Multimedia Courseware of Road Safety Education for Secondary School Students

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ABSTRACT

Cases of accidents involving children keep increasing from time to time. According to the statistic from Malaysian Institute of Road Safety Research (MIROS) has showed that the road accidents which involved the children reveal a significantly high degree of fatalities and injuries. In order to decrease the risk of accident involving children, an initiative to develop a courseware application about road safety have been taken as a precaution step to help children protect their safety on road. This paper will discuss about the multimedia implementation in developing learning courseware to introduce basic road safety knowledge for students within the age 12 to 17 years old. For implementation process, the Rapid Application Development (RAD) approach has been selected as the methodology to develop the courseware. Basically the methodology divided into four phases which are requirement planning, user design, rapid construction, and transition. After development process, a survey was conducted in SMK Mergong which located at Alor Setar in order to get feedback from the student in term of the impacts while using the courseware. From the survey, it showed that the courseware application really help the students to get clear understanding about road safety. The use of picture, audio and video in the courseware also become interactive and particularly suitable for level of student's understanding.

Keywords: learning courseware, multimedia courseware, road safety education.

I INTRODUCTION

Malaysia has become one of the countries that have large number of accident cases. Every year, the Department of Road Safety in Malaysia has showed the statistic of road accidents that involve in all categories of road user. The statistic graph in figure 1 showed the number of accidents in Malaysia from year 2005 until 2009.

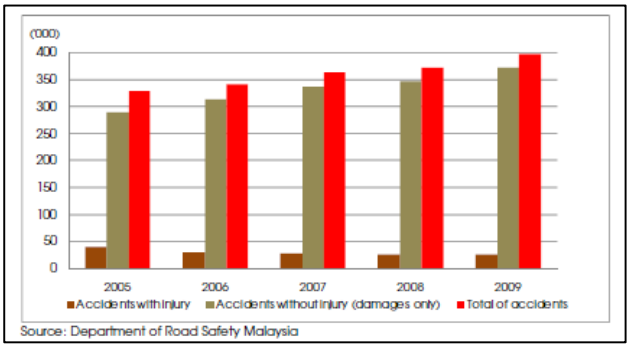

Figure 1. Statistic of accident cases in Malaysia

Most of the accidents occur due to the attitude of road user which can be associated to the aggressive and irresponsible of Malaysia's road user (Afiqah et al. 2011). One of the factors which contribute to accident cases is lack of awareness about road safety although the road user has learned about it when taking the driving license. Realizing the importance of road safety education which should be applied at young age, Ministry of Education of Malaysia has introduced road safety education into the primary schools in stages, beginning with Year One in 2008 (Afiqah et al. 2011). The purpose of road safety education is to educate young learner about safety knowledge when they are on the road. Besides that, there is also some organization which organized the campaign about road safety to young people. One of the organizations is Allianz Malaysia which they has thus far carried out 71 road safety awareness campaigns nationwide, with more than 400 employees trained by JKJR as road safety ambassadors (The Star Online, 2013).

Due to the advancement of technology, the education of road safety have been reformed into courseware application which also consisting multimedia elements in it. Beside, the use of courseware application in learning education has become a good initiative in order to attract student's attention in the class since the students easy to feel bored when they

have to read every single word on the textbook and listening to teacher's lecturer in the class.

II MULTIMEDIA COURSEWARE

Courseware can be defined as an educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer (Yang, 2005). Courseware can encompass any knowledge area, but information technology subjects are most common. Currently the use of Multimedia courseware in teaching and learning environment has contributed and enhanced conventional education sector into a new dimension (Zurina, 2006). Thus the courseware can be served as Computer Assisted Instruction (CAI) and Computer Assisted Learning (CAL) tools which can gave positive impression towards the understanding and creative thinking of student. One of the benefits using courseware in teaching and learning environment is can increase the quality of learning as challenges for today educationalist.

III MULTIMEDIA COURSEWARE STUDIES

The use of multimedia courseware has showed positive impact in teaching and learning environment since the students easy to understand the content compared to read the material in a textbook. There are some researches has been done which related to multimedia courseware of road safety education. Table 1 below showed the description of multimedia courseware studies.

Table 1. Description of multimedia courseware studies.

No	Author and Publication	Research Title	Description
1	Nur Afiqah, A.B. ; Abdul Nasir, Z. ; Nur Fadziana, F.M. published in 2011 IEEE Conference on Open Systems (ICOS 2011)	The Use of Multimedia, Augmented Reality (AR) and Virtual Environment (VE) in Enhancing Children's Understanding of Road Safety	A courseware about road safety education for young learner which consisting interactive multimedia elements and also combined with Augmented Reality (AR) and Virtual Environment (VE) technologies.
2	Azemi, A. published in Frontiers in Education Conference, 1996. FIE '96. 26th Annual Conference., Proceedings of (Volume:1)	Using Multimedia Courseware in Engineering Education	A courseware about engineering education which can enhance students understanding about the engineering process. This courseware was developed for the first electrical engineering circuit's course and can be use during lecture session.
3	Zurina, M. ; Ros, E.K.M. published in Computational Intelligence for Modelling, Control and Automation, 2005 and International Conference on Intelligent Agents, Web Technologies and Internet Commerce, International Conference on (Volume:2)	Multimedia Design And Development In Mathematics Learning Courseware For Preschool Education	A courseware to introduce basic Mathematics knowledge for preschool children within the age of 4 to 6 years old. The courseware is expected to act as a catalyst for the implementation of Information and Communication Technology in preschool education in Malaysia.

Basically the previous research was about different topics but still remain using the same concept using courseware application as a delivery medium. Some courseware application was included with Augmented Reality (AR) and Virtual Environment (VE) technologies in order to produce the interactive courseware which can attract more attention from users.

IV DESIGN AND DEVELOPMENT

The methodology used for the application development is based on Rapid Application Development (RAD) methodology which consists of four phases. According to Nik, Azila & Hazlifah (2010), Rapid Application Development (RAD) is a development lifecycle designed to give much faster development and higher-quality results than those achieved with the traditional lifecycle. Figure 2 illustrated the general view of the methodology:

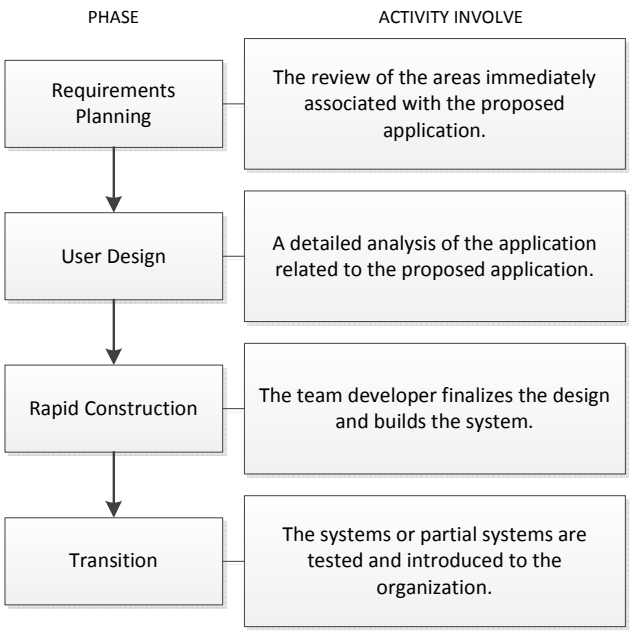

Figure 2. RAD methodology phases

A. Requirements Planning

In this phase, a review has been made in order to produce a broad definition of the system requirements in terms of the functions of the application will support. The review also includes an outline system area model of the area under study and a definition of the application's scope. Basically it will divide into 3 tasks which shown in the diagram below:

Figure 3. Tasks in Requirements Planning

Research Current Situation. This task initiates the Requirement Planning stage for the proposed application by searching the current environment. The purpose of this task is to prepare the requirements definition of the application by gathering information about the application of road safety education as discussed in the previous section. So the team developers become familiar with the current situation by looking at similar application for the purpose of looking for any reusable structures.

Define Requirements. For this task, the outline system area model is being defined. The developers construct a flow diagram of the application as illustrated in Figure 4.

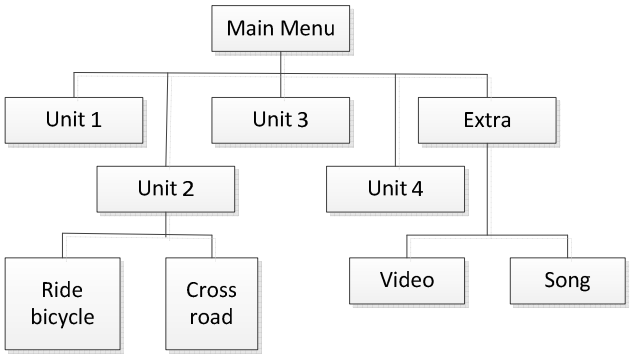

Figure 4. Flow diagram of the application

Finalize Requirements. In this task, the scope and objective of the proposed system is formally documented. The scope for the application is divided into four main categories which are:

- **Unit 1**:Types of road signboard
- **Unit 2**: The correct ways to cross the road
  The correct ways to ride a bicycle on the road
- **Unit 3**: Type of road in Malaysia
- **Unit 4**: Quizzes
- **Additional**: Patriotism knowledge and video of road safety

There are four objective of proposed application such as:

- To help the student to learn and understand about types of road signboard
- To teach the student how to ride a bicycle on the road and how to cross the road with correct ways
- To make the student know and understand the types of road in Malaysia

- To enhance the student understands by answering the quizzes for all topics.

The estimation duration to implement the application is about two months and the target audience was identified which is elementary school students (form four and form five students). The hardware requirement is being recognized and for software requirement, the developers used Adobe Flash CS6 as platform to develop the application.

B. **User Design**

In this phase, the process of designing the application begins. All the design flow and information have to clearly state in storyboard such as functioning button, layout, background image, video and audio. Figure 5 showed the sketches for the storyboard.

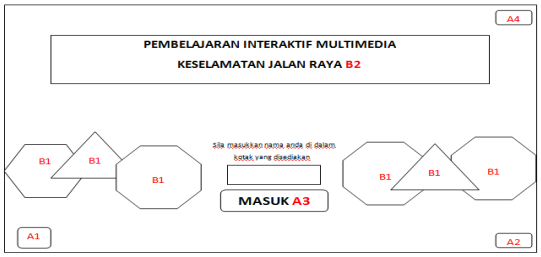

Figure 5. Storyboard sketch

In the storyboard, all specific objects in the application have to be specified. The design also clearly stated in the storyboard in term of shape and the position in the application. This process is important in order to make the development process can be done smoothly.

C. **Rapid Construction**

The development processes begin in this phase where the developers build the application until it completely functioned. The developers use the storyboard that has been specified in user design phase as a guideline to develop the application. Figure 6 showed the interfaces in the application during development process.

Figure 6. Introduction Interface

Figure 6 showed the introduction interface of the application when user start using the application. User need to enter their name in the column provided and click 'Masuk' button to entering the application. In this page, user also can mute the background music if they want.

Figure 7. Main menu interface

In figure 7, it showed the main menu which consist of four categories. User has to select which category they want by clicking the balloon image that represents the button. In main menu, there is additional button for video and patriotism knowledge. If user wants to exit the application, they can click the door image that represents the exit button.

Figure 8. Interfaces for each category

Figure 8 showed the interface for each category which are Unit 1: Type of signboard, Unit 2: Guideline to cross the road, Unit 3: Types of road and Unit 4: Quizzes. Each category contains different functionality and information. User can go back to main menu by clicking the 'Menu Utama' button or go to other units by clicking the traffic light image that represents the button for each unit.

User Testing. During development process, the user testing was carried out in order to ensure the application can be use by the user without have any problems. The user testing is conducted in SMK Mergong which located at Alor Setar, Kedah. The students from form 4 and from 5 are selected to test and evaluate the application and their feedback is reported. There are two testing in order to evaluate the applications which are Prototype Test and Acceptance Test.

Prototype Test. This testing is carried out during development of the application. A prototype application will be evaluated by the students in order to get the feedback on the general look and operation of the application. The feedback from the students can be used as a guideline to make improvement in term of the functionality and operation.

Acceptance Test. The purpose of acceptance testing is to prove that the application conforms the requirement by fit the needs of user. This testing is important in order to know whether this application can be accepted by target users.
This testing is more focused on the operation and performance of the application. The application is improved in many aspects especially after get the feedback from the target user through prototype testing.

In both user testing, student will use the application and give feedback by answering the survey that have been provided. The survey consist several parts such as general question, video and audio usage, application design and function and quiz unit. Student need to answer the questionnaire based on their user experience while using the application. The survey use Likert Scale concept where student need to choose the answer given which start from 1: Totally Disagree, 2: Disagree, 3: Natural, 4: Agree, 5: Totally Agree. Student has to circle their answer based on the category provided and the answer was reported in statistic graph.

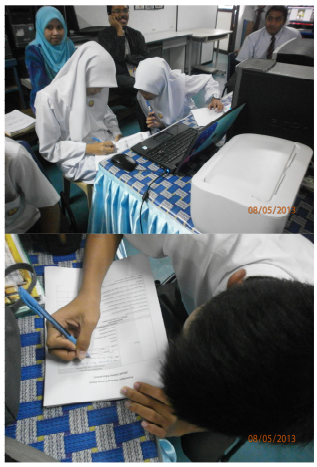

Figure 9. The testing environment during Prototype and Acceptance testing

D. Transition

This is the last phase in RAD methodology. In transition phase, developer will check the application again and fix the error if any based on the feedback gain from the students in acceptance testing. After all errors have been fixed, the application is ready to be delivering to the user. The application can be use in Windows operating system and it does not have to be installing in the computer. User just needs to click the application and start using it because the application is published in executable file (.EXE) format which can be run automatically. If the application is burn in the CD, the CD must contain a

special file named which is 'autorun.inf' in its root directory in order to make it run automatically.

V FINDINGS

Based on the survey answered by the students, the statistic graph was reported in figure 10:

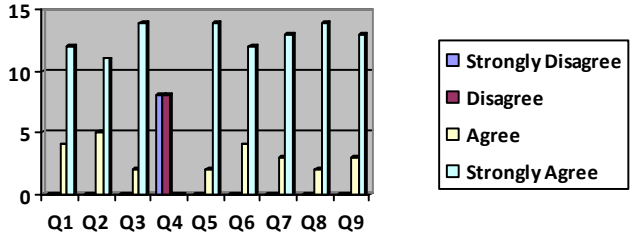

Figure 10: Acceptance test statistic

Based on the statistic above, students agree that the application has suitable and acceptable design button. The image and graphic used also related with road safety education. The font type, size and color also suited their need which big and colorful. However, half of the students disagree that the application design distracts their attention while another half students strongly disagree. For 3D rotation image used for road signboard, the students strongly agree that it is interesting and great.

VI. CONCLUSION

The application of Road Safety Education is completely developed by using Rapid Application Development (RAD) methodology. Thus it just need short period of time to develop the application since the goal of RAD methodology is faster, better and cheaper. Some of the advantages is can reduce development time, increase usability of the components and increasing the speed to develop the application. In term of the content, it is very good application for students because they can learn about basic knowledge of road safety. Moreover the use of this courseware application can attract student's attention since the application is developed with interesting interface and layout which the student would not feel bored while use it. The use of audio and video also help the student to gain better user experience. So this courseware application really helps the students to understand about road safety and they can learn it in fun environment other than to read it on the book.

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