may have to wait for 5sec for the application to fully load. The start button can be clicked after the application fully loaded. Then, application will show the main menu page.

Figure 12: Splash Screen

Figure13: Main Menu

Figure 13 above shows the main menu for this application. This application is divided into 2 main sections which are:

a) **Section 1:** "JOM BELAJAR" – User will learn to recognize letter, spell words and form sentences.

b) **Section 2:** "UJI IQ ANDA" – Exercise will be provided in a fun way based on the module learned by the user in the "Jom Belajar" section.

At the main menu, user has to begin the learning session with the first section followed by the exercise in the game form at the end of the module.

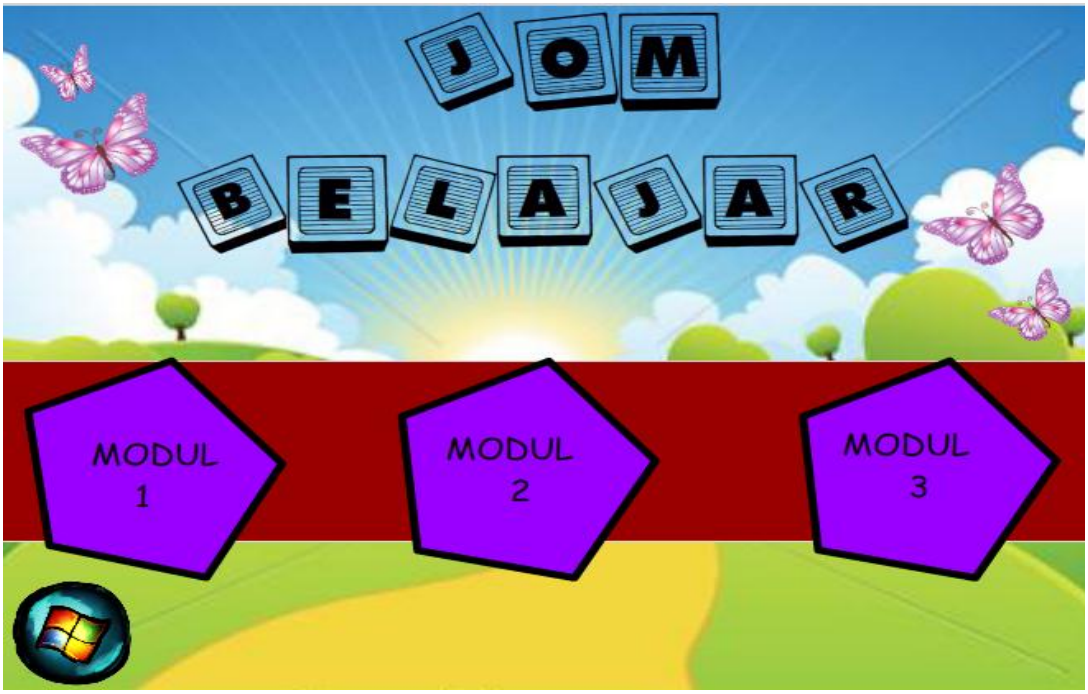


Figure 14: Main Screen for "JOM BELAJAR" Section

Figure 14 above show main screen for the first section which is "JOM BELAJAR" section. This section contained 3 main modules. All the modules help user in mastering their reading skill.

a) **Module 1:** This module teaches user on how to recognize letter and user will listens to the sound of the letter.

b) **Module 2:** This module teaches user to combine letters to form a word. Besides that, this module also helps the user to know on how the word is pronounced.

c) **Module 3:** This module teaches user on how to combine words and syllable to form a complete sentences. After that, user will learn on how to read those sentences well and fluently.

At the main screen, user will have the freedom to choose desire modules. After completed all these 3 modules, user may continue to the next section to have better understanding about the module learned.

The first module which is Module 1 is a module where user learns to recognize letter and will listens to the sound of the letter follow by the word created from the letter in the form of music. Figure 14 is the sample screen shots of the application which referring to the contents in Module 1. Children should be able to recognize letter and how the letter pronounced before continue to the other module. Figure 15 show the example of letter 'A' being demonstrated. This will help children to really understand on how the letter 'A' being pronounced by looking at the sketching of demonstrator in the application. A picture will be display together with the letter in order to help children remember all letters faster. This process continues from the letter 'A' until letter 'Z'.

Figure 15: Module 1, Letter Selection

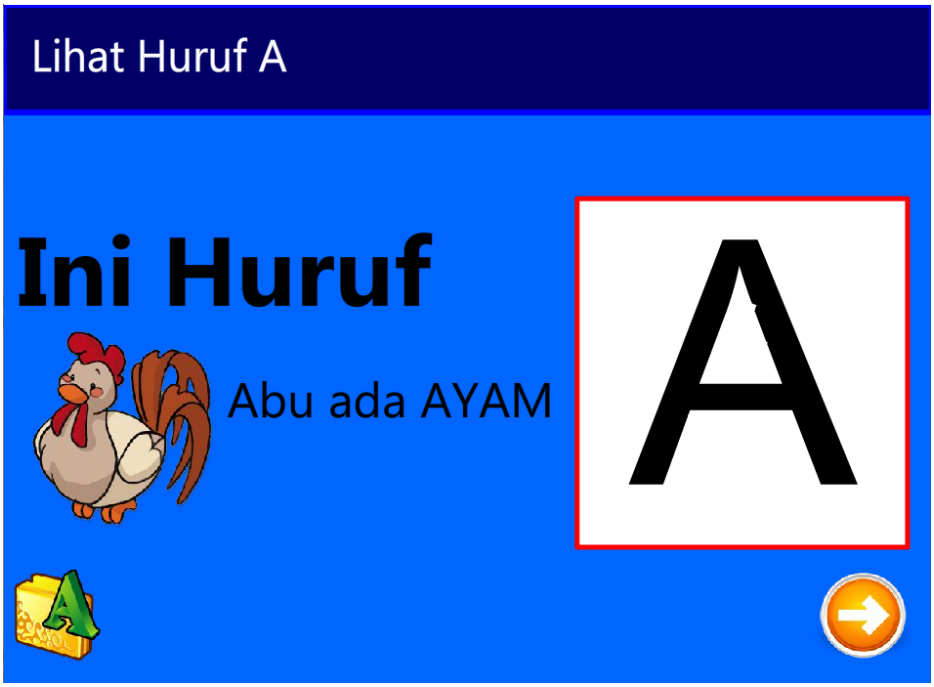


Figure 16: Module 1, Recognize and Pronunciation of Letter

After completing module 1, user will be able to recognize and pronounce all letters well before learn on how to combine letter to form a word syllable from module 2. In module 2, user will be teach on how to combine the letters to form a word syllable and pronounce the word correctly. A picture will be displayed together with the word, to help the children remember well.

In Module 2 and Module 3, user have a freedom to choose the topic that they interested. For module 2, after select any one topic, the application continue with the words related to the topic. Figure 17 show the topics available in module 2 which is Animal and Sport. Each topic contains 10 related word and each word will be displayed with picture and separated syllable to help children remember and understand faster as shown in Figure 18, Figure 19, Figure 20 and Figure 21.

Figure 17: Topic Selection for Module 2

Figure 18: Words available for Animal Topic

Figure 19: Words available for Sport Topic

Figure 20: Module 2 Content's for Animal Topic

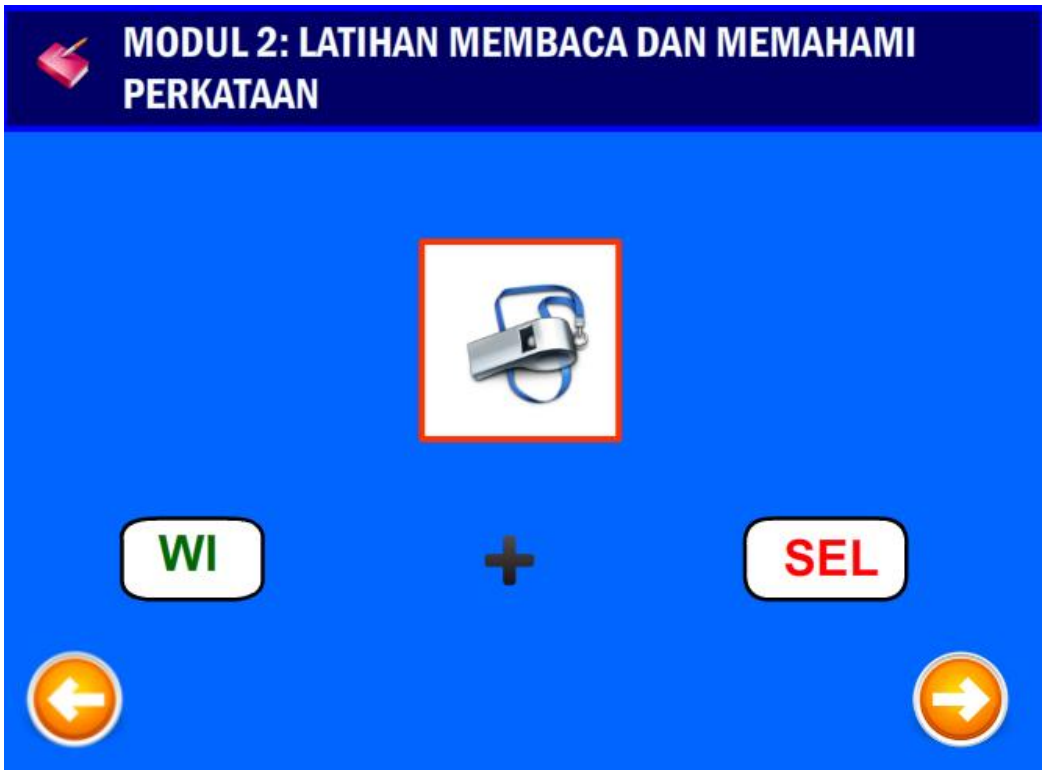


Figure 21: Module 2 Content's for Sport Topic

After completed module 2, children should be able to recognize letter and spell word. Hence, in the last module which is module 3, children will be teach on how to combine word in order to construct a sentence. The topic in module 3 is same as the topic in module 2 which is Animal and Sport as shown in Figure 22. Each topic contained 10 related sentences. The sentence is created based on the word learned by the children in module 2. So, children can recall back what they already learned before for long-term memory. Figure 23 and Figure 24 show the example of the content available in module 3.

Figure 22: Topic Selection for Module 3

Figure 23: Module 3 Content's for Animal Topic

Figure 24: Module 3 Content's for Sport Topic

After finished all the three modules, user should be able to recognize letter, spell word and read sentences. User need to go to section 2 which is "Uji IQ Anda" section after finish those 3 module.

"Uji IQ Anda" is the second section that will ensure that the users really understand what they learned in the first section, "Jom Belajar" section. User is provided with the exercise in a fun way in the second section. There are 3 level of exercire provided for the user. All the exercise is provided based o the contents of the module in the first section which is "Jom Belajar" section.

Figure 25 below depicted the screenshot of instruction for "Uji IQ Anda" section. This page has a button linked to the main page of the exercises as shown in Figure 26.

Figure 25: Main Instruction of Section 2 ("Uji IQ Anda")

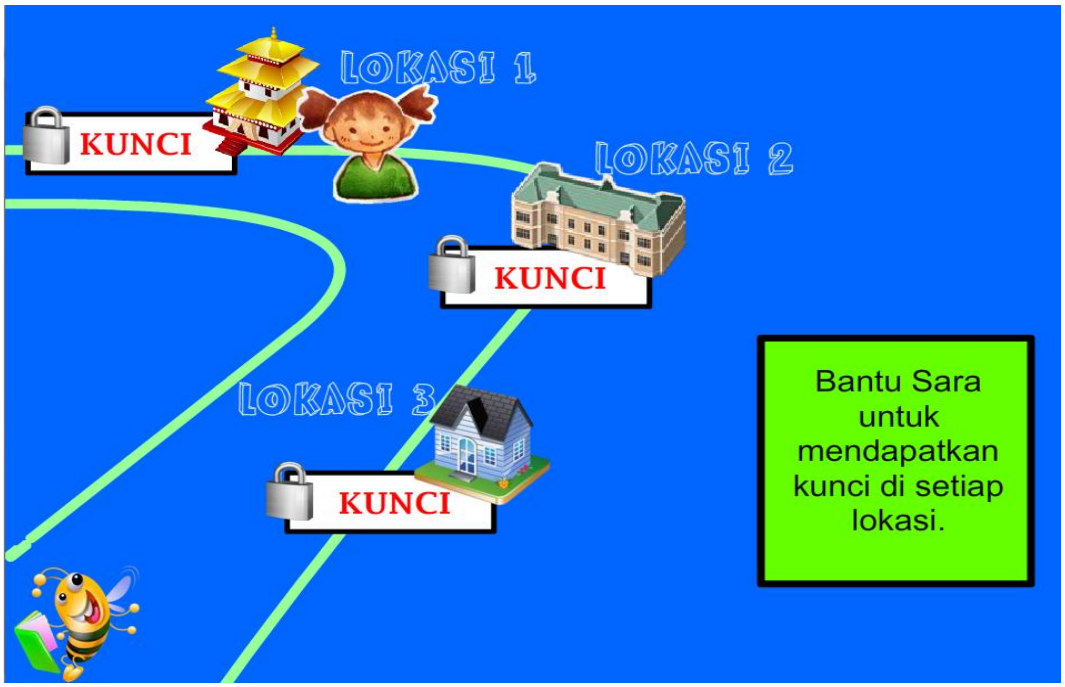


Figure 26: Main Page of Exercise in the Game Form

There are three level of exercise user needs to complete. Each exercise requires the users to recall back what they already learned in the first section ("Jom Belajar" section). All the exercises using mouse – click approach to answer the questions as shown in Figure 27, Figure 28 and Figure 29. All the exercises range from the easy level to intermediate level.

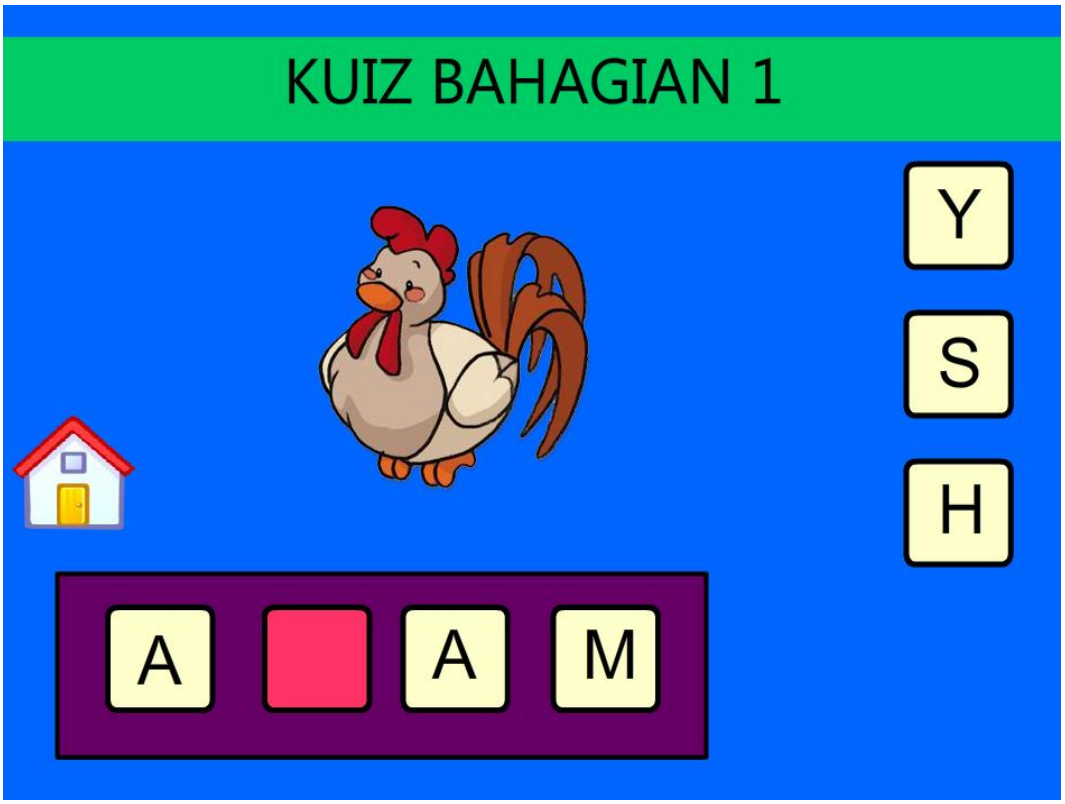


Figure 27: Exercise 1 (Easy)

Figure 28: Exercise 2 (Intermediate)

Figure 29: Exercise 3 (Intermediate)

Figure 30 shows the screenshot if the user can solve all questions in each exercise correctly. Every time users get the key from each location, this screenshot will appeared showed that they managed to answer all the questions correctly.

Figure 30: Screenshot indicates that the user manages to answer all questions in the exercise

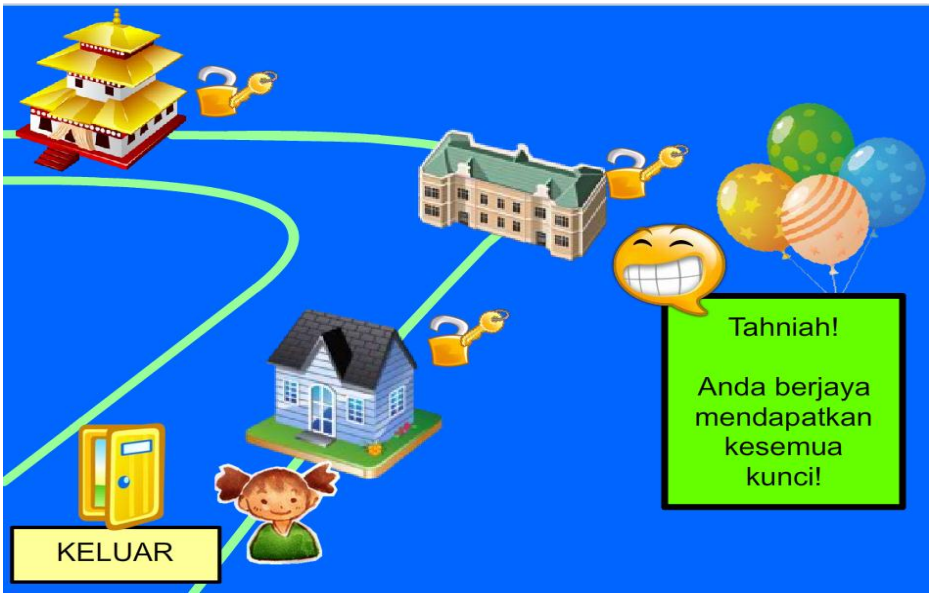


Figure 31: Screenshot indicates that the user manages to answer all exercisess in the "Uji IQ Anda" section

Figure 31 is the screenshot when the user managed to complete all the exercises correctly in the second section. If the users manage to achieve until this part, it shows that the users understand well the contents in the first part of the courseware.

After finishing the development phase, the author proceeds with the evaluation phase which is user – acceptance testing: to determine whether the courseware is suitable and can help the target user or not in their reading difficulties problem. The details of the user - acceptance testing are explain in the Section 4.4.

4.4 User Acceptance Test

4.4.1 Product Efficiency and Effectiveness

There are two sessions conducted for the user – acceptance testing. The first part of evaluation is on the acceptability and suitability of the courseware in terms of engagement offered by the courseware to the user and the efficiency of the courseware features and contents, whether the courseware is easy to learn by slow learners regardless their learning ability level and also the user's interest towards this courseware. Overall, this evaluation determines whether the target users can adapt easily with the courseware or not.

Efficiency measures speed with accuracy, in which user can complete the tasks while using the product. Timing data has been collected to measure time taken to perform each task until completed. This stage have been conducted in order to determine the difference of time taken by each user to complete the same task for several times using the developed courseware, to see whether there is decrement in time (increase of efficiency). In addition, qualitative data has also been collected from observations on user's interaction with courseware's elements such as text, icon, button, picture, sound interaction and etc. This stage also helps in detection any product's errors or problems that interrupt and slow them down during their learning process using "my LINUS" courseware. For this first evaluation, it was conducted in 'Sekolah Kebangsaan Temong' involved a total of ten users from "Linus" and "Linus Tegar" children.

The second part of evaluation is to compare which approach more quickly for the user can get module and exercise done with less mistakes (wrong answers), either using the courseware or using current method, regardless their ability level. Mistakes (wrong answers) done by the users also will be calculated, to determine whether "my LINUS" courseware can help in reducing mistakes (increase effectiveness) or not.

Effectiveness, on the other hand, refers to compare between the outcomes of the current method with the new developed courseware. It constantly measures if the actual output produced meets the desired output. Since efficiency is all about focusing on the process, importance is given to the 'means' of doing things whereas effectiveness focuses on achieving the 'end' goal. For this second evaluation, it was conducted in 'Sekolah Kebangsaan Chegar Galah' involved a total six users from "Linus" and "Linus Tegar" children.

4.4.1.1 Acceptability Evaluation I: *Product Efficiency*

Efficiency measures speed with accuracy in which user can complete the tasks while using the developed product. In this study, testing for efficiency has been conducted by collecting amount of time taken to perform each exercise for several times by a total of ten users. This step purposely conducted, to see the differences in time taken by each user to complete the exercise, whether by using this courseware may decrease in time taken to complete or not (increase of efficiency). If the time taken is decrease, it means that the courseware is suitable with the users as they can learn easily in the short time. In addition, qualitative data has also been collected from observations on user's interaction with courseware's elements such as text, icon, button, picture, sound interaction and etc. This stage also helps in detection any product's errors or problems that interrupt and slow them down during the learning process using "my LINUS" courseware. The results during this session are:

- **Time taken:** End time minus start time to complete each exercise until completed. There are three exercises provided to the user in the form of games, range from easy to difficult level. The time recorded includes the errors made by the user because it is one of limitation working with them as they are slow learners group.

- **Errors:** Mistake made by user in term of navigation and interaction while completing the task given.

Below are the details of the prototype - testing:

Date of Prototype - Testing: 22nd March 2013

Location: Sekolah Kebangsaan Temong, 33600, Enggor, Kuala Kangsar, Perak.

Users: Total of ten slow learner children ("Linus" and "Linus tegar" group)

Purpose: To determine the difference of time taken by each user to complete the same exercise for several times using the developed courseware ("my LINUS"), to see whether there is decrement in time (increase of efficiency). So, it will measure either this developed courseware easy to learn by the slow learner or not. There are three exercises in the form of game provided to the users ("Uji IQ Anda" Section).

Results:

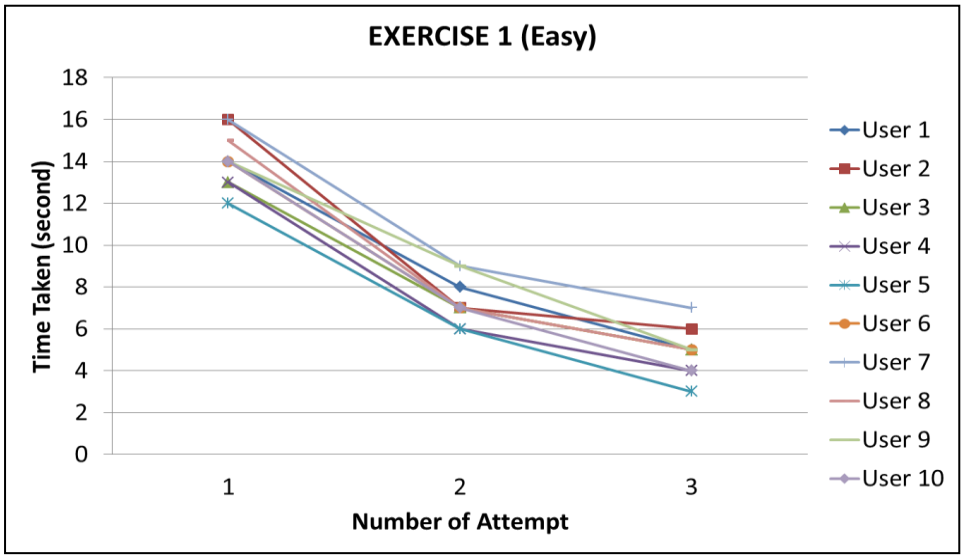


Figure 32: Time taken for the users to complete exercise 1 (Efficiency Evaluation)

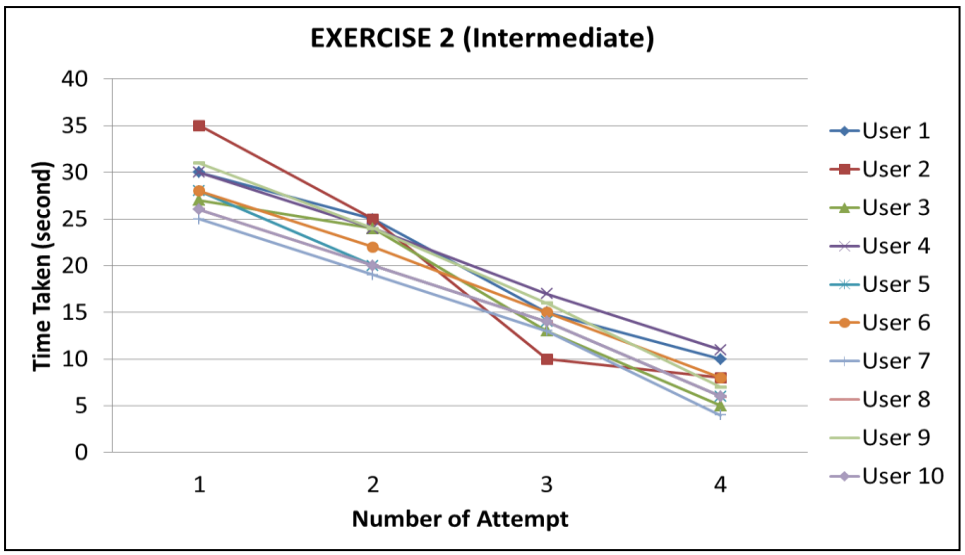


Figure 33: Time taken for the users to complete exercise 2 (Efficiency Evaluation)

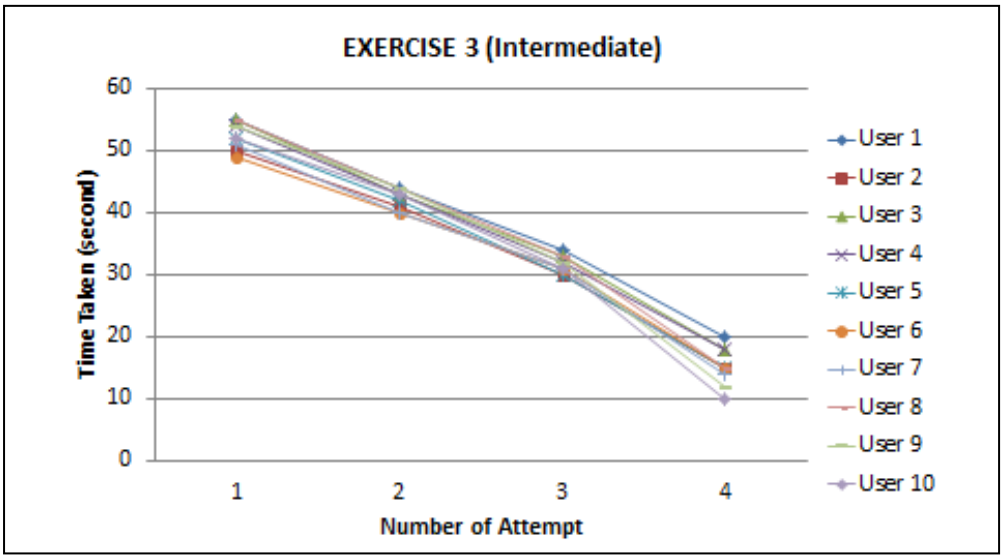


Figure 34: Time taken for the users to complete exercise 3 (Efficiency Evaluation)

Descriptions:

Figure 32, Figure 33 and Figure 34 illustrate the time taken on tasks for efficiency evaluation. From the results on all three exercises provided in "Uji IQ Anda" Section, it shows that the time taken was decreased along with the numbers of attempts performed. This is because the more users attempted on identical task, the more familiar they get and thus the lesser time they took.

From this results, it also can be concluded that the developed courseware easy to learn and suitable for the users as the graphs for each exercise illustrates the overall downward trend and individual variances. Users took lesser time to complete the task once they get familiar with the interfaces of the courseware. Courseware interface that is easy to learn will allow them to build on their own knowledge during playing without deliberate effort.

Overall results have shown that time taken to complete the exercises decrease along with the number of attempts performed by user on similar task. It indicates that the courseware has been designed to support the efficiency aspects that are suitable for slow learners, the extent that they can fully make use of as the interactions were developed suitable with their speed and abilities for learning process.

4.4.1.2 Acceptability Evaluation II: *Product Effectiveness.*

The second evaluation is conducted by measured the difference of time taken between the current LINUS method and the developed "my LINUS" courseware using same module contents and same exercises on a total of six slow learners. This evaluation is conducted to measure which approach is more quickly the user can get module and exercise done, either using the courseware or using current method, regardless their ability level. All users were asked to do three set of same modules and exercises two times using two different approaches:

i) **Current LINUS method.**

ii) **"my LINUS" courseware**.

Overall usage time (time for all modules and exercises completion) were recorded and compared between two different approaches. The results obtained will be discussed according to the modules included in the courseware.

- **Time for task completion:** Total time taken to complete all tasks, measured in seconds. The time recorded include assisted and unassisted because it is one of limitation working with slow learners.

- **Errors:** The total errors (wrong answers) make by the users in each exercise while completing "Uji IQ Anda" section, whether it will decrease when using multimedia – learning approach ("my LINUS" courseware) or not.

- **Assists:** The assistance was given verbally to users who could not proceed on the task due to some limitations such as confused toward courseware navigation, courseware error or situation that the user went lost and not sure on their step. Assistance is given to ease user's situation to carry out task in certain way without major interference.

Below are the details of the prototype - testing:

Date of Prototype - Testing: 1st April 2013

Location: Sekolah Kebangsaan Chegar Galah, 33600, Sauk, Kuala Kangsar, Perak.

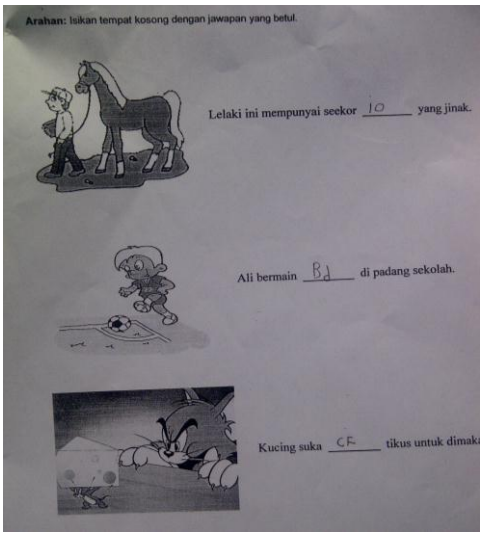
Users: Total of six slow learner children ("Linus" and "Linus Tegar" group)

Purpose: To measure the difference of time taken between the current LINUS method and the developed "my LINUS" courseware using same module contents and same exercises on a total of six slow learners. So, it will determined which method is more quickly and can attract children much to finish their learning session effectively. There are three modules and three exercises provided to be completed by the users.

Current LINUS Method:

- Use text book as reference.
- Module with static picture and black & white color.
- Exercise on paper with static picture and black & white color.
- Activity in Class.
- Written test.

Pictures Below: *Current LINUS method.*



Pictures Below: *Using "my LINUS" courseware (same modules and same exercises).*

Results:

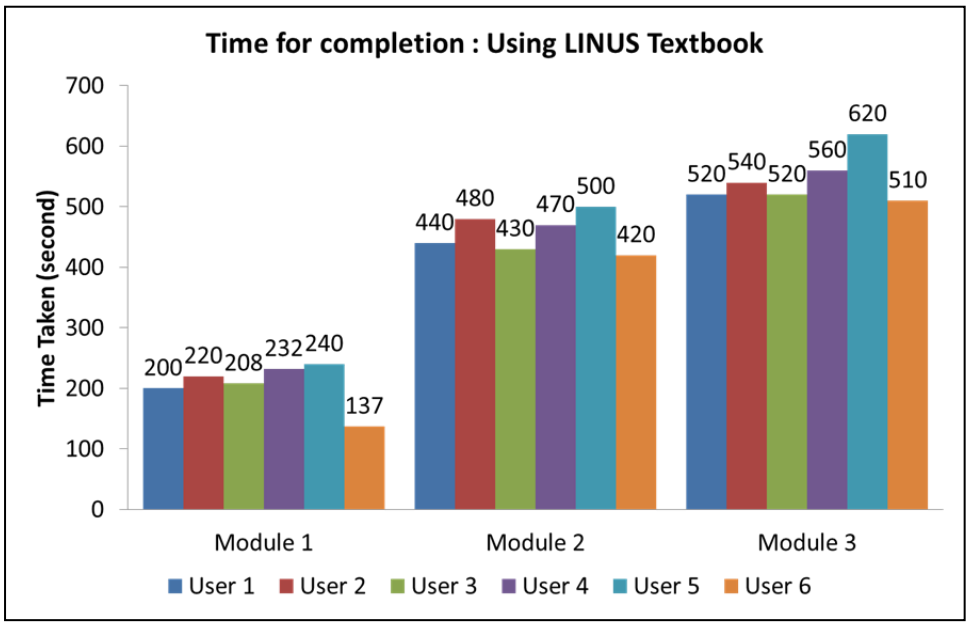


Figure 35: Time taken for the users to complete each module using current method (Effectiveness Evaluation)

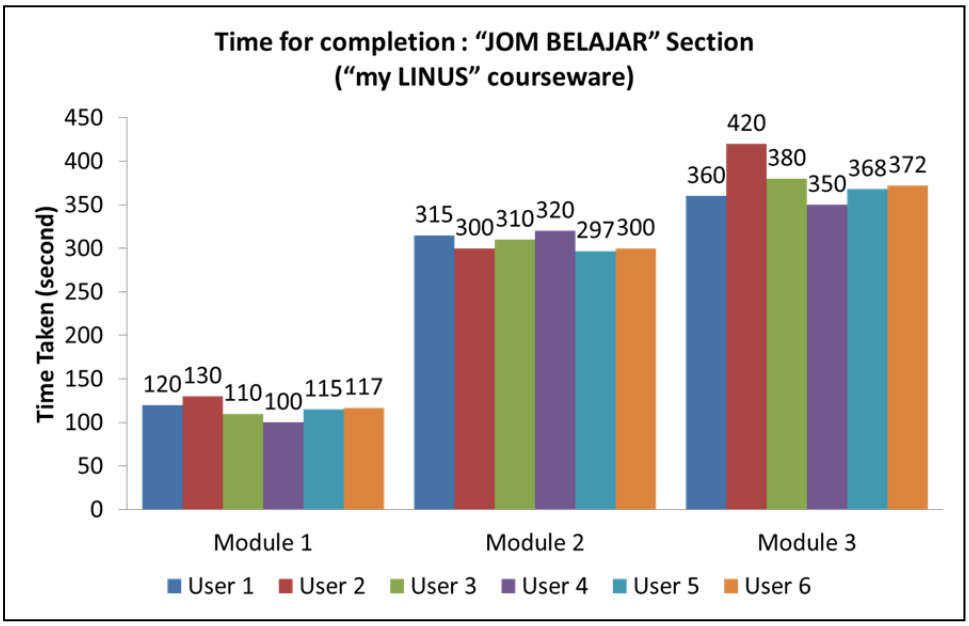


Figure 36: Time taken for the users to complete each module using "my LINUS" courseware

(Effectiveness Evaluation)

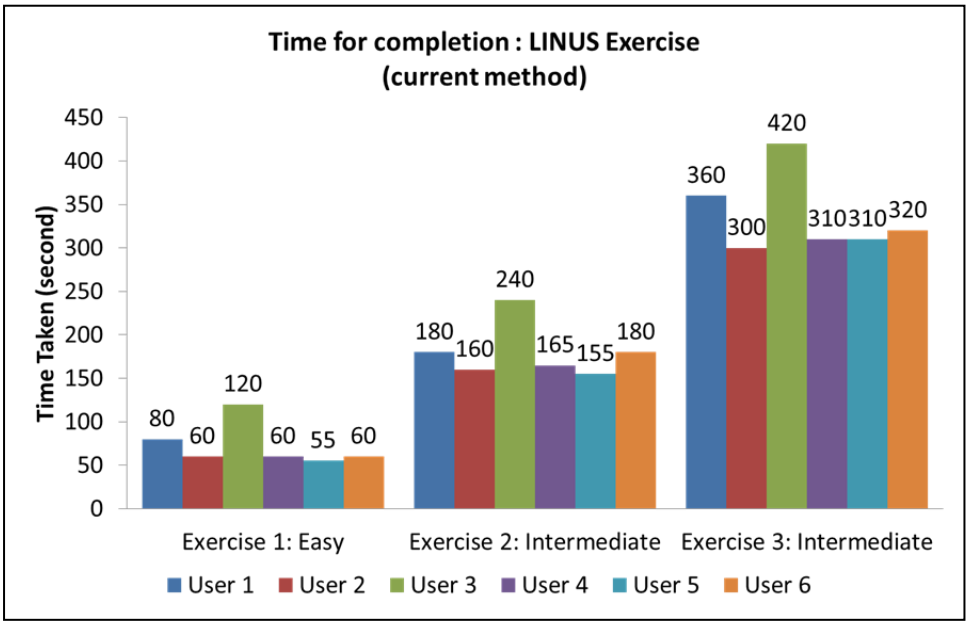


Figure 37: Time taken for the users to complete each exercise using current method (Effectiveness Evaluation)

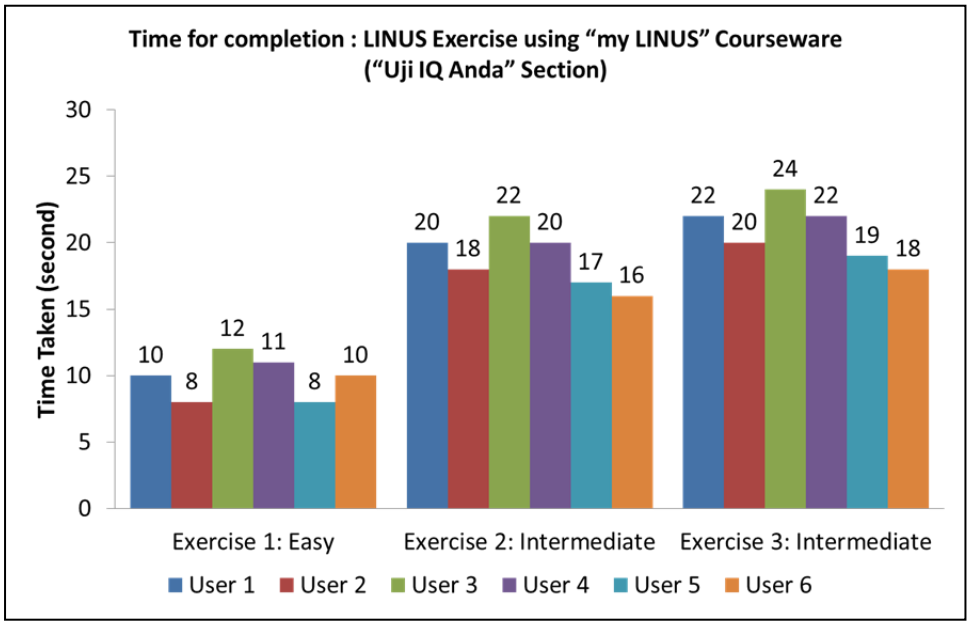


Figure 38: Time taken for the users to complete each exercise using "my LINUS" courseware (Effectiveness Evaluation)

Descriptions:

Figure 35, Figure 36, Figure 37 and Figure 38 illustrates the time taken on tasks for effectiveness evaluation. From the results above, it shows the comparison of time taken for each user to complete same modules and exercises by using two different approaches.

From Figure 35 and Figure 36, it can be analyzed that users took lesser time to complete the modules using "my LINUS" courseware compared to the textbook. This is because, by using textbook, user easy to get bored and cannot concentrate much as the textbook only contained static words and pictures. It seems that user is more interested learning using multimedia approach compared to the current approach. User may interact with the computer through the sound and animation embedded to the courseware. As a result, user can increase their retention time and learn actively using the developed courseware.

From Figure 37 and Figure 38, the same results also produced. It can be analyzed that, users took lesser time to complete the same exercises provided using "my LINUS" courseware compared to the printed paper exercises (current LINUS method). Users are interested more to answer the questions using computer compared write in the printed paper.

Multimedia elements embedded in the developed courseware such as picture, text, audio and animation is the main reason why the time taken for modules and exercises completion using "my LINUS" courseware is less than using the current LINUS method. Overall results have shown that time taken to complete both modules and exercises decrease when using multimedia – learning approach. It indicates that the courseware has been designed to support the effectiveness aspects that are suitable for slow learners, the extent that they can fully make use of as the interactions were developed suitable with their speed and abilities for learning process.

In addition, the errors make by the users in the exercise part also recorder and it decreases when using multimedia – learning approach ("my LINUS" courseware). Below is the data analysis analyzed during the product – testing evaluation, giving them same exercise questions related with the modules learned before but different approaches.

Exercise 1; *Number of errors (wrong answer),*

TARGET USERS	CURRENT LINUS METHOD	MULTIMEDIA - LEARNING APPROACH ("my LINUS" courseware)
User 1	1 out of 3 questions	0 out of 3 questions
User 2	0 out of 3 questions	0 out of 3 questions
User 3	2 out of 3 questions	1 out of 3 questions
User 4	0 out of 3 questions	0 out of 3 questions
User 5	0 out of 3 questions	0 out of 3 questions
User 6	0 out of 3 questions	0 out of 3 questions

Exercise 2; *Number of errors (wrong answer),*

TARGET USERS	CURRENT LINUS METHOD	MULTIMEDIA - LEARNING APPROACH ("my LINUS" courseware)
User 1	2 out of 4 questions	1 out of 4 questions
User 2	2 out of 4 questions	0 out of 4 questions
User 3	3 out of 4 questions	1 out of 4 questions
User 4	1 out of 4 questions	0 out of 4 questions
User 5	2 out of 4 questions	0 out of 4 questions
User 6	1 out of 4 questions	0 out of 4 questions

Exercise 3; *Number of errors (wrong answer),*

TARGET USERS	CURRENT LINUS METHOD	MULTIMEDIA - LEARNING APPROACH ("my LINUS" courseware)
User 1	2 out of 3 questions	0 out of 3 questions
User 2	2 out of 3 questions	0 out of 3 questions
User 3	3 out of 3 questions	1 out of 3 questions
User 4	2 out of 3 questions	0 out of 3 questions
User 5	1 out of 3 questions	0 out of 3 questions
User 6	1 out of 3 questions	0 out of 3 questions

From the data collected, it shows that multimedia – learning approach will helps user to decrease their errors and increase their attention during learning process. So, it is proving that this courseware is suitable for slow learner children and may increase the effectiveness to the slow learner children during their learning process.

CHAPTER 5
CONCLUSION

"my LINUS" courseware has the abilities to help slow learner children overcome in their reading difficulties during learning process. The development of this courseware definitely contributes to them as the approach and technique used are suitable and fit with the slow learner learning levels. In addition, this courseware at the same time helps teacher in assisting slow learner children in today learning environment. "my LINUS" creates a much more fun ways of learning and grasps the children attention to focus and interested in the module given during their learning process. Hence, this research is mainly to focus on the suitable technique in teaching and learning for slow learner children who are having reading difficulties.

From the user – acceptance testing have been conducted, it is proven that "my LINUS" courseware able to increase efficiency and effectiveness compared with the current LINUS method. Overall, the evaluations have generated positive results where all users showed that the courseware designed is suitable and acceptable to the slow learners needs: in terms of multimedia elements, contents and its usability.

For future works, this product can be made to be compatible in other platform, not just limited to PC / laptop but also in smartphone and online usage. Operating system such as Android, iOS and Blackberry will create portability to this application. Further studies also needs to done to add another functions and attractive elements that can help slow learner children to to overcome their reading difficulties in learning process.

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APPENDICES

Appendix 1: **Actual Gantt Chart**

No	Activities	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1	[FYPI]Title selection / proposal 1.3 Assignment of supervisor 1.4 Project approval									
2	[FYPI]Extended research									
3	[FYPI]Submission of extended proposal : 3.1 Literature review 3.2 Identify project requirements									
4	[FYPI]Presentation 1: Proposal Defense									
5	[FYPI]Project work on interim report 5.1 Literature review 5.2 Design 5.2.1 Plan project 5.2.2 Project design 5.2.3 Interface design									
6	Project development									
7	[FYPII] Submission of progress report 1									
8	[FYPII]Testing 9.1.1 Project testing 9.1.2 User acceptance testing									
9	[FYPII] Pre - EDX									
10	[FYPII]Submission of dissertation - softbound									
11	[FYPII]Presentation 2 : Viva									
12	[FYPII]Submission of final disesertation - hardbound									