Computer Based Training (CBT) Of
Driver's Education Curriculum (DEC): Instructional Design
For Student with Reading Difficulty

By

Dayang Aliaa Zawani bt Awang Bakar

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Dissertation submitted in partial fulfillment of

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Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

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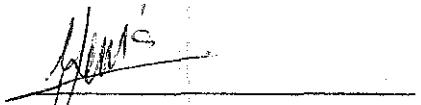
Approved by,



(Mr. Yew Kwang Hooi)
Project Supervisor

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
January 2011

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 acknowledgement, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

DAYANG ALIAA ZAWANI BT AWANG BAKAR

Abstract

This study focuses on instructional design that leads to a proposal of computer-based-training (CBT) Driver's Education Curriculum (DEC), an alternative reading from DEC. It addresses problems faced by some students who have reading difficulty. Conventional learning is probably too exam-oriented and does not sufficiently prepare students with the swift responsiveness to traffic symbols or situations in actual driving. A courseware based on driving rules and safety awareness is developed to support the study. Experiment will be carried out on end-users to study the effect of using the courseware which has not been implemented in ordinary driving school or institute. The hypothesis is that computerized learning capitalizing on cognitive theories and instructional design will develop better learning imprint bears findings that the courseware is a good revision tool for student who are having reading difficulty to prepare themselves before taking the table test.

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INTRODUCTION

1.1 Background of study

Driving school or institute acts as a center of education for people who wish to own their driving license and wants to drive. In Malaysia, driving lessons are divided in two stages. The first stage is a course to obtain the L license (Learner Probationary Drivers license) which consists of 6 hours of lecture based on DEC (Driver's Education Curriculum), then followed by theoretical computerized driving test and a total of 6 hours of mandatory theory and practical course. Next stage is to obtain P license (Probationary Drivers License) whereby learner drivers need to undergo 6 to 10 hours of driving course depends on their driving standard, go through qualifying test or Q.T.I. before sitting for practical test with JPJ (Jabatan Pengangkutan Jalan / Road Transport Department) official or testers.

The primary tool needed to pass the test especially for the first stage is by reading and understanding DEC handbook and also listening to the lectures provided by driving school or institute. This sounds easy for literate people but how about illiterate people who cannot read and may have problems of understanding the curriculum? It creates hardship for this particular group of people.

This research emphasize on this illiteracy problem on how to overcome it by creating a driving lesson courseware that addresses illiteracy problem among the learner drivers. Besides, this courseware is an alternative method of learning in driving school. It is intended to educate learners based on Malaysia's driving syllabus provided by JPJ basically on the rules, safety

awareness, and such. There are quiz and also game to make the learners understand about the syllabus. The unique innovation is incorporation cognitive learning theories to aid students with reading and understanding difficulties.

1.2 Problem Statement

Learners with reading difficulties face difficulties in learning from driving handbook. Also the current learning method is not sufficient as it is too exam oriented and not sufficiently prepares students with the swift response to traffic situations.

1.3 Objective

The main objective of this project is to investigate, design and implement cognitive DEC syllabus driving courseware to assist students with reading difficulties using cognitive learning theories, multimedia design and suitable user interface.

1.4 Scope of Work

This project focuses on an alternative method to learn DEC lessons: Road User's Guide, The Highway Code, Defensive Driving, Driving in Various Situations, Health and Safety Requirements for Drivers, Law and Driving Offences and Regulations and Laws Relating to Motorcyclist which is the same as what is offered by Malaysia's driving school or institute besides that this courseware is offering virtually not practically. It does not cover driving lesson on slope climbing, side parking techniques and 3-Point turn maneuvers, which are hands-on lessons and which has no concern with learner reading capabilities. The design of the courseware will be backed by cognitive learning theories and proven using real user experience. Assuming that the conventional syllabus is sufficient but the learning methodology is suspected to be not really effective.

CHAPTER 2
LITERATURE REVIEW

2.1 Benefits in using courseware for learning

Courseware is basically computer software used in teaching. Broadly defined, it refers to any instructional materials that are used to support in the learning process. Mayer (1992) has found that contiguity, the presentation in an integrated frame of information conveyed in more than one medium enhances learning. [1] Learning through courseware, or other forms of multimedia learning with the medium of text, animations, images and sound conveying information to the user, certainly support this theory. Courseware is meant to adopt a multimedia training and education in an organization whether at firm or even at school.

Multimedia is defined by Hooper and Reinartz (2002) as the combination of two or more media into a single coherent message. Three multimedia categories are identified: presentation tools, interactive programs, and learning environments. Presentation tools can be such medium as slides and web pages, among others. Interactive programs include the likes of drill and practice software and tutorials. [2]

Finally, learning environments have five characteristics: problem space (the central problem around which student activity revolves), related cases, information resources, cognitive tools (resources for recording, analyzing, and organizing information), and conversation tools.

2.2 Cognitive Learning Theories

Mayer's cognitive theory proposes three main assumptions when it comes to learning with multimedia:

- There are two separate channels (auditory and visual) for processing information (sometimes referred to as Dual-Coding theory);
- Each channel has a limited (finite) capacity (similar to Sweller's notion of Cognitive Load);
- Learning is an active process of filtering, selecting, organizing, and integrating information based upon prior knowledge. [3]

By incorporating these cognitive learning theories to the courseware, it can aid learner drivers to understand the driving syllabus well. Both audio and visual are implemented in the courseware to create simple and easy-to-understand user interface plus less-text-interface to assist learner drivers.

2.3 Design of Adaptive Web Browser (AWB) for students with reading difficulties

Chi Nung Chu et al (2002) had been designing AWB for students with reading difficulties which including mental retardation and learning disabilities. According to them, these students are having difficulties with word decoding and comprehension. Challenges that they faced are in manipulating browser to read through the web and comprehending contents on the web pages by learning through the Internet.

AWB has these features to assist the students with reading difficulties:

- Simplified Interface

  The toolbar of AWB is modified by considering user's cognition abilities with added voice description for the most frequently used functions on the toolbar so that users could easily learn to interact with the AWB.

- Voice and Picture Assistance

  AWB could read out word or sentences highlighted by users in synthesized voice output. Contents of web page could be listened by users instead of reading. Pictures can automatically pop-up as user mouse over it and AWB can speak the target word by clicking right button. [4]

Based on these designs, they have conducted evaluation and have a result that shown the effectiveness of the AWB that can assist students with reading difficulties.

2.4 Driving Lesson

2.4.1 Online Driving Lesson

Other driving lesson courseware that is available nowadays is mostly online based and it is available widely in the oversea market such as United States and United Kingdom as most of users are having Internet connection available at their home. There are many online driving lesson offered to the learners for example one of them is available at http://www.driverseddirect.com/ (Drivers Ed Direct®)

Drivers Ed Direct® is an online driving school offered for learner drivers in the United States which is currently available at some states in California, Colorado, Florida, Nevada, Oklahoma, and Texas. The online driving lessons include Interactive Flash animation, the most current info on safe driving techniques, updated DMV rules and regulations and comprehensive material to get you on the road to becoming a new driver. [5]

Figure 2.1 Drivers Ed Direct® Interactive Flash lesson

However, there is currently no online driving school or even driving lesson courseware available today in Malaysia. With the availability of this courseware project, it can provide learner drivers a new way to learn driving and not to forget to aid learner with difficulties of reading and understanding DEC handbook. Using courseware to learn also give benefits to the learner drivers which do not have Internet connection at their home to learn driving with ease.

2.4.2 Malaysia's Driving Syllabus Resources

2.4.2.1 Existing Conventional Syllabus

Based from observation at Institut Memandu City Miri Sdn. Bhd. Miri, Sarawak, there is a special class held every week for students who are having reading disability and also for slow learners. This class is held especially for these students with approval from the JPJ and local doctors to certify the students that they are having the specified disabilities. A sample of the application forms, doctor's approval can be found in **Appendix A**. If the student is between the ages of 20-30 years old, he or she is categorized as slow learners while 30 years and above would be students with reading disabilities. The instructor is using a multimedia slide to teach the students and will focus on the important points for the students to pass the test later on. He explains to the students with help of whiteboard and the multimedia slideshow.

Figure 2.2 Institut Memandu City Miri Sdn.Bhd

For these students, the theoretical computerized driving test will be replaced with oral test using pen and paper which is handled by a JPJ officer that is handled once a month at the driving institute. It is a special test with the help of projector, the questions will be displayed on the screen and the officer will explain the meaning of the questions and answers one by one thus the student will only have to answer either A or B on the paper. They can ask if they do not understand the questions or even can discuss amongst themselves.

2.4.2.2 Resources

It is quite difficult to find a resource on Malaysia's driving syllabus apart from the KPP handbook. http://driving-school.com.my/ is a good online resource for learner drivers in Malaysia to find a lot of tips on driving, maintaining cars and so much more. It is written by Cikgu Yap, an experienced driving instructor in Malaysia. There is a lot of useful information available at this blog. However, this website is written in blog which is sometimes quite hard to find the information that we need as we need to scroll through the blog and find the related tags.

Figure 2.3 Driving School Malaysia Blog User Interface

With this project, the driving lesson courseware includes a section that will help learner drivers to browse through knowledge on driving in Malaysia in a user-friendly interface which is easy to navigate around. Besides that, the courseware is also providing quiz for user to prepare for the real test.

2.5 Flash technology

Flash is a multimedia platform used to design animation and was developed by Future wave in 1995 which is known as FutureSplash Animator at that time. Later it was acquired by Macromedia in 1996 and is currently developed and distributed by Adobe Systems. The latest version of Flash is Flash Professional CS5 which boasts a number of improvements over previous versions, including better animation physics, improved typography controls, new code hints and snippets for building web apps in ActionScript, some new data formats, and better ability to add cue points to videos. It also has a few tricks for developers eager to publish apps to places where Flash isn't allowed.

2.6 Action Script

ActionScript is a scripting language used for the development of courseware through Adobe Flash platform. ActionScript 2.0 is an object oriented programming language (OOP) allows you to create new features that can be accessed via methods of new classes. This is the preferred way of building up libraries of commonly used features not native to ActionScript. For many designers, the ActionScript 2.0 OOP coding style may initially seem a little long-winded because more lines of code seem to be concerned with building up the code structure than actually solving the problem at hand, especially for modest classes. It gives a structured way to make the code flexible enough to reuse in several different applications and also makes the code easier to transfer to other users (which is particularly useful in a design environment consisting of an ActionScript coder and several nonscripting designers). [7]

CHAPTER 3
METHODOLOGY

3.1 Project Approach

The development methodology used in this project is prototyping as shown in Figure 3.1 below. The reason for choosing this method is because:

- The analysis phase is relatively thorough which is used to gather information and develop ideas for the courseware concept. The design prototype is intended for the user to visualize how the courseware built will be.
- By having prototype of the design, it will reduce the risk related with the courseware by validating the vital issues that are understood before the real courseware is being built. If there are needs for refinement, the project will moves into design and implementation and develop a design prototype. It keeps on reiterating until all the raised issues are determined.
- Prototyping usually produces more stable and reliable systems especially when the features are need to be understood more and challenging technical issue to be solved during the development process.

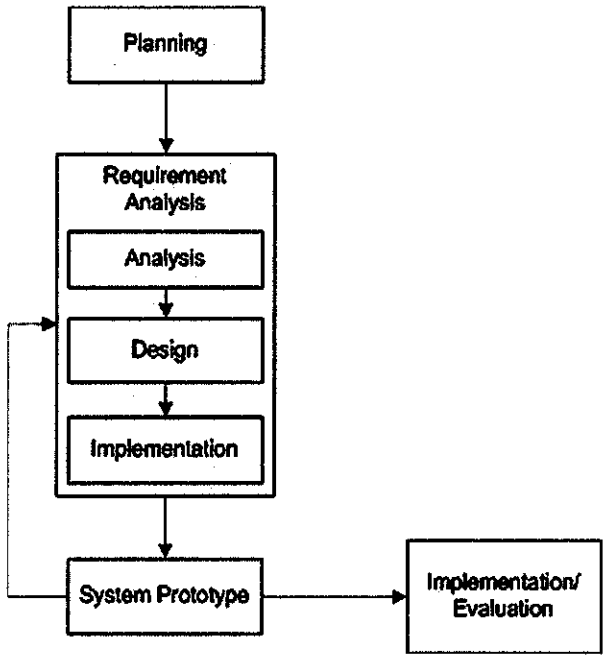

Figure 3.1 Prototyping Methodology

3.2 Stages of Prototyping Method

3.2.1 Planning

Project planning started at this stage where topic of this project is being selected and area or scope of project is defined. Here is where all of the resources for this project are being gathered. Literature review is conducted during this stage and all the journal and articles has been read through to get a better understanding of how to develop a driving lesson courseware that addresses illiteracy problem.

3.2.2 Requirement Analysis

3.2.2.1 Analysis

Analysis of current system is conducted at this stage. From the research that has been carried, there are many websites that offer online driving lesson to driver learners but mostly they are available in the oversea such as United States and United Kingdom. There is no available driving lesson courseware in Malaysia's market yet at the moment.

User's personal computers have to be installed with the latest Adobe Flash Player to view it since the prototype will be developed using Adobe Flash.

3.2.2.2 Design

To develop this project, Adobe Flash combined with ActionScript is used to build the courseware. ActionScript will be the scripting language which will be used for the navigation and animation within the courseware. The interface will be design as well as the program flow in this phase.

3.2.2.3 Implementation

In this stage, the courseware will be implemented in local computer; it is not the finish prototype which will be delivered to public. This is the stage where the prototype will be refined if there is any flaw in the previous prototype.

3.2.3 System Prototype

System prototype will be developed and feedback from users will be taken to improve the system and understanding the requirements. Users will be notified that the system is only a prototype and not the finish product. If the product does not meet the requirement, it will go back to the requirement analysis stage.

3.2.4 Implementation/Evaluation

In this final stage, the prototype will be implemented and users can use the courseware. Evaluations are conducted on various aspects to measure the quality of the courseware and to make sure that the courseware works flawlessly.

Evaluation stage will be conducted where learner drivers will be testing the courseware. All comments and suggestions will be taken and a survey form will be provided to know their feedback on the usefulness of the courseware whether the learner drivers can achieve the level of understanding the driving syllabus by using the courseware besides using traditional method by reading from the DEC handbook.

3.3 Methods for designing interface

- **Thinking aloud**

  According to Nielsen (1993) the method of thinking aloud allows us to understand how the users approach the interface and what consideration the users keep in mind when using the interface. [8] Users are asked to verbalize and describe their thoughts and feelings while interacting with the courseware. A better understanding of user's thought and interaction with the courseware can be achieved using this method.

- **Questionnaires**

  Questionnaires or survey are generally a common way to gather data and allow a quantitative analysis of results. The questionnaires that are well-designed can gather information on both the overall performance of the system as well as information on specific components of the system. About 60 questionnaires have been filled by random people in order to get information needed to fulfill their requirement as a user.

- **Interviews**

  Interviews are used besides questionnaires to gather information regarding user requirement in designing user interface of the courseware. Rubin (1994) suggest that interviews are used at the beginning and end of an evaluation and also the beginning of development, initially to gather general information to form the basis of questionnaire and afterwards to clarify its results and fill in the gaps. [9]

3.3.1 Design strategy

The fundamental problem which had to be addressed in designing the courseware is user's difficulty with reading. This had to be addressed at the very beginning of design process which meant that text dependence have to be minimized. Conventional way of learning depends heavily on the ability to

read text from the handbook unfortunately which creates complexity for student with reading difficulty. The design strategy of the project involved understanding how user with such difficulty can learn independently by implementing various elements of visuals, sounds, animations and minimal usage of text when designing the courseware.

3.4 Tools required

3.4.1 Hardware

The hardware tools used during system development is a net book powered by 1.83GHz Intel Atom Processor with 2GB DDR2 RAM and 250GB of hard disk space.

User PC with any hardware specification can run this courseware.

3.4.2 Software

This project is developed using Adobe Flash Pro CS5, Adobe Photoshop CS2, Audacity and FreeNaturalReader 10.0. Adobe Flash is used to create and code the courseware while Adobe Photoshop will be the image editing software during this entire project. Audacity and FreeNaturalReader are also used to record voices and sound editing.

User PC should be installed with latest Flash plug-in to run the courseware.

3.5 Feasibility Analysis

A feasibility study is an evaluation of a proposal designed to determine the difficulty in carrying out a designated task. Generally, a feasibility study precedes technical development and project implementation. In other words, a feasibility study is an evaluation or analysis of the potential impact of a proposed project. The result of this study is used to make a decision whether to proceed with the project, or table it. Several elements has been considered and examined for this feasibility study should be as listed below:

- **Technical Feasibility study**

  Adobe Photoshop CS2, Adobe Flash Pro CS5, Audacity and FreeNaturalReader 10.0 are used for the development tools.

- **Economic Feasibility study**

  This courseware need to be distributed in a CD-ROM for the final output and will incurred extra cost in order to develop it. But, it is a worth investment, since the courseware is beneficial for learner drivers in driving institutes and schools.

- **Schedule Feasibility study**

  This courseware is expected to be completed in April 2011.

- **Legal Feasibility study**

  This courseware need to face with some legal scrutiny and have to adapt with legal issues after its completion.

- **Needs analysis**

  End deliverables of this project is a Driving Rules & Safety Awareness Courseware for People with Difficulty on Reading & Understanding DEC Handbook which benefits to people with such difficulties.

3.6 Gantt Chart

See **Appendix B** for Gantt chart

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Data Gathering and Analysis

4.1.1 Questionnaire

A questionnaire has been designed for a guideline in developing this project. The objective of the questionnaire is to gather as much as important information that related to the issues in order to develop a better design of the courseware. The purpose of this questionnaire is to investigate the relevance for developing this courseware on driving rules and safety awareness which focuses on overcoming problem for people who have difficulties in reading and understanding DEC handbook.

This questionnaire has been distributed to around 63 random people who among them are mostly who have taken driving license and some have not yet experience taking driving lesson. Questionnaire is distributed online which is easy for respondents to submit they questionnaire anytime they wanted. The objective and the relevance of the questionnaires are first briefly explained to the respondents before they complete the questionnaire. Feedback and comments from respondents are highly contributed to the studies of the project. A sample of the questionnaire can be found in the **Appendix C**.

4.1.1.1 Questionnaire Result

The result of the questionnaire is as follows:

Question 1: Gender

From the surveys of 63 respondents, it indicates that 23 of the respondents are male and 40 female which had been randomly selected consisting of random people in Malaysia.

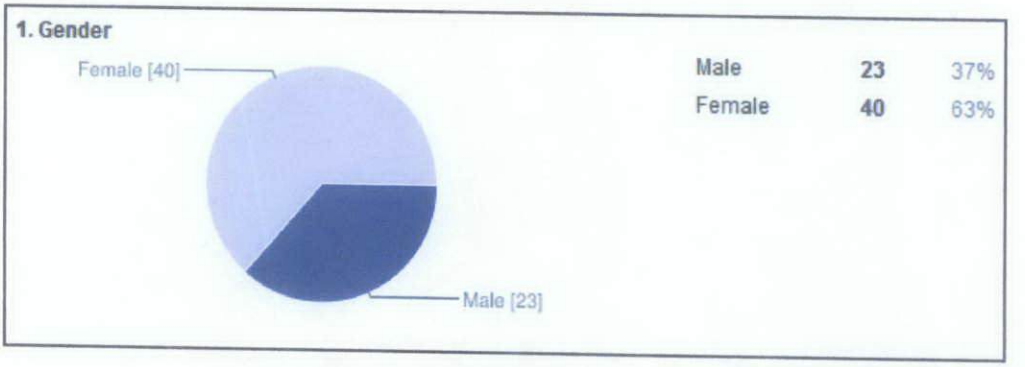

Figure 4.1: Gender of respondents

Question 2: Familiarity with learning using courseware.

From the survey, 13 respondents do not have any experience learning using courseware, 13 respondents have little familiarity, 26 responded 'average' while only 11 out of 63 respondents have very much familiarity with learning using courseware. Some of the respondents do not even know the term 'courseware' itself and this explained why some of them answered 'not at all'.

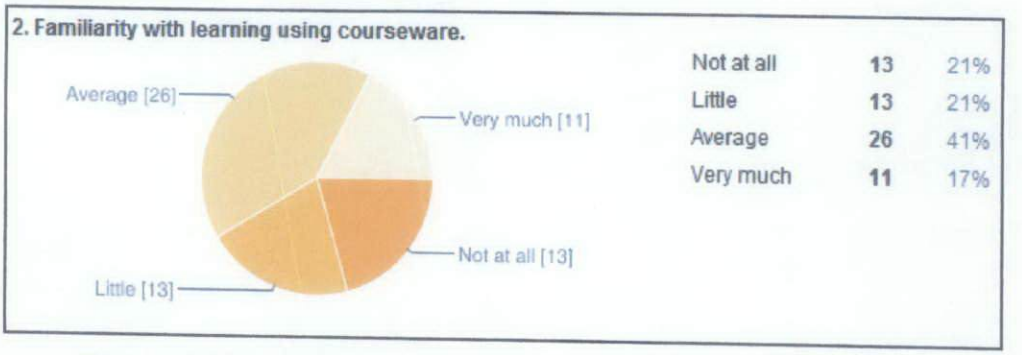

Figure 4.2: Familiarity with learning using courseware

Question 3: Level of computer literacy.

From Figure 4.3, it is known that most of the respondents which are about 45 have the high level of computer literacy. 14 of them are intermediate, which is often need help while using computer and only minority of them – 4 respondents are having low level of computer literacy.

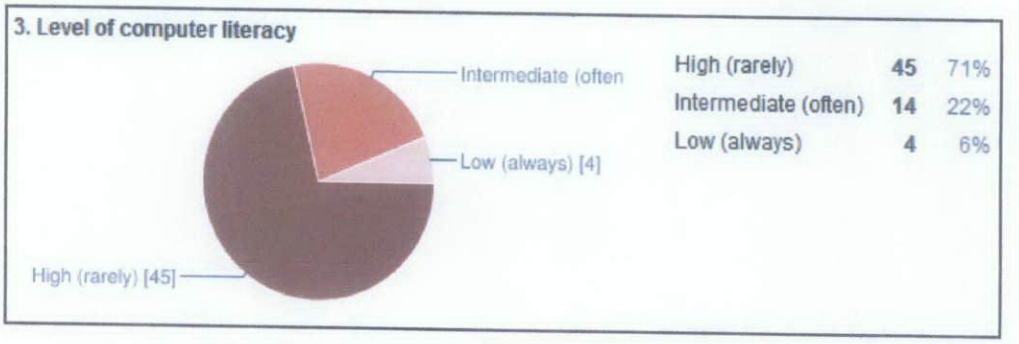

Figure 4.3: Level of computer literacy

Question 4: Have you taken driving license?

58 respondents have taken driving license and only 5 of them have not yet taken the license. This question is important to gather experience from people who have passed their table test which required them to read the DEC handbook most of the time.

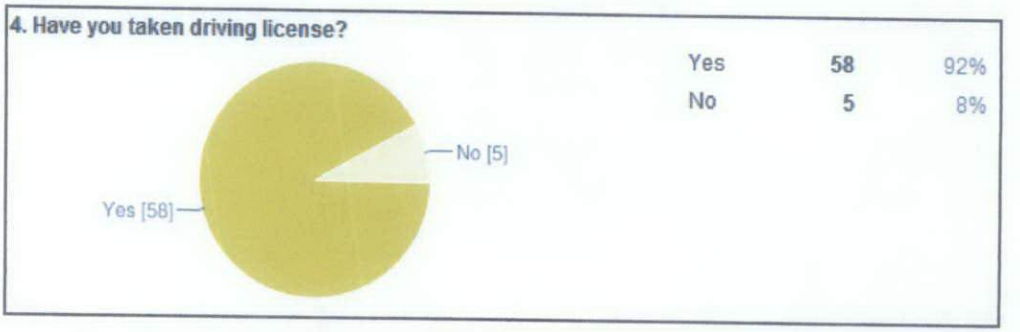

Figure 4.4: Respondents that have taken driving license

Question 5: How did you study for your table test?

From the survey, 23 respondents read DEC handbook, 1 respondent listening to lectures, and 31 respondents studied by reading handbook and listening to

lectures. Other 3 respondents studied by exercise book and also using CD bought at some driving schools which contains exercises similar to table test.

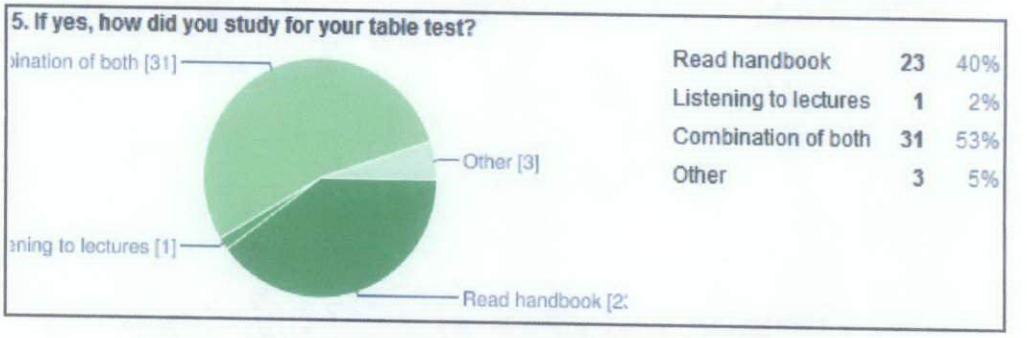

Figure 4.5: Methods of studying for table test

Question 6: Did you pass your table test for the first time?

About 48 respondents passed and 12 respondents did not pass their table test at their first attempt.

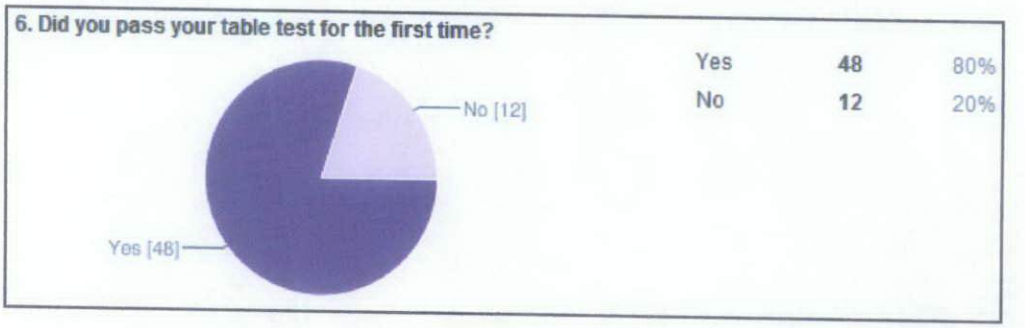

Figure 4.6: Respondents' percentage of passing table test at the first attempt

Question 7: If no, how many time(s) that you have failed until you pass your table test?

Mostly of respondents failed 1 time (53%) before passing their table test.

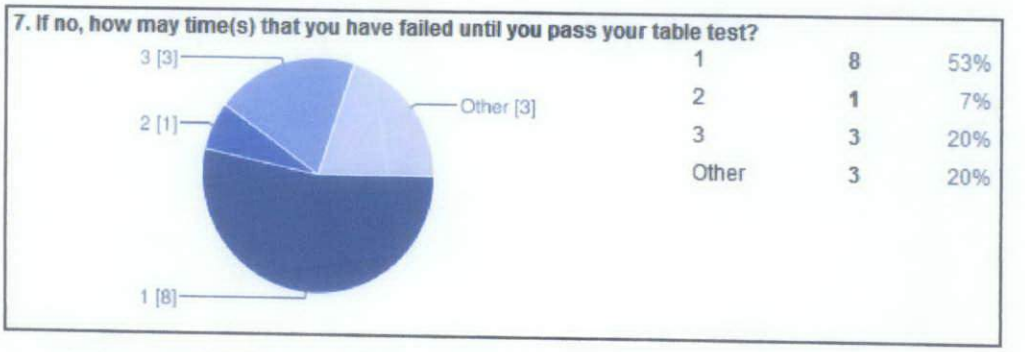

Figure 4.7: Times of failing table test until pass table test

Question 8: In your opinion, why do you think learner drivers fail in their table test?

From Figure 4.8, 41 respondents answered do not study well causes learner drivers failed in the table test. While 14 said they do not understand the handbook, 5 answered do not have enough time in answering the table test. The other 3 said that confusion in answering, too many things to digest to understand the handbook and difficulty answering using computer.

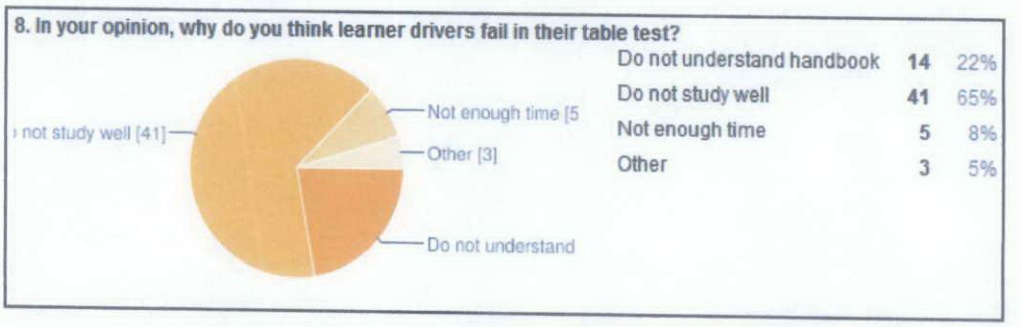

Figure 4.8: Opinion on why learner drivers fail table test

Question 9: If you have given a chance, will you use this courseware in preparing for your table test? If no, why?

Most of the respondents chose 'yes' if they have given a chance to use the courseware as preparation for their table test.

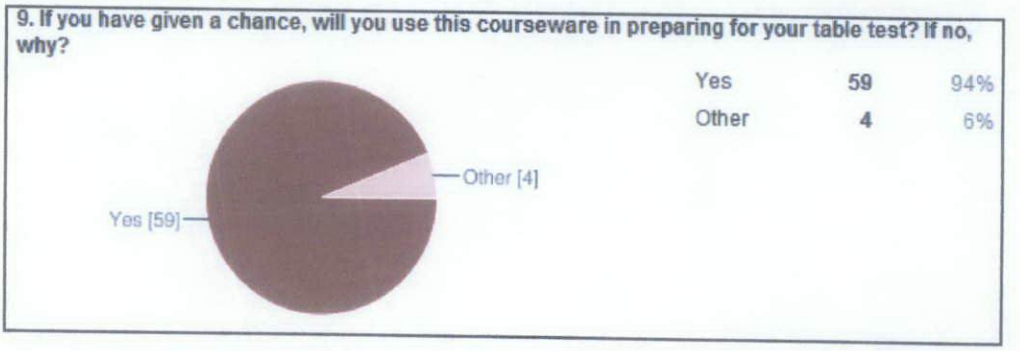

Figure 4.9: Percentage of using the courseware if respondents have given a chance

Question 10: Do you think this courseware will help learner drivers in passing their table test?

Almost all respondents answered 'yes' which is 97% of total respondents. This strengthens the opinion that the courseware will aid learner drivers in passing their table test in the future

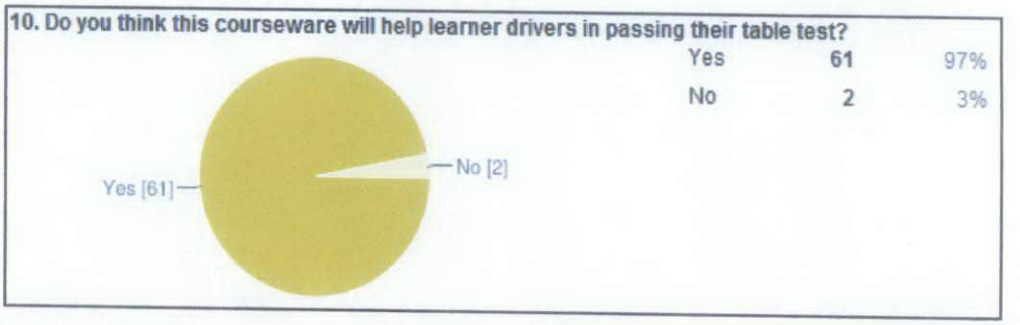

Figure 4.10: Respondents' opinion on effectiveness of courseware

4.1.2 Interview

An interview was conducted with a driving instructor, Cikgu Zamri of Metro Driving School, Kota Damansara, Petaling Jaya, Selangor and also with random new learner driver, Abdul Latiff. The objective of the interview is to gather information regarding learner drivers who are having reading difficulty and also get opinion and feedback on the design of courseware. A second interview was carried on 27th December 2010 with Mr. Yong Soon Choi an instructor from Institut Memandu City Miri Sdn. Bhd Miri, Sarawak to get better point of view regarding conventional teaching style for students with learning disabilities.

From the interview, there are some students who are having problem of understanding DEC handbook instead of having difficulty of reading it. When asked on how they respond to these students, Cikgu Zamri encouraged his students to come forward and meet him personally so he can explain in details of what the students are having hard time of understanding. Statistically, under his supervision, there are about 10 to 15 students per year who are having difficulty of understanding DEC handbook. And mostly, these students are failing their table test at least once for the first time. When asked regarding the courseware development and design, he said that if the courseware contents are displayed in an interesting way, surely enough it will

attract students' attention to get better understanding of the presented modules plus it will definitely going to help students with such difficulties. As for new learner driver, he said that learning will be easy and understandable if the explanations are in visual or animation combines with written explanations and sounds to attract students' attention to focus on the deliverables. Thus, he also said that the courseware will help him on learning DEC handbook in a fun way. A sample of the interview questions can be found in the **Appendix D**.

From the second interview, Mr. Yong said that the passing rate of students with reading disabilities is quite high. On average, out of 100 students, only 3 students failed their table test due to the special oral test conducted by the JPJ officer mentioned earlier on in Chapter 2. When asked about opinion regarding students' interest in using the courseware, he mentioned to use a lot of images, animations and sounds to explain to the students so that they have the idea of what it is all about.

Figure 4.11 Writer & Mr. Yong Soon Choi, the instructor

4.2 Courseware Design

4.2.1 Flowchart

The process begins with the user accessing the start page. From there, the user can choose to start using the courseware or quit the courseware. If user click quit button, a popup box will appear asking user to select yes or no to quit. Upon selection of start button, user will be able to access the main menu of the courseware. There are 5 menus to choose from which is lesson, quiz/test, tips, games, about and stop. If *Lesson* is selected, user will start learning the lesson based on DEC handbook. It is the basically the same for others as well. For *Quiz*, user will be tested based on what they have learned at the lesson stage. User will be able to find out how much they scored when taking the quiz. Users can play memory game when *Game* is selected. *About* is where the information regarding the courseware will be displayed.

Once user has completed each stage chosen, users may return to the main menu again by clicking back button. Also, a *back* button will be available at all stages that will enable them to access main menu anytime. When the user is finished with the courseware, he or she should be able to simply click the stop button and leave the courseware. The process can be summarized in a flow chart, as depicted below.

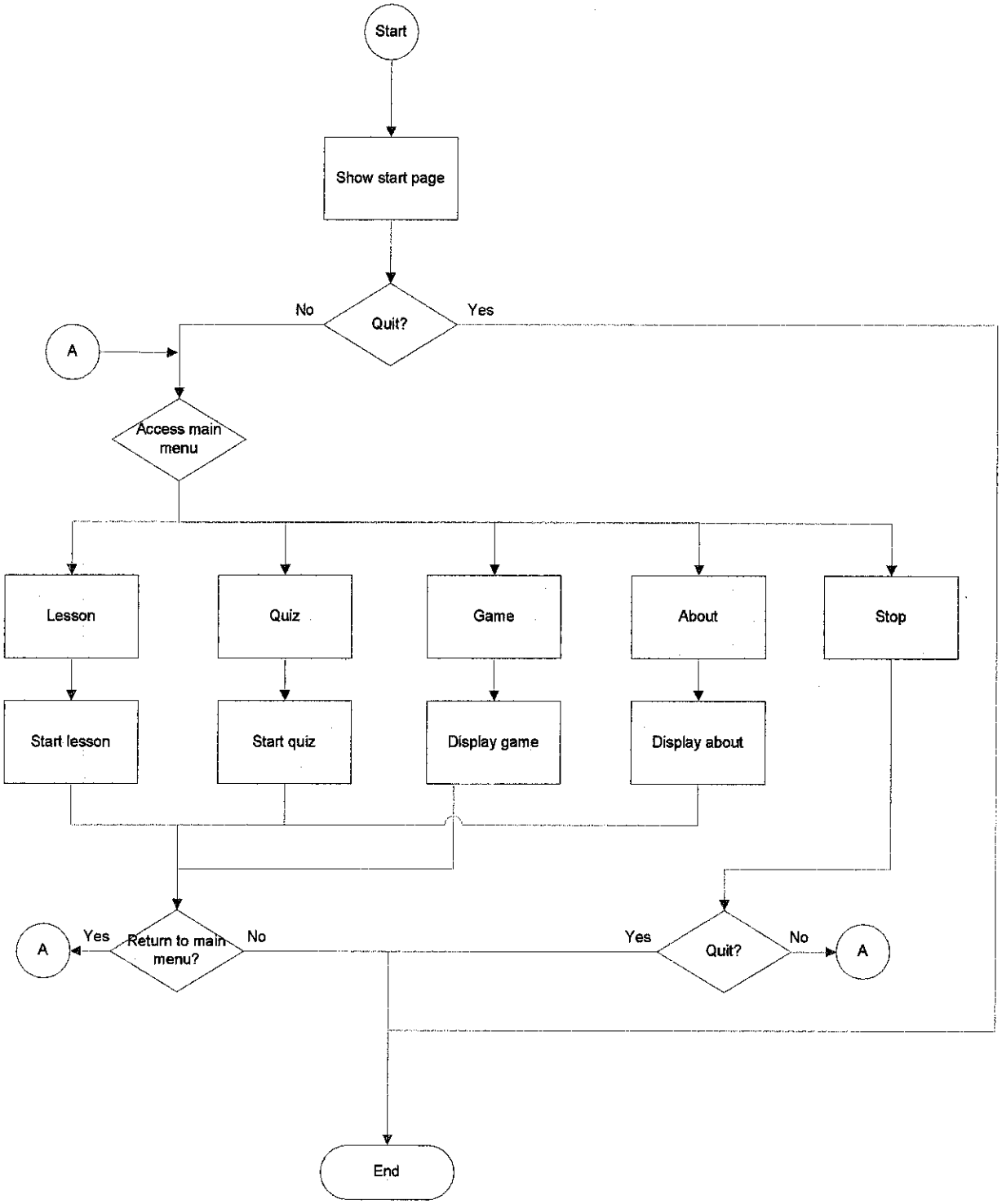

Figure 4.12: Courseware flowchart

4.2.2 Courseware Layout and Content

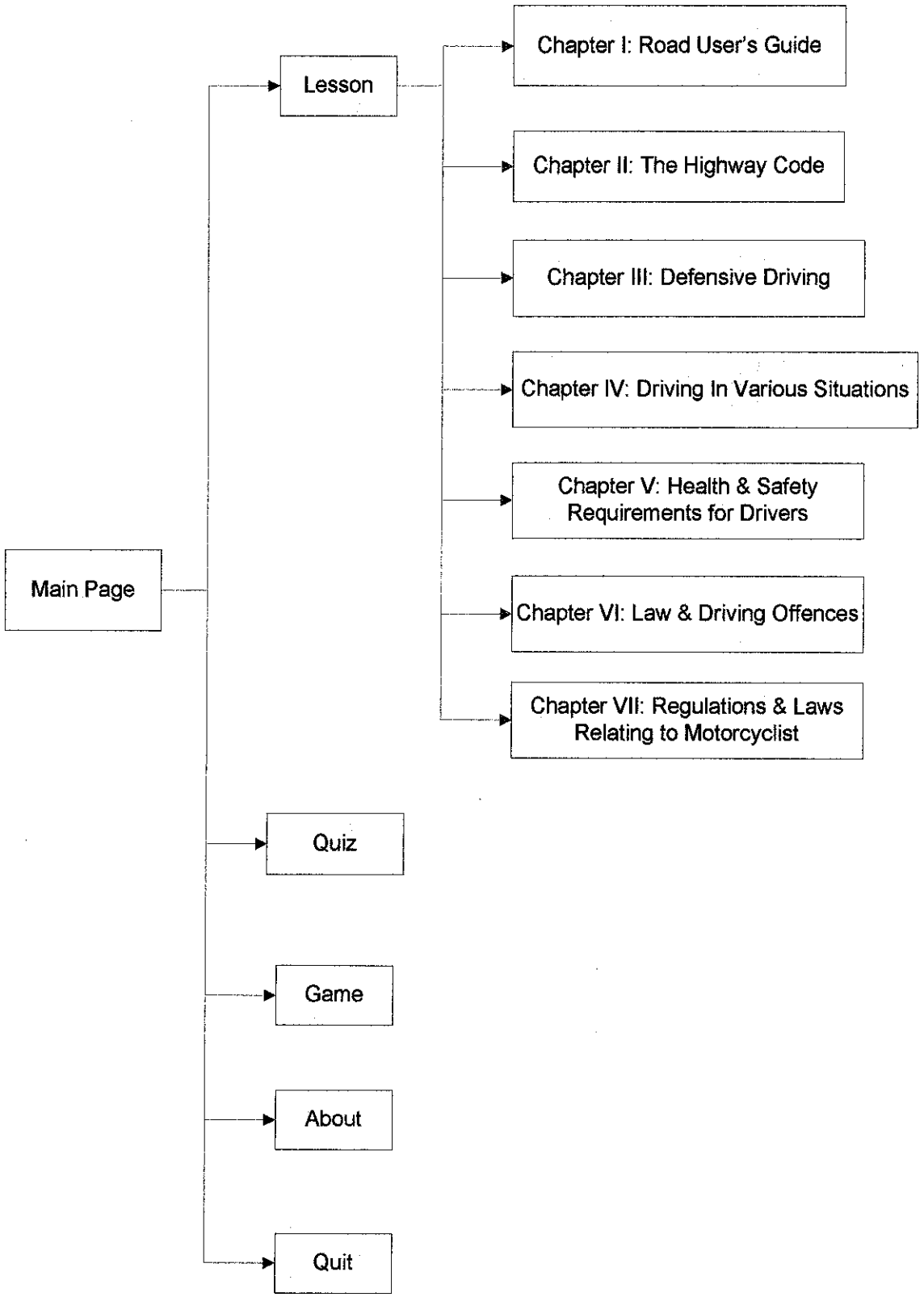

Figure 4.13: Content of courseware

4.2.3 Storyboards

The storyboards for this prototype are shown as below:

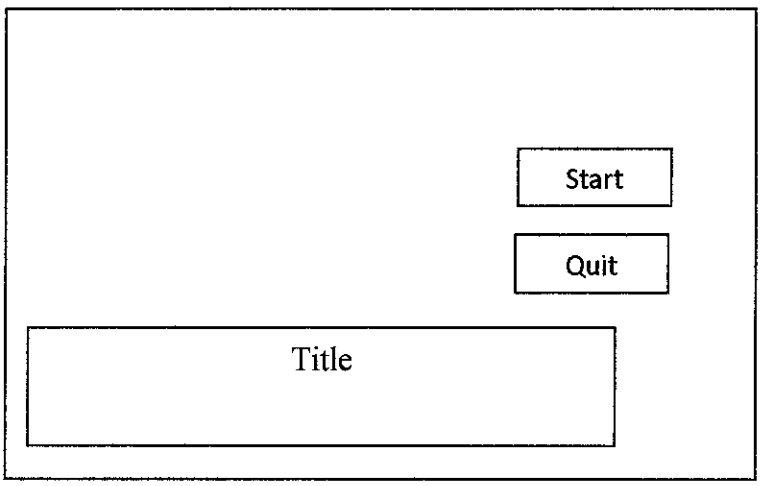

Figure 4.14: Storyboard for start page

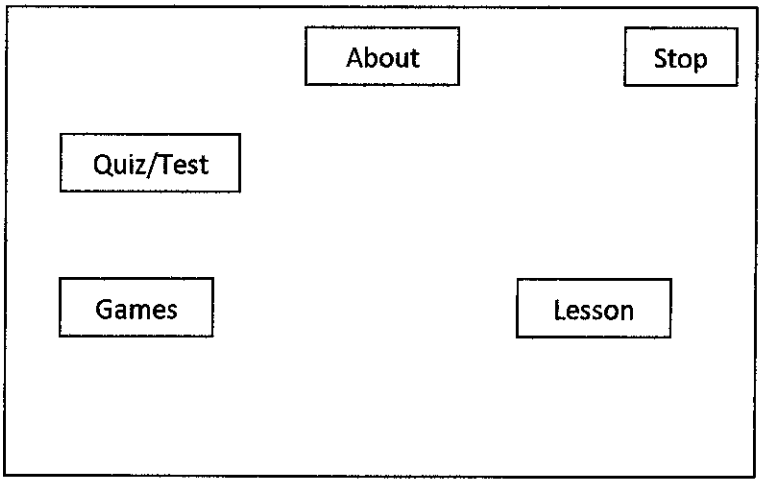

Figure 4.15: Storyboard for main menu

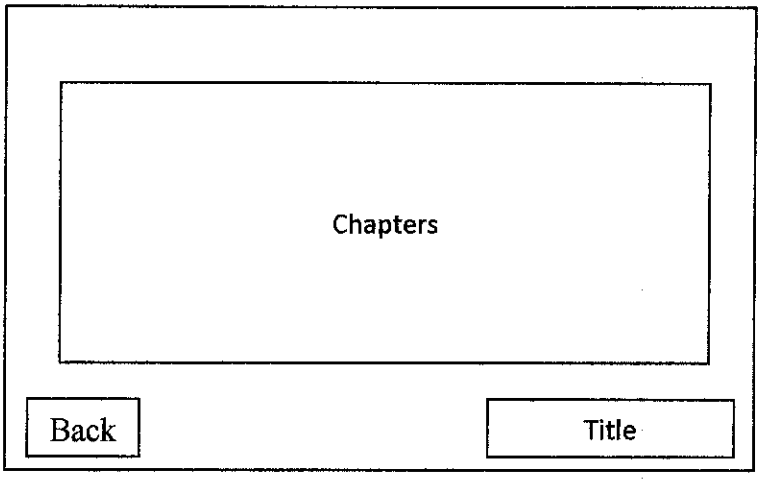

Figure 4.16: Storyboard for 'Lesson'

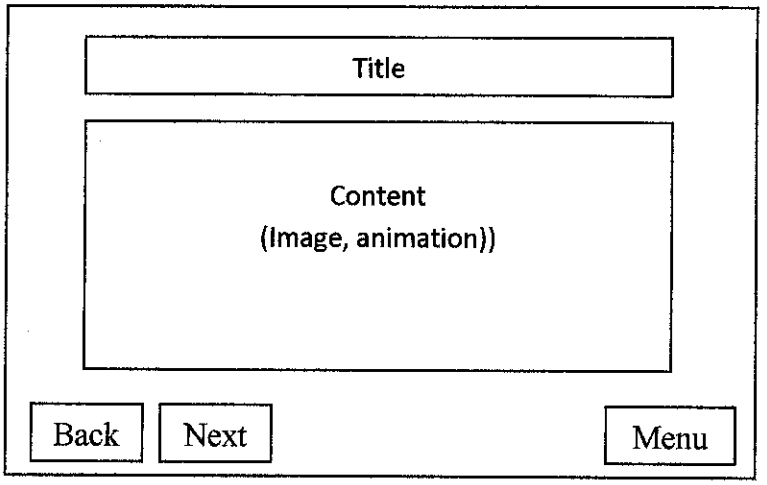

Figure 4.17: Storyboard for Chapters in 'Lesson'

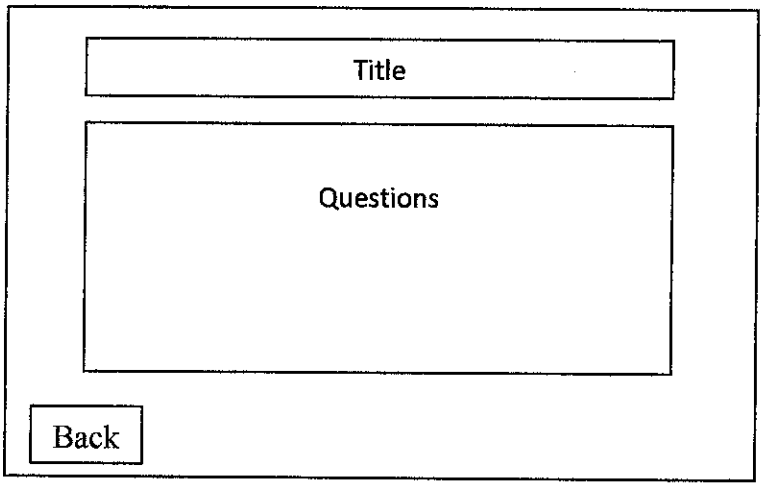

Figure 4.18: Storyboard for 'Quiz/Test'

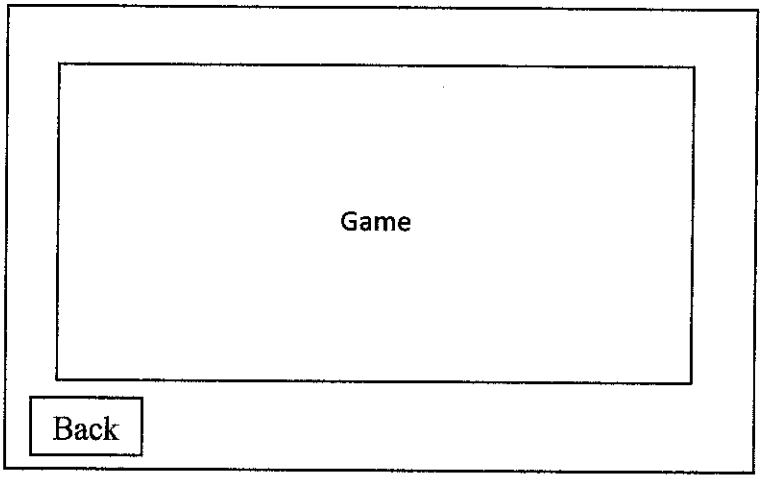

Figure 4.19: Storyboard for 'Game'

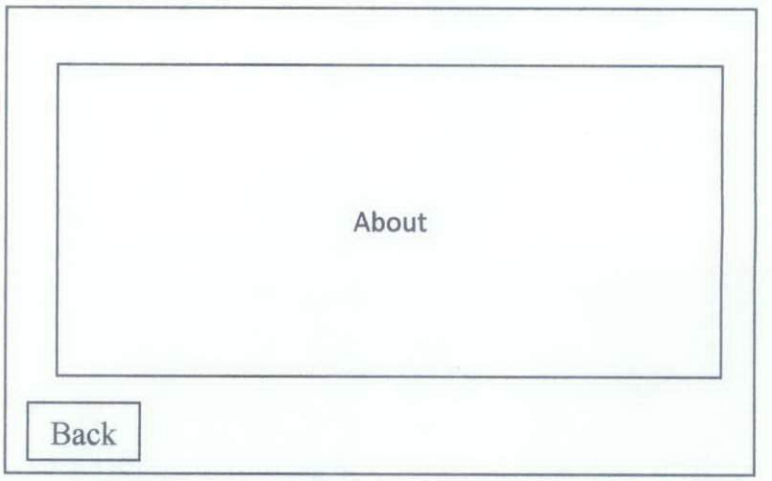

Figure 4.20: Storyboard for 'About'

4.2.4 Interface

This section describes the layout and pages that makes up the interface of the courseware.

4.2.4.1 Start Page

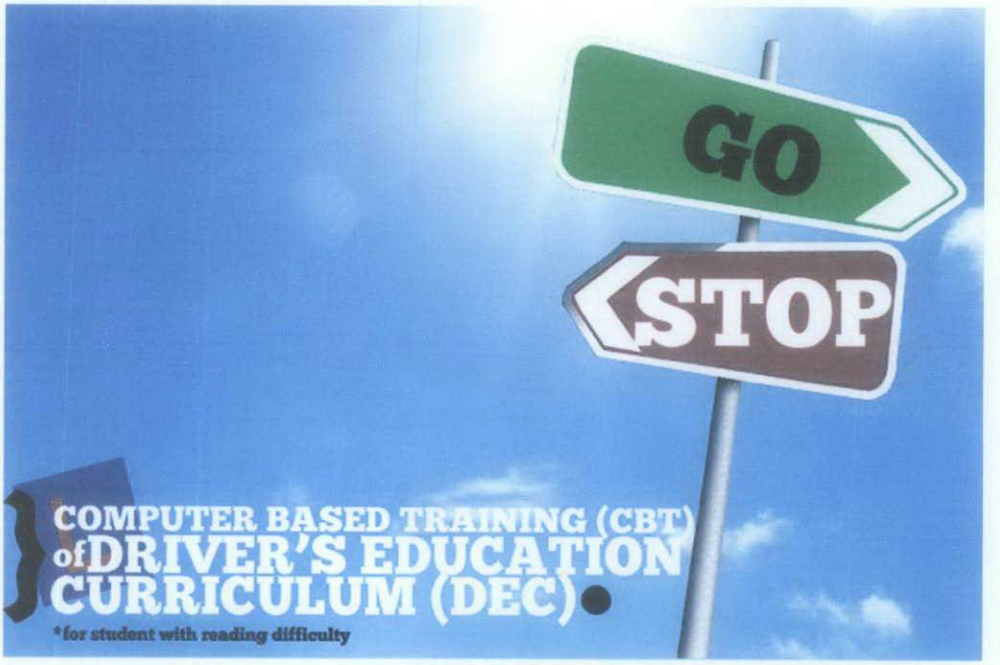

Figure 4.21: Start page

When user launches the courseware, user can see two buttons which is *GO* and *STOP* button. *GO* will lead the user to the main menu of the courseware

while *STOP* will ask the user between Yes or No to quit. There is audible button of GO and STOP when user hovers at them.

4.2.4.2 Main Menu

Figure 4.22: Main menu

The main menu that shows several options that has different features. Here, users are given options that they can choose.

Buttons	Functionality
Steering Wheel (Lesson)	Will lead user to the lesson page
Papers (Quiz)	Will lead user to the quiz page
Glovebox (Game)	Will lead user to the game page
Rear Mirror (About)	Will show a brief information about the courseware
Stop sign (Quit)	A popup box will appear to ask user to quit

Table 4.1: Buttons functionality

When user hovers at each item specified in the menu, user can hear its function. For example, user hovers at steering wheel, the wheel will turn and user can hear *'Lesson'*.

4.2.4.3 About

User can view information about the courseware. A simple interface is as shown in Figure 4.23. User can return to the main menu by clicking the arrow button on the left side.

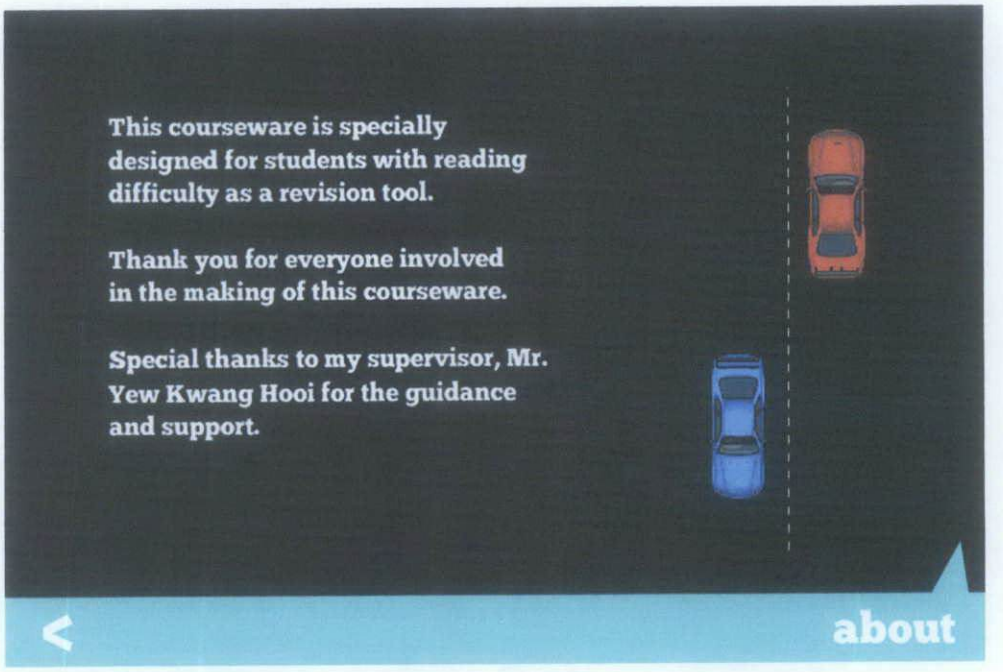

Figure 4.23: *About* page

4.2.4.4 Lesson

Here, user can choose to learn according to DEC handbook by browsing through seven chapters all together. The chapters are Road User's Guide, The Highway Code, Defensive Driving, Driving in Various Situations, Health and Safety Requirements for Drivers, Law and Driving Offences and finally, Regulations and Laws Relating to Motorcyclist. Audible buttons for each chapter are designed for students with reading difficulty. The interface of each lesson includes variety of animations, graphics, audio and video elements to let learner drivers to understand more on the syllabus. Minimal text usage is implemented throughout the courseware to reduce complication for learner drivers with reading problem.

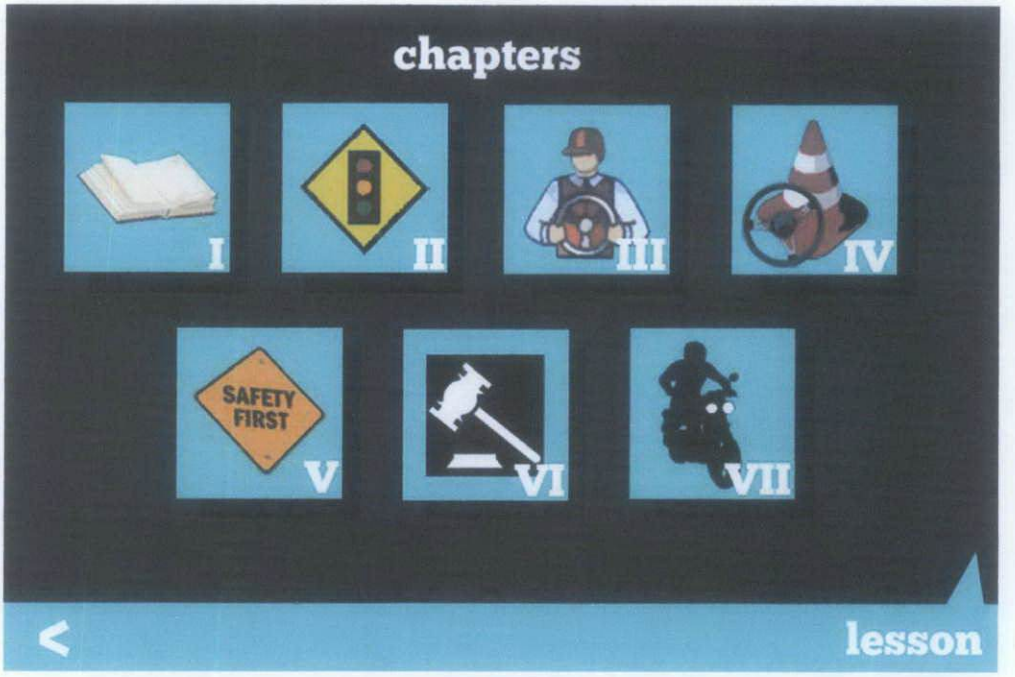

Figure 4.24: *Lesson* page

Figure 4.25: *Lesson* page when explanation

4.2.4.5 Quiz

Users will be presented with quiz in order to gauge their level of understanding. Multiple choices type of question will be used. There will be only 2 choices of answers. The question and answers will be read to the user to ease student with reading difficulty. There is also explanation in the form of animation for each of answer selection to make user understand more as

seen in Figure 4.27. Once the user chooses the answer, immediate feedback will be given whether the answer chosen is right or wrong. If the answer is right, √ will be displayed in green color. If the answer is wrong, X will be displayed in red. Scores will be accumulated and will be shown at the end of the quiz. Both are depicted in Figure 4.28 and Figure 4.29.

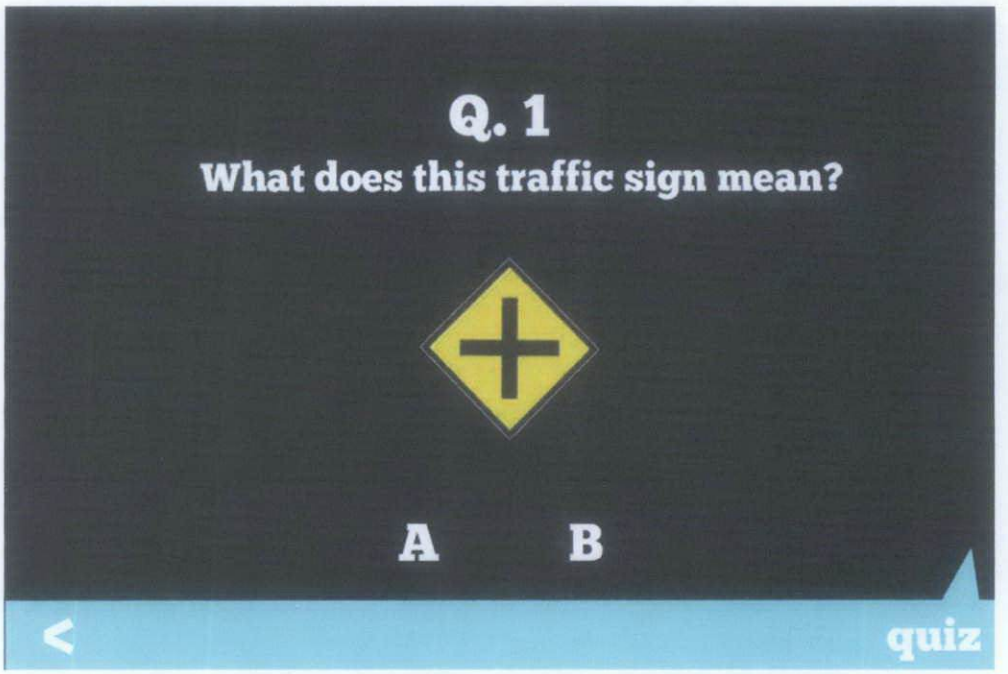

Figure 4.26: *Quiz* page

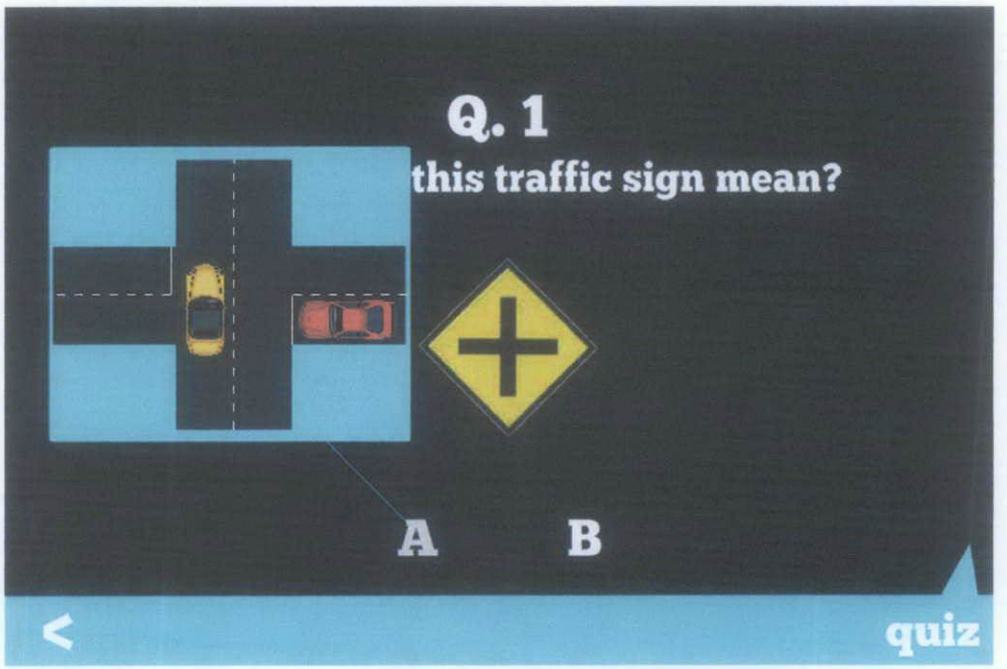

Figure 4.27: *Quiz* answer selection

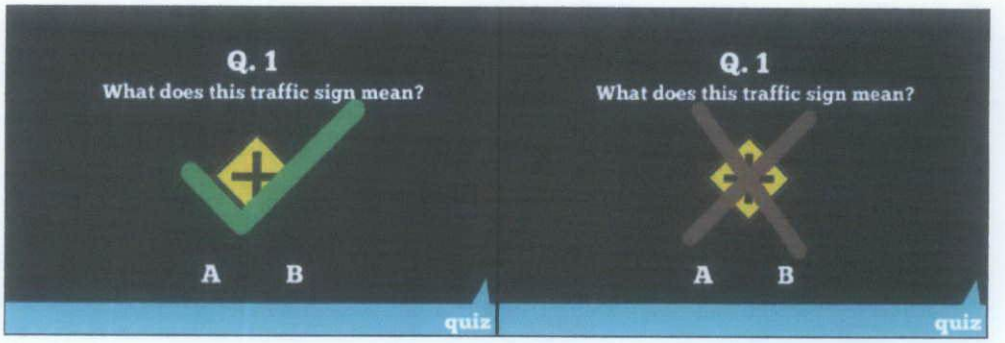

Figure 4.28: *Quiz* right or wrong

Figure 4.29: *Quiz* score

4.2.4.6 Game

Users can take a break by playing a fun and interesting memory game which also testing the user's knowledge on the Highway Code. The game is using drag and drop feature where user need to drag the meaning according to the right signs. When user drags the meaning to the correct sign, the meaning will stick to the sign as seen in Figure 4.31. If it is the wrong sign, the meaning will return back to its original position. When user drags on the meaning, the meaning will be read to the user to ease students with reading difficulty.

Figure 4.30: *Game* page

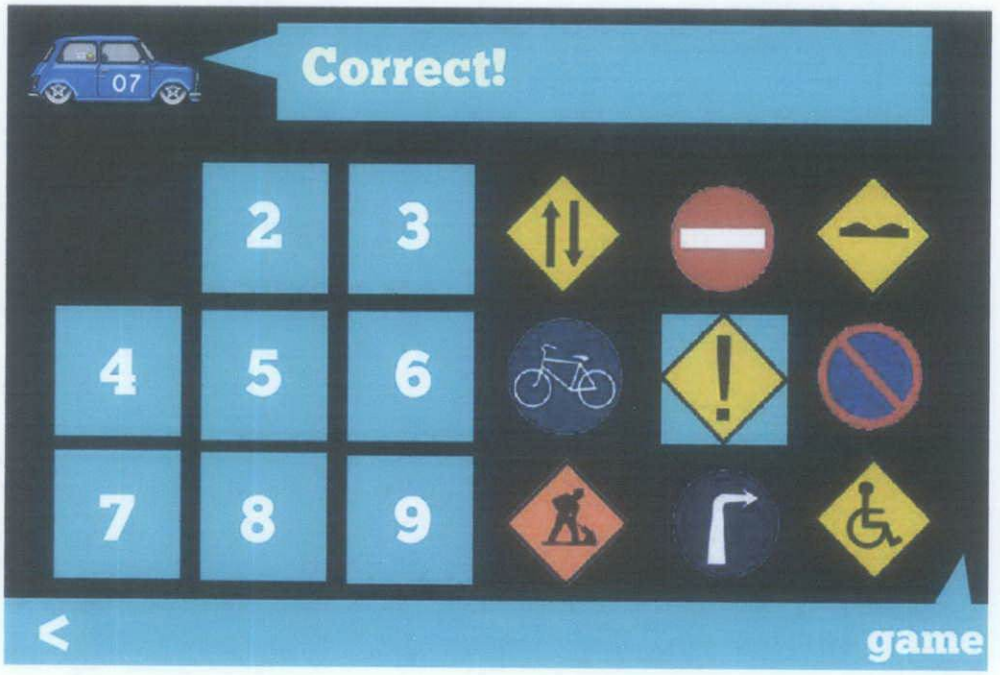

Figure 4.31: *Game* page when answer is correct

4.3 Discussion

This section describes the testing that has been carried out when implementing the prototype to the users.

An experiment has been conducted to evaluate the usability of the courseware. The participants are learner drivers who are in the process of taking driving lesson. 10 users involved in the testing session which are randomly chosen. They are divided into 2 groups – 1 group tested with conventional DEC while the other group learns using the courseware. Later, both groups are asked to answer a simple test based on DEC and the results are compared. Based on the result, it is found out that group using the courseware did better than using conventional DEC.

The participants are then supplied with a survey using Likert Scale to see which learning theories are affected and to measure the effectiveness as shown in **Appendix E**. Among the participants who have tested the courseware, 9 out of 10 strongly agreed that the courseware is ideal for user with reading difficulty to use as a revision tool before taking the test. It assists them to learn independently through the visual representation and animation that explain DEC instead of reading from the text.

Also, it is found out the design principles of cognitive learning theory that have been applied including providing coherent verbal, visual information, sounds, animations and also reducing the load for a single processing channel to convey the DEC are demonstrated well.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 Conclusion

CBT of DEC: Instructional Design for Student with Reading Difficulty is developed to provide driving school's student with reading difficulty a revision tool for them to revise the DEC before taking the table test. With animations, graphics, minimal texts and sounds, user can simply use the courseware by themselves or with the help of instructor.

A simple interface especially designed for the student plus verbal instruction will assist them to understand and revise DEC much better compared to the conventional method where the student supposed to read and make revision from the handbook provided by the driving school which is unreasonable as the student with such difficulty could not read. With this as a revision tool, student can plainly insert a CD loaded with the courseware which is distributed by the driving school and start doing the revision by their own.

Thus, it is hope that by having this courseware, student with reading difficulty can benefit from it and aid them to understand DEC much better and finally pass the table test and prepare them to face the practical lesson soon after.

5.2 Recommendation

The author would like to enhance the courseware by adding a multi-language option which consists of other language than English which is Bahasa Melayu to enable user who uses Bahasa Melayu as their primary language to utilize the courseware. Besides, more games can be added to provide fun and entertaining way in learning and remembering DEC. Furthermore, for a future development, perhaps the courseware will be developed into a mobile application which will be available on iPhone / iPad or even on Android to increase mobility of using the courseware instead learning from a desktop.

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[9] Rubin, J. (1994). *Handbook of Usability Testing*, New York: John Wiley & Sons.

Appendix A: Sample of application form & doctor approval letter

GEORGE MEDICAL CLINIC

Lot 3053, Morsjaya Commercial Centre, Airport Road, 98000 Miri, Sarawak..
Tel: 085-439904 Fax: 085-439904

Date : 26/10/2010

Our Ref :

Your Ref :

Kepada,
JABATAN PENGANKUTAN JALAN (JPJ),
Bahagian Miri,

Tuan,

Per : SANAH ANAK KANJAN (630222-13-5266)

Saya dengan ini mengesahkan bahawa :-

1. Calon ini adalah Lembam.
2. Calon mampu menduduki ujian teori dan mampu memandu/menunggang.

Sekian Terima Kasih,

Yang benar,

.....
Dr George Emang, M.D (UKM)
GEORGE MEDICAL CLINIC
Lot 3053, Morsjaya Comm. Ctr,
Airport Road, Miri, Sarawak.

LAMPIRAN A1

JABATAN PENGANGKUTAN JALAN MALAYSIA

BORANG PERMOHONAN UJIAN UNDANG-UNDANG JALAN RAYA (BAHAGIAN I)
LISAN BAGI CALON BUTA HURUF

Borang ini hendaklah diisi dalam dua (2) salinan

BAHAGIAN 1 : MAKLUMAT PEMOHON

1. Nama Pemohon	
2. No. Kad Pengenalan	
3. Alamat	
4. No. Poskod	

BAHAGIAN 2 : MAKLUMAT WAKIL (JIKA MAKLUMAT PEMOHON DIISI OLEH WAKIL)

1. Nama Wakil	
2. No. Kad Pengenalan	
3. Alamat	
4. No. Poskod	

BAHAGIAN 3 : PENGAKUAN PEMOHON DAN PENGESAHAN

PENGAKUAN PEMOHON

Saya mengaku bahawa saya Buta huruf. Saya juga mengaku bahawa kandungan borang ini telah di terangkan oleh.....no. kad pengenalan ..... kepada saya. Saya faham sekiranya pengakuan saya ini tidak benar, saya boleh dikenakan tindakan di bawah Sek 108 Akta Pengangkutan Jalan 1987 yang membawa kepada denda tidak melebihi RM 5000 atau penjara selama tempoh tidak melebihi satu (1) tahun atau kedua-duanya sekali.

Nama :
No. KP :

.....
Tandatangan / Cap Jari Pemohon

Institut Memandu City Miri Sdn. Bhd.
(586069-T)
Lot 2912 & 2913, Boulevard Commercial Centre,
Jalan Bulan Sabit Merah,
98000 Miri, Sarawak.

PENGESAHAN

Saya.....no. kad pengenalan.....mengesahkan bahawa pemohon adalah Buta Huruf. Saya faham sekiranya pengesahan ini tidak benar, saya boleh dikenakan tindakan di bawah Sek 108 Akta Pengangkutan Jalan 1987 yang membawa kepada hukuman denda tidak melebihi RM 5000 atau penjara selama tempoh tidak melebihi satu (1) tahun atau kedua-duanya sekali.

Nama :
Jawatan :

.....

Tandatangan,
Jawatan dan Cop Rasmi.

(Pengesahan hanya boleh dilakukan oleh Penghulu / Guru Besar / Pengetua Sekolah / Pegawai Kerajaan Kumpulan A / Wakil Rakyat / Jaksa Pendamai atau Ketua Masyarakat bagi Sabah dan Sarawak)

UNTUK KEGUNAAN PEJABAT SAHAJA

BAHAGIAN 4 - BUTIRAN SEMAKAN

Borang Permohonan Telah Disemak

Nama :
Jawatan :

Tandatangan : .....
Tarikh :

BAHAGIAN 5 - KEPUTUSAN PERMOHONAN

Permohonan tuan untuk menduduki Ujian Undang-undang Jalan raya (Bahagian 1) Lisan adalah :-

LULUS / TIDAK LULUS

Nama :
Jawatan :

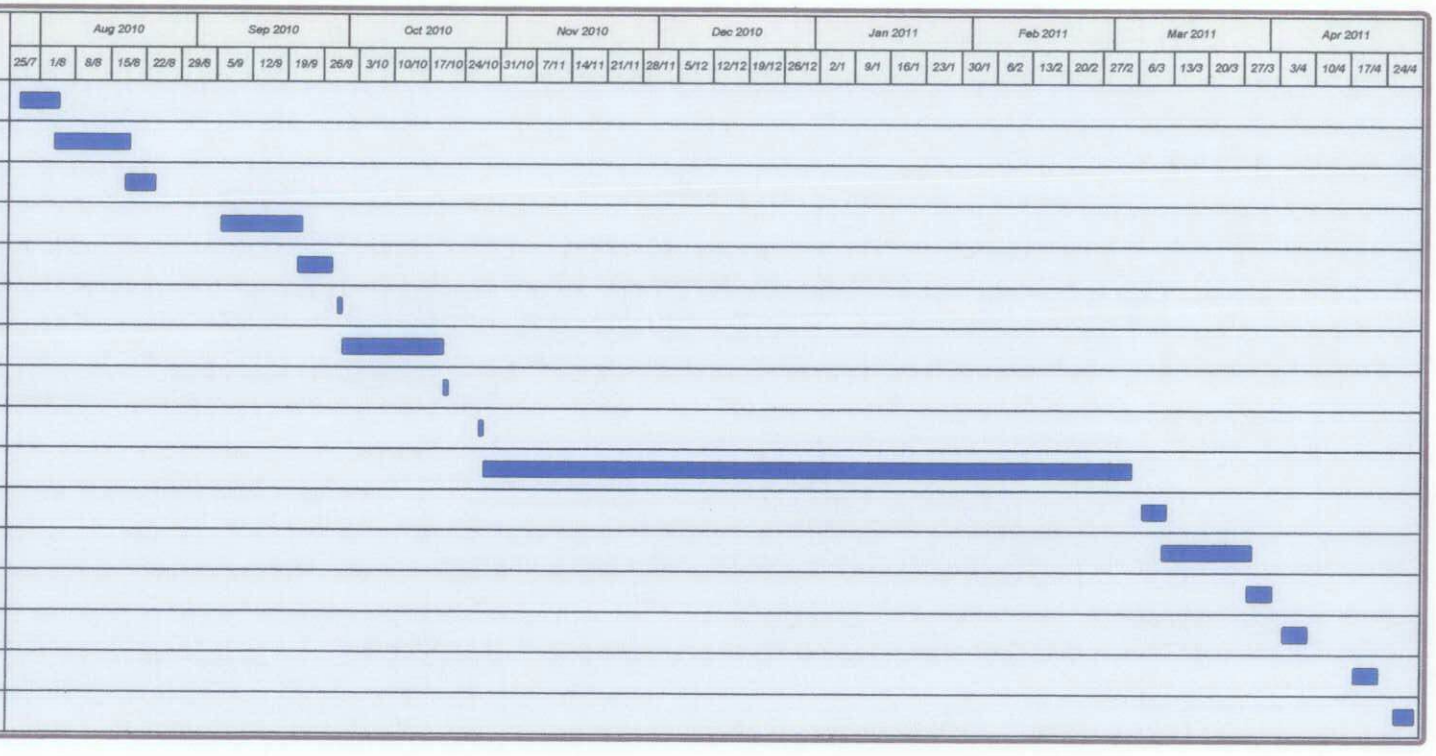
Tandatangan : .....
Tarikh :

Pemohon yang diluluskan untuk menduduki Ujian Undang-undang Jalan raya (Bahagian 1) Lisan adalah dikehendaki mendaftar dan menghadiri kelas KPP khas yang diadakan di Institut Memandu.

PERHATIAN :

a. Bahagian 1 dalam borang permohonan boleh diisikan oleh pemohon atau wakil.
b. Surat ketutusan/kelulusan yang dikeluarkan oleh JPJ Negeri/Cawangan hanya sah dan terpakai bagi kegunaan menduduki kelas KPP khas di institut memandu yang terdapat di dalam Negeri tersebut.
c. Calon yang berpindah ke lain-lain Negeri, hendaklah mengemukakan semula borang permohonan di JPJ Negeri yang baru.

ID	Task Name	Start	Finish	Duration
1	Proposal submission	28/7/2010	4/8/2010	6d
2	Research on topic	4/8/2010	18/8/2010	11d
3	Submission preliminary report	18/8/2010	23/8/2010	4d
4	Research on topic	6/9/2010	21/9/2010	12d
5	Submission of progress report	21/9/2010	27/9/2010	5d
6	Seminar 1	29/9/2010	29/9/2010	1d
7	Research on topic	30/9/2010	19/10/2010	14d
8	Submission of interim report	20/10/2010	20/10/2010	1d
9	Oral Presentation	27/10/2010	27/10/2010	1d
10	Project development start	28/10/2010	4/3/2011	92d
11	Submission of progress report	7/3/2011	11/3/2011	5d
12	Project work continue	11/3/2011	28/3/2011	12d
13	Pre-EDX	28/3/2011	1/4/2011	5d
14	Dissertation	4/4/2011	8/4/2011	5d
15	Viva	18/4/2011	22/4/2011	5d
16	Final Dissertation	26/4/2011	29/4/2011	4d



Appendix B: Project Gantt Chart

Appendix C: Questionnaire

Driving Lesson Courseware Questionnaire

My name is Aliaa and I'm currently doing FYP on driving lesson courseware for people who are having difficulties in reading & understanding Driver's Educational Curriculum (DEC / KPP) handbook. This courseware will touch all about the sign posts, rules, etc that is based on DEC handbook which basically focuses on driving rules and safety awareness in the driving class. This questionnaire is used to collect data for this research. Thank you for participating.

---

* Required

1. Gender *

- ○ Male
- ○ Female

2. Familiarity with learning using courseware. *

- ○ Not at all
- ○ Little
- ○ Average
- ○ Very much

3. Level of computer literacy * (You rarely/often/always need help on using computer)

- ○ High (rarely)
- ○ Intermediate (often)
- ○ Low (always)

4. Have you taken driving license? *

- ○ Yes
- ○ No

5. If yes, how did you study for your table test? table test = theoretical computerized driving test

- ○ Read handbook
- ○ Listening to lectures
- ○ Combination of both
- ○ Other: _____

6. Did you pass your table test for the first time?

- ○ Yes
- ○ No

7. If no, how may time(s) that you have failed until you pass your table test?

- ○ 1
- ○ 2
- ○ 3
- ○ Other: _____

8. In your opinion, why do you think learner drivers fail in their table test? *

- ○ Do not understand handbook
- ○ Do not study well
- ○ Not enough time
- ○ Other: _____

9. If you have given a chance, will you use this courseware in preparing for your table test? If no, why? * If no, please choose other and state reason.

- Yes
- Other:

10. Do you think this courseware will help learner drivers in passing their table test? *

- Yes
- No

11. Any comments? on how improving the courseware

Submit

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https://spreadsheets.google.com/viewform?formkey=dHY3bHlrMDluNU5aeUpSZUlmMTFTSnc6MA

Appendix D: Interview questions

Interview with _____

(Driving school/new learning drivers/instructors)

Assalamualaikum/Hello,

I'm Dayang Aliaa taking ICT course at Universiti Teknologi PETRONAS (UTP) Perak. I am currently doing a final year project (FYP) entitled **Instructional Computer Based Learning Of DEC/KPP For New Learner Driver With Focus On Group With Reading Difficulty.** Basically the project is on developing a courseware for students based on KPP handbook which touches on road signs, road safety and driving awareness. But the focus is on **students with reading difficulty** – having difficulty to read and understand the KPP handbook. They can learn from this courseware instead of reading from the handbook. There will be many visual, animations, sounds in the courseware to help students to understand the syllabus. To help with my research, I need to interview you to get some feedbacks and opinion regarding this courseware development. Your opinion is extremely important in collecting data for my research.

Thank you for your cooperation.

Questions:
(for driving school/instructor)

1. Is there any student with reading difficulty? How do you respond to it?
   Wujudkah pelajar yang menghadapi masalah membaca dan pemahaman buku KPP? Bagaimanakah pihak tuan respon dengan masalah ini?

   _____
   _____
   _____

2. Can you please give me the statistic of students with reading difficulty? (e.g.How many a year?)
   Berapakah statistik pelajar yang menghadapi masalah membaca? (cth: berapa orang setahun)

   _____
   _____
   _____

3. Do these students fail in their table test? If yes, how many times (average)?
   Adakah pelajar tersebut gagal dalam ujian berkomputer? Jika ya, berapa kali gagal (purata)?

   _____
   _____
   _____

4. What do you think will help to gain student's interest in using this courseware?
Apa pendapat tuan terhadap courseware ini untuk menarik minat para pelajar menggunakannya?

_____
_____
_____

5. What do you think of this courseware development? Will it helps?
Apa pendapat tuan tentang pembikinan courseware ini? Adakah ia akan membantu pelajar mengatasi masalah?

_____
_____
_____

Questions:
(for new learner driver)

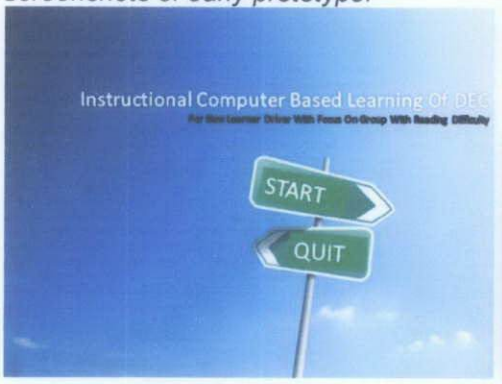
1. What do you think will help you to understand KPP handbook by using the courseware? (e.g. more animations, sounds, etc)
Apa yang akan membantu anda utk memahami buku KPP dengan menggunakan courseware ini? (cth: banyak animasi, bunyi, dan sebagainya)

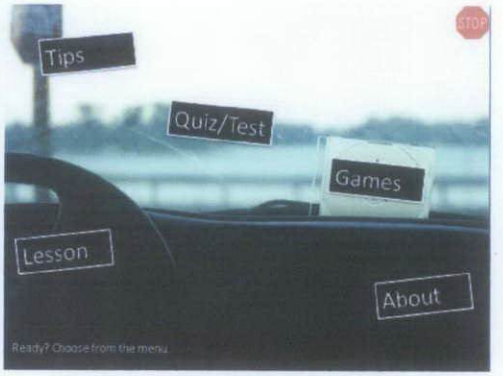
_____
_____
_____

2. What do you think of this courseware development? Will it helps?
Apa pendapat anda tentang pembikinan courseware ini? Adakah ia akan membantu anda mengatasi masalah?

_____
_____
_____

Screenshots of early prototype:





Appendix E: Survey - Likert Scale

Thank you for participating. Please circle the number represents how you feel about the courseware.

It is simple to use.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree

It is fun to use.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree

It is very user friendly.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree

The design is suitable for intended user.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree

The animations and verbal explanations help a lot than reading from text.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree

I don't feel overloaded with information when using it.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree

This courseware is ideal for user with reading difficulty to use as a revision tool before taking the test.

Strongly Disagree -----1-----2-----3-----4-----5-----6-----7 Strongly Agree