

**COMPUTER-BASED LEARNING APPLICATION TO TEACH INTRODUCTION  
TO MULTIMEDIA FOR UNIVERSITY STUDENTS**

**BY**

**KONG XUE YING**

**A REPORT**

**SUBMITTED TO**

**Universiti Tunku Abdul Rahman**

**in partial fulfillment of the requirements**

**for the degree of**

**BACHELOR OF INFORMATION SYSTEMS (HONS)**

**BUSINESS INFORMATION SYSTEMS**

**Faculty of Information and Communication Technology**

**(Kampar Campus)**

**JAN 2019**

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Name : Kong Xue Ying

Date : \_\_\_\_\_

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I would like to express my sincere thanks and appreciation to my supervisor, Mr Lim Jit Theam who has given me this bright opportunity to engage in a project to develop multimedia-oriented computer based learning application. He had given me lots of advices and guidance when carrying out this project. A million thanks to him. Thanks to my moderator, Mr Syed Muhammad Bin Syed Omar who had given some advices to improve the project too.

Besides, I would like to express my gratitude to my friends for giving me support and help during the process of completing this project. Finally, I must say thanks to my parents and my family for their love, patience, unconditional support and continuous encouragement throughout the course.

## **ABSTRACT**

The expected output of this proposed project is a computer-based learning application which will be able to support interactivity with user in learning process. It targeted to be exposed to university students as an alternative of conventional lecture presentation slides or other paper-based learning materials for the purpose of teaching a subject that offered in Faculty of Information Communication and Technology, Universiti Tunku Abdul Rahman (UTAR), which is “Introduction to Multimedia”. It aims to introduce the fundamentals of multimedia elements and tools for the students. The ADDIE model of instructional design was used to help develop the application. The course will be pre-setting up into the computer application by integrating all learning materials and quiz with answers provided. Besides, the course content was designed with multiple choice of delivery formats such as interactive slides and video. Interactive slides means adding more interactive features into the conventional presentation slides, for example, buttons allocated in each slide to allow non-linear flow of content. Meanwhile, video helps to catch user’s eye in teaching certain content like theory-based topics because it is demonstration-friendly. In addition, the attractiveness of the application can be enhanced by adding graphics, audio and animations so that it could grab the user’s attention easily. The proposed application does not require Internet and browser to support its operation, mostly shared via external storage devices such as DVD or CD and thumb drive.

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## LIST OF ABBREVIATIONS

<i>BMP</i>	Bitmap
<i>CBL</i>	Computer-based Learning
<i>CD</i>	Compact Disc
<i>DVD</i>	Digital Versatile Disc
<i>GB</i>	Gigabyte
<i>ICT</i>	Information and Communication Technology
<i>JPEG</i>	Joint Photographic Experts Group
<i>PC</i>	Personal computer
<i>PNG</i>	Portable Network Graphics
<i>SVG</i>	Scalable Vector Graphics
<i>SWA</i>	Shockwave Audio
<i>URL</i>	Uniform Resource Locator
<i>WBL</i>	Web-based Learning
<i>WBLE</i>	Web-based Learning Environment

## **CHAPTER 1: INTRODUCTION**

### **1.1 Background Information**

Electronic learning (e-learning) means make use of information and communication technology (ICT) in education, it has been a characteristic of new era which help students to save time and reduce travel cost because of its advantage of convenient time and place access to learning content (Talebian, Mohammadi & Rezvanfar, 2014). Computer-based learning is a form of e-learning which can be accessed offline on computer, it allows learners to learn at their pace and track their learning progress according to the grades assigned instantly by the computer (Bonthala, 2016). Meanwhile, computer-based learning (CBL) software is an application that make use of interactive elements to present any type of learning with the help of computers (Techopedia, n.d.).

Computer-based learning application could act as an alternative of traditional classroom which enable students to learn outside of classroom. Currently, lecture method is still popular for learning purpose in classroom, while the use of computers is less than optimal (Lestari, 2015). During a typical lecture, lecturers use an overhead projector to present information for students with the assistance of visual effects in a presentation (Kelly, 2017).

However, the disadvantage associated with projected presentations is the risk of technical difficulties, improper functioning of projector, screen and electricity or even a bright environment will lead to presentation failure (Sheehan, 2015). Besides, Ding & Liu (2012) pointed out slide presentation causes lecturers neglect the interaction with students, learning is centered on lecturers while students are passive, consequently reduce learning motivation of students. Hence, there is a need to have an application that able to support interactive offline learning and assessment for students to access as an active learner, who can study independently to master knowledge according to the course material involved in the application.

A computer-based learning application should be able to resolve the issue of lecture method. This is due to Zou et al. (2013) claimed that CBL application provides flexibility for self-paced learning by preventing learners follow a predetermined sequences, it allows students to revise learning content without any limitations. It



shows that CBL application could be a revision source for students after lecture classes which will not be repeated again.

Therefore, a CBL application will be developed through this project in order to provide an easy to use and interesting learning platform for students so they do not need to barely rely on the subject matters that provided in classrooms. It could provide an immersive experience for users to be more engaged with the learning materials and learn in faster pace by synchronising the media elements like text, graphics, animations, video and audio as well as adding interactivity into the application.

The reason of not choosing web-based learning (WBL) application, which is also a type of e-learning that support online learning to be developed in this project is due to the consideration of some of its limitations may not able to settle the problem domain effectively. According to Senthil (2013), technical issues like Internet connection failure and website malfunctions exist on both user and server side will obstruct efficiency of web-based learning. Rashid et al. (2016) also declared poor Internet connection were hindered students to access every display in a web-based learning environment. It reveals that WBL could not able to function ideally in every context such as location with limited bandwidth.

### **1.2 Problem Statement and Motivation**

Students criticised visual presentation technology in classrooms because lecturer-centered presentations based on slides did not teach them the way to interact with the study materials on their own (Inoue-Smith, 2016). Thus, based on the existing issue, the lack of interactivity of subject matters which hard to engage students in learning process will be the problem domain of this project. The attractiveness and interactivity of learning materials should be enhanced and integrated into a standalone application that allows learners to access anywhere and anytime.

The Mayer's multimedia principle stated that people learn more deeply from words and graphics than from words alone (Walsh, 2017). This indicated that it is important to have a multimedia application that can rendered near to students and provide them an efficient and interesting way to learn certain subject instead of continuously using the learning models and methods like studying textbook or lecture

notes. The issue of monotonous learning model could be resolved by developing a CBL application through this project due to its ability to provide interactivity with user, facilitate greater retention of new knowledge and better understanding of the content.

Besides, a CBL application could also able to resolve the technological obstacles that faced by WBL application. For instance, students who located in rural areas with weak Internet network had limited access to the learning content delivered by WBL application (Rashid et al., 2016). With CBL application, it helps to save the cost spent on getting good Internet access or mobile data. This is because it supports offline learning so it always accessible and capable to accommodate unlimited number of users (Andriotis, 2015).

### **1.3 Project Scope**

In order to resolve the problem of unattractive learning materials, the expected outcome of this project is a computer-based learning application which contains a series of interactive course materials and assessment. Interactivity allows flexibility for user to control the content and information flow, and therefore tends to retain more information of what they see, hear and do simultaneously. Users can choose which topic to be studied according to their learning progress and at a pace that comfortable for themselves.

The application can be installed on desktops or laptops where no Internet connection is required to run the application. After that it will able to be accessed anywhere and anytime to provide students a more engaging and enjoyable learning experience. It could be able to sustain motivation of students to explore novel knowledge. Students can reach the application outside of classrooms, utilise it to reduce overall learning time since they can adjust to their own learning styles. It should be environmentally friendly, which can help students to reduce the use of paper.

The application will be targeted to teach the course “Introduction to Multimedia” for the UTAR students. The aim of the course is to present both the concepts and technologies underlying multimedia. In addition, students will be able to gain knowledge about the fundamental elements in multimedia through the course offered in the proposed application.

### **1.4 Project Objectives**

The objectives that should be accomplished in this project including:

- To create and apply interactive multimedia components in a computer-based learning application for presenting learning materials about introduction to multimedia subject.
- To study and apply the approach for designing a computer-based learning application for university students to use as self-paced learning source.
- To evaluate the effectiveness of interactive aspect-applied course materials in motivating university students for being part of the learning process.

### **1.5 Impact, Significance and Contribution**

The measure of success to achieve the project objectives will be according to the level of engagement and satisfaction of user with the proposed application. Some useful knowledge in multimedia aspect were anticipated to be obtained by students from the application effectively. For instance, students should able to select appropriate multimedia authoring tools for creating or editing multimedia components after studying the course in the application.

Besides, students may tend to forget some of the knowledge that had learned in classes. Therefore, a new learning style could be established with the success of this project. For example, students may use the application after attending certain classes to strengthen their memory about a particular topic or use the application to do revision and prepare for examinations. Unlike the traditional method of teaching in classroom which is less likely to be played back, a CBL application does not restrain the frequency of usage, which means it could help the students who having issue like poor understanding to learn at their own pace. In addition, the application could help learners to relieve their stress for learning. Some lovely illustrations or animations and dramatic sound effect may lead users to believe that learning process could be amusing.

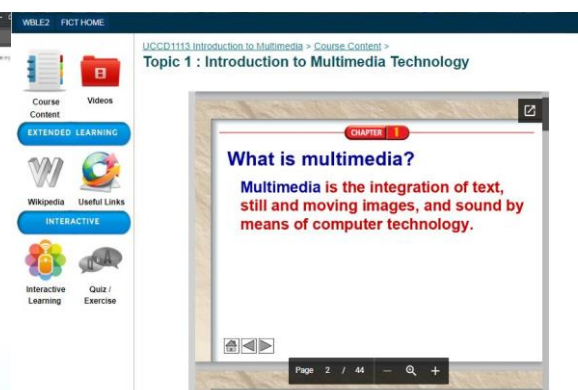
## CHAPTER 2: LITERATURE REVIEW

### 2.1 Web-based Learning Environment (UTAR's WBLE2)

UTAR's WBLE2 is built and powered by Google Sites. UTAR established the website with the purpose of promoting online based learning among students. Students have to sign in through UTAR webmail in order to access into the website. It contained courses from every faculty in the university. Each course offered lecture slides for each chapter, pre-recorded lectures and useful links for students to acquire more knowledge. Interactive learning components such as exercises and quizzes were added into the website to help students engaged in the materials easily, study and remember effectively.



**Figure 2.1.1:** Screenshot of FICT homepage in UTAR's WBLE2.



**Figure 2.1.2:** Screenshot of the content of "Introduction to Multimedia" in WBLE2.

#### 2.1.1 Benefits

Some benefits of using WBLE2 are:

- **Accessibility via multiple type of devices:** It is accessible through various type of devices such as computers, smartphones and tablets.
- **Minimise local storage:** Despite the browser stored cache when students browse through the web-based learning environment, the program does not occupied much space since it is not installed on the device and all resources were stored on the cloud.

### 2.1.2 Limitations

Some limitations of WBLE2 are as follows:

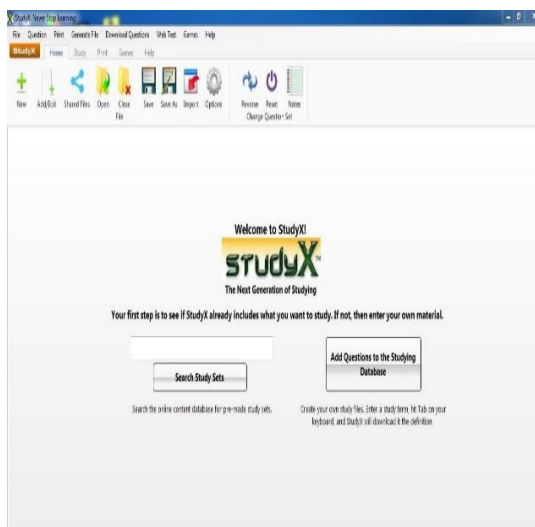
- **Technical limitations:** Due to it is delivered through Internet technology, it may failed to provide convenience to the audience who having problem in acquiring Internet services. Besides, if bandwidth is limited, it takes longer to display all elements especially video.
- **Incomplete functionality:** It is barely course content and useful links were provided for the subject “Introduction to Multimedia”. The interactive learning components were not accessible so it will be hardly encourage students to utilise the website constantly.
- **Unaesthetic interface:** There are minimum visual components like animations were used to design the website interface. Hence, it may hardly engage students with the subject matters on the website.

## 2.2 Computer-based Learning Applications

In this section, several existing computer-based learning applications will be reviewed to integrate some information domains as the benchmark of this project.

### 2.2.1 StudyX

StudyX is a computer application designed by a computer company, Jeff Computers. The program aimed to shorten elementary students' study time, making more fun in education. Users can use StudyX to play mini games like word search and Math practice as well as to jot down notes in the notepad embedded in the application.



**Figure 2.2.1.1:** Screenshot of StudyX main page.

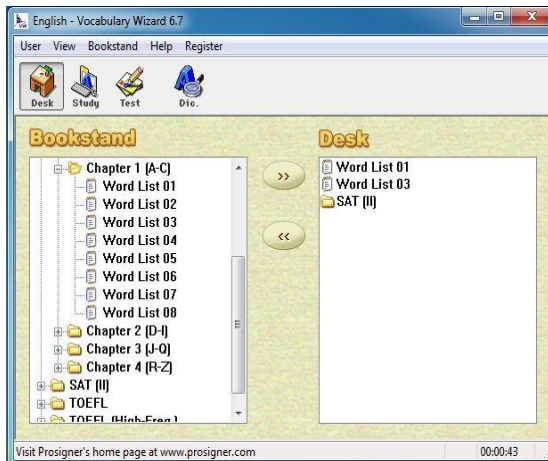


**Figure 2.2.1.2:** Screenshot of StudyX Math Game.

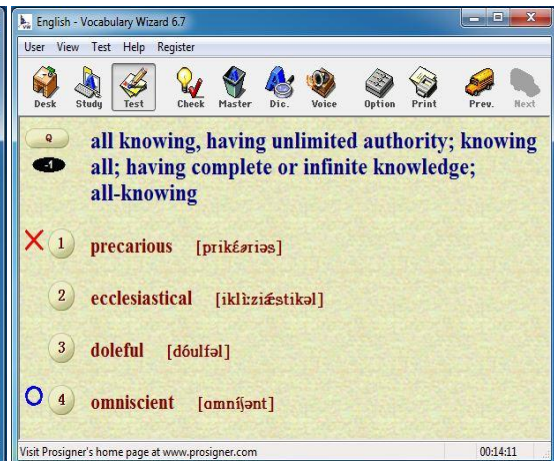
The strength of StudyX was its customisable feature for users to generate their own questions and answer template for self-studying purpose. Unfortunately, it did not provided any template or example of quiz question. It caused novice users had no idea of how to create a quiz question and eventually they could not access the full functionality of the program but merely able to use the features that did not require user to create questions, such as Math game. As a result, user gained very limited knowledge from this application. Furthermore, no sound effect was added into StudyX. It could be a reason for user to feel uninteresting when using the application.

### 2.2.2 Vocabulary Wizard 6.7

Vocabulary Wizard 6.7 is a computer learning application which developed to teach the English words that appear most often in tests. It taught the subject by different methods like flash card program with spoken words available, dictionary or multiple choice quizzes and spelling exercise.



**Figure 2.2.2.1:** Screenshot of Vocabulary Wizard 6.7 main page.



**Figure 2.2.2.2:** Screenshot of Vocabulary Wizard 6.7 multiple choice quiz.



**Figure 2.2.2.3:** Screenshot of Vocabulary Wizard 6.7 flash card program.



**Figure 2.2.2.4:** Screenshot of Vocabulary Wizard 6.7 spelling exercise.

This application emphasised on the improvement of English pronunciation by enabling a recorded audio to play for selected word on flash card program. It also allowed user to control their learning progress by setting the maximum number of words that will be taught in the program.



Nevertheless, Vocabulary Wizard 6.7 did not provide graphical representation to assist the interpretation of words instead of using too much text explanation in the course, thus caused it became a plain application which difficult to motivate user. On the other hand, sometimes, a similar question appeared in consecutive sequence because it did not fix the order of questions. As the result, users may find boring to answer the quizzes if a particular question duplicated for several times.

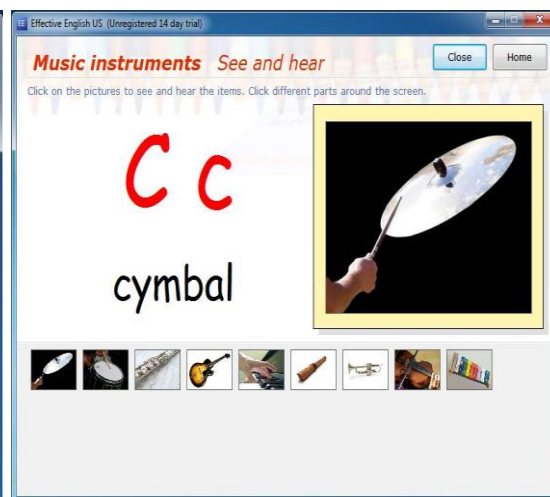
### 2.2.3 Effective English

Effective English is an English learning computer application for kids to learn English in a more interesting way. Multiple features that offered in Effective English are learning with pictures, word games and spelling games. It taught the popular words in a few categories, such as alphabet, food, number, animals, music instruments, etc.

Effective English mixed up text, images and voice in the course materials in order to sharpen memory of user. For example, in the learning with pictures section, a recorded voice which spoke out the word to be taught will be played. Not only that, it also helped user to keep track of learning progress and improvement by logging the game results.

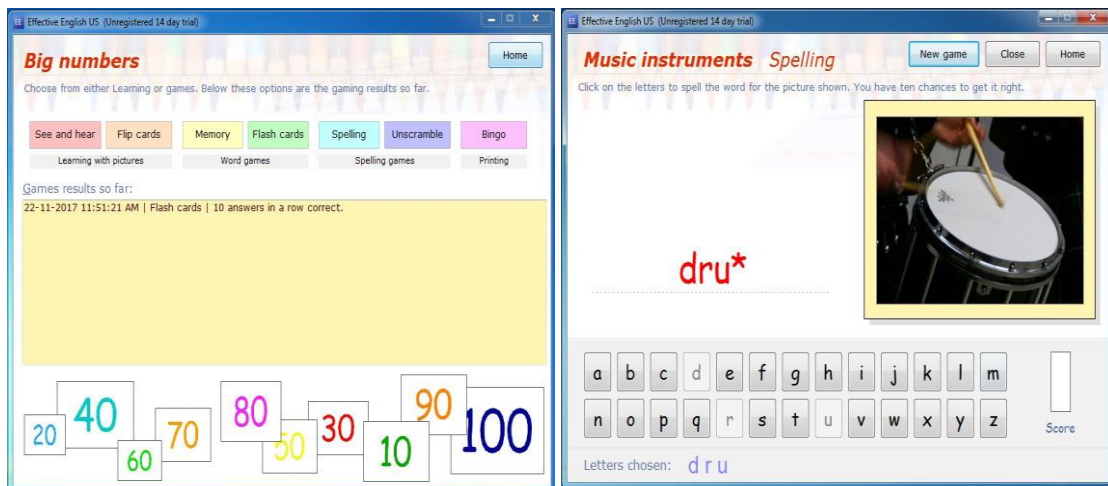


**Figure 2.2.3.1:** Screenshot of Effective English main page.



**Figure 2.2.3.2:** Screenshot of Effective English learning with pictures page.





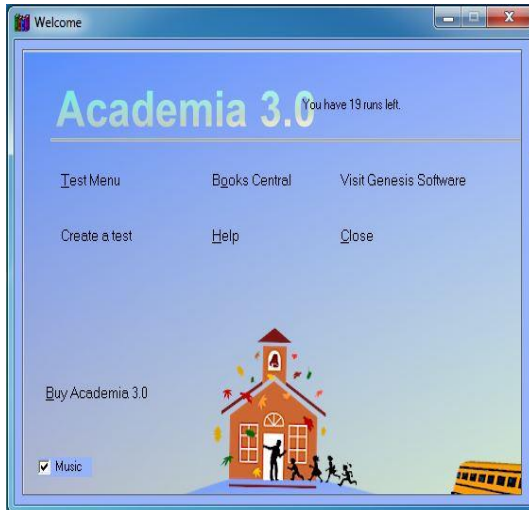
**Figure 2.2.3.3:** Screenshot of options of learning methods and games available in Effective English. **Figure 2.2.3.4:** Screenshot of spelling game in Effective English.

However, some weaknesses can be found in the application. It merely focused on teaching words by utilising images but no further explanation about the words was provided. Even though it can reduce the use of text and avoid information overload, but it may caused user easily confused and difficult to relate a word to the actual object if there are many items involved in a single picture.

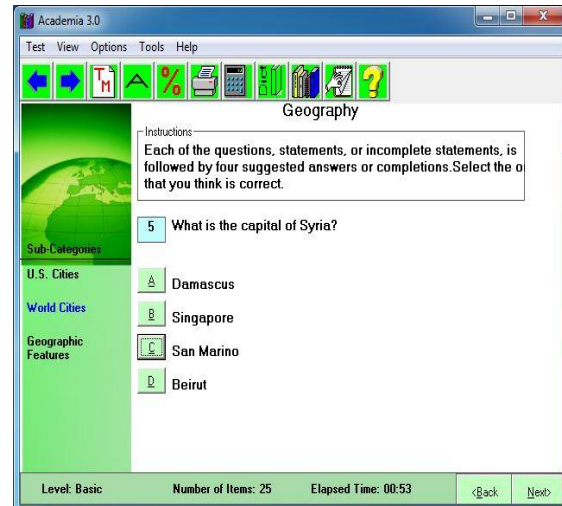
## 2.2.4 Academia

Academia is a computer application designed to improve users' knowledge in a variety of areas, which were English, Mathematics, Science, Geography and History. It comprised of a set of in-house tests with a high school difficulty level under each topic to ensure users getting a well-rounded education. The application expected users would gain knowledge by doing the tests since it provided answers and allowed user to check them instantly. Besides, it calculated score after users attempting a set of questions to inform their learning progress.

Academia offered a choice for user to turn on music so they can study in a relaxing mode. The music was able to play in main menu page but unfortunately it will stopped when other functions including quizzes were opened. Therefore, the music was unable to achieve its actual objective.



**Figure 2.2.4.1:** Screenshot of Academia main menu page.



**Figure 2.2.4.2:** Screenshot of Academia quiz.

Moreover, it did not provide any course materials for user to study before attempting the quizzes. Consequently, users may take longer time to study a topic since they just learned through the answers.

### 2.2.5 Learning English & Armenian Language

Learning English & Armenian Language is a computer language learning application that help user to memorise hundreds of English and Armenian words which commonly used in daily speeches. It is suitable for language beginners who want to learn Armenian or English. The two languages were translated in both directions and each word was illustrated with a picture.

The application also provided a feature for users to select the learning method with either slide show or click the buttons to proceed to next slide on their own. Besides, user can even set the delay period of slide show, which could accomplish the requirement of self-paced learning.



**Figure 2.2.5.1:** Screenshot of alphabet learning section in Learning English & Armenian Language.



**Figure 2.2.5.2:** Screenshot of fruits learning section in Learning English & Armenian Language.

The strength of this application was its ability to pronounce the English as well as Armenian word aloud with native Armenian while user can choose one of the language to be pronounced. Nonetheless, the resolution of the pronunciation audio was quite low. Users may find it difficult to listen the pronunciation clearly and eventually get confused by the spoken text. In addition, quiz was not provided so users barely study the words but unable to measure their knowledge.

### 2.2.6 Buensoft French

Buensoft French is a computer application which can be utilised to study French phrases and words that commonly used with proper pronunciation and translation in English. It comprised of lessons and various quiz activities for French language beginner to learn in an entertaining way.

Buensoft French offered many type of activities like matching game, quiz, typing game and more to ensure users were completely understand every lesson. The narration was iterated in nearly every activity for each lesson, which was capable to offer an efficient way for user to remember the pronunciation and French phrases. It also counted score of each quiz that users attempted in order to keep track of their learning speed.



Figure 2.2.6.1: Screenshot of Buensoft French main page.

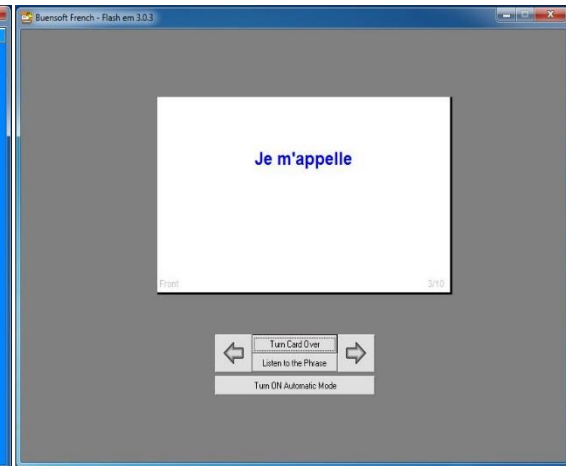


Figure 2.2.6.2: Screenshot of flash card learning section in Buensoft French.

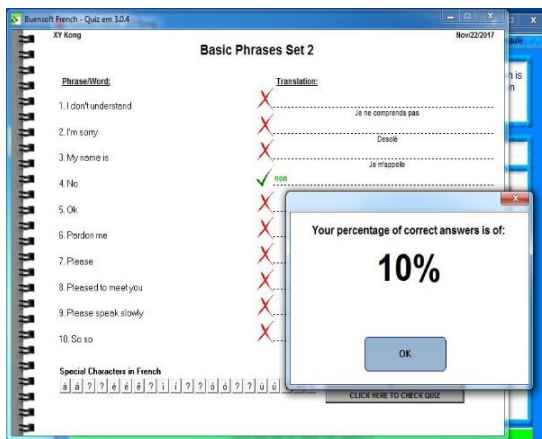


Figure 2.2.6.3: Screenshot of quiz in Buensoft French.



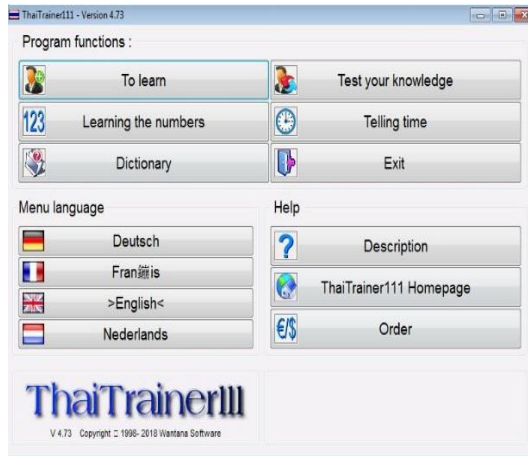
Figure 2.2.6.4: Screenshot of typing game in Buensoft French.

However, the developer of Buensoft French paid less attention on the design of user interface and hence the usage of graphics in the application was minimum. This issue caused the application became less appealing and hard to engage users even though it provided a lot of effective functionalities in teaching French language.

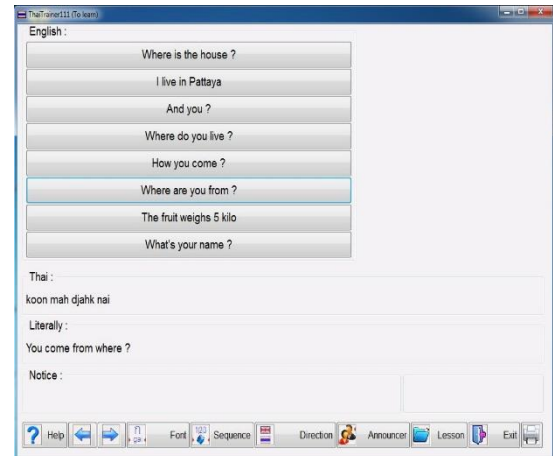
## 2.2.7 ThaiTrainer111

ThaiTrainer111 is a computer application that let user to learn the Thai language with English, Deutsch, French or Nederland translation. It offered 90 lessons which covered from words to sentences that commonly used in reality, as well as two

additional lessons for numbers and time. ThaiTrainer111 helped user to study the exact pronunciation correctly by using soundtrack that recorded by Thai students. Furthermore, users can test their knowledge by doing the multiple-choice questions.



**Figure 2.2.7.1:** Screenshot of ThaiTrainer111 main page.



**Figure 2.2.7.2:** Screenshot of learning section in ThaiTrainer111.



**Figure 2.2.7.3:** Screenshot of test section in ThaiTrainer111.

ThaiTrainer111 also provided the Thai narration to be switchable between a male and female voice so that user can listen to different tones and vowels sound. Nonetheless, some weaknesses and errors were found in the application, such as lack of illustrations, similar questions repeated in a quiz section and sometimes score was not added although a question has been answered correctly. These issues may lead to user frustration.

### 2.3 Comparisons of Existing Computer-based Learning Applications

Table 2.3.1: Summary of features available in the existing application and proposed application in this project.

	Lessons	Quizzes	Graphics	Audio	Video	Animation
StudyX		✓	✓			
Vocabulary Wizard 6.7	✓	✓	✓	✓		
Effective English	✓	✓	✓	✓		
Academia		✓	✓	✓		
Learning English & Armenian Language	✓		✓	✓		
Buensoft French	✓	✓	✓	✓		✓
ThaiTrainer111	✓	✓	✓	✓		
Author's proposed application	✓	✓	✓	✓	✓	✓

After literature review, it can be found that the utilisation of multimedia elements was quite limited in the existing computer-based learning application. Therefore, applying and combining the multimedia elements into proposed application could improve the attractiveness of user interface. Besides, the quiz questions should be arranged in unordered sequence and ensure they will not appeared repeatedly in same section.

CHAPTER 3: SYSTEM DESIGN

3.1 Block Diagram

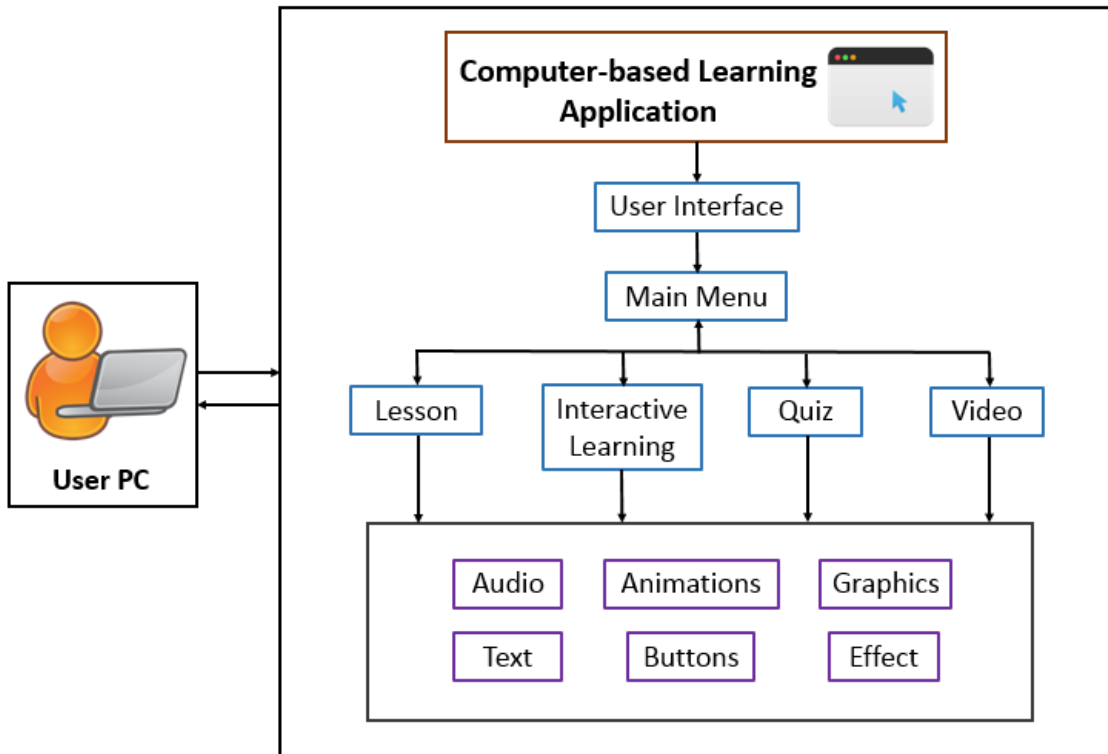


Figure 3.1.1: Block diagram.



3.2 System Flow Diagram

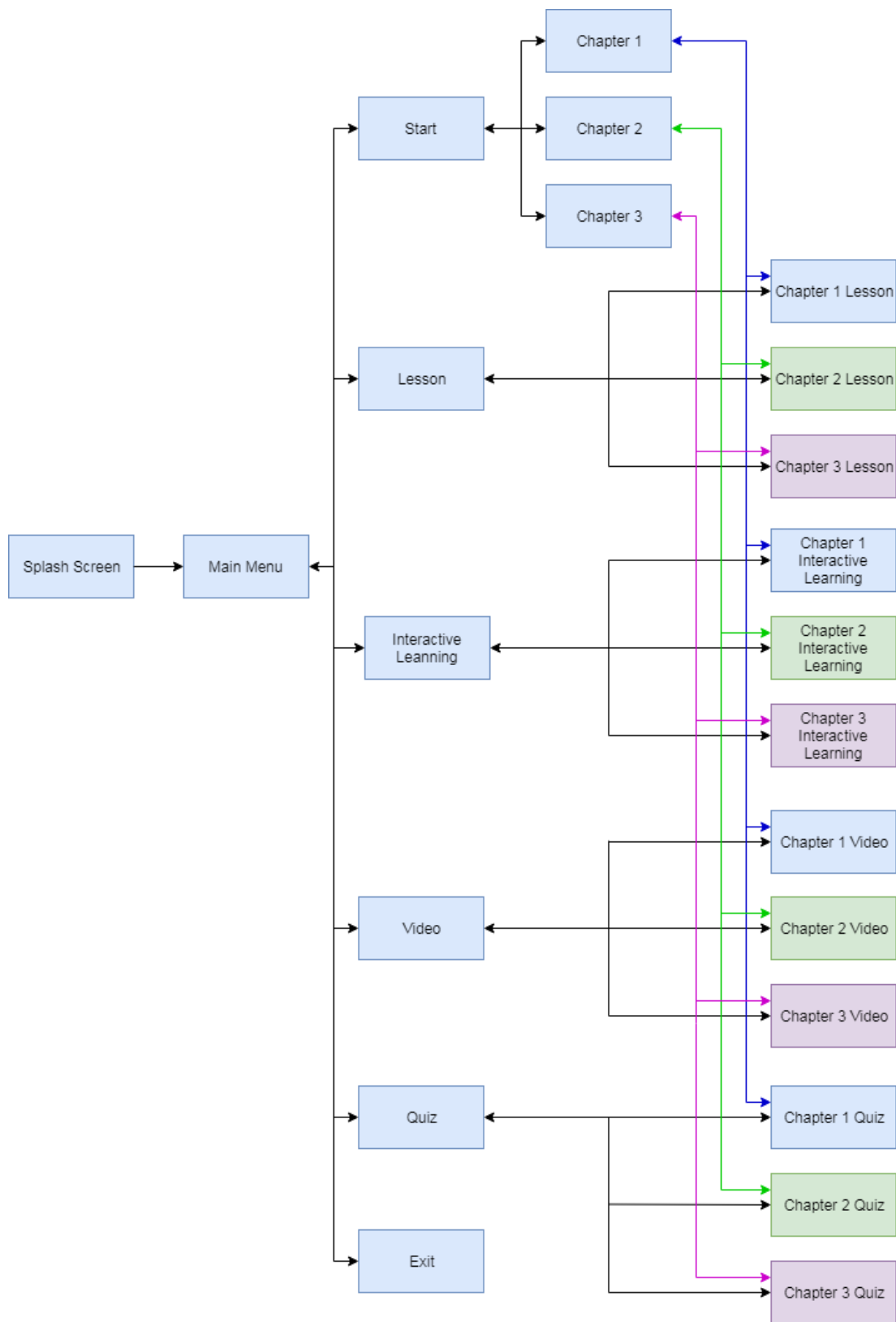


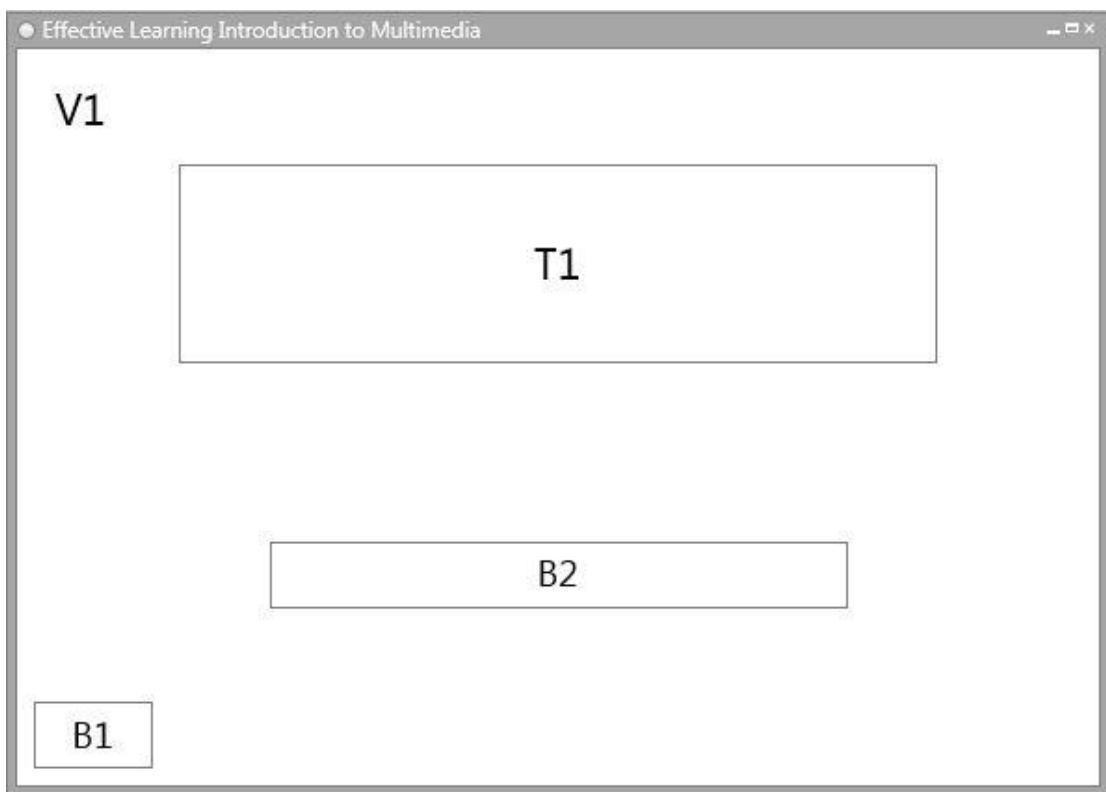
Figure 3.2.1: System flow diagram.



### 3.3 Storyboarding Design

The storyboarding design for this project will be shown in this section, some letters were used to label the elements in the storyboards:

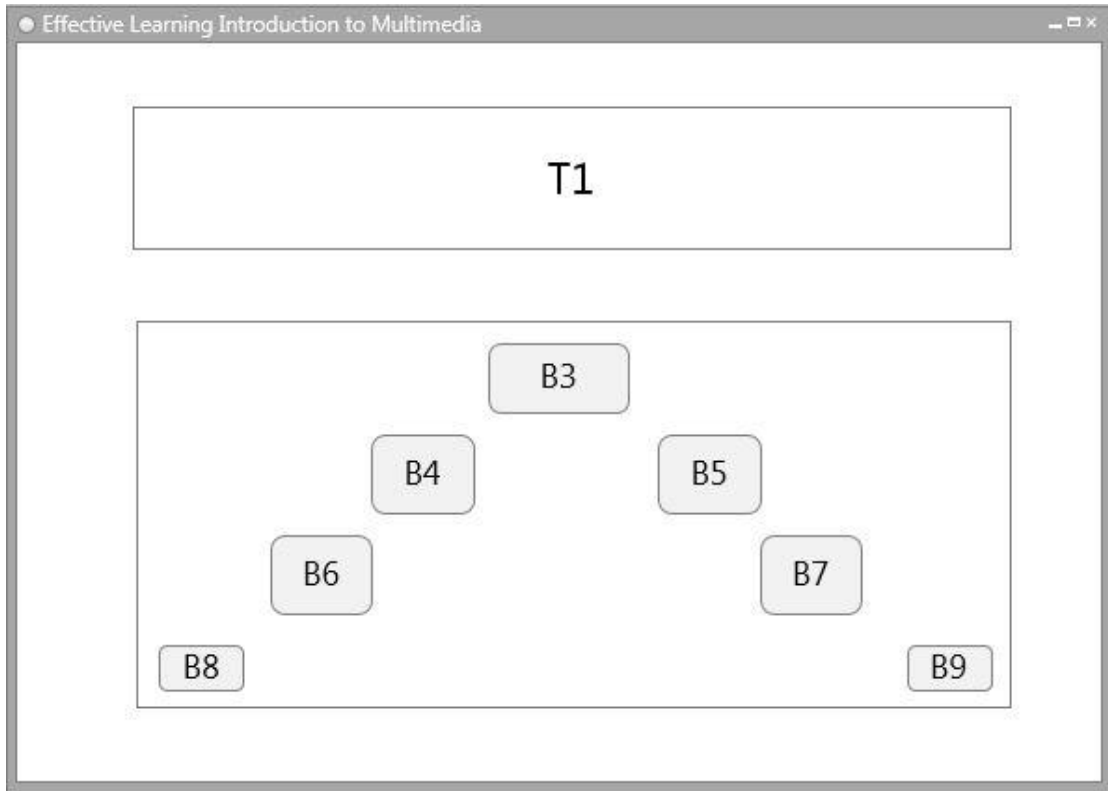
- B – Button
- G – Graphic
- M – Area to perform certain task
- T – Text
- V – Video



**Figure 3.3.1:** Storyboard of splash screen.

Table 3.3.1: Description of splash screen.

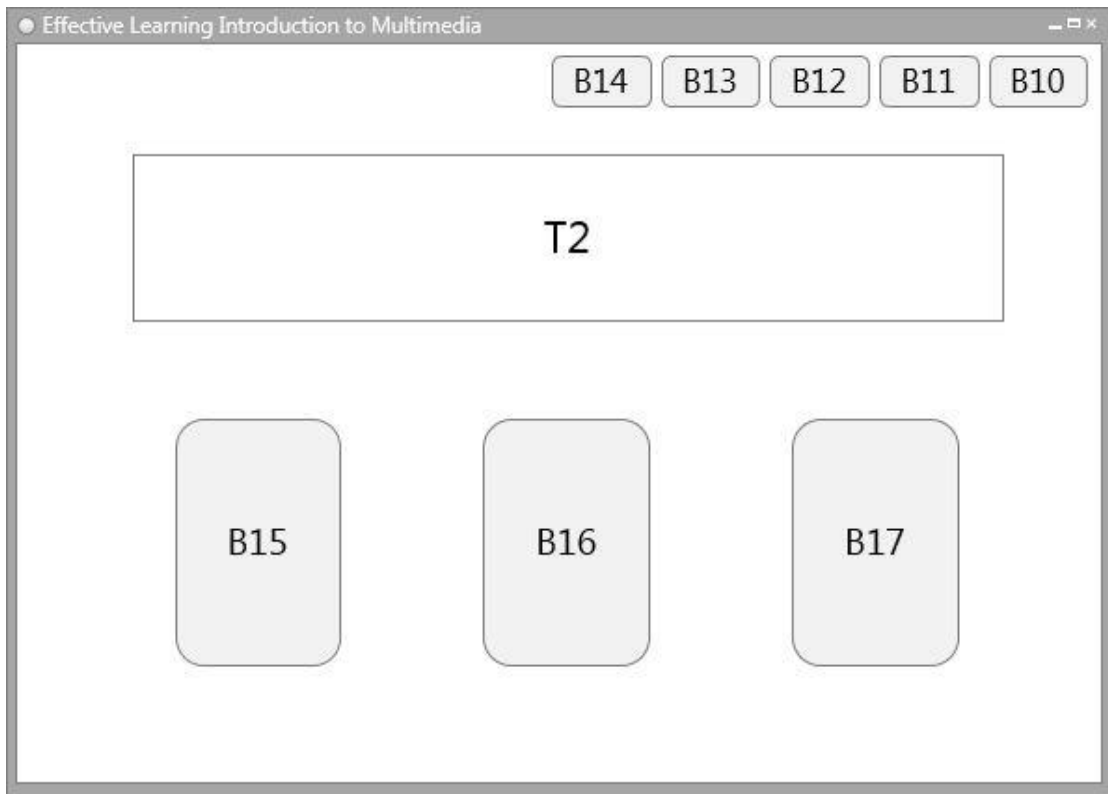
Label	Description
<b>V1</b>	Splash video.
<b>T1</b>	Title of the application.
<b>B1</b>	“Skip” button. It appears before the splash video ended to navigate to the main menu. Hidden when splash video ended.
<b>B2</b>	A button appears when splash video ended to navigate to main menu.



**Figure 3.3.2:** Storyboard of main menu.

Table 3.3.2: Description of main menu.

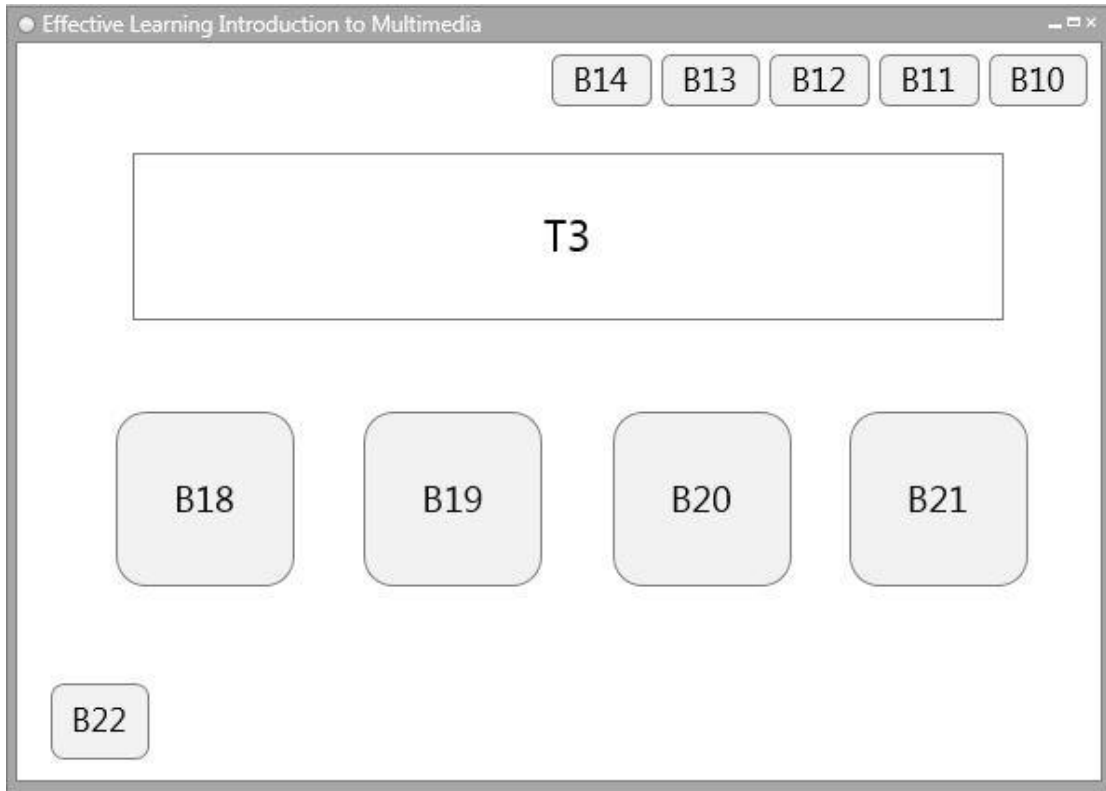
Label	Description
<b>T1</b>	Title of the application.
<b>B3</b>	“Start” button. It will navigate to chapter selection page when user click on it.
<b>B4</b>	“Lesson” button. It will navigate to lesson module start page when user click on it.
<b>B5</b>	“Video” button. It will navigate to video module start page when user click on it.
<b>B6</b>	“Interactive Learning” button. It will navigate to interactive learning module start page when user click on it.
<b>B7</b>	“Quiz” button. It will navigate to quiz module start page when user click on it.
<b>B8</b>	Background music on or off button.
<b>B9</b>	“Exit” button. An alert dialog box will be displayed when user click on it to ask user to confirm their intention to exit the application.



**Figure 3.3.3:** Storyboard of chapter selection page.

Table 3.3.3: Description of chapter selection page.

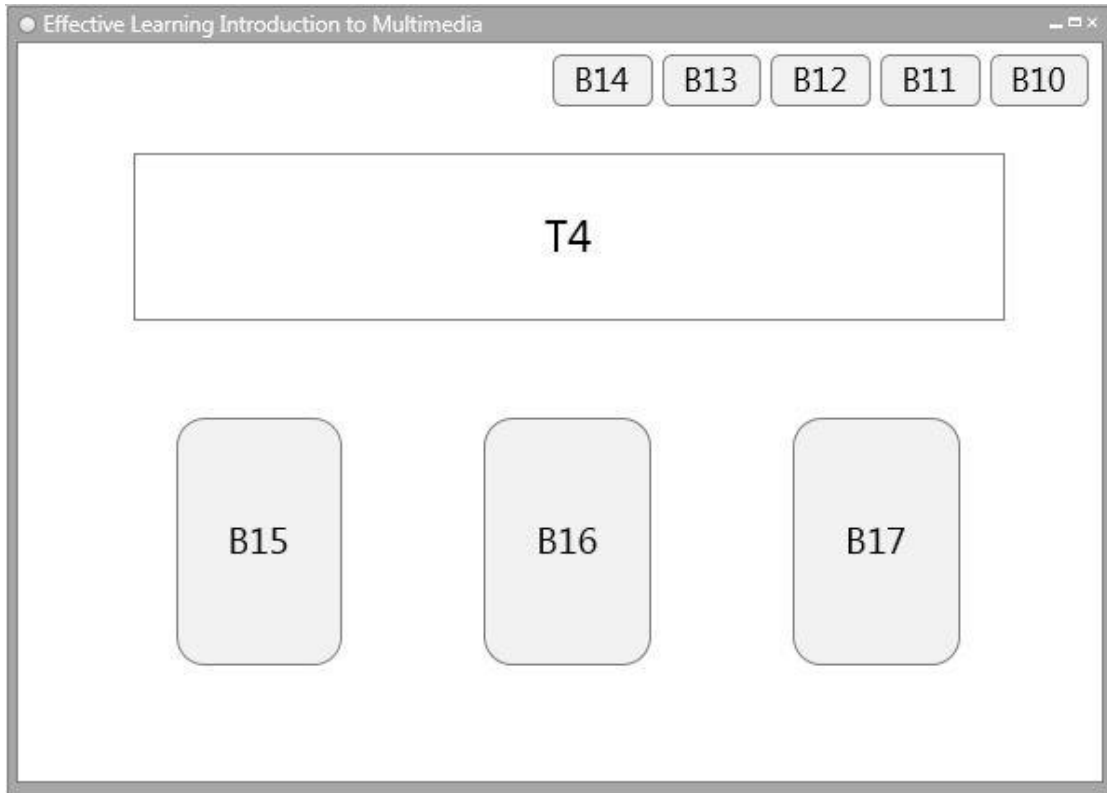
Label	Description
<b>T2</b>	Title of the course, “Introduction to Multimedia”.
<b>B10</b>	“Home” button which link to main menu.
<b>B11</b>	“Lesson” button which link to lesson module start page.
<b>B12</b>	“Interactive Learning” button which link to interactive learning module start page.
<b>B13</b>	“Video” button which link to video module start page.
<b>B14</b>	“Quiz” button which link to quiz module start page.
<b>B15</b>	“Chapter 1” button. It will navigate to module selection page for chapter 1.
<b>B16</b>	“Chapter 2” button. It will navigate to module selection page for chapter 2.
<b>B17</b>	“Chapter 3” button. It will navigate to module selection page for chapter 3.



**Figure 3.3.4:** Storyboard of module selection page.

Table 3.3.4: Description of module selection page.

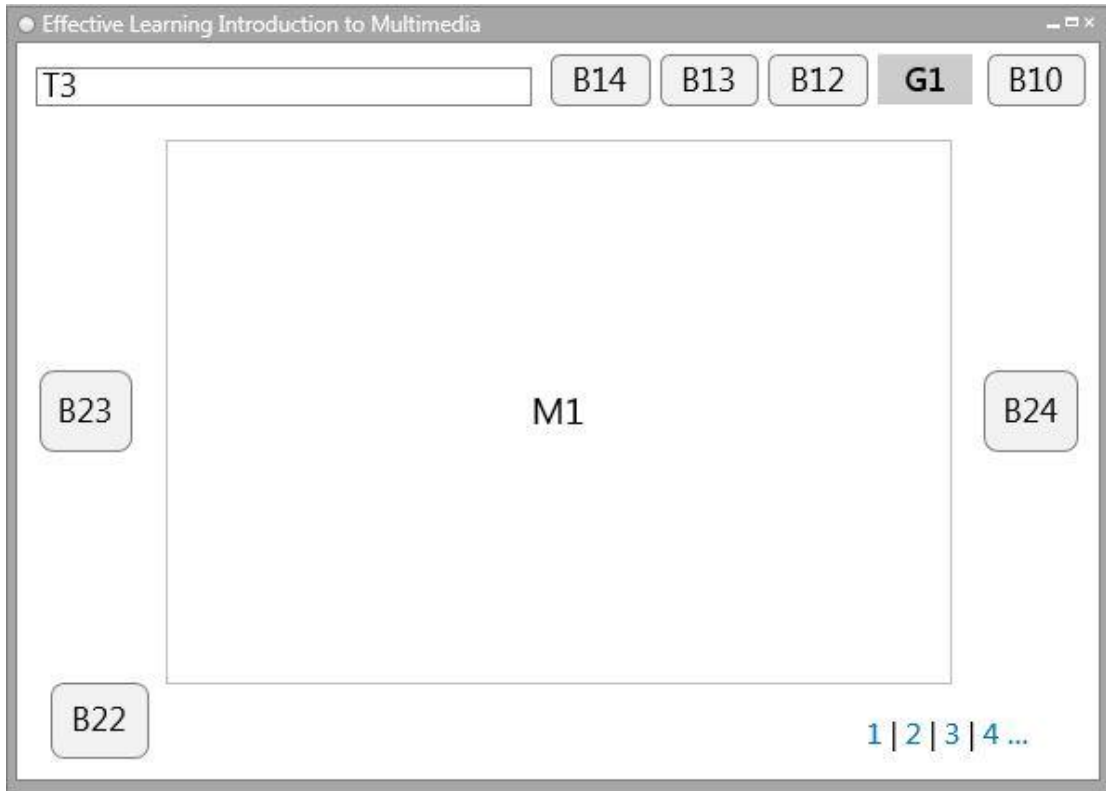
Label	Description
<b>T3</b>	Title of respective chapter.
<b>B22</b>	Back arrow button which link back to chapter selection page.
<b>B10</b>	“Home” button which link to main menu.
<b>B11</b>	“Lesson” button which link to lesson module start page.
<b>B12</b>	“Interactive Learning” button which link to interactive learning module start page.
<b>B13</b>	“Video” button which link to video module start page.
<b>B14</b>	“Quiz” button which link to quiz module start page.
<b>B18</b>	“Lesson” button. It will navigate to the lesson of respective chapter.
<b>B19</b>	“Interactive Learning” button. It will navigate to interactive learning section of respective chapter.
<b>B20</b>	“Video” button. It will navigate to play the video of respective chapter.
<b>B21</b>	“Quiz” button. It will navigate to quiz section of respective chapter.



**Figure 3.3.5:** Storyboard of module start page.

Table 3.3.5: Description of module start page.

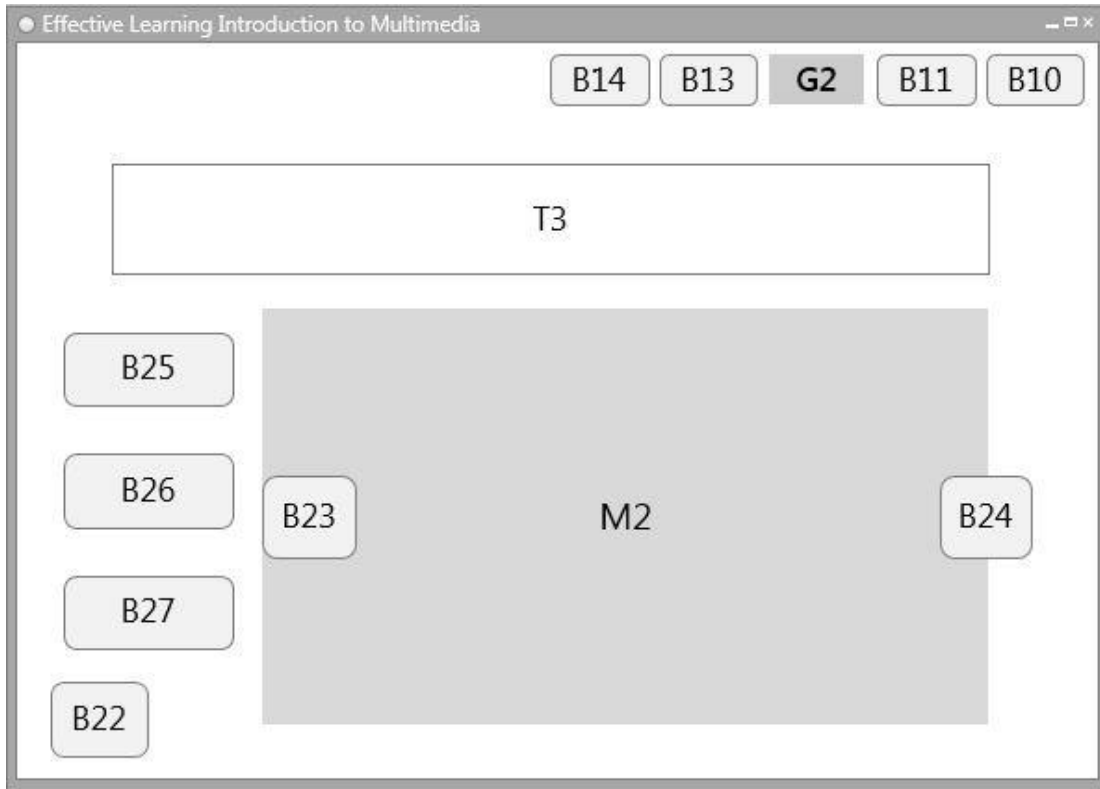
Label	Description
<b>T4</b>	Title of respective module. For instance, “Lesson”, “Interactive Learning”, “Video” and “Quiz”.
<b>B10</b>	“Home” button which link to main menu.
<b>B11</b>	“Lesson” button which link to lesson module start page.
<b>B12</b>	“Interactive Learning” button which link to interactive learning module start page.
<b>B13</b>	“Video” button which link to video module start page.
<b>B14</b>	“Quiz” button which link to quiz module start page.
<b>B15</b>	“Chapter 1” button. It will navigate to respective module section for chapter 1.
<b>B16</b>	“Chapter 2” button. It will navigate to respective module section for chapter 2.
<b>B17</b>	“Chapter 3” button. It will navigate to respective module section for chapter 3.



**Figure 3.3.6:** Storyboard of lesson page.

Table 3.3.6: Description of lesson page.

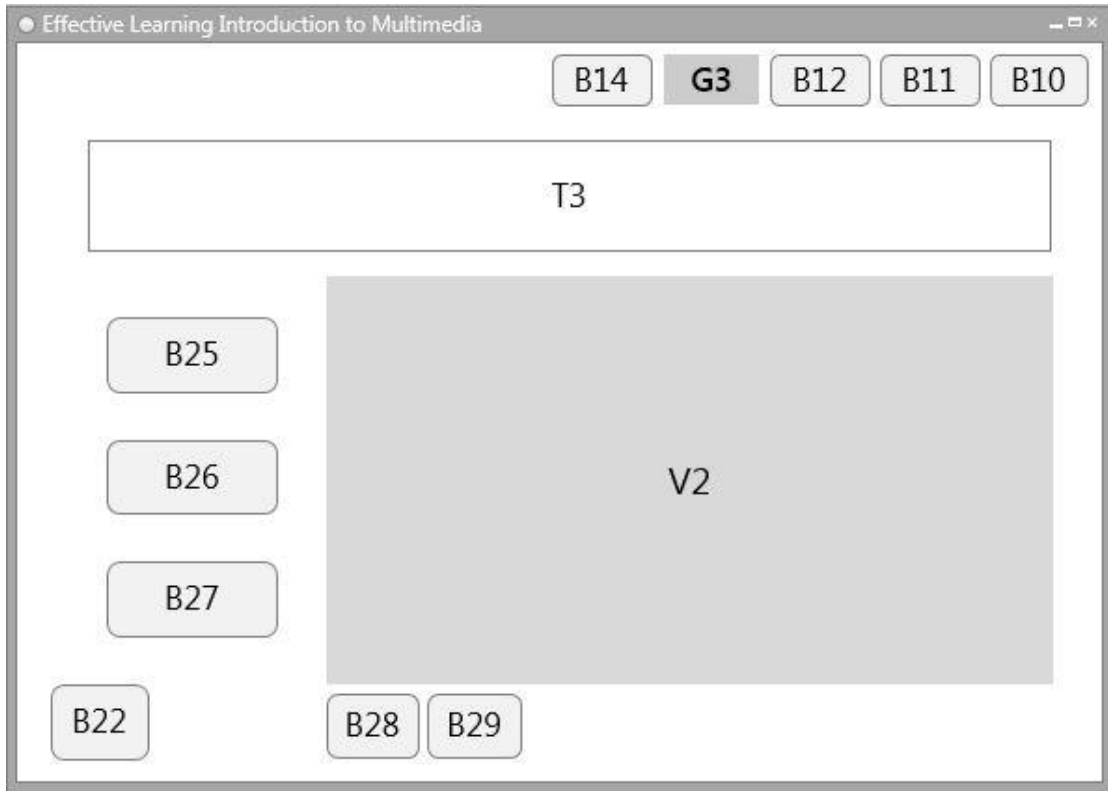
Label	Description
<b>T3</b>	Title of respective chapter.
<b>B22</b>	Back arrow button which link back to previously visited page.
<b>B10</b>	“Home” button which link to main menu.
<b>G1</b>	Graphic to show lesson module was currently selected.
<b>B12</b>	“Interactive Learning” button which link to interactive learning module start page.
<b>B13</b>	“Video” button which link to video module start page.
<b>B14</b>	“Quiz” button which link to quiz module start page.
<b>B23</b>	Button to previous slide.
<b>B24</b>	Button to next slide.
<b>M1</b>	Area of displaying the lesson content.



**Figure 3.3.7:** Storyboard of interactive learning section page.

Table 3.3.7: Description of interactive learning section page.

Label	Description
<b>T3</b>	Title of respective chapter.
<b>B22</b>	Jump back button which link back to previously visited page.
<b>B10</b>	“Home” button which link to main menu.
<b>B11</b>	“Lesson” button which link to lesson module start page.
<b>G2</b>	Graphic to show interactive learning module was currently selected.
<b>B13</b>	“Video” button which link to video module start page.
<b>B14</b>	“Quiz” button which link to quiz module start page.
<b>B23</b>	Button to previous interactive learning question.
<b>B24</b>	Button to next interactive learning question.
<b>B25</b>	“Chapter 1” button, link to interactive learning section for chapter 1.
<b>B26</b>	“Chapter 2” button, link to interactive learning section for chapter 2.
<b>B27</b>	“Chapter 3” button, link to interactive learning section for chapter 3.
<b>M2</b>	Area of interactive learning section.

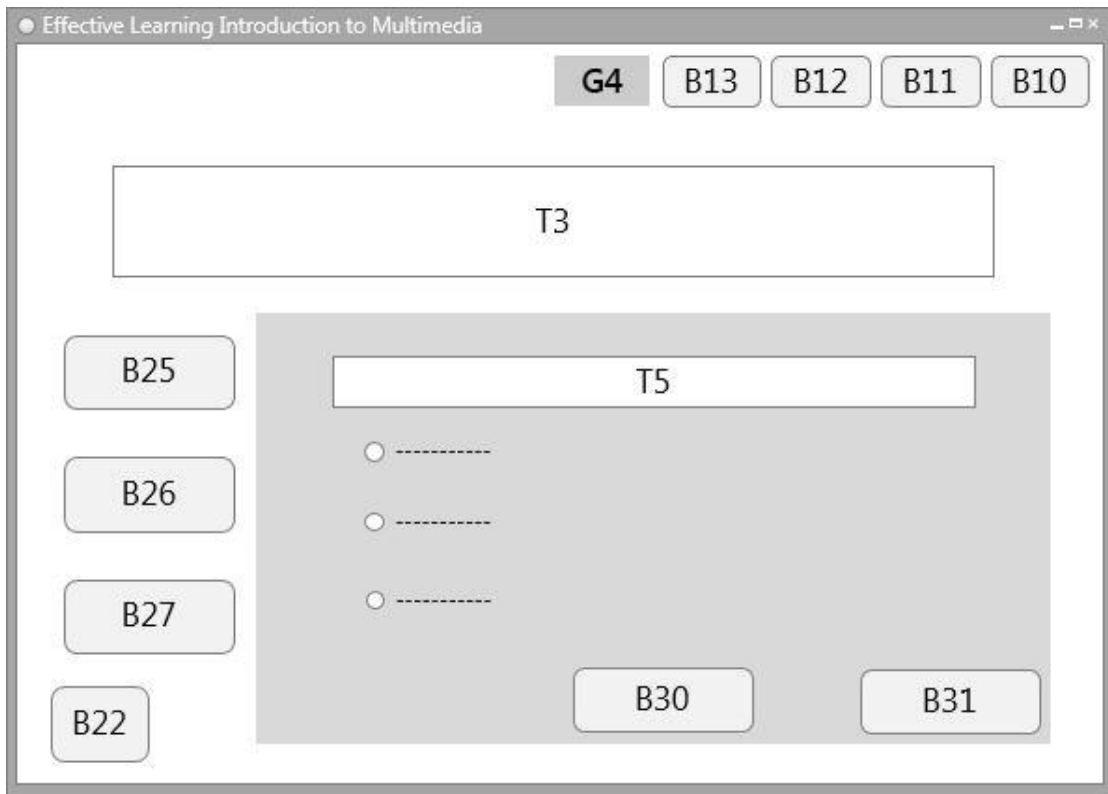


**Figure 3.3.8:** Storyboard of video page.

Table 3.3.8: Description of video page.

Label	Description
<b>T3</b>	Title of respective chapter.
<b>B22</b>	Jump back button which link back to previously visited page.
<b>B10</b>	“Home” button which link to main menu.
<b>B11</b>	“Lesson” button which link to lesson module start page.
<b>B12</b>	“Interactive Learning” button which link to interactive learning module start page.
<b>G3</b>	Graphic to show video module was currently selected.
<b>B14</b>	“Quiz” button which link to quiz module start page.
<b>B25</b>	“Chapter 1” button which link to video page of chapter 1.
<b>B26</b>	“Chapter 2” button which link to video page of chapter 2.
<b>B27</b>	“Chapter 3” button which link to video page of chapter 3.
<b>B28</b>	“Play” or “Pause” button. To play or pause the video.
<b>B29</b>	“Stop” button. Click it to stop the video.
<b>V2</b>	Video of respective chapter.





**Figure 3.3.9:** Storyboard of quiz section page.

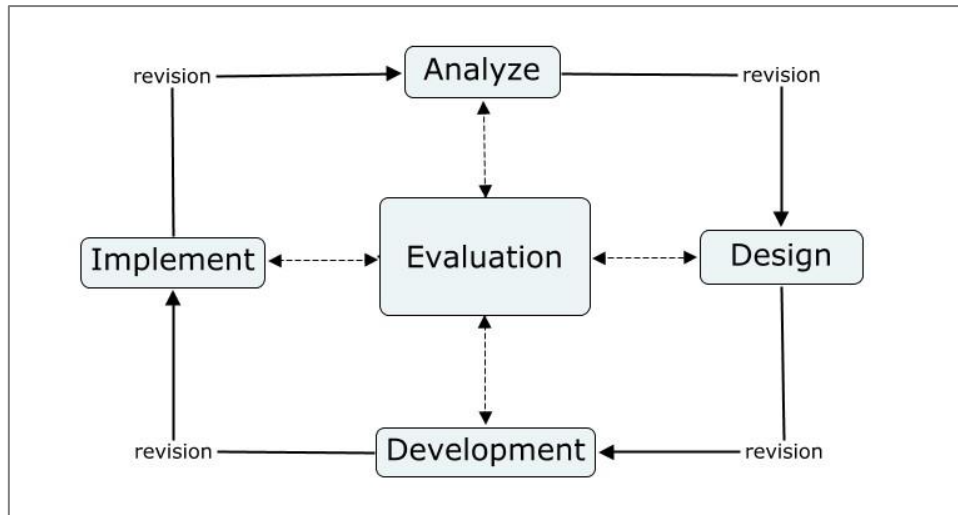
Table 3.3.9: Description of quiz section page.

Label	Description
<b>T3</b>	Title of respective chapter.
<b>T5</b>	Quiz question.
<b>B22</b>	Jump back button which link back to previously visited page.
<b>B10</b>	“Home” button which link to main menu.
<b>B11</b>	“Lesson” button which link to lesson module start page.
<b>B12</b>	“Interactive Learning” button which link to interactive learning module start page.
<b>B13</b>	“Video” button which link to video module start page.
<b>G4</b>	Graphic to show quiz module was currently selected.
<b>B25</b>	“Chapter 1” button, link to quiz section for chapter 1.
<b>B26</b>	“Chapter 2” button, link to quiz section for chapter 2.
<b>B27</b>	“Chapter 3” button, link to quiz section for chapter 3.
<b>B30</b>	“Submit” button to submit and check each question.
<b>B31</b>	“Next” button to proceed to next question.

## CHAPTER 4: PROPOSED METHOD / APPROACH

## 4.1 Design Specifications

## 4.1.1 Methodology



**Figure 4.1.1.1:** ADDIE model (LearnUpon, 2018)

The methodology used in this project is ADDIE model. Cheung (2016) declared that ADDIE model is an instructional design methodology used to help organize the production of course materials. It consists of five stages of development process: Analysis, Design, Development, Implementation and Evaluation. It is suitable to be applied in this project since the ultimate goal of this project is to deliver e-learning course for user to study effectively. In this case, the analysis and design phase were conducted in Final Year Project I, whereas development, implementation and evaluation stage will be performed in Final Year Project II.

With the guidance of ADDIE model, the problem statement, objectives, target audience, media types used of this project were identified in the first phase, which is **analysis** phase. Conduct the benchmarking of similar existing product can help to find out the potential improvement, strengths and constraints of the proposed application. Gantt chart was developed in this stage for scheduling the timeline for project completion.

In **design** phase, which is the second phase of this project, a set of planned strategies were identified for attaining the project's goals. For instance, prepare and design all the chapters, quiz questions with answers that will be covered in the course

to ensure the learning outcomes are evidently beneficial to the students. Next, develop system flow diagram, design the user interface and create storyboards to layout the elements used in the project as well as organise the ideas before developing the course materials. Furthermore, the creation of media elements will be conducted in this phase to produce and gather the text, video, graphics, animations and audio to be used in the proposed application. The prototype is also one of the product in this phase.

As proceed to **development** phase, the course content, quizzes, media elements, interactions and functional navigation were developed and integrated in authoring tool. Each element developed in the application was guided by the storyboards created in previous phase. After that, all of the contents were tested and reviewed to make sure there are no basic errors such as spelling, grammar, navigation and flow.

In **implementation** phase, the final application was shared and delivered to the target audience when it is fully developed. The learners were asked to complete surveys at the end of the testing section to assess their user experiences.

In the **evaluation** phase, formative and summative evaluation were conducted. Formative evaluation was performed in each stage of ADDIE process in this project to keep improving the project's quality. The summative evaluation of this project was conducted to receive and gather survey feedback from users to measure the achievement of intended project objectives. The feedback can also help to improve and revise the application.

### 4.1.2 Development Tools



The primary development tool in this project is **Adobe Director**. It is a multimedia authoring tool which can be used to integrate the multimedia elements which created by using other tools into a standalone project. Besides, it is useful to add navigational and functional interactivity by applying Lingo script into the elements in order to develop the interactive CBL application. Additionally, Adobe Director is capable to create animations for this project.

The minimum system requirements of Adobe Director are:

- 512MB of RAM
- 500MB of available hard disk space
- 1.3GHz processor



**Adobe Illustrator** is useful for creating or editing vector graphics. The software offered a variety of options and tools to add effects to the graphics for improving their attractiveness. The graphics that created in this software will be exported and utilised in the project. It supported many file formats such as BMP, JPEG, PNG, SVG, etc.

The minimum system requirements of Adobe Illustrator are:

- 2GB of RAM (4GB recommended) for 32 bit; 4GB of RAM (16GB recommended) for 64 bit
- 2GB of available hard disk space
- AMD Athlon 64 processor or multicore Intel processor (with 32 / 64-bit support)
- Monitor resolution: 1024 x 768 display (1920 x 1080 recommended)



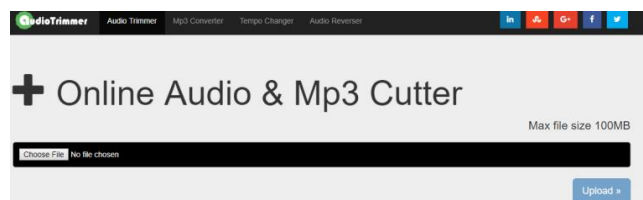
**Powtoon** is a web-based animation software which used to create animated presentations. It allows to record or import user-created voice-overs and save them as narration. The presentations created by Powtoon can be exported as animated explainer videos and utilised in the proposed application. The requirements of Powtoon are:

- Internet connection
- Web browser



**NaturalReader Online** is a text-to-speech web application that used to convert written text into spoken natural sounding speech which can be used as narration for the proposed application. Its requirements included:

- Internet connection
- Web browser



**Online Audio Cutter** is a free tool to perform simple audio editing. It is useful to add in fade-in, fade-out effects, trim mp3 tracks and various audio files to be used in the project. The requirements needed to run this tool are:

- Internet connection
- Web browser

## 4.2 Hardware Requirements for Development

Table 4.2.1: List of minimum hardware requirement for development.

<b>Hardware</b>	<b>Minimum requirement</b>
<b>Processor (CPU)</b>	1.3GHz (2GHz or more recommended)
<b>Memory (RAM)</b>	2GB (4GB recommended) for 32-bit; 4GB (16GB recommended) for 64-bit
<b>Hard Drive</b>	2.5GB of free disk space
<b>Sound card with speaker</b>	16-bit sound card or higher
<b>Graphics Processing Unit (GPU)</b>	1GB of VRAM (4GB recommended)
<b>Input device such as keyboard or mouse</b>	Any brand of input device

## 4.3 Implementation Issues and Challenges

There are some unavoidable issues and challenges that may affect the quality of this project. Firstly, the timeframe to work on this project is not enough for delivery of the best quality project. Completing a project on deadline may affect the quality of the proposed application as the deadline hindered modification and improvement that could be made for some features in the application. In addition, the course content that included in the application may not able to cover all the subject matters taught in class due to the timeframe set for completion of this project is rather short that caused difficulty to develop a fully functional subject in the CBL application.

On the other hand, the feedback about the performance of proposed application may altered as it delivered to multiple users from different backgrounds. There is a possibility of disagreement between them because the performance evaluation of an application could be intuitive, some students may prefer to use CBL application to study as it will be having more fun, and meanwhile some students may prefer stick to paper-based learning materials. Moreover, if the application is distributed to students who refuse to attempt new things, the application will not be useful for them and it may affect the accuracy to measure performance of this project.

4.4 Timeline

4.4.1 Final Year Project I



Figure 4.4.1.1: Gantt chart for Final Year Project I.

4.4.2 Final Year Project II

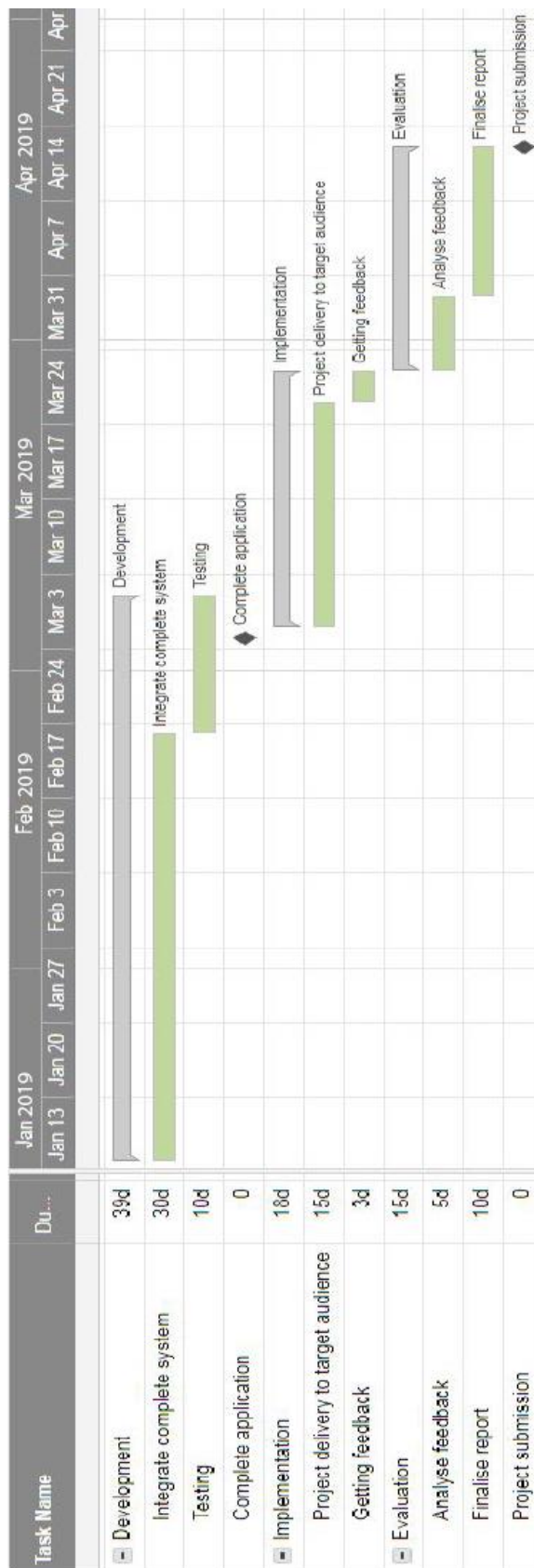


Figure 4.4.2.1: Gantt chart for Final Year Project II.



## CHAPTER 5: MULTIMEDIA DEVELOPMENT PROCESS

### 5.1 Pre-Authoring Process

The media elements creation was conducted in this stage. Its purpose is to prepare the components that needed to be integrated via authoring tool in next stage.

#### 5.1.1 Text

All the text elements used in the application were sans serif text. The text elements can mostly be created directly via the authoring tool since there are quite a lot of words to be displayed in the application for presenting the course content and instructions. However, in order to include some aesthetic effects for the title in each page, Adobe Illustrator was used to create some text elements for the application as well. After the text elements were created, they were exported as image in PNG file format because it supports transparency which can remove the background of text.

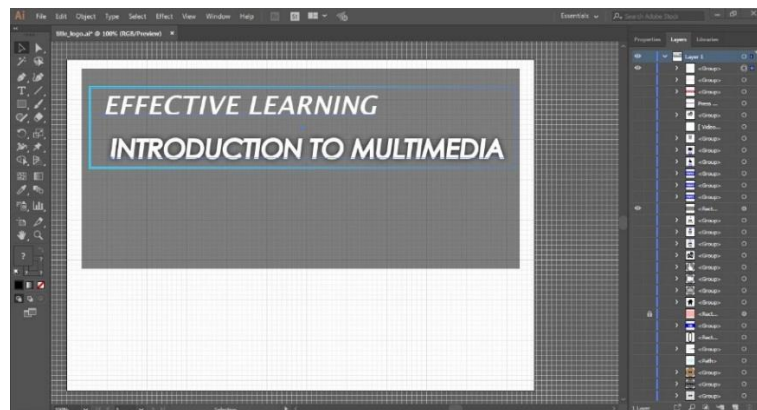


Figure 5.1.1.1: Text element created in Adobe Illustrator.

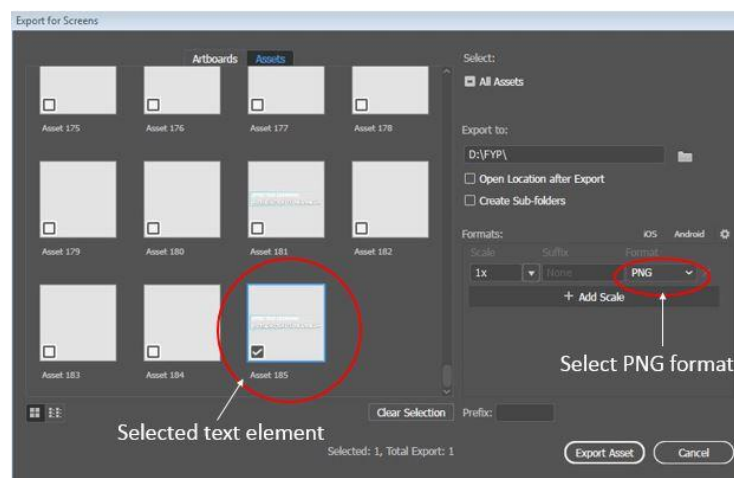
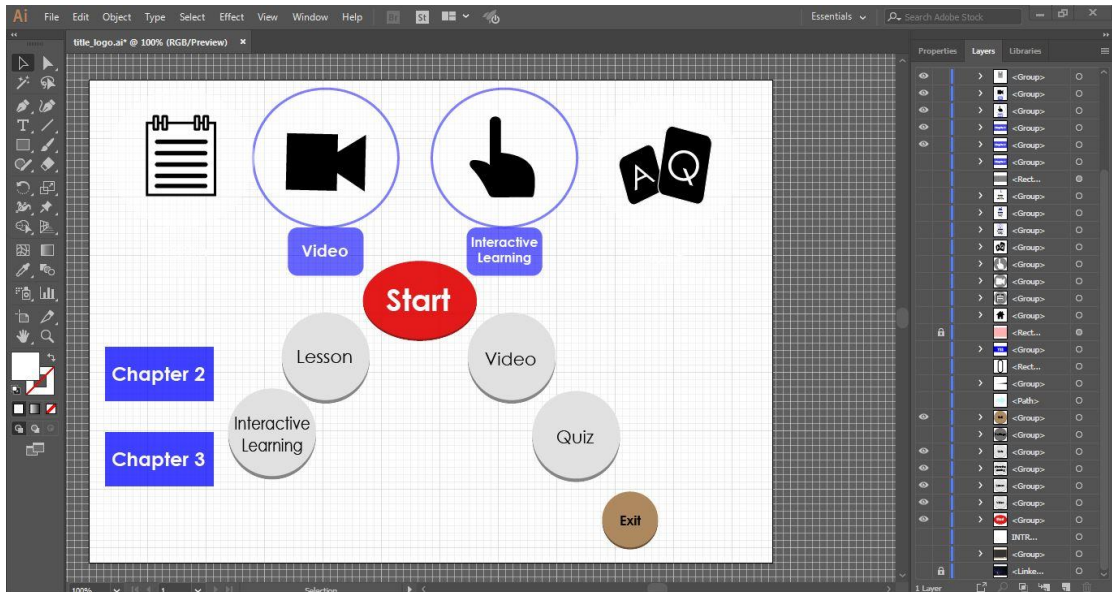


Figure 5.1.1.2: Export options for text element in Adobe Illustrator.

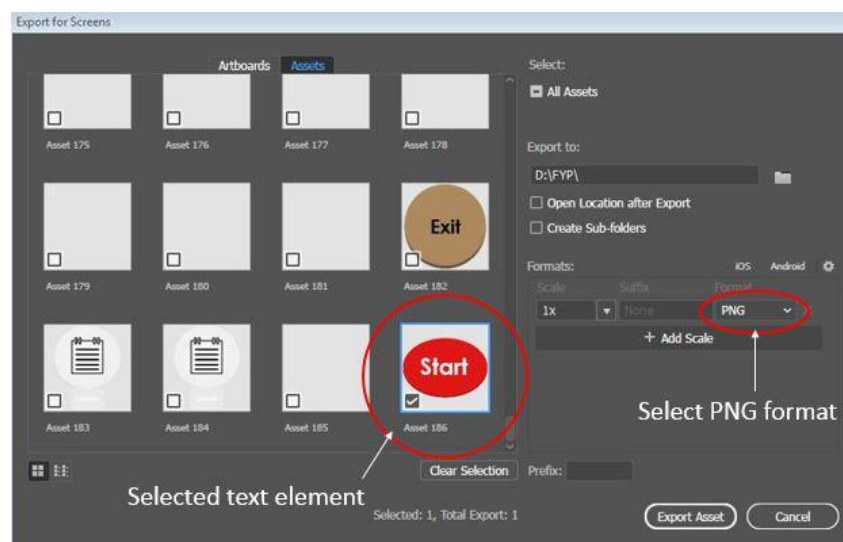
### 5.1.2 Graphics

The graphics elements were created by using Adobe Illustrator so they can be used as buttons or decorations in the application. There were two versions of the same type of button to be created by applying some changes like colour or size to each of them. The purpose of doing so is to differentiate the buttons in normal state and the buttons that currently pointed by mouse cursor.



**Figure 5.1.2.1:** Graphics elements that created in Adobe Illustrator.

Similar to the text elements, the graphics that have been created were exported as image in PNG file format in order to support the transparency of background.

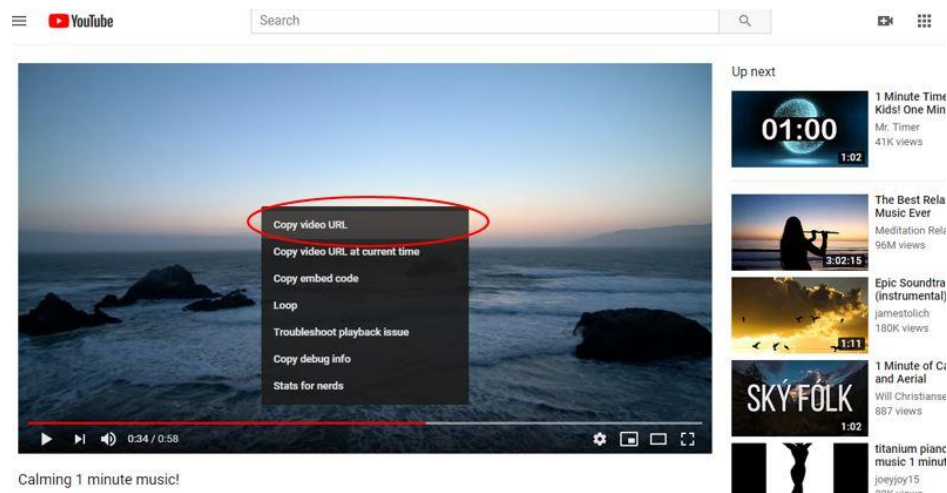


**Figure 5.1.2.2:** Export options for graphics created in Adobe Illustrator.

### 5.1.3 Audio

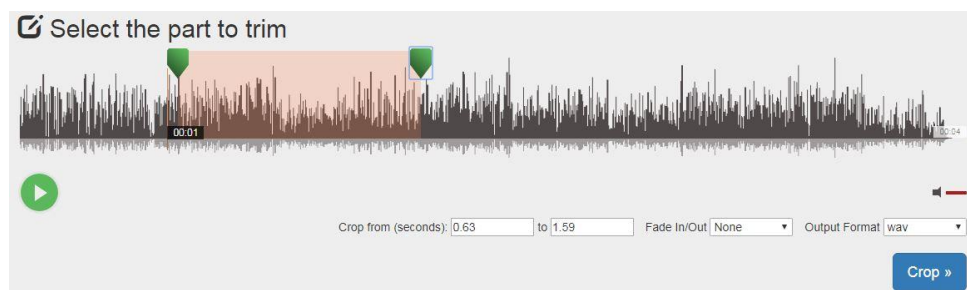
Audio is important for the application as it needs sound effect to gain attention and background music to create atmosphere.

The source to obtain the necessary audio elements for this project was video-sharing website, YouTube. The website was used to search the suitable background music and sound effect, after that the URL of the video was copied so it can be converted to SWA file format (for better usage in authoring tool) via online video convertor.



**Figure 5.1.3.1:** Copy YouTube video URL to obtain background music.

On the other hand, the audio elements obtained from website may not perfectly fit to be used in the application. Therefore, Online Audio Cutter was used to trim the audio in order to take the necessary part.

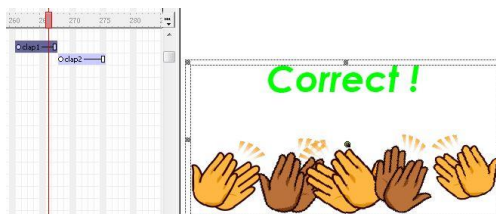


**Figure 5.1.3.2:** Online Audio Cutter.

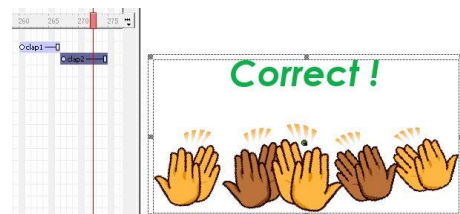
### 5.1.4 Animations

There are two types of animations were included in the application, which are path-based animation and cel-based animation. The path-based animation will be developed through authoring process, whereas the cel-based animation was created by using Adobe Director in this stage. The authoring software provided a function to create cel-based animation, which known as film loop in the software.

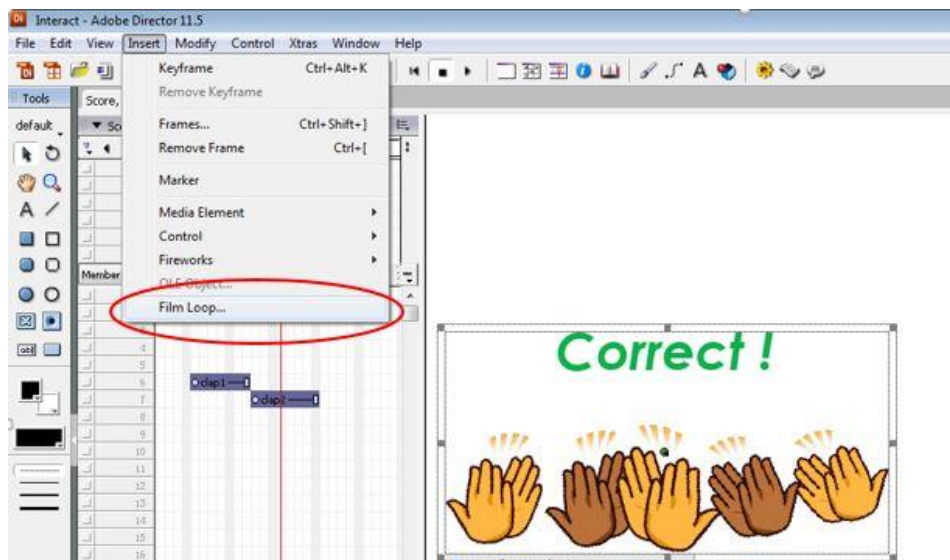
Film loop can be done by arranging two or more images on the timeline, then select all the images simultaneously and lastly choose the insert film loop function in Adobe Director to make the images combined as a film loop.



**Figure 5.1.4.1:** Image in frame 1 for creating film loop.



**Figure 5.1.4.2:** Image in frame 2 for creating film loop.



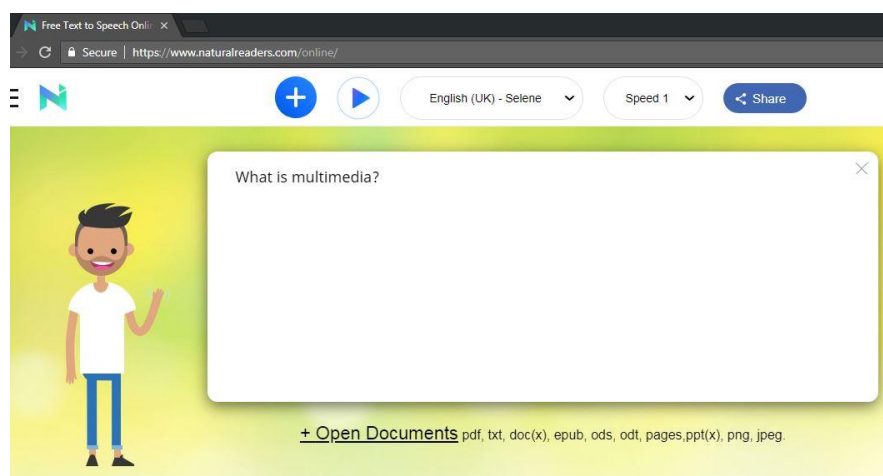
**Figure 5.1.4.3:** Film loop function in Adobe Director.

### 5.1.5 Video

The animated explainer videos that utilised in the video module were created by using Powtoon. To create a Powtoon animated video, several slides were created in Powtoon as each slide represented a scene. After that, the slides were populated by adding text, graphics and background. The narrations that required for the video to explain its content was computer-generated with the help of text-to-speech web application, NaturalReader Online. The spoken speech that generated by the web application were recorded by the built-in voice-over recorder in Powtoon and saved as voice-over for the videos. Finally, the timing of all the elements to be appeared on the screen was adjusted in order to ensure that all the visual elements reflect on the voice-over that running in the background. The videos were then exported to YouTube and they can be obtained from the website in order to be used in the application.



**Figure 5.1.5.1:** Video editing in Powtoon.



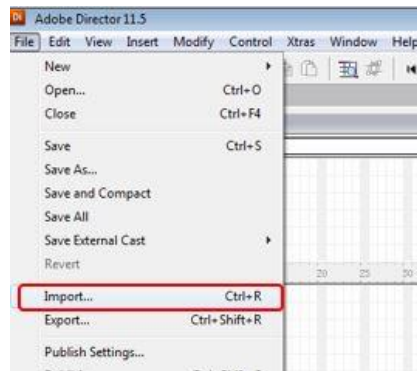
**Figure 5.1.5.2:** Text-to-speech web application, NaturalReader Online.



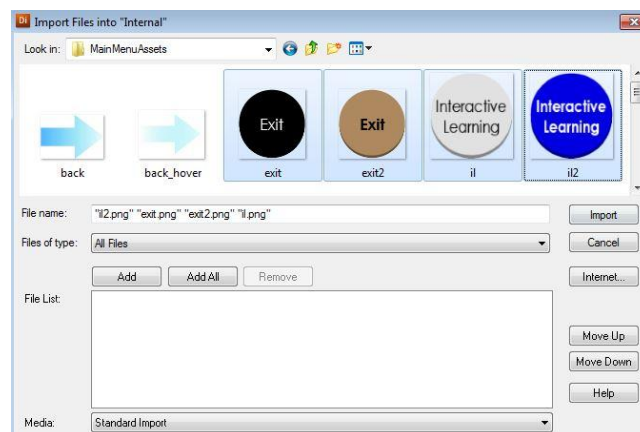
## 5.2 Authoring Process

### 5.2.1 Importing the Media Elements

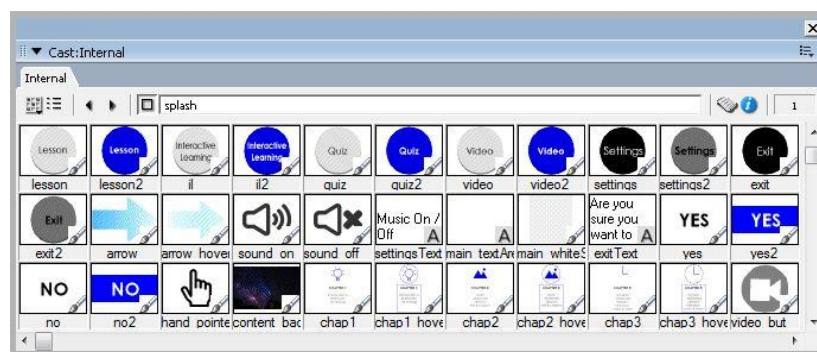
As the authoring tool for this project was chosen, which is Adobe Director, the digital media files that created by other tools were imported into the cast window in Adobe Director. Once the media elements were imported into cast window, they are ready to be sequenced in the authoring tool.



**Figure 5.2.1.1:** Import option available in Adobe Director.



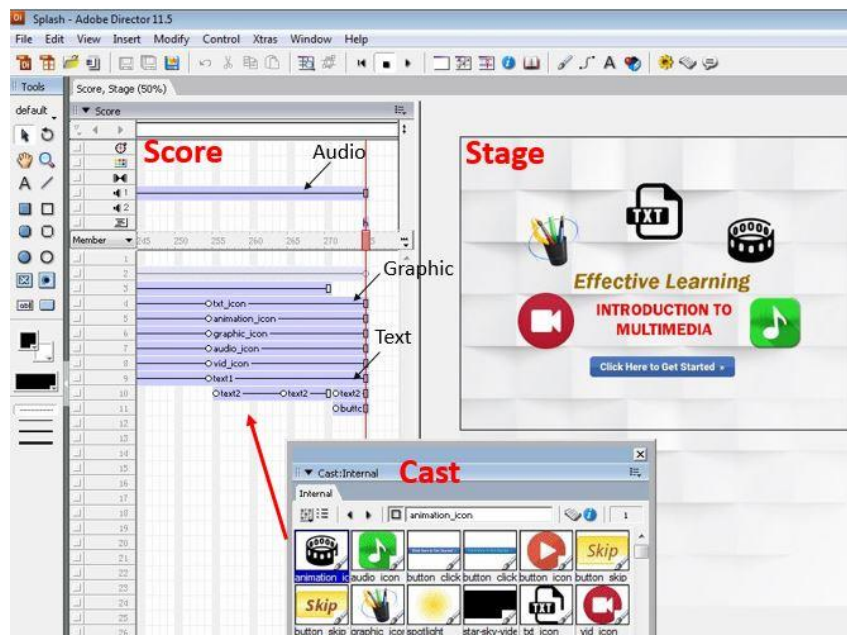
**Figure 5.2.1.2:** Import desired media elements.



**Figure 5.2.1.3:** Cast window after imported desired media elements.

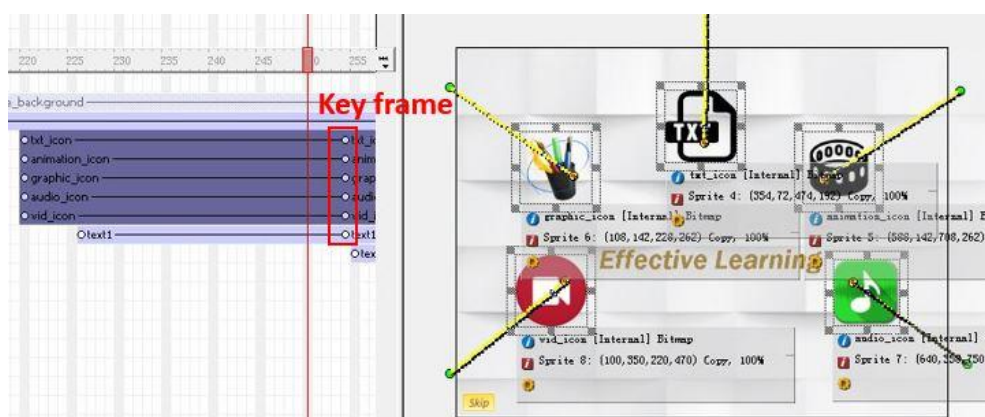
### 5.2.2 Synchronising the Media Elements

The media elements were then sequenced in order of appearance in the timeline in score window. Adobe Director allows to integrate the elements of multimedia in order to create an appealing and interactive multimedia application. The members in cast window can be inserted into the score window so that the media elements can be displayed on the stage. Then, the position of elements on the stage were arranged accordingly based on storyboarding design as a blueprint. The stage contains all the objects that can be seen by user in the final product.



**Figure 5.2.2.1:** Integration of media elements.

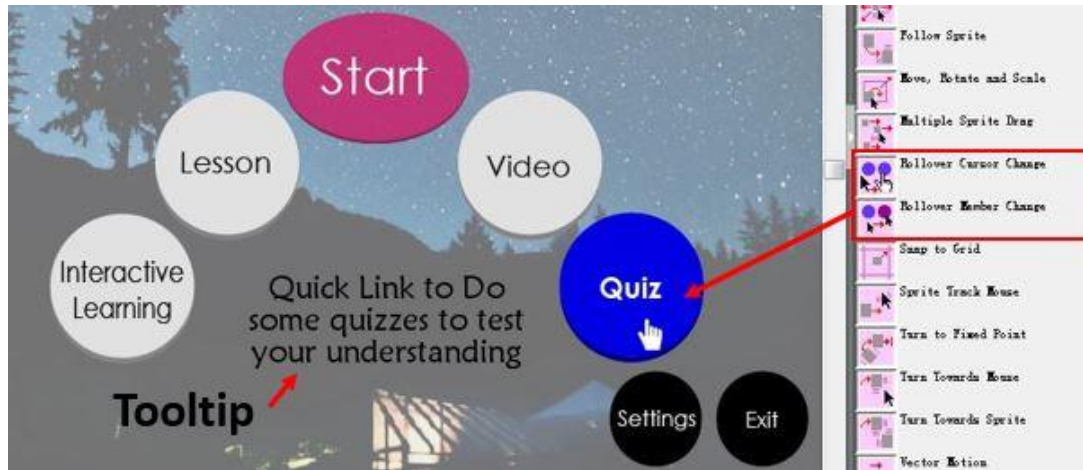
Besides, Adobe Director was also used to create path-based animations by inserting key frame to the sprite and adjusting the particular sprite to different positions.



**Figure 5.2.2.2:** Path-based animations created in Adobe Director.

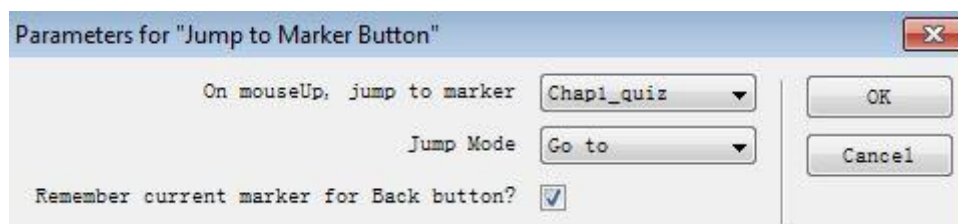
### 5.2.3 Adding Interactivity

In order to speed up the authoring process of multimedia project, Adobe Director provided some built-in behaviours which can be applied into the elements in score window to perform some common operations. The rollover cursor change, rollover member change and tooltip were some of the examples of built-in behaviour that can be used to create interactivity between application and user.

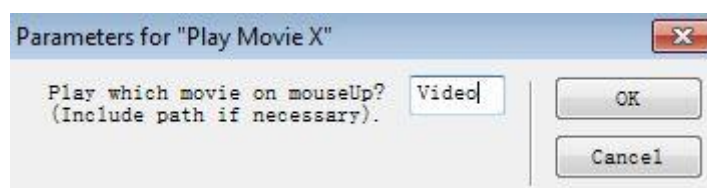


**Figure 5.2.3.1:** Interactive behaviours in Adobe Director.

Additionally, there are some built-in behaviours under controls and navigation categories were also useful for adding navigation to the buttons. For instance, play movie X, play frame X, jump to marker button and jump back button were frequently used for applying navigational function in the application. Once the navigation was added, the navigation flow was validated to ensure all the content were linked correctly.



**Figure 5.2.3.2:** Jump to marker button behaviour.

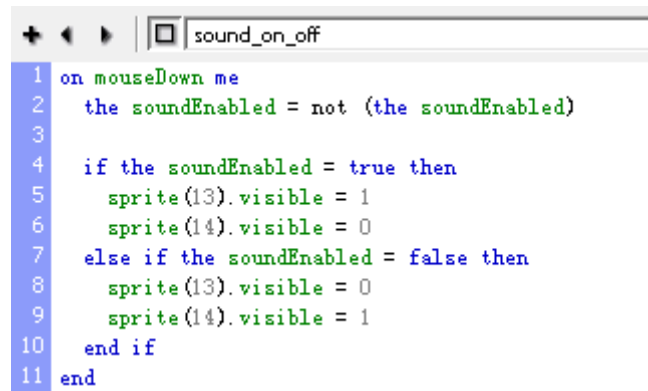


**Figure 5.2.3.3:** Play movie X behaviour.



Furthermore, the scripting language, Lingo was written to create scripts that able to employ advanced operations and incorporate interactivity in each module as well as the main menu.

Lingo script was used in main menu to enable or disable the background music.



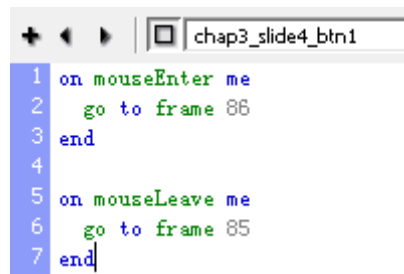
```

+ < > | □ sound_on_off
1 on mouseDown me
2   the soundEnabled = not (the soundEnabled)
3
4   if the soundEnabled = true then
5     sprite (13).visible = 1
6     sprite (14).visible = 0
7   else if the soundEnabled = false then
8     sprite (13).visible = 0
9     sprite (14).visible = 1
10  end if
11 end

```

**Figure 5.2.3.4:** Lingo script written to control the on or off of background music.

The Lingo script was utilised in lesson module to hide particular information in the slides and display them when cursor was pointed to certain button or area.



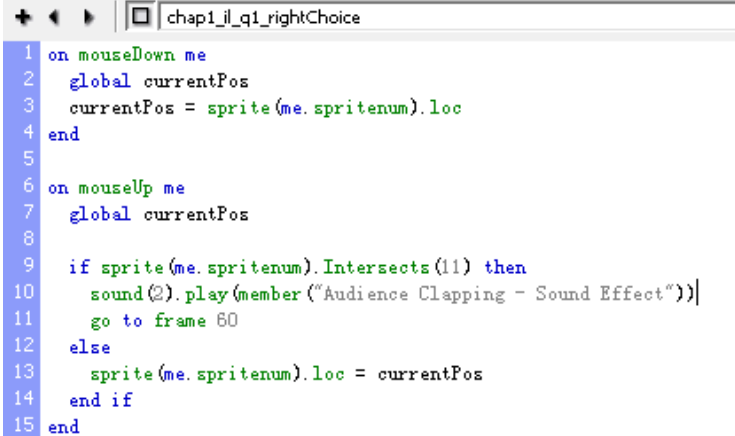
```

+ < > | □ chap3_slide4_btn1
1 on mouseEnter me
2   go to frame 86
3 end
4
5 on mouseLeave me
6   go to frame 85
7 end

```

**Figure 5.2.3.5:** Lingo script written to hide and display particular information.

Interactive learning module also utilised Lingo scripts in order to prescribe the right and wrong answer as well as to give feedback or hint to the users, so that they can learn from the mistakes.

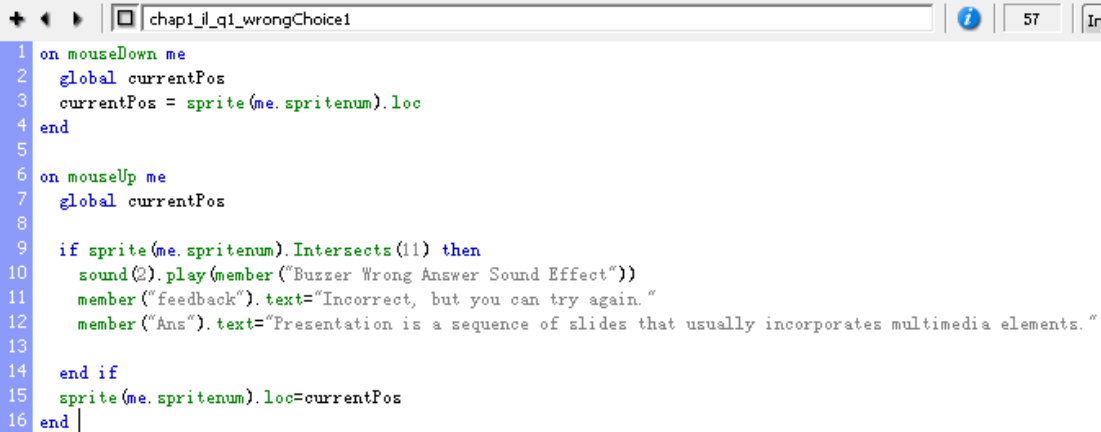


```

1 on mouseDown me
2   global currentPos
3   currentPos = sprite(me.spriteNum).loc
4 end
5
6 on mouseUp me
7   global currentPos
8
9   if sprite(me.spriteNum).Intersects(11) then
10    sound(2).play(member("Audience Clapping - Sound Effect"))
11    go to frame 60
12  else
13    sprite(me.spriteNum).loc = currentPos
14  end if
15 end

```

**Figure 5.2.3.6:** Lingo script written to apply to a right choice in interactive learning.



```

1 on mouseDown me
2   global currentPos
3   currentPos = sprite(me.spriteNum).loc
4 end
5
6 on mouseUp me
7   global currentPos
8
9   if sprite(me.spriteNum).Intersects(11) then
10    sound(2).play(member("Buzzer Wrong Answer Sound Effect"))
11    member("feedback").text="Incorrect, but you can try again."
12    member("Ans").text="Presentation is a sequence of slides that usually incorporates multimedia elements."
13
14  end if
15  sprite(me.spriteNum).loc=currentPos
16 end

```

**Figure 5.2.3.7:** Lingo script written to apply to a wrong choice in interactive learning.

For the video module, Lingo scripts were needed to create action like play, pause and stop the video.

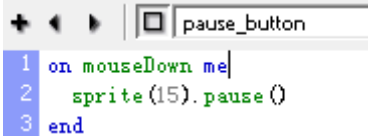


```

1 on mouseDown me
2   sprite(15).play()
3 end

```

**Figure 5.2.3.8:** Lingo script created to play the video.

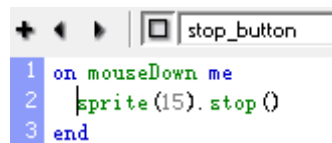


```

1 on mouseDown me
2   sprite(15).pause()
3 end

```

**Figure 5.2.3.9:** Lingo script created to pause the video.



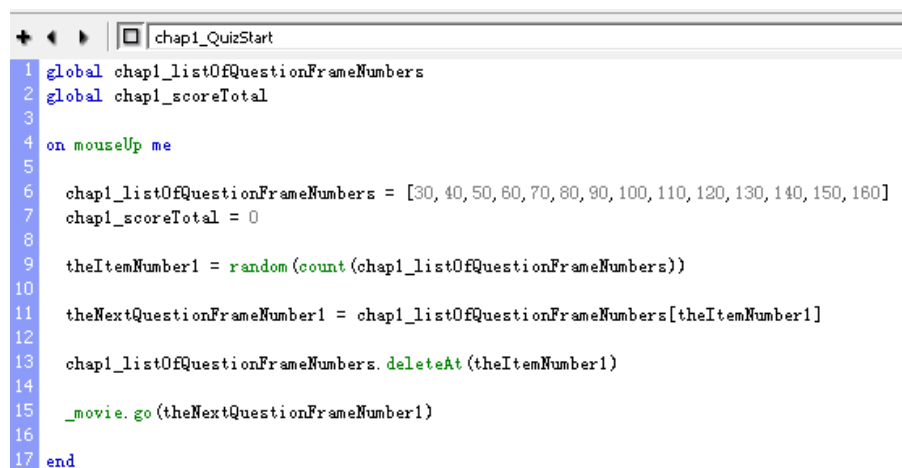
```

+ < > | stop_button
1 on mouseDown me
2   sprite (15). stop ()
3 end

```

**Figure 5.2.3.10:** Lingo script created to stop a video.

In quiz module, Lingo scripts were required to develop the functionalities like initialize and shuffle a set of quiz questions, calculate the total score of quiz as well as play different sound effect as a response for the answer given by user.

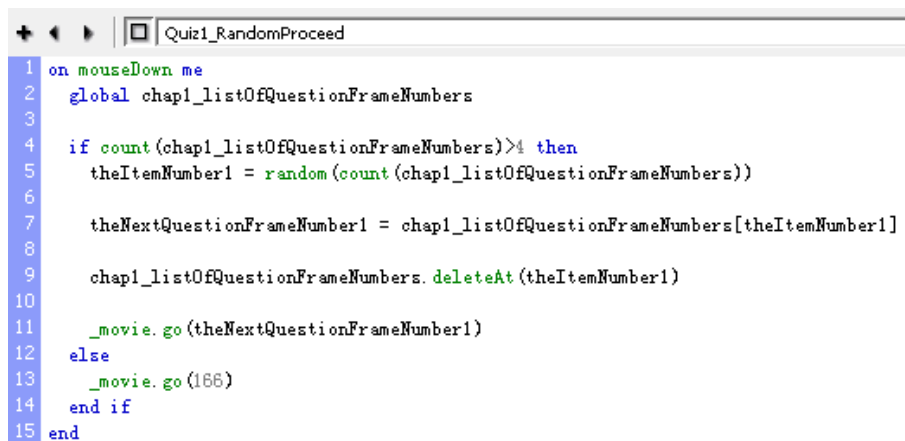


```

+ < > | chap1_QuizStart
1 global chap1_listOfQuestionFrameNumbers
2 global chap1_scoreTotal
3
4 on mouseUp me
5
6   chap1_listOfQuestionFrameNumbers = [30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160]
7   chap1_scoreTotal = 0
8
9   theItemNumber1 = random (count (chap1_listOfQuestionFrameNumbers))
10
11   theNextQuestionFrameNumber1 = chap1_listOfQuestionFrameNumbers [theItemNumber1]
12
13   chap1_listOfQuestionFrameNumbers.deleteAt (theItemNumber1)
14
15   _movie.go (theNextQuestionFrameNumber1)
16
17 end

```

**Figure 5.2.3.11:** Lingo script written to initialize a set of quiz questions.

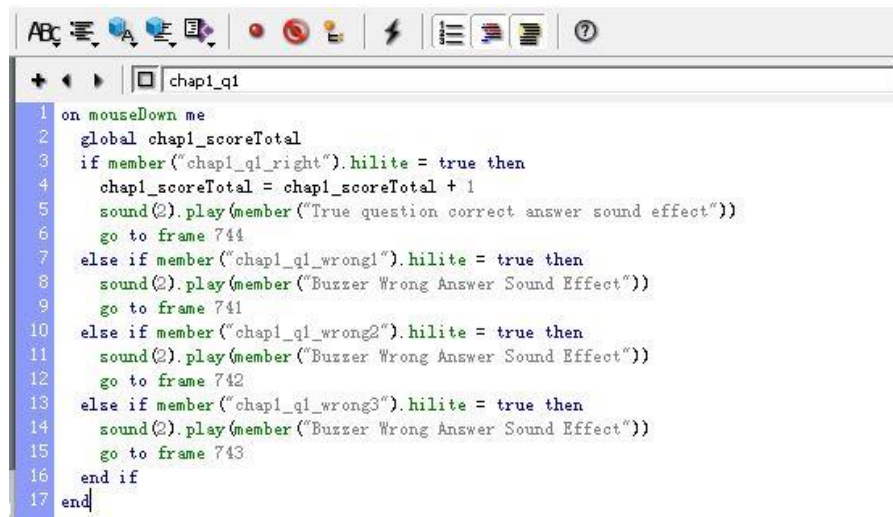


```

+ < > | Quiz1_RandomProceed
1 on mouseDown me
2   global chap1_listOfQuestionFrameNumbers
3
4   if count (chap1_listOfQuestionFrameNumbers) > 1 then
5     theItemNumber1 = random (count (chap1_listOfQuestionFrameNumbers))
6
7     theNextQuestionFrameNumber1 = chap1_listOfQuestionFrameNumbers [theItemNumber1]
8
9     chap1_listOfQuestionFrameNumbers.deleteAt (theItemNumber1)
10
11     _movie.go (theNextQuestionFrameNumber1)
12   else
13     _movie.go (166)
14   end if
15 end

```

**Figure 5.2.3.12:** Lingo script written for displaying next question randomly.

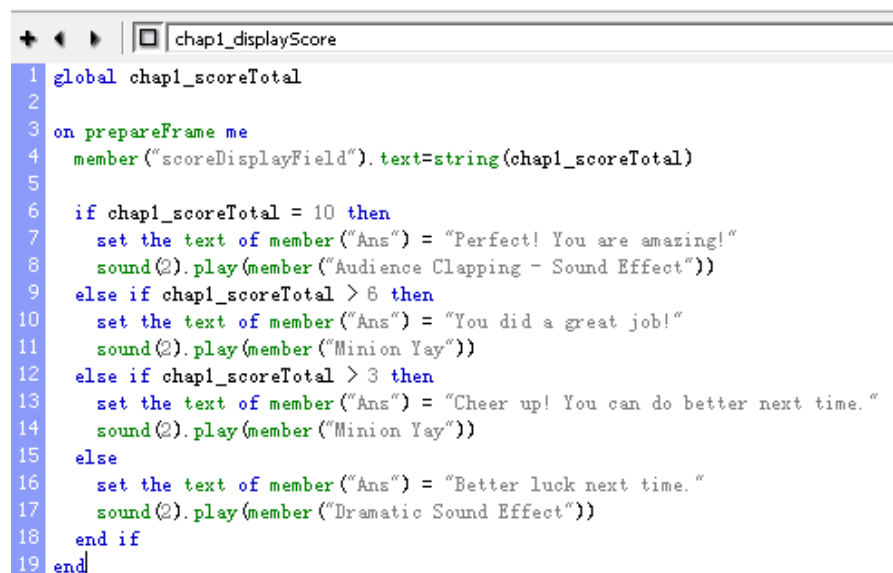


```

1 on mouseDown me
2   global chap1_scoreTotal
3   if member("chap1_q1_right").hilite = true then
4     chap1_scoreTotal = chap1_scoreTotal + 1
5     sound(2).play(member("True question correct answer sound effect"))
6     go to frame 741
7   else if member("chap1_q1_wrong1").hilite = true then
8     sound(2).play(member("Buzzer Wrong Answer Sound Effect"))
9     go to frame 741
10  else if member("chap1_q1_wrong2").hilite = true then
11    sound(2).play(member("Buzzer Wrong Answer Sound Effect"))
12    go to frame 742
13  else if member("chap1_q1_wrong3").hilite = true then
14    sound(2).play(member("Buzzer Wrong Answer Sound Effect"))
15    go to frame 743
16  end if
17 end

```

Figure 5.2.3.13: Lingo script written for checking quiz answer.



```

1 global chap1_scoreTotal
2
3 on prepareFrame me
4   member("scoreDisplayField").text=string(chap1_scoreTotal)
5
6   if chap1_scoreTotal = 10 then
7     set the text of member("Ans") = "Perfect! You are amazing!"
8     sound(2).play(member("Audience Clapping - Sound Effect"))
9   else if chap1_scoreTotal > 8 then
10    set the text of member("Ans") = "You did a great job!"
11    sound(2).play(member("Minion Yay"))
12  else if chap1_scoreTotal > 3 then
13    set the text of member("Ans") = "Cheer up! You can do better next time."
14    sound(2).play(member("Minion Yay"))
15  else
16    set the text of member("Ans") = "Better luck next time."
17    sound(2).play(member("Dramatic Sound Effect"))
18  end if
19 end

```

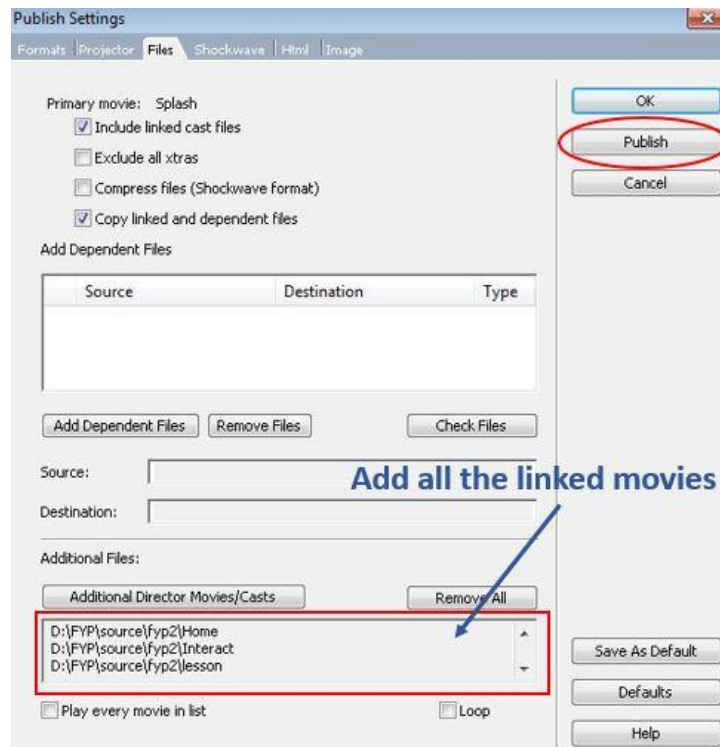
Figure 5.2.3.14: Lingo script written for displaying total score and feedback to user.

After incorporating interactivity to the media elements, all of the movies created were tested to make sure there is no error found before moving forward to the next step, which is the last procedure of authoring process.

## 5.2.4 Packaging the Final Application

The final application should be packaged as a standalone piece so that it can be played back on any machine without helper application. The packaged application was

published into an executable file with the extension .exe, which can be easily distributed to users.



**Figure 5.2.4.1:** Publish settings in Adobe Director.

## 5.3 Post-Authoring Process

### 5.3.1 Delivery and Storage Medium

The executable file and videos of the completed application were compressed into ZIP archive file format as most of the operating systems have built-in support for it. Then, it was delivered to the target audience through offline storage medium like CD and thumb drive.







### 5.3.2 Testing









The application was distributed to 30 respondents, who were university students so they can test the application with their own computers. They were also required to fill up a Google survey form in order to share their feedback about the application based on their user experience. All of their feedback were recorded and evaluated.









**CHAPTER 6: TESTING****6.1 Unit Testing**

The individual components in the application were tested in unit testing. Its purpose is to verify that each unit of the application performs as designed.









Table 6.1.1: Unit testing result.









Unit / Component	Function	Expected Output	Test Result
	Button that link to main menu.	Navigate to main menu when it was clicked.	Similar to expected output
	Button that link to main menu.	Navigate to main menu when it was clicked.	Similar to expected output
	Button that link to select chapter page.	Navigate to select chapter page when it was clicked.	Similar to expected output
	Button that link to lesson module start page.	Navigate to the lesson module start page when it was clicked.	Similar to expected output
	Button that link to video module start page.	Navigate to video module start page when it was clicked.	Similar to expected output
	Button that link to interactive learning module start page.	Navigate to interactive learning module start page when it was clicked.	Similar to expected output

	<p>Button that link to quiz module start page.</p>	<p>Navigate to quiz module start page when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button used to indicate background music was on.</p>	<p>Background music turned off when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button used to indicate background music was off.</p>	<p>Background music turned on when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to an alert dialog box to verify intention to quit program.</p>	<p>An alert dialog box shown when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to main menu in the alert dialog box.</p>	<p>Navigate to main menu when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that used to confirm intention to quit program.</p>	<p>Quit program when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to main menu.</p>	<p>Navigate to main menu when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to lesson module start page.</p>	<p>Navigate to the lesson module start page when it was clicked.</p>	<p>Similar to expected output</p>

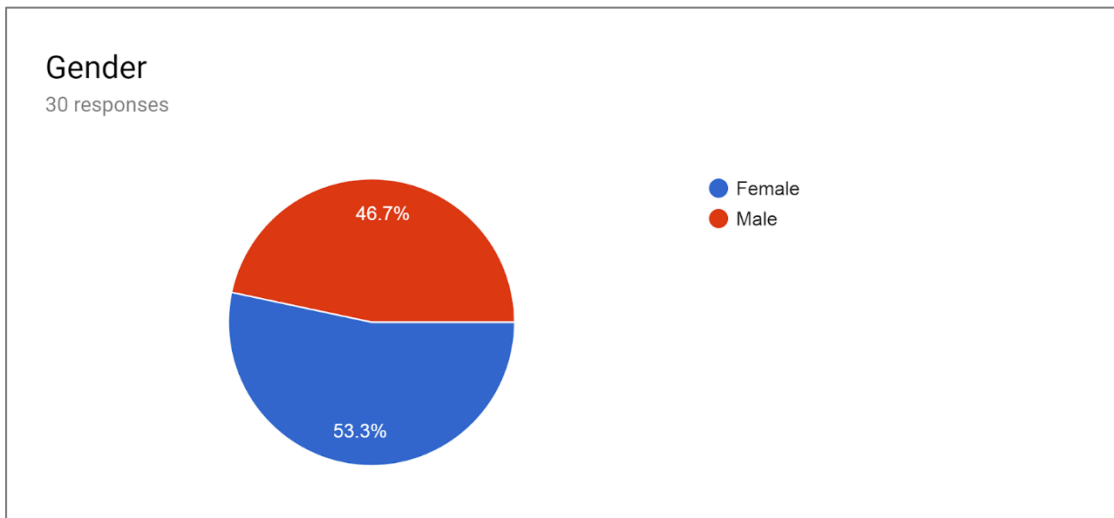
	<p>Button that link to interactive learning module start page.</p>	<p>Navigate to interactive learning module start page when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to video module start page.</p>	<p>Navigate to video module start page when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to quiz module start page.</p>	<p>Navigate to quiz module start page when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button which link back to previously visited page.</p>	<p>Navigate back to previously visited page when it was clicked.</p>	<p>Similar to expected output</p>
 <div data-bbox="355 1178 448 1290" style="border: 1px solid black; padding: 2px;"> <p>CHAPTER 1: Introduction to Multimedia Technology</p> </div>	<p>Button that link to the module section of chapter 1 in each module start page.</p>	<p>Navigate to the respective module page of chapter 1.</p>	<p>Similar to expected output</p>
 <div data-bbox="355 1397 448 1509" style="border: 1px solid black; padding: 2px;"> <p>CHAPTER 2: Multimedia Authoring</p> </div>	<p>Button that link to the module section of chapter 2 in each module start page.</p>	<p>Navigate to respective module page of chapter 2.</p>	<p>Similar to expected output</p>
 <div data-bbox="355 1617 448 1729" style="border: 1px solid black; padding: 2px;"> <p>CHAPTER 3: Multimedia Skills and Training</p> </div>	<p>Button that link to the module section of chapter 3 in each module start page.</p>	<p>Navigate to respective module page of chapter 3.</p>	<p>Similar to expected output</p>
	<p>Button that link to lesson section of respective chapter.</p>	<p>Navigate to lesson section of respective chapter.</p>	<p>Similar to expected output</p>



	<p>Button that link to interactive learning section of respective chapter.</p>	<p>Navigate to interactive learning section of the respective chapter.</p>	<p>Similar to expected output</p>
	<p>Button which link to the video page of respective chapter.</p>	<p>Navigate to video page of respective chapter.</p>	<p>Similar to expected output</p>
	<p>Button that link to quiz section of respective chapter.</p>	<p>Navigate to quiz section of respective chapter.</p>	<p>Similar to expected output</p>
	<p>A button used to close additional information box.</p>	<p>Additional information box closed when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to next slide in lesson and interactive learning modules.</p>	<p>Proceed to the next slide when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button that link to previous slide in lesson and interactive learning modules.</p>	<p>Go back to previous slide when it was clicked.</p>	<p>Similar to expected output</p>
	<p>The button that link to the respective module section of chapter 1.</p>	<p>Navigate to respective module page of chapter 1.</p>	<p>Similar to expected output</p>
	<p>The button that link to the respective module section of chapter 2.</p>	<p>Navigate to respective module page of chapter 2.</p>	<p>Similar to expected output</p>

	<p>The button that link to the respective module section of chapter 3.</p>	<p>Navigate to respective module page of chapter 3.</p>	<p>Similar to expected output</p>
	<p>Button to play video.</p>	<p>Video played when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button to pause video.</p>	<p>Video paused when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button to stop video.</p>	<p>Video stopped when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button to initialize a set of quiz questions.</p>	<p>Quiz section of respective chapter started when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button to submit user's answer of each quiz question.</p>	<p>Shows feedback of each question based on user input.</p>	<p>Similar to expected output</p>
	<p>Button to proceed to the next quiz question.</p>	<p>Proceed to next quiz question when it was clicked.</p>	<p>Similar to expected output</p>
	<p>Button to retry the respective quiz.</p>	<p>The quiz start over when it was clicked.</p>	<p>Similar to expected output</p>

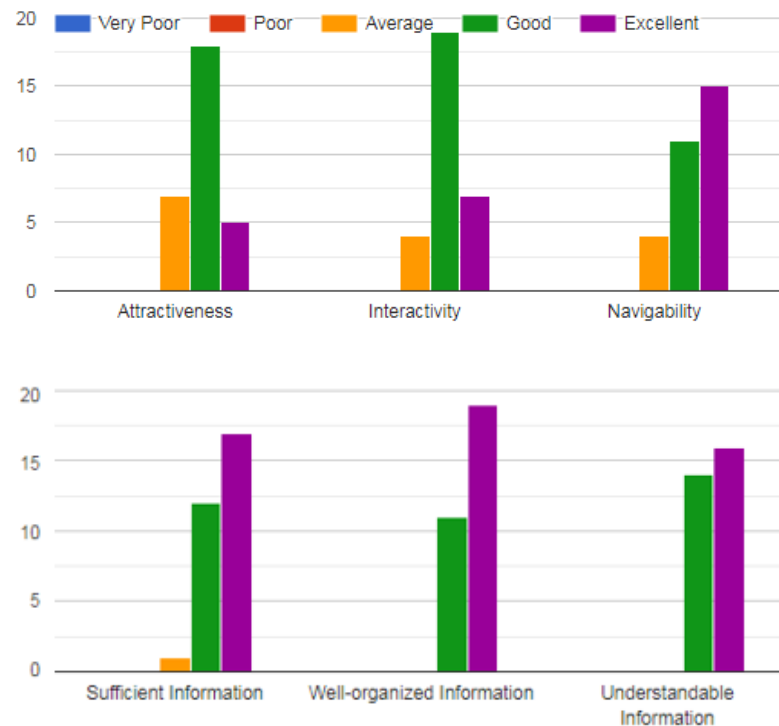
## 6.2 User Testing Analysis



**Figure 6.2.1:** Chart of gender distribution of respondents.

The final application was distributed to a total of 30 respondents who were university students to conduct the user testing. 53.3% of them are females and 46.7% of them are males. They were requested to test the application and complete a survey form (refer to appendix B) based on their user experience.

Question: Please indicate the extent of satisfaction with Module 1 – Lesson.

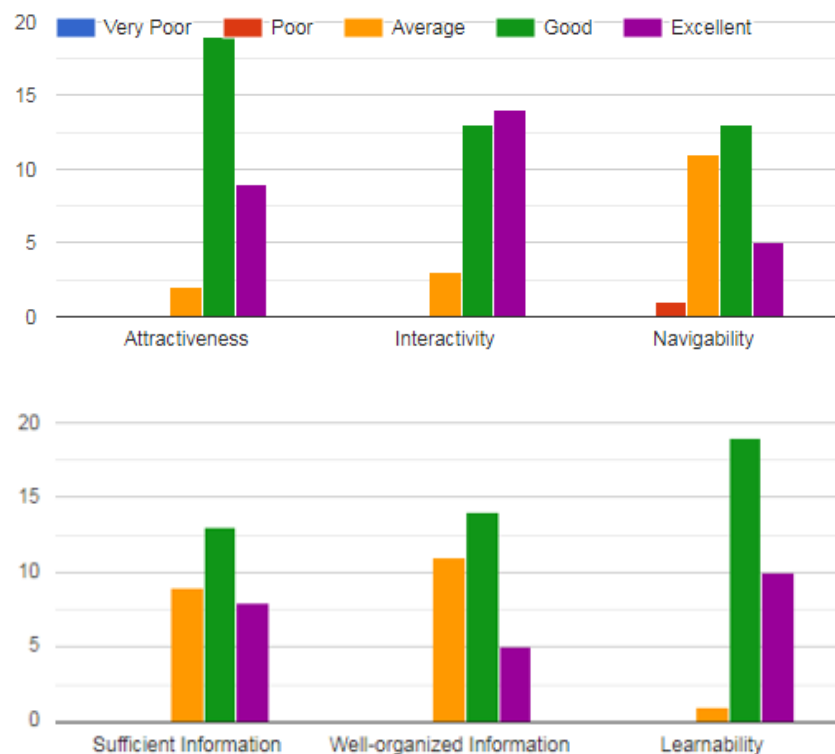


**Figure 6.2.2:** Chart of user feedback for lesson module.

Based on the chart above, it revealed majority of the respondents think that lesson module offered good attractiveness, good interactivity, excellent navigability and provided very sufficient, well-organised and understandable information. On the other hand, minority of them considered the attractiveness, interactivity and navigability of lesson module as average.

This results indicated that the attractiveness of content could decreased when information associated is plenty. Therefore, adding more interactivity to the content should be able to increase its attractiveness.

Question: Please indicate the extent of satisfaction with Module 2 – Interactive Learning.

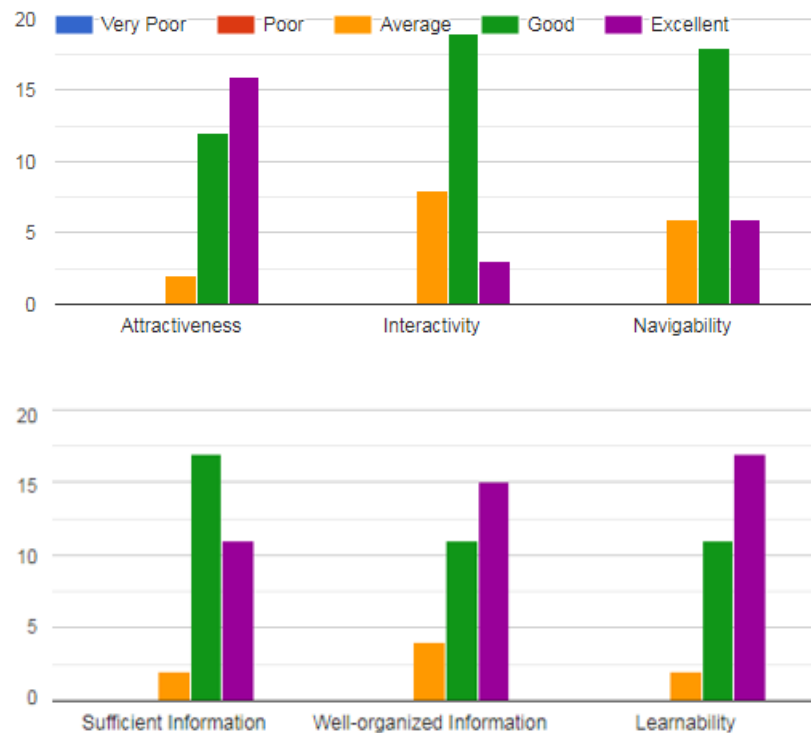


**Figure 6.2.3:** Chart of user feedback for interactive learning module.

The chart above demonstrated most of the respondents think the interactive learning module was good in attractiveness, interactivity and learnability. However, the aspects of navigability, sufficient information and well-organised information were rated as average by nearly one third of the respondents. One of them rated poor for the navigability of interactive learning.

The performance of interactive learning module was rather poor as compared to other modules. This may be due to the instruction and explanation given in the module was not clear and insufficient.

Question: Please indicate the extent of satisfaction with Module 3 – Video.

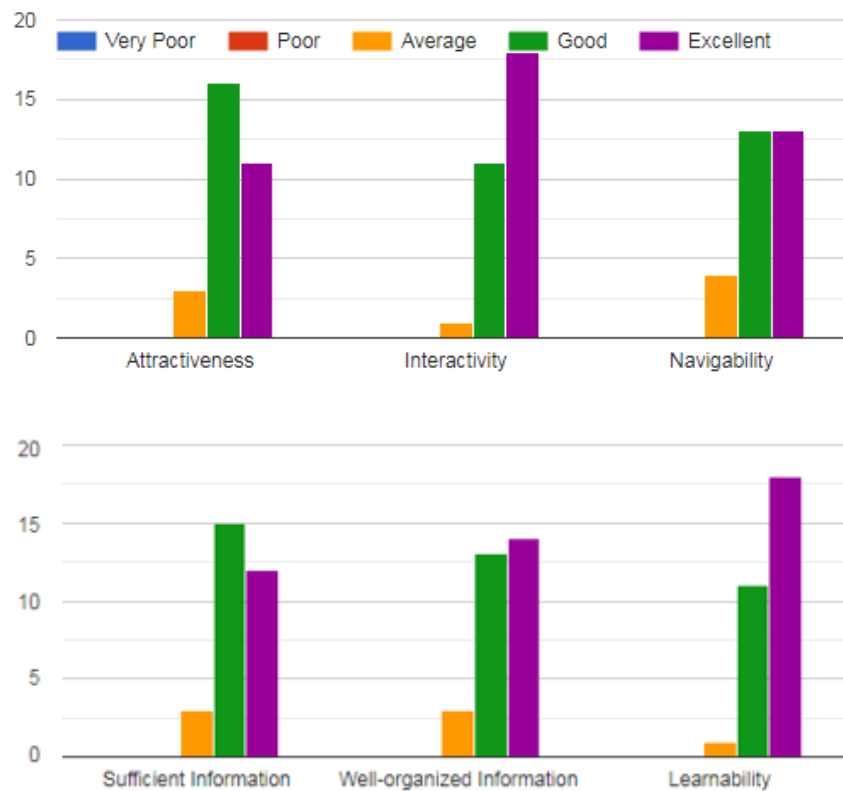


**Figure 6.2.4:** Chart of user feedback for video module.

According to the chart of video module, it illustrated majority of the respondents rated video module as good in the aspects of interactivity, navigability and information sufficiency. Moreover, most of them considered the attractiveness, well-organised information and learnability was excellent. However, minority of them rated average for the elements interactivity and navigability.

The reason of some respondents may think the videos were lack of interactivity and navigability is due to video is linear presentation, which required less interaction with users to render its content. Nevertheless, it can still be attractive and learnable as Brown (2019) also declared that videos that filled with information can be easily consumed in a fun manner as well as providing learners an immersive learning experience.

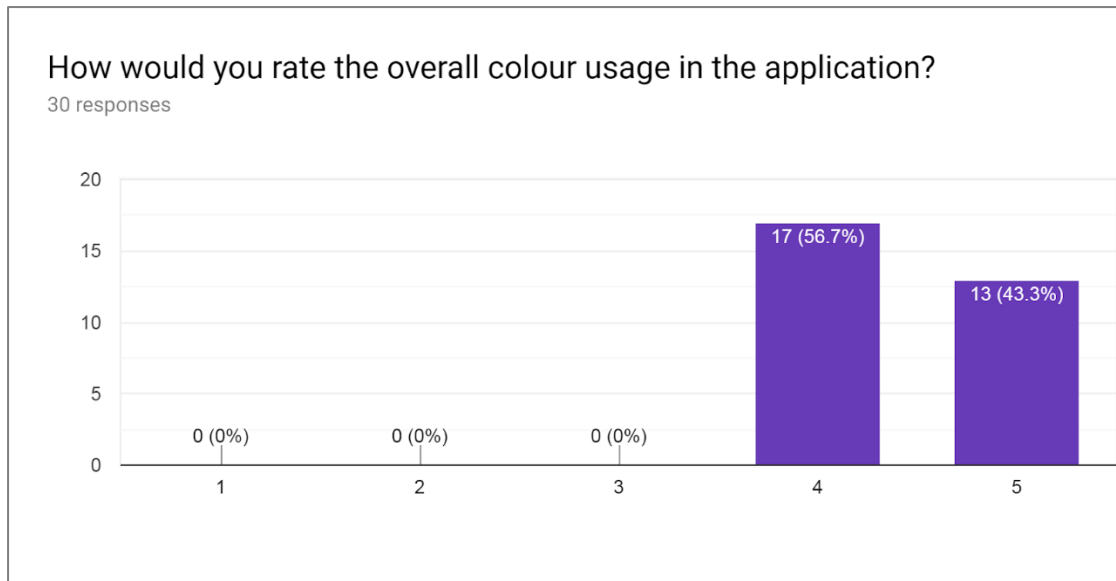
Question: Please indicate the extent of satisfaction with Module 4 – Quiz.



**Figure 6.2.5:** Chart of user feedback for quiz module.

The chart of quiz module represented a good sign because majority respondents agreed the quiz provided good or excellent in all aspects. Additionally, not more than 5 out of 30 respondents rated average in each aspect.

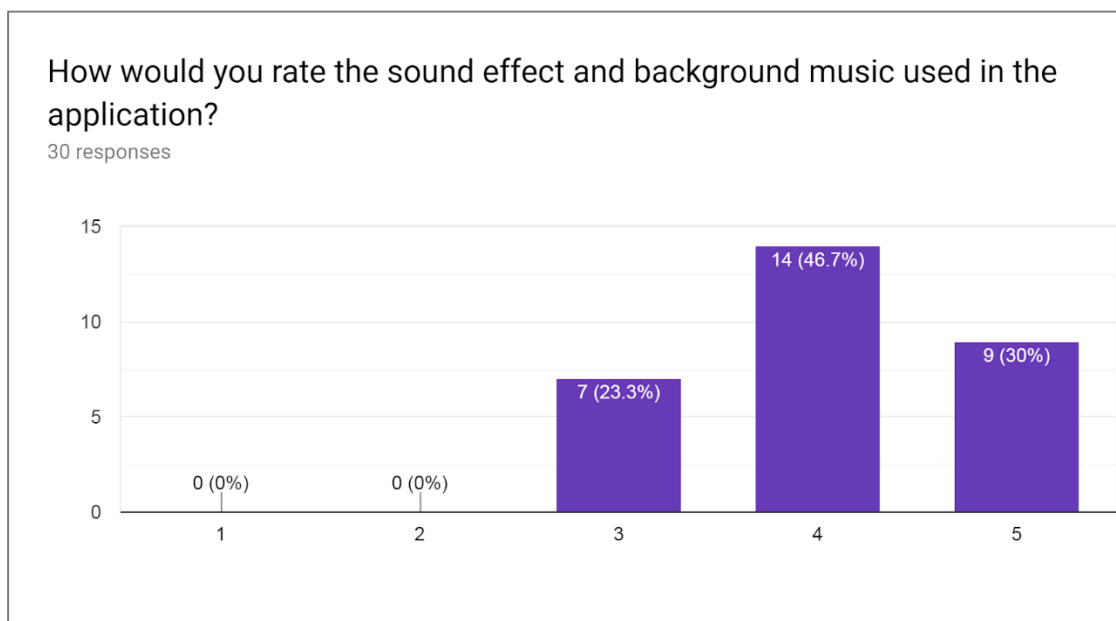
The implementation of quiz module in the application was successful as most of the feedback received were positive. The application informed the correct answer to users instantly when they submit their answer. Thus, they will not get boring easily in the process. Not only that, users were able to deepen their understanding of each chapter by attempting the quizzes because they can learn from mistakes.



**Figure 6.2.6:** Chart of user rating on overall colour usage.

Based on the chart above, it showed that 56.7% of respondents rated good for the overall colour usage in the application whereas the rest of them rated it as excellent.

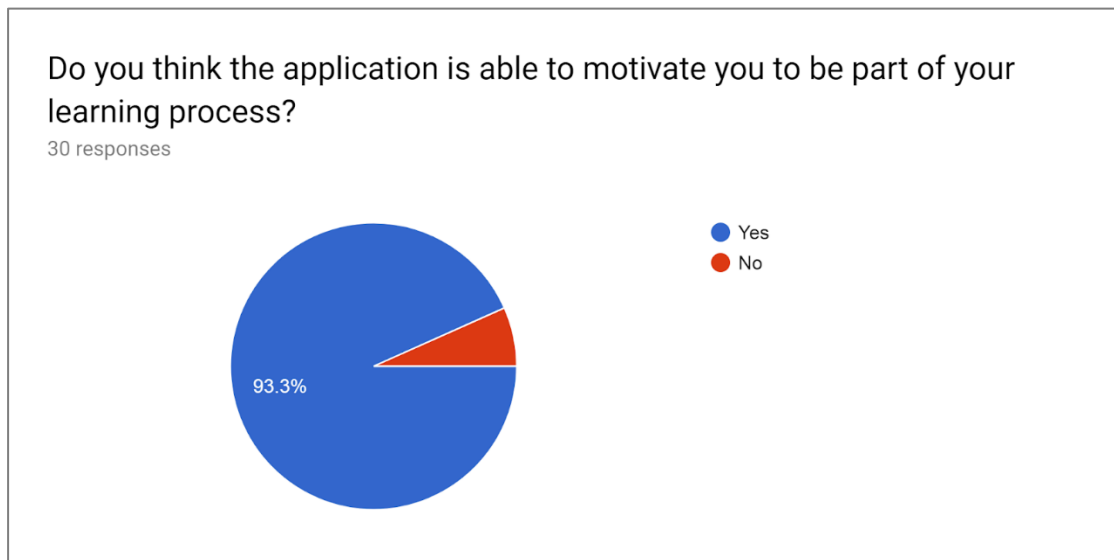
This result was satisfying as none of the respondents rated the colour usage was poor or average. This is due to colour usage was considered deeply in the development process. For example, the background graphics had been ensured to make colour contrast with the text elements in order to increase its readability and legibility.



**Figure 6.2.7:** Chart of user rating on sound effect and background music.

In terms of sound effect and background music used in the application, majority respondents which is 46.7% of them think it was good, 30% of them rated it as excellent and 23.3% of them rated average.

The result implied the audio that employed in the application can be improved to enhance its function to create favourable atmosphere and acquire adequate attention from users in the learning process.

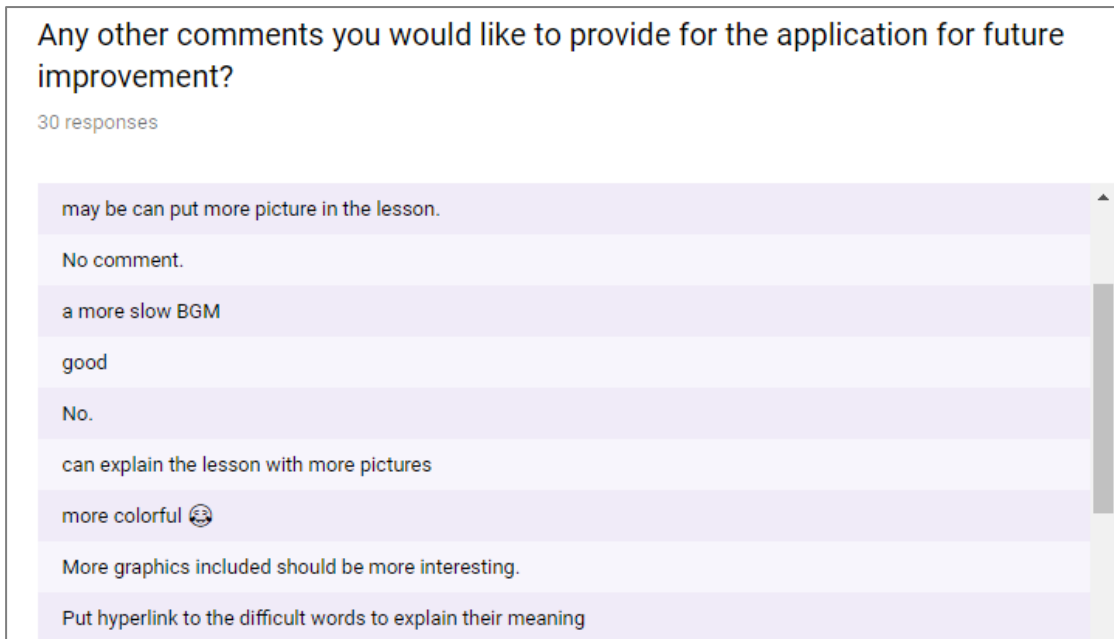


**Figure 6.2.8:** Chart of user feedback on application’s ability to motivate user to learn.

From the chart displayed in figure 6.2.8, it demonstrated 93.3% of respondents agreed that the application is able to motivate them to be involved in the learning process. It means that with the interactivity incorporated with learning materials, they were encouraged to be more concentrate on the content when using the application. The more the users feel they were getting involved, the more information or knowledge they could absorbed from the learning process.

Unfortunately, there are 2 respondents, which is 6.7% of them disagreed the ability of the application to motivate them in learning process. This could be due to they prefer to study with the conventional learning method like reading linear presentation slides or notes.





**Figure 6.2.9:** User feedback for future improvement.

The respondents were also asked to express their suggestions for the future improvement of the application. As a summary, most of them suggested:

- To utilise more graphics to the lesson module to enhance its attractiveness and learnability.
- Use a softer background music.
- Provide explanation for the difficult words or terms by using a hyperlink.

### **6.3 Improvement after Testing**

After gathering the user feedback, the application was revised based on the suggestions that provided by the respondents in user testing phase so the usability and performance could be enhanced.

Firstly, create hyperlinks for the difficult terms or words in order to explain their definition for the users. User can click on the hyperlinks and its definition will be displayed instantly. This feature not only provide convenience but also able to decrease distraction of users in the learning process as they do not need to search meaning of certain words with other dictionaries.



Figure 6.3.1: A slide in lesson module before testing.

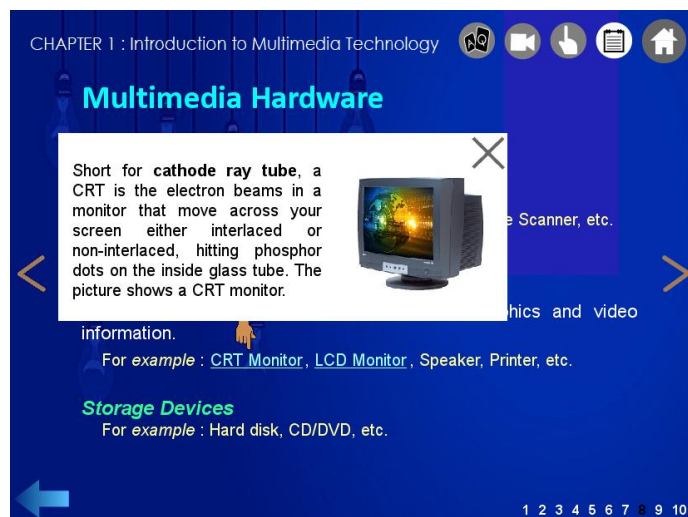


Figure 6.3.2: After created hyperlink, it can be clicked to show the definition.

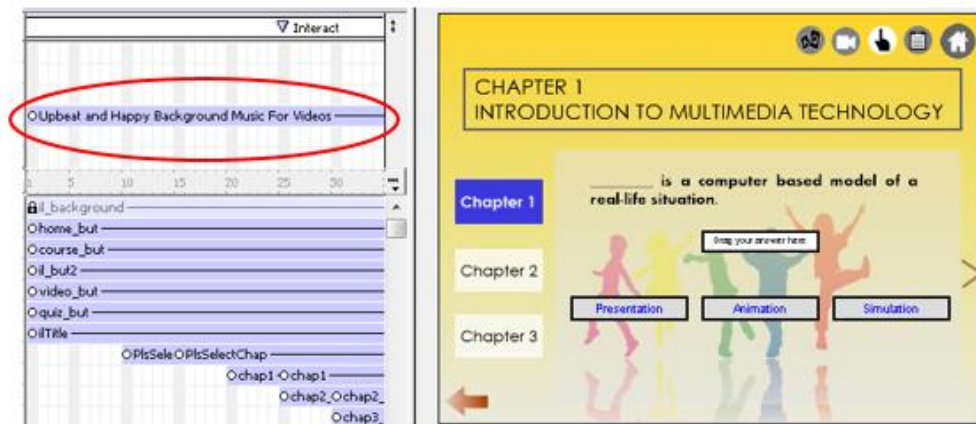


Figure 6.3.3: Definition shown for another hyperlink that has been clicked.

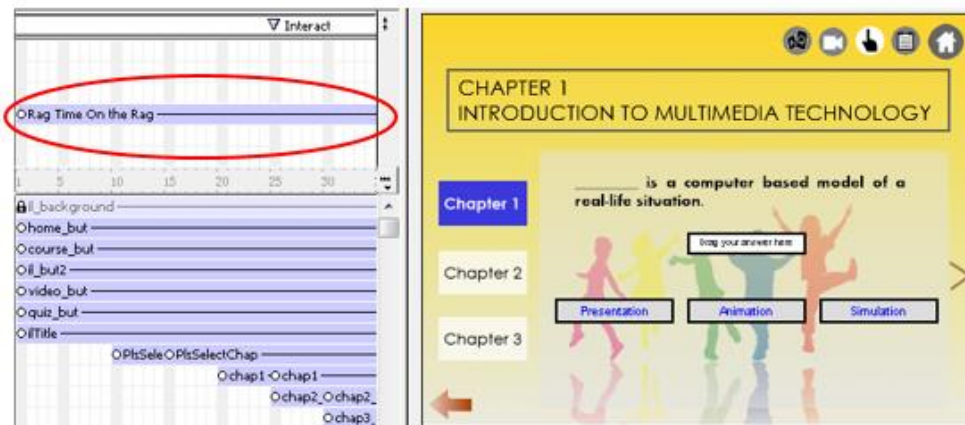
## CHAPTER 6: TESTING

In addition, figure 6.3.2 and figure 6.3.3 also demonstrated that some graphics were also added into the lesson for the purpose of making clearer explanation as well as to aid users for the visualisation of content.

On the other hand, the background music of some modules was replaced with a slower music in order to generate a more advantageous atmosphere for learning process.



**Figure 6.3.4:** Upbeat background music was used initially.



**Figure 6.3.5:** Background music was replaced with a slower music.

**CHAPTER 7: USER MANUAL****7.1 System Requirements****7.1.1 Hardware Requirement**

Table 7.1.1.1: List of hardware requirement specifications of application.

<b>Hardware</b>	<b>Specification</b>	<b>Description</b>
<b>Processor (CPU)</b>	Minimum 1GHz; Recommended 2GHz or more	Carries out the instructions of computer programs.
<b>Memory (RAM)</b>	Minimum 1GB; Recommended 4GB or above	Temporary storage area to hold the data and instructions that the CPU needs.
<b>Hard Drive</b>	Minimum 110MB of free disk space	To store the executable file and videos of the application.
<b>Sound card with speaker</b>	16-bit sound card or higher	To play the background music and sound effects.
<b>Graphics card</b>	16-bit color or higher	To display graphics and animations.
<b>Input device such as touchpad or mouse</b>	Any brand of input device	To provide user input.

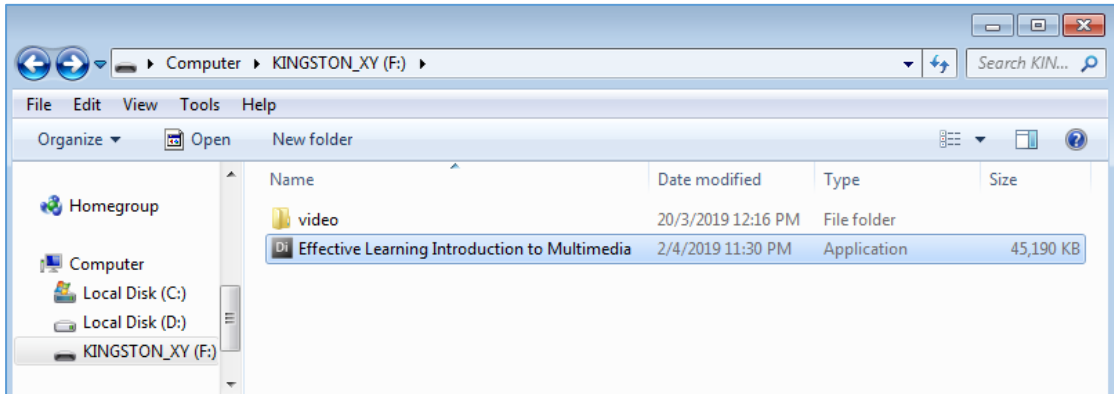
**7.1.2 Software Requirement**

Table 7.1.2.1: List of software requirement specifications of application.

<b>Software</b>	<b>Specification</b>	<b>Description</b>
<b>Operating system</b>	32-bit or 64-bit Windows 7 or newer	Manages computer hardware and software resources as well as to provide common services for computer programs.

## 7.2 Getting Started

Foremost, insert the external storage device CD or USB flash drive into the computer. Then, open it and an executable file of the application and a folder which consists of videos that linked externally by the application will be shown. Next, double click on the executable file and the application will be started.

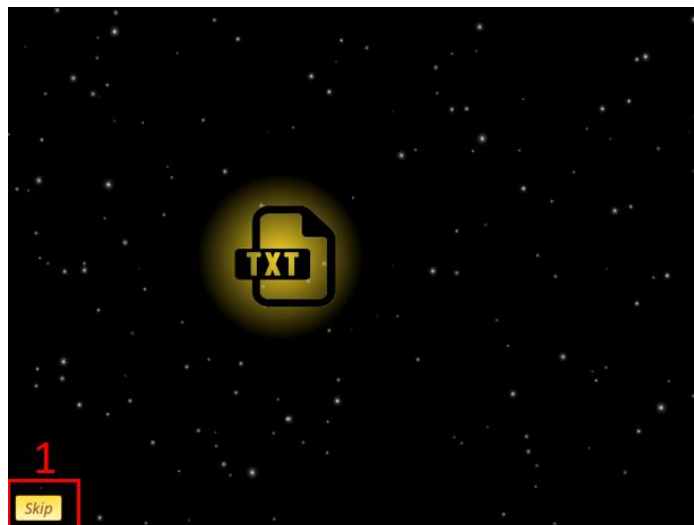


**Figure 7.2.1:** Application file in USB flash drive.

## 7.3 Using the Application

### 7.3.1 Splash Screen

The splash screen is an animated video which is about 10 seconds. It served as the invitation to the application and get user excited about the application before entering into the content.



**Figure 7.3.1.1:** Screenshot of splash screen when splash video was playing.



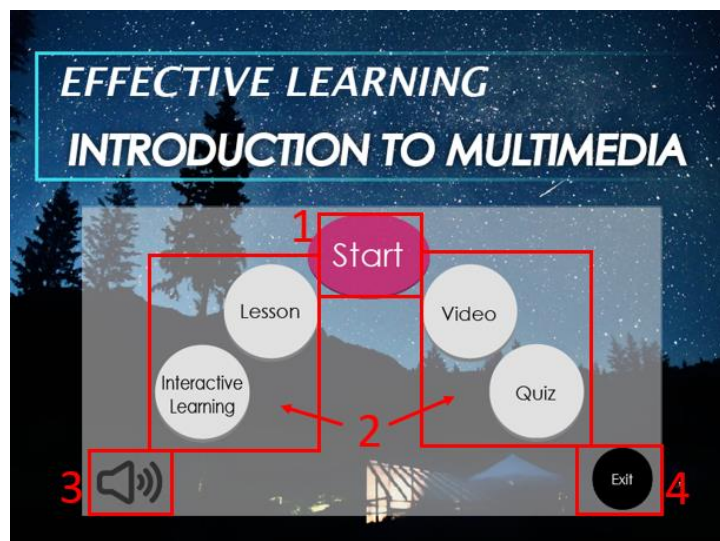
**Figure 7.3.1.2:** Screenshot of splash screen when splash video ended.

Table 7.3.1.1: Guidelines of splash screen.

Label	Description
1	Button that link to main menu, it will be hidden when splash video ended.
2	Button that link to main menu, it appeared when splash video ended.

### 7.3.2 Main Menu

Main menu provides the direct access to all the different modules that are covered in the application. It gives the users a way out of the program with the placement of exit button. Not only that, it also include a button for users to turn on or mute the background music.



**Figure 7.3.2.1:** Screenshot of main menu.

Table 7.3.2.1: Guidelines of main menu.

Label	Description
1	Button that link to chapter selection page (refer to figure 7.4.1) in order to start learning the subject chapter by chapter.
2	Buttons that serve as quick links to respective modules.
3	Button to turn on or mute the background music.
4	Exit button that is not instantaneous so it linked to exit page (refer to figure 7.3.1) to confirm the intention to exit the program.

### 7.3.3 Exit Page

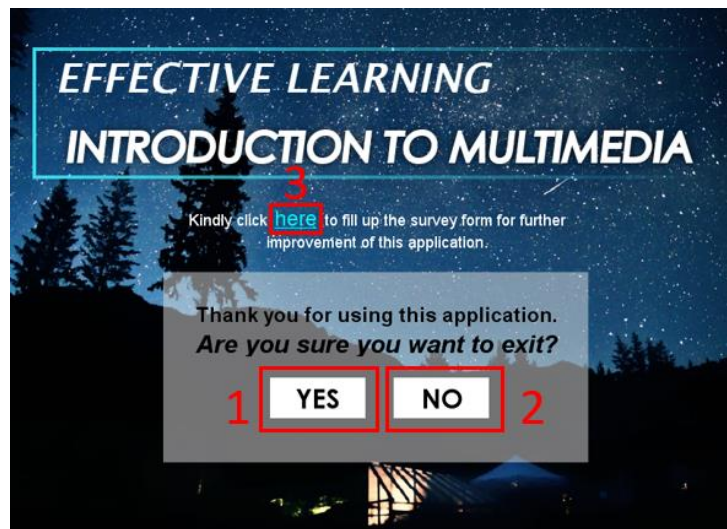


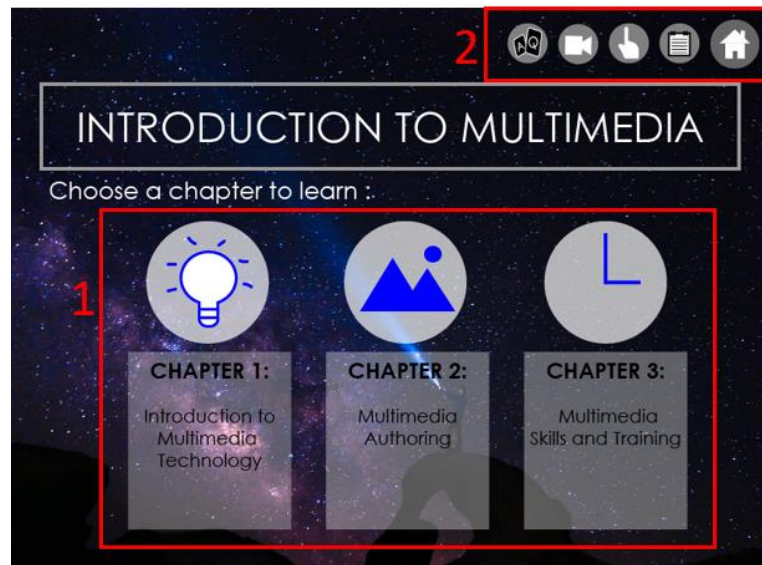
Figure 7.3.3.1: Screenshot of exit page.

Table 7.3.3.1: Guidelines of exit page.

Label	Description
1	Button that will halt the program when it was clicked.
2	Button that link back to the main menu.
3	A link to the user feedback survey form.



### 7.3.4 Chapter Selection Page



**Figure 7.3.4.1:** Screenshot of chapter selection page.

Table 7.3.4.1: Guidelines of chapter selection page.

Label	Description
1	Buttons that link to module selection page (refer to figure 7.5.1) for respective chapters.
2	Navigation buttons that link to all the different modules and main menu.

### 7.3.5 Module Selection Page



**Figure 7.3.5.1:** Screenshot of module selection page.



Table 7.3.5.1: Guidelines of module selection page.

Label	Description
1	Buttons that link to different modules of the selected chapter.
2	Navigation buttons that link to all the different modules and main menu.
3	Back button which link back to chapter selection page (refer to figure 7.4.1).

### 7.3.6 Lesson Module

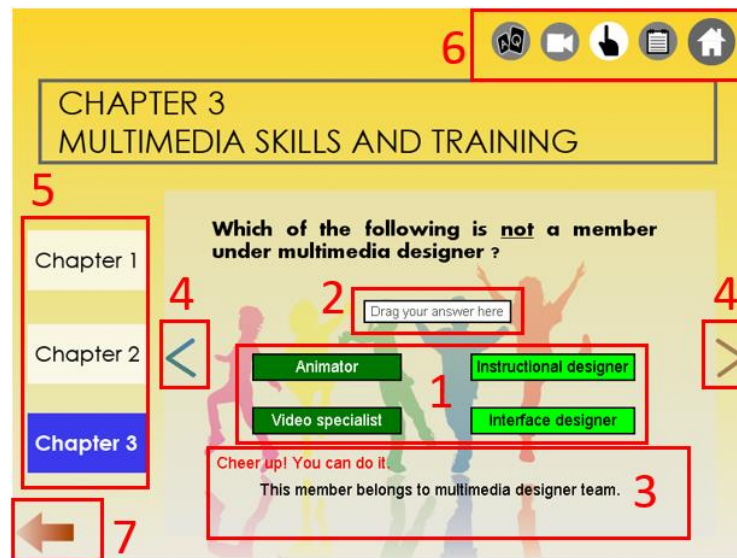


Figure 7.3.6.1: Screenshot of lesson module.

Table 7.3.6.1: Guidelines of lesson module.

Label	Description
1	Components that used to show the additional information when cursor pointed to each of them.
2	Navigation buttons that link to all the different modules and main menu.
3	Back button which link back to previously visited page.
4	Backward and forward buttons that link to the previous slide and the next slide.
5	Numbered page navigation, which allowed non-linear navigation.

### 7.3.7 Interactive Learning Module

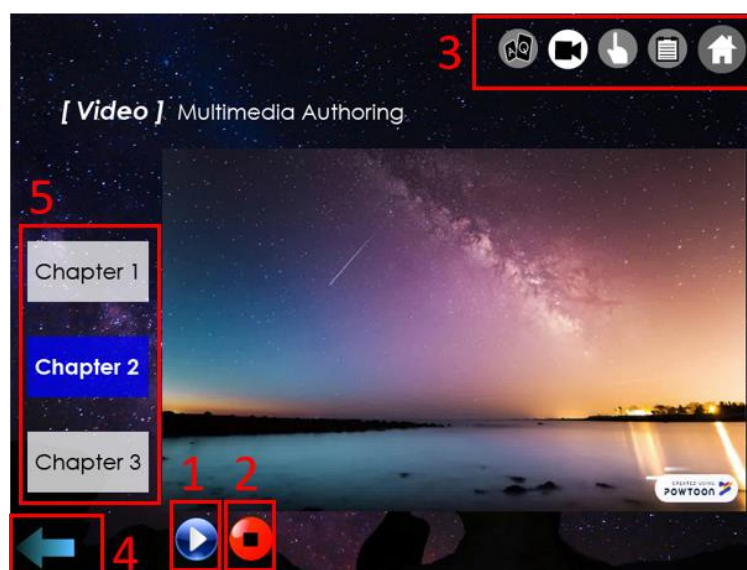


**Figure 7.3.7.1:** Screenshot of interactive learning module.

Table 7.3.7.1: Guidelines of interactive learning module.

Label	Description
1	The draggable components that show options available for the particular question in interactive learning.
2	Area to interact with the draggable components. When the draggable components released on this area, response will be triggered according to the selected option.
3	Feedback and hint or explanation that displayed after a wrong answer was chosen.
4	Backward and forward buttons that link to the previous question and the next question.
5	Buttons that link to the same module of other chapters.
6	Navigation buttons that link to all the different modules and main menu.
7	Back button which link back to previously visited page.

### 7.3.8 Video Module



**Figure 7.3.8.1:** Screenshot of video module.

Table 7.3.8.1: Guidelines of video module.

Label	Description
1	Area to locate play button and pause button. The buttons are used to play and pause the video. Play button is visible and pause button is hidden when the video was not playing and vice versa when the video was playing.
2	Stop button which can be used to stop the video.
3	Navigation buttons that link to all the different modules and main menu.
4	Back button which link back to previously visited page.
5	Buttons that link to the same module of other chapters.

### 7.3.9 Quiz Module

Quiz can be used to test and strengthen the user's understanding for each chapter. The concept of navigating to other chapters and modules is similar to the interactive learning and video modules. The sequence of questions that created in the quizzes will be shuffled and when they start over to prevent users memorising the answers. Additionally, a series of steps are required to be carried out accordingly in order to complete a quiz and obtain the total score:

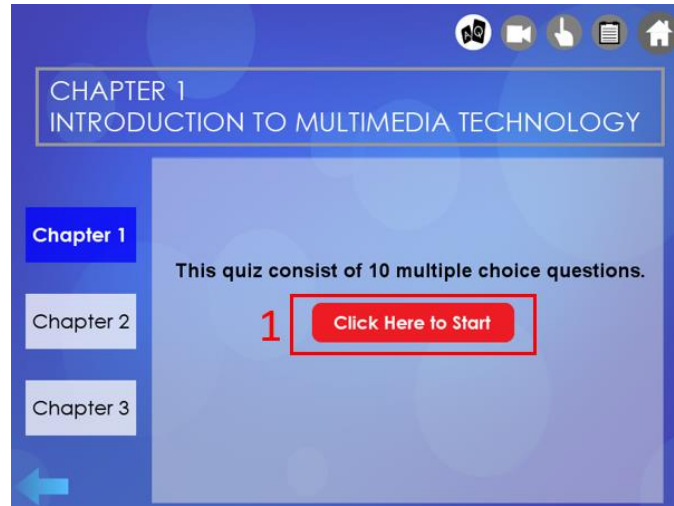


Figure 7.3.9.1: Screenshot of quiz module when starting a quiz.

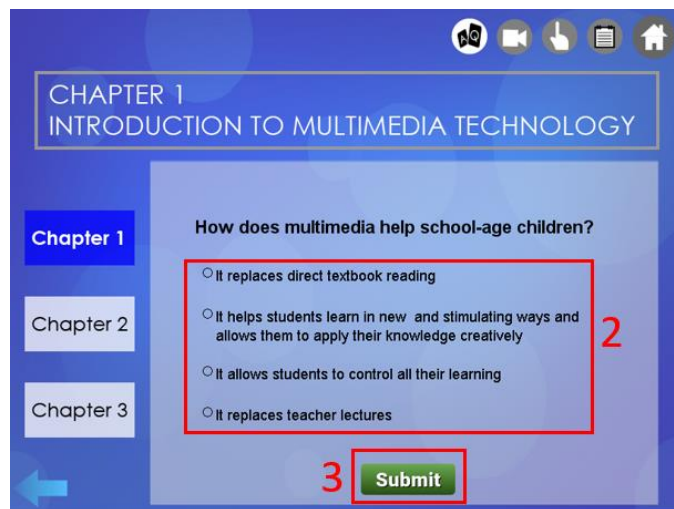


Figure 7.3.9.2: Screenshot of quiz module when conducting a quiz.

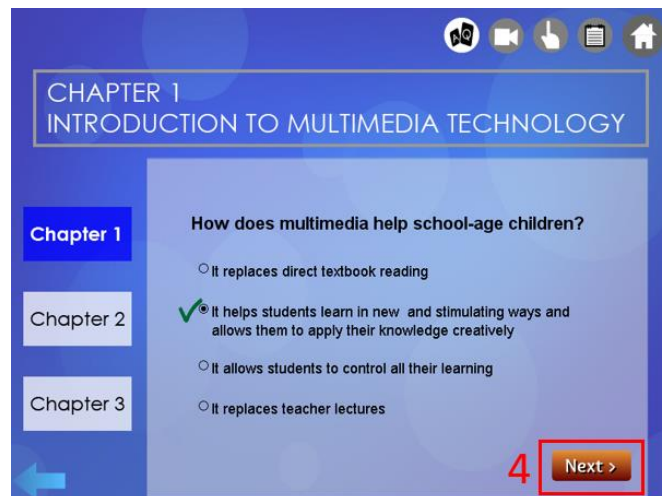
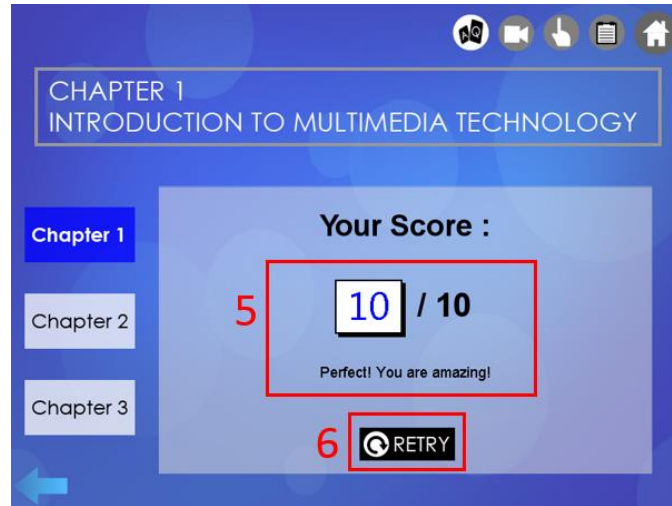


Figure 7.3.9.3: Screenshot of quiz module when a question was answered.



**Figure 7.3.9.4:** Screenshot of quiz module when a quiz was finished.

Table 7.3.9.1: Guidelines of quiz module.

Label	Description
1	Click the button to start a quiz.
2	The options available for each question.
3	Button to submit the answer selected in each question.
4	Button to proceed to the next question.
5	Area to show the total score and feedback given based on the score obtained.
6	Button to retry the quiz.

## CHAPTER 8: CONCLUSION

### 8.1 Project Review, Discussion and Conclusion

The primary purpose of this project is to enhance the traditional lecture method for teaching a subject. Students may easily get bored to study the presentation slides or lecture notes because they centralised on presenting the text information, however the attractiveness and interactivity of learning content were neglected at the same time. Computer-based learning application helps learners to understand concepts with the combination of text, graphics, audio, video and animations which can provide a more attractive presentation of study materials. Not only that, it causes the learning process to become more interesting and promote better retention of knowledge by allowing user to interact with the application content.

In this project, a multimedia-oriented computer-based learning application was developed for teaching fundamental knowledge of multimedia. The learning materials in the application were applied with interactive components for achieving more effective learning experience. The application consist of four main modules, which are lesson, interactive learning, video and quiz.

An initial unit testing of the work was carried out to detect any severe implementation issues before moving too far forward. Then, the developed application was distributed to the target audience for system testing purpose as well as to find out any possible improvement for the project.

Based on the application that developed through this project, it shows that the proposed methodology is feasible for development because it helped to reduce revision and development time in authoring process. This is due to the project problem statement, scope and objectives were planned and analysed well before the authoring process started. In addition, the storyboards that created before authoring process served as a guideline for navigate through the different pages, so it was less confusing when adding the navigational function to the button elements.

As a conclusion, the final computer-based learning application had been developed with interactive multimedia components applied into it. Likewise, the approaches such as system flow diagram, storyboards, ADDIE model had been used for designing the project structure beforehand. Lastly, the effectiveness of the

interactive course materials to motivate university students to involve in learning process was verified by over 90% of user testing respondents agreed to the statement.

## **8.2 Novelties and Contributions of the Project**

This project provided an alternative for students to study the basic knowledge of subject “Introduction to Multimedia”. The proposed application in this project could supplement the conventional teaching method and improve the quality of learning by incorporating interactivity to the course content. It could offer a rather more engaging learning experience for gaining as much knowledge regarding multimedia as possible.

Additionally, the application is able to provide flexibility to the learners as they can study the course with the application according to their own time table. This learning strategy offered convenience to the learners and it could keep them motivated to complete the course on their own without having to force them (Bhattacharyya, 2017).

## **8.3 Future Work**

More improvements could be added into this project in future development to strengthen its functionality for engaging students in learning process.

Firstly, the application could be able to capture data like time required to complete a quiz and total score, then analyse the data to assume the level of learning ability of different user. With that assumption, the course content could be adjusted accordingly to different levels so it matched with the ability of each user.

Besides, the application could also available online in the future so that more users can access to its content. Not only that, it could capture the input from teachers so they can set up and edit their own content such as adding quiz questions or change the videos. Since the scripts to randomly generate the quiz questions were implemented in this project, questions that added by the teachers would able to be shuffle as well.

Finally, current trends indicate that virtual reality (VR) is a part of the future in education (Steinbach, 2018). It connected the gaps between theory and practice as well as providing an immersive learning experience by allowing users to interact with virtual 3D environment. This project can integrate with VR technology and allow learners to interact with the content within a virtual environment, which could help them to remember the topics more easily.

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**APPENDIX A: FINAL YEAR PROJECT BIWEEKLY REPORT**

<b>Trimester, Year: 3, 3</b>	<b>Study week no.: 5</b>
<b>Student Name &amp; ID: Kong Xue Ying 15ACB03467</b>	
<b>Supervisor: Mr Lim Jit Theam</b>	
<b>Project Title: Computer-based Learning Application to Teach Introduction to Multimedia for University Students</b>	

**1. WORK DONE**

- Redesign splash screen.
- Revise the prototype.

**2. WORK TO BE DONE**

- Develop the remaining chapters in the application.
- Create a survey form for obtaining user feedback.

**3. PROBLEMS ENCOUNTERED**

It was time consuming to develop a multimedia-oriented application.

**4. SELF EVALUATION OF THE PROGRESS**

Weak in overall progress.

\_\_\_\_\_  
Supervisor's signature

\_\_\_\_\_  
Student's signature

<b>Trimester, Year: 3, 3</b>	<b>Study week no.: 9</b>
<b>Student Name &amp; ID: Kong Xue Ying 15ACB03467</b>	
<b>Supervisor: Mr Lim Jit Theam</b>	
<b>Project Title: Computer-based Learning Application to Teach Introduction to Multimedia for University Students</b>	

**1. WORK DONE**

All study materials and interactive components that planned to be included in the application was integrated in the application.

**2. WORK TO BE DONE**

- Revise the application based on the suggestions given by supervisor.
- Documentation.

**3. PROBLEMS ENCOUNTERED**

Lack of time to keep on improving the application.

**4. SELF EVALUATION OF THE PROGRESS**

Slow progress in documentation as developing the application was time consuming.

\_\_\_\_\_  
Supervisor's signature

\_\_\_\_\_  
Student's signature

<b>Trimester, Year: 3, 3</b>	<b>Study week no.: 10</b>
<b>Student Name &amp; ID: Kong Xue Ying 15ACB03467</b>	
<b>Supervisor: Mr Lim Jit Theam</b>	
<b>Project Title: Computer-based Learning Application to Teach Introduction to Multimedia for University Students</b>	

**1. WORK DONE**

- Revise the documentation based on modifications made.
- Amendment of the application.

**2. WORK TO BE DONE**

- Distribute the application and survey form to target audience.
- Analyse the user feedback.

**3. PROBLEMS ENCOUNTERED**

To convince the target audience to download the application and share their feedback after using the application.

**4. SELF EVALUATION OF THE PROGRESS**

Moderate in overall progress.

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Supervisor's signature

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Student's signature

<b>Trimester, Year: 3, 3</b>	<b>Study week no.: 12</b>
<b>Student Name &amp; ID: Kong Xue Ying 15ACB03467</b>	
<b>Supervisor: Mr Lim Jit Theam</b>	
<b>Project Title: Computer-based Learning Application to Teach Introduction to Multimedia for University Students</b>	

**1. WORK DONE**

- Revision of application based on user feedback.
- Amendment on documentation.

**2. WORK TO BE DONE**

- Finalise the report.

**3. PROBLEMS ENCOUNTERED**

Time constraint so it is hard to add on all improvement that suggested by test users.

**4. SELF EVALUATION OF THE PROGRESS**

Moderate in overall progress.

\_\_\_\_\_  
Supervisor's signature

\_\_\_\_\_  
Student's signature

**APPENDIX B: SURVEY FORM**

**Computer-based Learning Application for Introduction to Multimedia**

Dear respondent,

I am final year undergraduate student of Bachelor of Information Systems (Hons) Business Information Systems, Universiti Tunku Abdul Rahman (UTAR). The purpose of this survey is to obtain user's feedback after using the application in order to conduct a research on its interactivity, effectiveness and efficiency. Please answer the following questions based on the experience on using the application.

Your participation would be greatly appreciated.

\* Required

**Demographic Profile**

**1. Gender \***

Mark only one oval.

- Female
- Male

**Module Testing**

Please indicate the extent of satisfaction with each module in the application.

**2. Module 1 - Lesson \***

Mark only one oval per row.

	Very Poor	Poor	Average	Good	Excellent
Attractiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sufficient Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-organized Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understandable Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**3. Module 2 - Interactive Learning \***

Mark only one oval per row.

	Very Poor	Poor	Average	Good	Excellent
Attractiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sufficient Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-organized Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learnability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX B

**4. Module 3 - Video \***

*Mark only one oval per row.*

	Very Poor	Poor	Average	Good	Excellent
Attractiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sufficient Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-organized Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learnability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**5. Module 4 - Quiz \***

*Mark only one oval per row.*

	Very Poor	Poor	Average	Good	Excellent
Attractiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Navigability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sufficient Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Well-organized Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learnability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Overall Feedback**

**6. How would you rate the overall colour usage in the application? \***

*Mark only one oval.*

1      2      3      4      5

---

Very Poor                  Excellent

**7. How would you rate the sound effect and background music used in the application? \***

*Mark only one oval.*

1      2      3      4      5

---

Very Poor                  Excellent

**8. Do you think the application is able to motivate you to be part of your learning process? \***


*Mark only one oval.*

Yes  
 No

**9. Any other comments you would like to provide for the application for future improvement? \***

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPENDIX C: POSTER



## Computer-based Learning Application to Teach Introduction to Multimedia for University Students

By Kong Xue Ying  
Supervisor: Mr Lim Jit Theam

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### INTRODUCTION

Computer-based learning (CBL) application use interactive elements to present any type of learning with the help of computers. It supports interactivity in learning process, which provides interactive offline learning and assessment for learners.

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### PROBLEM STATEMENT

Students are passive as learning is centered on lecturers with the lecture presentation teaching method. Thus, the lack of interactivity of subject matters caused difficulty to engage students in learning process.

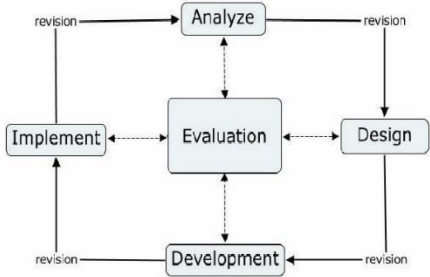
---

### OBJECTIVES

- ◆ Create a CBL application for teaching subject introduction to multimedia.
- ◆ Study and apply approaches for designing a CBL application for university students.
- ◆ Evaluate the effectiveness of interactive course materials in motivating university students for being part of the learning process.

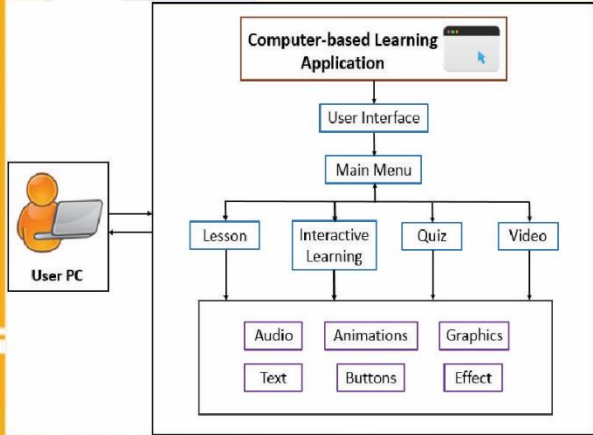
---

### METHODOLOGY



ADDIE Model

### SYSTEM DESIGN



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### RESULTS

- ◆ Developed multimedia-oriented CBL application incorporated with interactivity.
- ◆ User testing conducted and majority respondents agreed the application could motivate them to engage in learning process.

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### CONCLUSION

Interactive CBL application helps learners to understand concepts with the combination of text, graphics, audio, video and animations.



## APPENDIX D: PLAGIARISM CHECK RESULT

FYP2			
ORIGINALITY REPORT			
<b>8%</b>			
SIMILARITY INDEX			
	<b>6%</b>	<b>1%</b>	<b>5%</b>
	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS
PRIMARY SOURCES			
<b>1</b>	<b>eprints.utar.edu.my</b> Internet Source		<b>1%</b>
<b>2</b>	<b>www.diva-portal.org</b> Internet Source		<b>1%</b>
<b>3</b>	<b>Submitted to University of Greenwich</b> Student Paper		<b>1%</b>
<b>4</b>	<b>Submitted to University of Warwick</b> Student Paper		<b>&lt;1%</b>
<b>5</b>	<b>Submitted to Manchester Metropolitan University</b> Student Paper		<b>&lt;1%</b>
<b>6</b>	<b>es.scribd.com</b> Internet Source		<b>&lt;1%</b>
<b>7</b>	<b>www.coursehero.com</b> Internet Source		<b>&lt;1%</b>
<b>8</b>	<b>Submitted to Middlesex University</b> Student Paper		<b>&lt;1%</b>
<b>9</b>	<b>Submitted to University of East London</b>		