

**THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING  
APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)**

By

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## REPORT STATUS DECLARATION FORM

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## ABSTRACT

This project is to discuss about the multimedia courseware for learning Science subject and the target audience of this proposed project is secondary students. The objectives of this project is to create and develop an educational yet high quality multimedia courseware for those individual users to learn Science subject. In the addition, this project is to develop an attractive user interface, meaningful content and funny animations to motivate as well as attract students' attentions to learn Science subject. Moreover, this project is able to provide voice teaching for learners and let them understand the contents well in the short time.

Furthermore, this project is also figured out some existing problems and provide some effective solutions to solve it. There are few problems existing while the secondary students learn Science subject through multimedia courseware. Those problems are included quality of courseware is not high, formalist answer is limiting the thinking of students, lack of interesting about unattractive design of multimedia courseware and difficult to understand the contents and no voice teaching. Thus, this project has to solve the issues.

Besides that, the methodology applied in this project is ADDIE model. The ADDIE model is one of the familiar model which is consists of five phases, which is analysis, design, development, implementation and evaluation. Each of the phases in this model is performed their own tasks to design and develop the project. It also used to solve the existing problem which is faced by secondary students.

In the conclusion, since the content and information of this project is easy and simple for learners to understand, this project is good to assist the secondary students to learn Science subject well in the daily life. Then, this project is provided some colourful graphics, funny animations as well as meaningful video to motivate and encourage the students to learn Science subject. This project also able to evaluate the understanding level of secondary students in the learning process.

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## **Chapter 1.0 Introduction**

### **1.1 Introduction**

According to McGloughlin (2001), “Multimedia is a combination word of “multi” and “media”. Multi is meant as various and media is meant as combination of hardware and software that used for communication. Multimedia is an interactive presentation computer-based application that consists of combination of following media elements such as text, graphic, video, audio and animation in computing devices.” (McGloughlin 2001)

In the additions, according to Parekh (2006), “Multimedia is the general sense, therefore means “multiple intermediaries” between the source and sink of information or “multiple means” by which information is stored, transmitted, presented or perceived.” The multiple means by which we can perceive information are text such as letters and newspaper, images and graphics such as maps, photographs and charts, sound such as records and radio as well as video and animation such as motion picture and video cassettes.” (Parekh 2006)

Next, according to Reddi (2003),”Multimedia can be defined as an integration of multiple media elements such as texts, animations, audio, graphics, video and others into one synergetic as well as symbiotic whole that results in more benefits for the end user than any one of the media elements can provide individually.” (Reddi 2003)

Furthermore, according to Hofstetter (2001), “Multimedia is meant as the use of a computer to present and combine texts, audio, animation, graphic and video with links and tools that allow those individual users navigate, create, interact as well as communicate.” (Hofstetter 2001)

Besides that, according to Yang Jing (2005), “Courseware is educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer. Courseware can encompass any fields of knowledge area, but information technology subjects are most common. Multimedia courseware is frequently used for delivering education about the personal computer and its not most popular business application, such as word processing and spreadsheet programs.” (Jing 2005)

Moreover, Hick (1997) had stated that “Multimedia Courseware is many things to many people. In general terms, multimedia courseware is the use of difference communications mediums within a single computer-based program used to present information. By communications mediums, we mean audio for music, sound effects or voice-over narration, still photographs and / or graphics to help the end user understand the message that is being presented, video to further explain or illustrate ideas. (Hick 1997)

Interactive multimedia will becomes hypermedia when provided a structure of linked elements through which the individual user can navigate. Hypermedia is the extension of hypertext paradigm to multimedia. Hypertext systems consist of nodes which is used for holding those textual information and links which is represented semantic associations between the nodes. Then, in the most cases, the individual user is free to click and follow the certain links in a non-linear method. In hypermedia system, the nodes of knowledge, related data and information is available to present in any types of mediums, not just only simply text. (Riley 1995)

## 1.2 Background Information

Multimedia is a term that discussed regularly among educational technologies now. Multimedia is the amusing combination of computer software and hardware that allowed the individual to manipulate as well as integrated of various media such as video, text, picture, audio, animation, graphics, and sound elements to perform well presentations on the desktop of computer (Degada 2015). The multimedia courseware obtained useful and meaningful data and information about Science. The proposed courseware will be developed for the secondary students to learn Science knowledge.

Multimedia courseware is better than the traditional teaching style as the traditional teaching method will make the teaching effect of the class become poor. Moreover, the slow speed of teaching will make the efficiency become low. Multimedia courseware provided a method by which users enable to experience their subject in different manner. Multimedia is able to provide this experience by having simultaneous graphic, audio and others rather than in a sequential manner. The appeal of multimedia courseware in education is best demonstrated by various types of video games which currently available in the community.

Besides that, multimedia courseware can offered an enhanced their studying experience and practice at a low cost with good quality. Thus, the multimedia courseware can provided a long-term benefit or effect to all. By using the various type of multimedia courseware, students can improved their skills and knowledge without buying extra related resources. This can reduced the burden of students by saving their money (Matthew & David 1995).

On the other hand, the process of studying can become more goals oriented and more participatory. Then, students can learn knowledge at anywhere with flexible in time and space. Multimedia courseware is able to improve cooperation between teachers and students, make the learning situation become more funny and friendly without fear of inadequacy. It also tailored to individual studying styles and allowed them to increase their knowledge effectively (Steven 1997).

### **1.3 Problem Statement and Motivation**

Proposed multimedia courseware is one of the useful courseware that allowed the students in the secondary school to learn understanding as well as practice the Science subject. However, some problems and limitation are occurred in the existing multimedia courseware and traditional teaching methods.

#### **1.3.1 Quality of courseware is not high (Botha 1990)**

Multimedia courseware is included animations, graphics, image, sound, video, and text which can enhance the understanding as well as memory of information and knowledge. Then, the multimedia courseware can increase the learning interest of students to gain more knowledge (Tan, 2000). However, the form of multimedia courseware is too fancy that the main points as well as the difficult points are not standing out. In the addition, the animation, video, image, audio and others in the multimedia courseware is too cumbersome, until the students will ignored the multimedia courseware is just only a learning tools. The students cannot concentrate on the knowledge and contents of the subject because a lot of students' attention had already shifted to the colourful images and wonderful music.

#### **1.3.2 Courseware is informative but cannot highlight the importance (Dong & Li 2011)**

One of the benefits of multimedia teaching method is informative which compared with the traditional teaching style. During designing the multimedia courseware, some authors will miss out the importance of topics which result in excessive knowledge. Besides that, the importance of the information also cannot be highlighted. The information and data are regular applied on the multimedia courseware without a word to refine it. The final result is the input of information was far away with the current students' level. The students will feel anxiety and confused while can't understand well the topics of the subject.

### **1.3.3 Formalist answer is limiting the thinking of students (Dong & Li 2011)**

Students will do the practices and exercises of Science by using the multimedia courseware. Students answered the multiple choice question are always depend on the answer which provided by the teacher. It is very difficult to breakthrough the standard answer, especially definition or principle of topics. It is difficult for the students to make different expansions. As the time passes, students won't put forward their own opinions and ideas as well as changed into external stimulation recipients. In the addition, the teachers will keep on to present the same knowledge for the students. However, they had no any chance to discuss some questions and determined the problems for understanding the opinions of each other and making relevant adjustment as well as improvement. In a particular extent, the improper use of the courseware will make the students' subjective initiative become weaken.

### **1.3.4 Lack of interesting about unattractive design of multimedia courseware (Kamaruddin 2015)**

Sometimes, the author is aware that the students or users do not have any technical skills and they can't put much efforts as well as attentions into the system design. Thus, they will just simple design the user interface of courseware to save more time and cost. However, the multimedia courseware with the simple design without animation, video, audio, and others will make the students feel boring to learn knowledge by using the multimedia courseware. After that, the students preferred to the fun videos and wonderful images rather than the content which are full of words. The user interface of multimedia courseware which is too simple will reduced the students' motivation to apply it in the daily life.

### **1.3.5 Difficult to understand the content and no voice teaching (Joseph 2008)**

For the traditional teaching style, the students will study the textbooks or reference books to understand the subjects. The students are difficult to understand the meaning of content which tried to carry out as the book is too many words and not attractive. Moreover, the traditional teaching method had no supply the voice teaching for students. The students can't enhance memory during studying without the voice teaching during the learning process.

## **1.4 Project Objectives**

### **1.4.1 To study the usage of multimedia in Science using learner centered approach**

The students are able to learn the multimedia courseware in Science by using learner centered approach. This is a good strategic processing and also executive control. The required aspect of learning is included the ability to reflect on as well as regulated individual's thoughts and behaviors. The well-behaved students are actively involved in their own studying, assumed the responsibility for their own studying and monitored their own thinking.

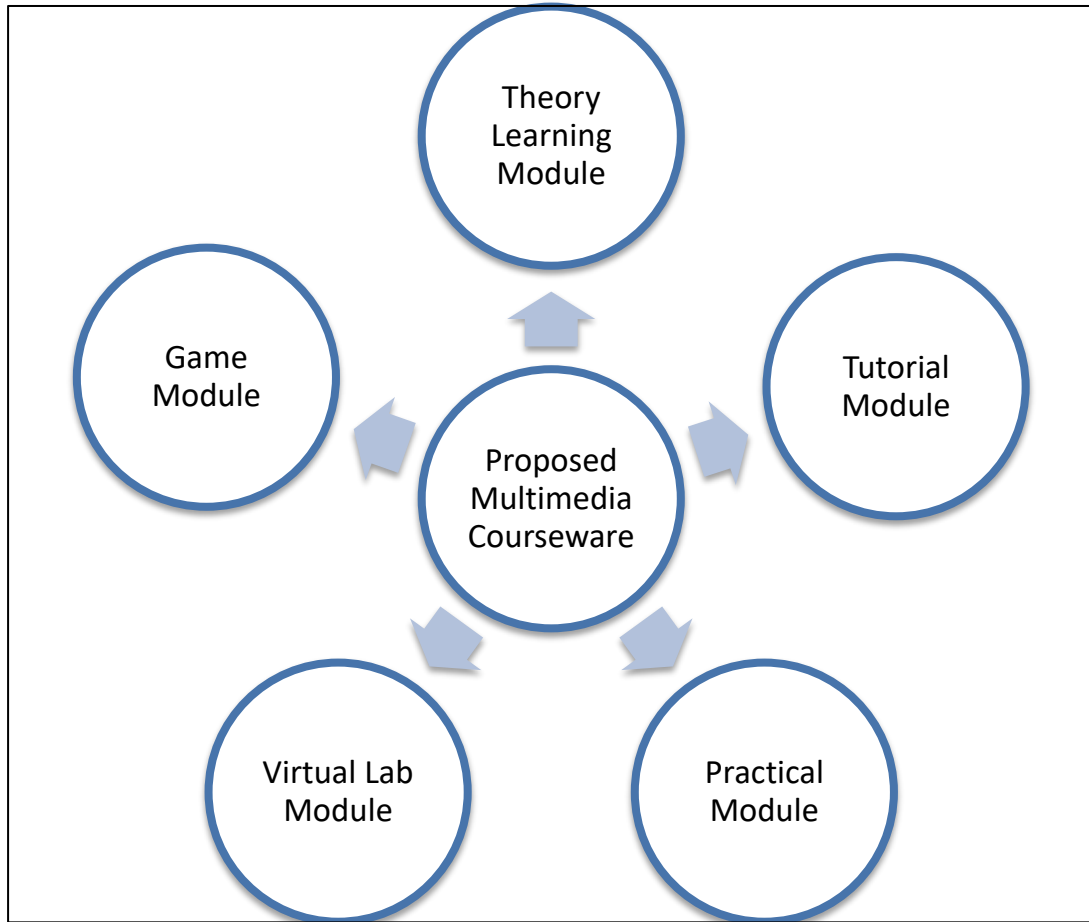
### **1.4.2 To design and develop an interactive multimedia application for Science education**

The students should learn the subject of Science more simple and easy by using the multimedia courseware. The multimedia courseware is included text, sound, animation, graphic and video which are able to increase the students' learning interest and let the students more understanding the contents and information of Science subject. The students can improve their Science knowledge by using the multimedia courseware without buying the related textbook or reference book anymore as well as saved the learning costs.

### **1.4.3 To study and evaluate the effectiveness of implementing this tool as a supplementary material to aid in the understanding of learners on Science**

Multimedia courseware is an interactive learning tool with video, games, animation, text and sounds which can enhance the students' learning interest and their skills. The attractive and funny multimedia courseware can attracted the students' attentions to keep on using this application to gain the Science knowledge as well as information. It can easy to evaluate the effectiveness of this tool and understanding of the students in the related subject. The students who are repeated using the multimedia courseware for learning Science are able to understand the related topics deeply and absorbed some extra knowledge of Science.

### 1.5 Project Scope and Direction



**Figure 1-5-F1 Proposed modules of multimedia courseware**

The proposed multimedia courseware will focus on the subject of Science and the main target users for this project is set as the students in the secondary school. This courseware will be the meaningful and attractive software for the users to gain the knowledge and information of Science. The modules which are included in the proposed multimedia courseware are theory learning module, tutorial module, game module, virtual lab module and practical module.

### **1.5.1 Theory Learning Module**

The learning module will provide students basis of recognizing and knowledge. The students have to focus on this lesson to prevent any confuse and problem for the following knowledge. After that, the learning lesson will go deeper and deeper to provide the detail information and explanation for understanding. Thus, the students can fully understand the information related to the topic after using the proposed multimedia courseware.

### **1.5.2 Tutorial Module**

The tutorial module is conducted after the students study the learning module of the software. Every exercise and tutorial helps to test the understanding of the students about the related topic. This module is a process for the students to find out the solution for the multiple-choice questions. After doing the tutorial questions, the students are able to realize their own understanding level about the topic.

### **1.5.3 Game Module**

The game module allowed the students to play some mini flash games that develop by the author to reduce their stress during studying. This module is act as powerful forces in the development of the students' mind as it let the students to establish, reflect as well as work out their own understanding about the topic. The mini flash games which are full of challenge and fun will motivate the students to play it regularly. Thus, the students can reinforce memory about some parts of the topic and understand the topic deeper.

### **1.5.4 Virtual Lab Module**

The video module is included some videos which are related to the Science subject. The students are able to increase the knowledge by watching the video in the courseware. Some animation, sound, text and graphic will included into the user interface of this module to attract the attention of the students.

### **1.1.5 Practical module**

The practical module is acted as scenario-based learning, which is an important element of studying strategies, engages students in case studies and interactive scenario.



In this module, the students can use the preexisting knowledge to understand it in the training context, apply knowledge to analyze the new situations, evaluate as well as create the new outcomes.

### **1.6 Impact, Significance and Contribution**

This project will encourage and motivate the students to learn and study the Science subject. If the students can't follow up the speed of the teacher or lack of understanding the topic of the subject during the class, they are able to use the multimedia courseware to enhance their understanding and knowledge as many different types of multimedia courseware elements are included such as meaningful video and animation in the system. The students will feel more interesting and funny to learn the Science by watching some videos, audio, animation and graphics rather than the content of the topic which was full of words. On the other hand, the students are able to gain and learn the extra knowledge and information as they can do various types of practices and exercises of the Science subject through the game of the system.

Besides that, the studying and learning process of the students will become much more liable and easier by using the proposed courseware. The teachers could obtain an additional medium in order to teach the students in the class. In the traditional method, the students need the different learning materials to develop and train their mind such as books, toys, education CDs and others which will increase the burdens of the school or family. Thus, the students only need a computer or laptop which becomes very familiar in each family now. Then, by using the proposed multimedia courseware, it is good for the students to practice and enhance their internet technology skills as well as knowledge.

In addition, the proposed multimedia courseware is involved various types of multimedia elements such as graphics, video, audio, animation and game which is able to keep the students' interest to gain more information about the Science subject. They also can enhance their memory and reinforce the skills by playing the games in the system. The students can absorb the knowledge and information easily by doing the practice and exercise frequently. Nowadays, multimedia courseware can enhance studying for the students with the different learning methods.

Last but not least, the students can learn the Science knowledge at their own house. Since the proposed multimedia courseware is online, it was good and convenience for those students who can't attend the class in the school or lack of understanding during the class. Multimedia courseware is flexible for the students to learn and study the Science knowledge at any time as well as anywhere without affect by the distance. The students are able to gain the knowledge easily and quickly by learning the animation and graphics which included the full explanations in the project.

### **1.7 Target Audience**

The target audience for this proposed multimedia courseware is focused on the secondary students in Science subject. Nowadays, such students sometimes entered the secondary school with the low level of basic Science knowledge. The students can't follow up the following topics without good basic of Science. Continuing education is more and more important for the students. In the addition, the students are feeling bored about the Science subjects and lack of interesting for learning it. Thus, this project is provided the learning elements for the secondary students to improve and enhance their Science knowledge. Besides that, the proposed multimedia courseware is included improved the students' interest to learn the Science subjects and understood the importance of this subject in our education life. Then, schools need to supply high quality learning material for the related subject and in technical fields (Weimer 2002).

## **Chapter 2.0 Literature Review**

### **2.1 Multimedia**

#### **2.1.1 Linear Multimedia**

Multimedia is composed of two parts which is the prefix multi and the root media. Multi is short form of multiple, which means as many. Media is a means distribute and represent information. Therefore, multimedia is the any combination of two or more of the media elements such as text, graphic arts, video, sound and animation which is represented digitally in computing devices and sufficiently well integrated.

Multimedia can be broadly divided into linear and non-linear categories. Linear multimedia is a types of multimedia that is developed to be presented in a sequential manner. It will starting at the beginning and running through to the end without variation. Linear multimedia does not features any sort of navigational abilities such as control flow of media, change the pace of media, select different options and click on various icons. It is always planned for display purposes with little amount of interaction and distraction from those audiences. By the way, linear multimedia is also referred to as “passive multimedia” due to its nature that not expected for the participation of audiences.

Moreover, there are two types of linear multimedia which are time-based and page-based presentation. The time-based is acted as movie presentation such as fictional movies recorded for entertainment purposes and pre-recorded instructional videos which is arranged in time and presented in sequence on a timeline. Then, the page-based is those media elements laid out in two-dimensional as in printed books and magazines which can look in randomly. (Doris 2016)

In the additions, the developer of the multimedia is in control while performing in this types of presentation. This category of media is preferential and favorable if the interaction is not essential in the presentation. The main objectives of linear multimedia are included to entertain and transmit knowledge to audience as well as make public familiar on the particular topic without any types of diversion. For examples, the PowerPoint slides presentation, storyline or movie, a slideshow of graphics that perform in a specific direction and others.

Next, there are various types of advantages for using linear multimedia. The advantages are included those audiences are able to focus and concentrate on a particular topic as well as they can effectively absorb the knowledge and information well during the learning process. Besides that, the content is organized and performed in logical order in the presentation. Linear multimedia performs exceedingly well for providing information to vast groups of people like seminars, training sessions, meetings in the workplace and others because the presenter is able to control the flow of the presentation nicely.

### **2.1.2 Interactive Multimedia**

Interactive multimedia is acted as a hybrid technology. It combines the storage, memory and retrieval capabilities of computer database technology with advanced instruments for determining and manipulating these various types of materials. Multimedia has many different significances and definitions vary which is depending on the context. Interactive multimedia is defined by three criteria. Firstly, interactive multimedia is any package of materials that includes some combination of animation, audio, graphics, video, texts and still images. These materials are packaged, integrated and linked together in some ways that offers users or individuals the ability to browse, navigate and analyse these materials through various searching and indexing features, as well as the capacity to annotate or personalize these materials. The criteria of interactive multimedia is including it is always “reader-centered”, it has the main priority which can control anything. In the interactive multimedia, the reader controls the experience of reading the materials and able to choose among the multiple choices, selecting the unique way and order through the data. Then, one of the key features of interactive multimedia is the ability to navigate through material in whatever ways are most meaningful for the individual users.

Interactive multimedia becomes hypermedia when its designer provides a structure of linked elements through which a user can navigate and interact. Hypermedia is able to reinforce the learning capacity of the users as their knowledge on a topic or a concept is compounded by text, graphics, animations, videos and audio to provide them the more comprehensive understanding, something that is missing from print media. Besides that, hypermedia is acted as the multimedia version of the term

hypertext. Hypertext is a navigational tool that links words or phrases together and allows individual users to navigate through textual information. By being able to link texts together, the users are able to gather data and information about a particular topic without having to leave the application. While hypertext pertains to links between textual information, hypermedia takes this a step further by creating links with multimedia elements such as sound, graphics, video and animations. The multimedia elements can be made into hot spots or hot objects with hypermedia. By being “hot”, these elements are linked to various different types of screens or trigger other elements in return.

Interactive multimedia allows the users control over the content that they view in the application and go to any part of the application at any time. It gives the user some navigational controls such as pull down menus, buttons, hypertext, hypermedia and others. The interactive multimedia is differentiated into two branching which are simple branching and conditional branching. The simple branching is the ability to go to another section of the multimedia production and conditional branching is an activity based on the results of IF-THEN decisions or events. In addition, interactive multimedia allows two-way interaction with multimedia course material, another computer or another user with direct response to the input. The interactive attributes commonly include data and text entry, mouse input, touch screens, voice commands, video capture and real-time interaction. Moreover, interactivity is the heart of every successful multimedia application and has the power to transform users from being passive viewers of multimedia to active participants of the message that is being communicated. People retain 80% of what they see, hear and do simultaneously. Therefore, the more involved the user is with the application, the more he or she will remember the data and information. (Doris 2016)

## **2.2 Interactive Multimedia**

### **2.2.1 Benefits**

Multimedia becomes interactive multimedia when a user is given the option of controlling the elements such as text, graphic, animation, sound and video. Interactivity empowers the individual users by allowing them control the content and flow of information. The response of the computing devices depends on the response of the users. Therefore, interactive multimedia has the potential to establish high quality as well as meaningful learning environments for individual users.

There are various types of advantages for adopting interactive multimedia in the daily life. First and foremost, the advantage of interactive multimedia is allowing the users to control of the pace learning. The non-linear multimedia presentation is enable the individual users to perform the greater freedom and navigational control in the applications. The purpose of having the interactivity incorporated multimedia application is the ability of individual users to have control of the application. The power of the computing devices has given individual users the ability to break the linearity of data and information by being able to manipulate applications as well as integrate interactivity. Through interactivity, the users can pace themselves in their learning process, concentrate on the learning materials which they are unfamiliar with it or particular parts that they are interested and learning as well as absorbing new knowledges. Besides that, the individual users can continue review and repeat the information or sections as needed. They can also make the choices to skip over learning materials which they are already know or inappropriate information in the applications. (Mannion 2014)

In the additions, nowadays, the advantages of incorporating interactivity into the multimedia applications is included increase the levels of productivity. The interactivity in a multimedia application is able to lead to a higher rate of retention and familiarity on the subject matters. For example, the individual users who are involved in the process of clicking on a particular types of navigational controls such as hypertext, icons and buttons to access more detailed information about a topic or a section will result in higher level of productivity in the market. An interactive multimedia allows individual users to view for the particular parts of knowledge and information with immediate effect. Therefore, this feature can avoid the application

users to search for the detail information through the online resources or related textbooks and assist them for time saving in learning process. (Strecher et al. 1999)

Moreover, one of the notable advantage by using interactive multimedia is interactivity. The learners who used the interactive multimedia in computing devices are tended to have higher percentage of time usage on the learning materials and information. Therefore, they are being part of the learning process. Interactivity in multimedia helps the learners to go further and deeply about the knowledge, rather than just simply select their own path through multimedia application. Individual users can manipulate those virtual objects on screen and involve in the industrial process. This allow individual users to experiment safely and assist them to understand the knowledge of the particular subjects deeply. Interactivity is also support role-playing, which is able to encourage individual users to consider alternatives viewpoints. (Andresen & Brink 2013)

Last but not least, interactive multimedia has the higher rates of learning. Individual users that interact with a multimedia application have a better likelihood of improving their learning rates. When they are involved and being part of learning process in the acquisition of knowledge, there is a sense of attachment that accelerates our learning about the learning subjects. The content is structured into learning tasks which is similar in the particular textbook. Therefore, the individual users are able to learn complete knowledge and also extra information by performing interactive multimedia application. For example, a hypertext on the word “photosynthesis” will link that word to another screen containing detailed information about the photosynthesis which the users can look through and read before continuing with the application. By being able to link texts together, individual users are able to collect related information about the topic without extra effort for searching those information.

### 2.2.2 Limitations

Interactive multimedia has various types of benefits for the individual users, but current design of interactive multimedia still involved few limitations. The various types of multimedia features such as animation, graphics, music, sound effect, still images and others are found beneficial for the users. In contrast, some interactive multimedia elements such as hotspots, games and others are found to be distracting.

First and foremost, the limitation of interactive multimedia is many educational interactive multimedia have been designed in the form of CD-ROMs and distributed into the wide markets. Generally, the different types of media are presented digitally as separate entities in computing devices and sufficiently well integrated. The text and word appears in one window, in the same time video clips and graphics are appear in another overlapping window. The issue with this method of structuring knowledge and information is that it is troublesome, if not impossible, for others to keep track of and integrate the separate learning resources. Merely, we do not necessarily consist the cognitive resources to process and integrate the information in this approach. The designer need to be able to continue switch their attentions and focus on within as well as between different parts of external representations in order to comprehend their relationship and details with each other. (Rogers & Scaife 2016)

Besides that, the limitation of interactive multimedia is included seriously lacking to support some interactions for individual users. The traditional learning method which is paper-based educational materials are able to present simultaneously those diagrams, depicting different and unique abstractions with full explanation text on the same page. In the additions, some external devices such as post-it notes, fingers and bookmarks can be used by learners to link the data an information explicitly in the form of different representations. Many educational CD-ROMs have been designed to be used by just simply choosing, pointing and clicking at the menu options given. The result is to display information in terms of text, meaningful graphics or running the video clips and audio. The “point and click” method of interaction provides little more to individual users than efficient page turning and capabilities of channel-hopping.

Although engaging the individual user more with the data and information presented at the interface, various types of interactivities are still limited in the ways how they assist the learning process. For example, in an interview of children who



frequently played the popular simulation games, Turkle reported that he play blindly, populating his lifetime with creatures he loves rather than obtaining any sense of objective. Therefore, when asked him about the question why one species of animal has become extinct, he just replied “I don’t know anything about these, it’s just happens in the world”. In the additions, those interactive features such as puzzles, colourful pictures, sound effects and dictionary function are usually available not only after, but also during process of oral narration. Therefore, these features will interrupt the flow of storyline and attract individuals’ attentions away from listening to the original narration. Those interactive features especially hotspot or interesting games will perform as seductive materials that can affect individuals’ concentration and distract them from the storyline.

Last but not least, some limitations of interactive multimedia are affected the learning process of individual users. Users input may control the multimedia production, but only within limits set by the multimedia producers. Generally, multimedia developer will designed and created the interactive multimedia as simple as possible, so that most of the users are ease to use and decrease the development time as well as production costs. Therefore, individual users only allowed to select the choices that are coded into the program and very limited control over navigations. Moreover, although the individual users discovered some errors or mistakes in the application, the content and information in the interactive multimedia are not allowed to be altered. By applying this application, one of the limitations of interactive multimedia is those individual users cannot provide some feedbacks and recommendations based on their using experiences for the organization. (Andresen & Brink 2013)

## **2.3 Applications of Multimedia**

### **2.3.1 Multimedia in Education**

Schools are acted as the most needy destination for multimedia. Nowadays, many schools in the United States (US) are chronically underfunded and occasionally slow to apply new applications and technologies, yet it is the power of multimedia can be maximized for the largest long-term advantages as well as benefits to all of us.

Multimedia will stimulate radical changes in the teaching process for the coming future, especially as intelligent students discover that they can exceed the limits of traditional teaching patterns. There is really that move away from “transmission” or “passive learner” learning model to “experiential learning” or “active learner” model of studying. In some cases, teachers in the schools may become like a mentors or learning facilitators, who leading the students along a studying path, not acted as the primary providers of knowledge and information for the students. Therefore, the educational software is always positioned as enriching the learning of process, but not as a potential replace for traditional teacher-based methods. (Vaughan 2004)

Multimedia in education is including effective learning packages and simulation of lab experiments. Sometimes, the course curriculum in different aspects cannot be explained deeply as well as easily through the simple text and graphics such as knowledge and information in the textbooks. Therefore, these can be presented through funny animation, audio annotation, video clips with sound effect, three-dimensional modelling and others for making them more understandable to learners. Besides that, expertise of the multimedia developers can designed and created the content as well as distributed them to the learners over the globe as part of distance learning. The multimedia in education is expected to offer an excellent grasp of subject matter and interactivity elements to give for better retention.

### **2.3.2 Multimedia in Entertainment**

Multimedia in entertainment becomes popular in the community. There is growing convergence of computer-based multimedia with entertainment as well as games-based media traditionally depicted as “shoot-em-up”. Based on the research, it is discovered that Nintendo alone had sold over 100 million game players worldwide and also more than 750 million games.

Application of multimedia technology which is related to the entertainment included interactive encyclopedias, computer-based games for learners, story-telling and cartoons. Computer-based games are one of the best applications of multimedia which had mentioned before due to the high amount of interactivity involved in it. Besides that, audio and video-on-demand applications adopting technology of multimedia would allowed individual users to specify the movies which they would like to watch, based on various types of criteria such as actors or actresses, genre, director awards won and others, but not just simply by the movie names. The application will try to match these different types of criteria with the movies in the record and draw out the best possible selections which satisfying those requirements.

Virtual reality is one type of application that use multimedia for entertainment and brought a different as well as more involved entertainment experience than others which are available with a standard movie theater. Computer-based virtual reality systems are interactive, three-dimensional space and use one or more devices in an attempt to give the individual users with a sense of presence. The more matters and the more points that describe the matters, the higher the resolution as well as the higher realistic the view. Each action or movement needs the computer to recalculate the angle, size, position, shape and others of all objects that make up the view. (Vaughan 2004)

### **2.3.3 Multimedia in Science or Medical Science**

Multimedia technologies in medical Science can be adopted to prepare high-quality magnetic resonance three-dimensional images of human bodies as well as practice complicated and numerous procedures of surgical. Doctor can provide better consultations for their patients by achieving of CT scans, X-ray images, ultrasonography images and others. After integrating those medical functions, this application could serve as an expert system. (Parekh 2006)

Multimedia computer technology has designed and created exciting developments in medical Science. It is used for telemedicine in the global. The physicians can diagnose and monitor their patients at remote locations. In the additions, the transmission of those images such as CT scans, X-ray images and others over geographical boundaries can assist the growth of telemedicine where the doctors segregated by distance can consult together to find out the solving methods to complicated situations. The multimedia computer technology also supplied the medical information which is available to the public through the internet and CD-ROMs.

Moreover, computer-based multimedia environment provides the medical training to learners such as physicians, nurses, medical researches and technicians in terms of virtual lab. Virtual lab allows the students in medical Science to learn by actively creating experiments and interpreting their outcomes. This method can help surgeons to develop and obtain skills through practice. Although learning textbooks and video clips can demonstrates the steps of procedures in the details, but the two-dimensional view and lack of interaction with those learners make them poor media for training skills. Therefore, the virtual medical lab provides the opportunity for learners to revise and redo their lab experiments, to develop and interpret results as well as always learn from their own mistakes.

#### **2.3.4 Multimedia in Business**

Businesses use multimedia to sell products and services to consumers all over the globe. Travel companies can market packaged tours by demonstrating expected customers glimpses of the destinations they would like to travel, fooding, lodging detail information, special or unique attractions and others. Hotel owners can adopt the multimedia technology to display the detail information of facilities offered at various hotels in the different places, so that the sales of hotels can increase gradually in the long-term periods. Next, customers can make the comparisons between different products in relation to their quality, price or others without leaving their places through electronic shopping. Once they selecting an item, hyperlinks will connected them directly to online store which they can place their orders simply and easily.

Business application for multimedia is including in industrial training. Most of the organizations are needed to maintain the high quality of employees by offering computer-based training (CBT) packages for employees. By creating multimedia presentations, all employees are allowed to use each of these particular courses and no need to spend time from office as well as attend others basic training. Moreover, the employees can learn at their own pace and different teams of employees could be appraised based on standardized evaluation procedures.

In the additions, multimedia in business is involved corporate presentations. Corporate presentations for underlining the salient characteristics and activities of organization, the products, business partners such as suppliers and constructors, can be developed by comprising multimedia elements along with simple textual descriptions. The customers or investors could more understand about the unique features of organization by presenting the information with colourful charts, simple graphs, audio or video presentation and others. (Parekh 2006)

## 2.4 Multimedia in Science Education

Multimedia is appropriate whenever a human interface connects a human user to electronic data and information of any types. Multimedia promotes minimal text-only computer interface and produced measurable benefits by acquiring and attracting attentions and interest of individual users.

First and foremost, multimedia technology played a main role in Science education like provide simulation in cell biology. Molecular exchange between the cytoplasm and nucleus is required for holding as well as maintaining Eukaryotic cell alive. For examples, ribonucleic acid (RNA) are transcribed in the nucleus and then exported into cytoplasm, but all proteins required in the nucleus are synthesized in cytoplasm and then imported into nucleus. Nucleo-cytoplasmic transport is generate regulation for transcription, deoxyribonucleic acid (DNA) replication and also cell cycle. The teachers need to integrate functional, structured and genetic approaches to examine those mechanisms. Thus, these mechanisms can be very easy and well taught with the help of simulation which is acted as multimedia technology. (Arulsamy 2012)

In the additions, the appropriate active learning experiences are essential in learning Science education and well-designed laboratory experiments give the best means for learning Science subject. However, there are many obstacles and problems on the use of real laboratory experiments in the schools. Therefore, computer-based simulations have developed several types of physiological phenomena that can be adopted to complement traditional learning methods of lectures and laboratories, offering those students with more learning opportunities to study by experimentation.

Moreover, students and teachers use the multimedia technology in Science education to promote learning and teaching process. For examples, individual users are able to access, organize, interpret and analyze a broad of learning resources such as downloaded the original source documents and learning materials from library or taking a virtual tour of museum by using the computing devices. The learners from different locations can cooperate on projects, sharing as well as accommodating their different types of perspectives.

Although multimedia technology acted as a tool that cannot replaced hands-on learning, it is able to improve, strengthen and reinforce the impact of activities in the

area as well as in the Science education. The multimedia developer can use the new information tools like blogs, streaming audio and video to engage those individual users as well as demonstrate the concept of Science effectively. Besides that, they are also engage those individual users with digital media tools and equipment such as video-publishing, audio-editing, photo-sharing and others to provide them some opportunities to illustrate their mastery of concept and simultaneously strengthen their literacy abilities and skills by having them developing their own contents.

The use of multimedia technology as part of a core Science education is allowed individual users to demonstrate their specific scientific ideas and concepts visually in anytime and anywhere. Then, it can instill a sense of wonder, surprise and excitement in learners about the universe around them, present some local and corresponding case studies for learners, provide some general experiences which are shared by all learners as well as give some examples of real people practicing science. Next, the use of multimedia resource in Science education is able to generate the interest of learners in Science careers and enhance latest skills which is including problem solving, critical thinking, as well as communication skills. The multimedia technology in Science education also provide current research, principle and theory on the related topics in Science subject.

## 2.5 Comparisons of Similar Multimedia Application

Multimedia courseware is a solution in dealing with differences in studying as well as knowledge background of students since it gathered and integrated the media materials that can undertake the retrieval ways of human information. A literature review is an evaluate information which can found in the selected study's area. The literature review is described, summarized and evaluated the literature.

### 2.5.1 Acrobatiq

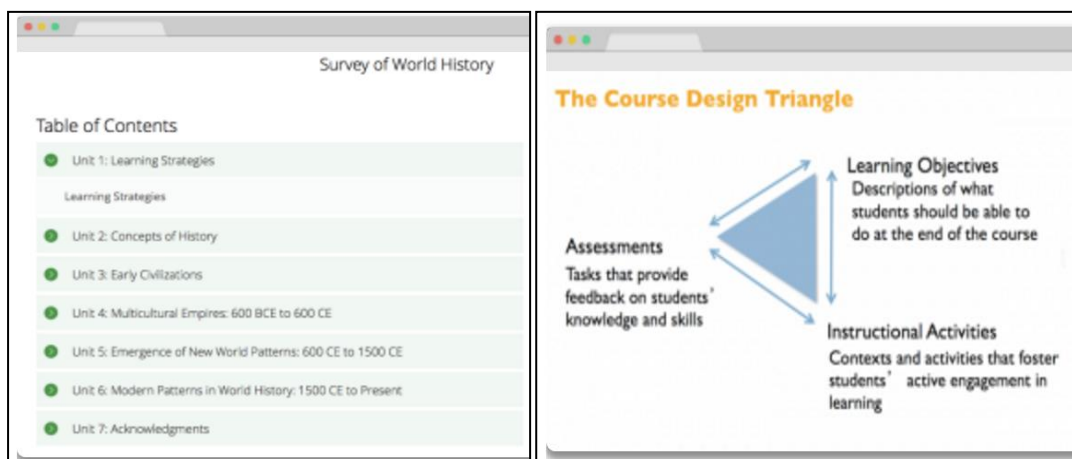
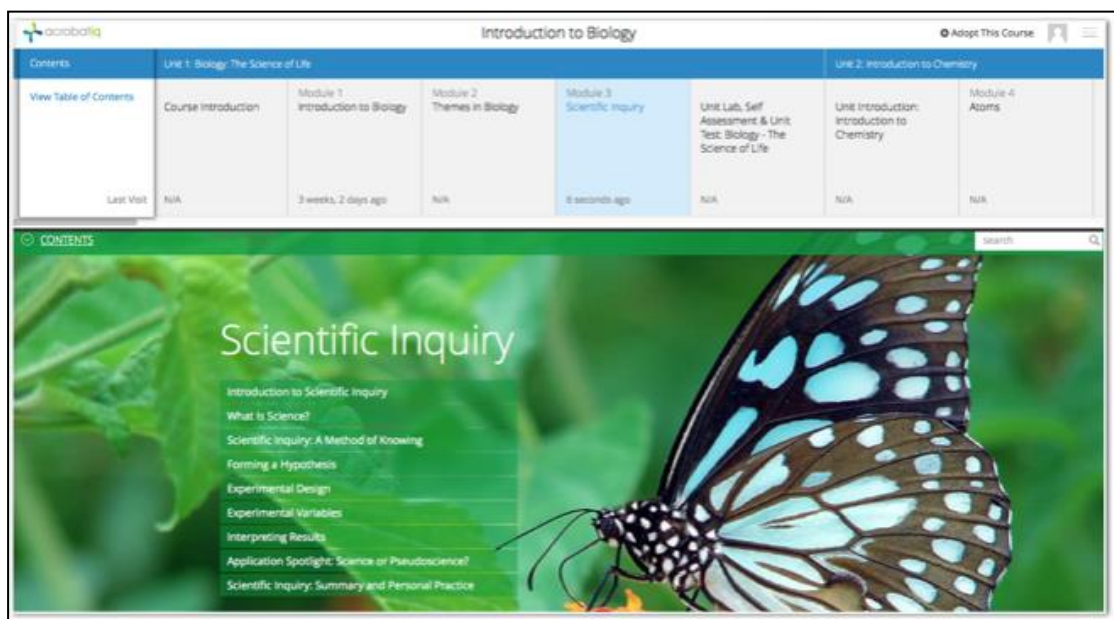


Figure 2-5-1-F1 Screenshots of Acrobatiq



### **2.5.1.1 Courseware Introduction**

Acrobatiq (Acrobatiq 2013) is a learning optimization by helping educators to create, develop, deliver as well as continually enhance the high quality for the learning programs. The Acrobatiq multimedia courseware is created from research-based principle of learning for the target users.

### **2.5.1.2 Strength (Pros)**

#### **1) Authoritative content aligned to distinct and clear learning objectives**

Acrobatiq courseware is included authoritative contents created by a team of subject matters experts, instructional designers and others. All the related text, assignments and assessments integrate to supply an interactive experience for the students or users. The content and assessments in this courseware are organized in an easy as well as logical order, which enable the students to customize the content in the short time to achieve the goals.

#### **2) Proven course design**

Acrobatiq courseware provides the proven course design for the students to ensure that they won't waste any time or efforts during learning process. The course design triangle is acted as foundation of Acrobatiq's data-driven, which divided into three parts such as learning objectives, assessments and instructional activities. It works closely to support enhance the quality of student quality.

#### **3) Adaptive practice**

Based on dynamically modeled students learning state, some practice questions are selected for the individuals for learning purposed. This courseware can customizes as well as personalizes practice questions for students. The students had more opportunities to practice their skills, while students with high levels of learning grasp are given less, enabling quicker progression through the meaningful activities.

#### **4) Synthesis activities**

The case studies and other interactive exercises encouraged students in the process of active studying. The students can understand the related topics deeply by gathering and analyzing data, evaluating their results and others. The Acrobatiq courseware allowed the students to collect all the information and applied their skill as well as information to real-world situations.

##### **2.5.1.3 Weakness (Cons)**

#### **1) Lack of interest as didn't include video and games**

This courseware without video and games will make the students feel boring to learn knowledge by using the Acrobatiq multimedia courseware. After that, the students preferred to the fun videos and interesting games during the learning process. The multimedia courseware which didn't include these features will reduce the students' interest for using this courseware.

#### **2) No music included in the courseware**

The Acrobatiq courseware didn't include any music for the students. The students will feel bored while just learning the knowledge in the long time without any soft music. The soft music in the courseware will not disturb students' learning and it will also improve their efficiency of learning.

# CHAPTER 2 LITERATURE REVIEW

## 2.5.2 MIT OpenCoursware

Home » Courses » Biology » Foundations of Computational and Systems Biology » Lecture Slides

### Lecture Slides

**COURSE HOME** Lecturer Key

**SYLLABUS** [CB] = Christopher Burge  
[DG] = David Gifford  
[EF] = Ernest Fraenkel  
[GL] = Guest Lecturer

**CALENDAR**

LEC #	TOPICS	LECTURERS
1	<a href="#">Course Introduction: History of Computational Biology; Overview of the Course; Course Policies and Mechanics; DNA Sequencing Technologies (PDF - 5.0MB)</a>	CB, DG, EF
<b>Genomic Analysis</b>		
2	<a href="#">Local Alignment (BLAST) and Statistics (PDF - 2.0MB)</a>	CB
3	<a href="#">Global Alignment of Protein Sequences (NW, SW, PAM, BLOSUM) (PDF)</a>	CB
4	<a href="#">Comparative Genomic Analysis of Gene Regulation (PDF - 2.9MB)</a>	CB
<b>Genomic Analysis—Next Gen Sequencing</b>		
5	<a href="#">Library Complexity and Short Read Alignment (Mapping) (PDF - 1.4MB)</a>	DG
6	<a href="#">Genome Assembly (PDF)</a>	DG
7	<a href="#">ChIP-seq Analysis; DNA-protein Interactions (PDF - 2.0MB)</a>	DG
8	<a href="#">RNA-sequence Analysis; Expression, Isoforms (PDF - 2.9MB)</a>	DG
<b>Modeling Biological Function</b>		
9	<a href="#">Modeling and Discovery of Sequence Motifs (Gibbs Sampler, Alternatives) (PDF)</a>	CB
10	<a href="#">Markov and Hidden Markov Models of Genomic and Protein Features (PDF)</a>	CB

**COURSE HOME** 7.36/7.91/20.390/20.490/6.802/HST.506 Recitation Slides

**SYLLABUS** In these optional recitation sections, the teaching assistants reviewed topics covered in the lectures. Not all lectures were reviewed in recitation sessions.

**CALENDAR**

SES #	TOPICS
R1	<a href="#">Review of topics covered in Lectures 2 and 3 (PDF)</a>
R2	<a href="#">Review of topics covered in Lecture 4 (PDF)</a>
R3	Burrows-Wheeler Transform (BWT) and Alignments. Guest Lecture: Heng Li ( <a href="#">Broad Institute</a> ) The slide deck is not available for this guest lecture.
R4	<a href="#">Review of topics covered in Lectures 5 and 6 (PDF - 1.5MB)</a>
R5	<a href="#">Review of topics covered in Lectures 7 and 8 (PDF - 2.1MB)</a>
R6	<a href="#">Review of topics covered in Lecture 9 and 10 (PDF - 1.8MB)</a>
R7	<a href="#">Review of topics covered in Lecture 10 (PDF - 3.9MB)</a>
R8	<a href="#">Review of topics covered in Lectures 12 and 13 (PDF - 4.2MB)</a>
R9	<a href="#">Review of topics covered in Lectures 14 and 15 (PDF - 2.6MB)</a>
R10	<a href="#">Review of topics covered in Lectures 15 and 16 (PDF - 2.1MB)</a>
R11	<a href="#">Review of topics covered in Lecture 18 (PDF - 1.9MB)</a>
R12	<a href="#">Review of topics covered in Lectures 19 and 20 (PDF - 1.8MB)</a>

**DOWNLOAD COURSE MATERIALS** 6.874 Recitation Slides

These recitation sections were required for students in 6.874, and optional for other students. They covered additional material related to artificial intelligence to supplement the lectures. Slides are available for a selection of these recitations.

SES #	TOPICS
R1	<a href="#">Statistics; Significance Testing; Bonferroni Correction (PDF)</a>
R2	<a href="#">Clustering, Model Selection, and BIC scores (PDF - 2.2MB)</a>
R5	<a href="#">Gene Expression Program Discovery Using Topic Models (PDF)</a>

Figure 2-5-2-F1 Screenshots of MIT OpenCoursware

### **2.5.2.1 Introduction Courseware**

MIT OpenCourseware (MIT OPENCOURSEWARE 2001) is provided wide overview of computational and systems biology. This course covered the history of topics and also expanded on the area in the field meeting today. It is defined various types of methods of deoxyribonucleic (DNA) sequencing of next generation and distinguished between protein elements.

### **2.5.2.2 Strength (Pros)**

#### **1) Authoritative content aligned to distinct and clear learning objectives**

MIT OpenCourseware is included authoritative contents created by a team of subject matters experts and instructional designers. The content and assessments in this courseware are organized in a simple, logical as well as easily customizable order, which enable the students to customize the content in the short time to achieve the goals and objectives.

#### **2) Video lectures are provided for voice teaching**

This courseware will provided the video lectures for the students which consist of voice teaching for easy understanding. Besides that, this courseware provided the video lectures which divided into various different types of topics for ease to use. The students are able to understand the subject deeply by voice teaching in the short time.

#### **3) Recitations features**

This course consists of recitations features for the student to review the topics which covered in the lecture. The recitation sections covered some additional material for students to gain extra knowledge. In the addition, the students can reviewed the recitation section as references for doing the assignments as well as projects.

### **2.5.2.3 Weakness (Cons)**

#### **1) Lack of interest without game module**

This courseware can't attract the attention of most of the students as it didn't include a game module. The game module is allowed for the students to play some mini flash games which are related to their courses to reduce their learning stress in their daily life. Thus, the students will lack of interest by using this courseware.

#### **2) Without subtitle in video lectures**

The video lecture is good for voice teaching. However, the students can't follow up the speed of the video and lack of understanding without the subtitle in this courseware. For the students who are weak in English language, they will can't understand the voice teaching and just watch the video.

### 2.5.3 Media Foundry

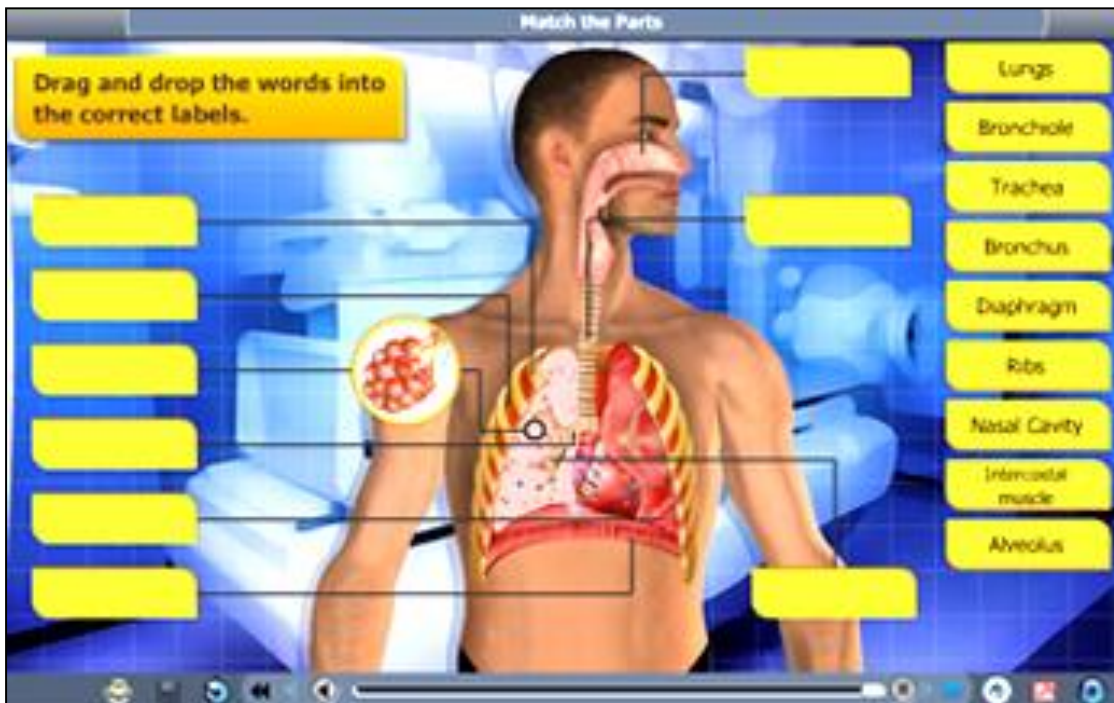
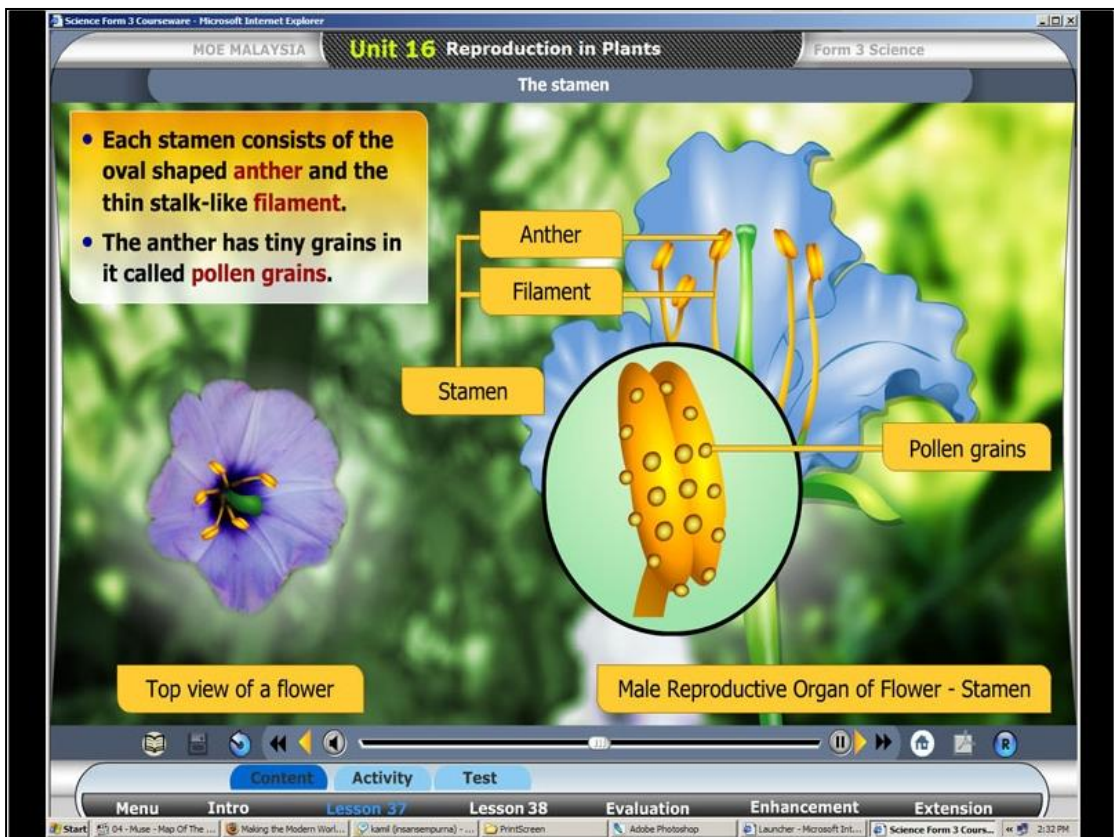


Figure 2-5-3-F1 Screenshots of Media Foundry

### **2.5.3.1 Introduction Courseware**

Media Foundry (NETCARBON 2010) is built for the consumption of Ministry of Education under the project. This courseware is built for the students to learn the Form 3 Science knowledge and information as well as helped the teachers to teach this Science subject in English.

### **2.5.3.2 Strength (Pros)**

#### **1) Video lectures are provided for voice teaching**

This courseware will provided the video lectures for the students which consist of voice teaching for easy understanding. Besides that, this courseware provided the video lectures which divided into various different types of units for ease to use. Each of vocabulary will came out with their pronunciation, detail descriptions, examples and others essential information. The students are able to understand the subject deeply by voice teaching in the short time.

#### **2) Colourful and attractive user interface design**

This courseware consists of colourful and attractive user interface based on the students' requirements and needs. This courseware with the attractive and wonderful images to design the background can attracted the attention of students and kept on using this courseware in the daily life.

#### **3) Adaptive practice**

Based on dynamically modeled students learning state, some practice questions are selected for the individual users for learning objective. This multimedia courseware provided the features of drag and dropped the words into the correct labels which had been prepared for the students. This feature can test the students' understanding and the students had more opportunities to practice their skills and knowledge.

### **2.5.3.3 Weakness (Cons)**

#### **1) Lack of interest without game module**

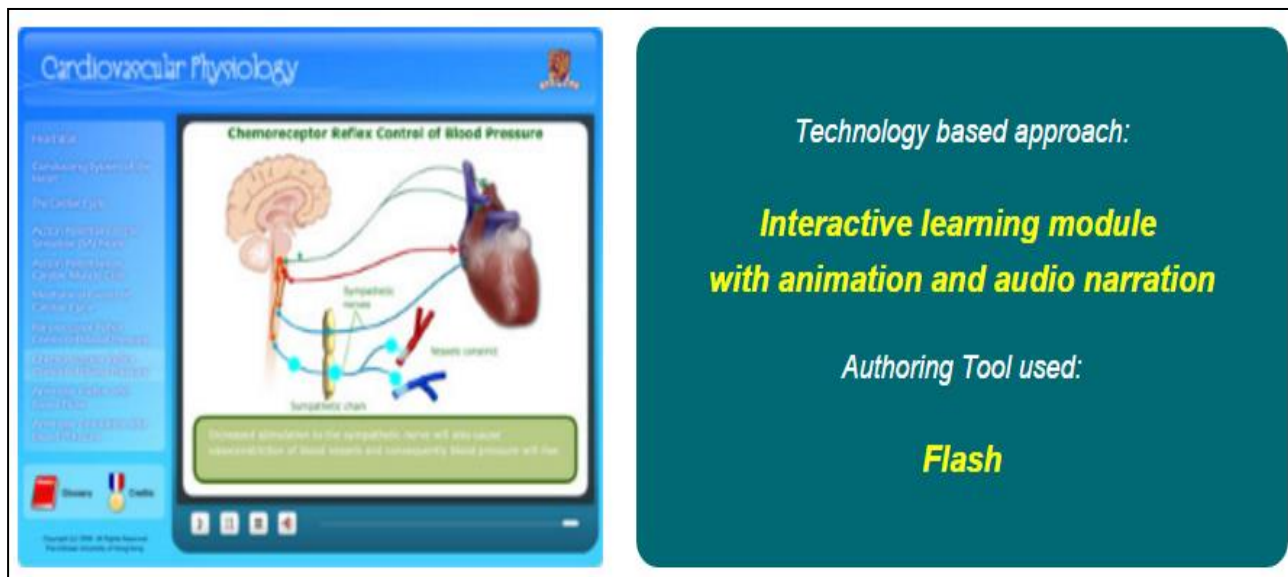
The weakness in this multimedia courseware is it didn't provide game module for the individual users to learn the particular subject. The game based learning program is become very familiar and popular in the current market. Therefore, game module in the learning process will be an element to attract students to learn the new knowledge. Thus, the students will lack of interest by applying this courseware without games.

#### **2) Multiple language support**

This courseware only supports English language and can't fulfill some students' requirements. If the students are weak in English language, they can't understand fully about the knowledge and information which is provided in this multimedia courseware.



## 2.5.4 WebCT and Moodle-Supported Animated Courseware



**Figure 2-5-4-F1 Screenshots of WebCT and Moodle-Supported Animated Courseware**

### 2.4.4.1 Introduction Courseware

WebCT and Moodle-Supported Animated (CUHK 2015) is acted as a course-specific animated and narrated courseware package. This courseware included the interactive learning module with animation and audio to conduct the learning process for the secondary students. It is related to the concepts as well as mechanisms to the human heart's physiology.

### 2.5.4.2 Strength (Pros)

#### 1) Clean and clear user-interface

This courseware is provided a clean and clear user-interface for the students. The designer had control the using of colourful text and image regularly to prevent the problem of interference factors and disturbed the learning process of the students. Therefore, the individual users are able to focus on the contents which are provided by the courseware without distracted.

## **2) Attractive animation and audio**

This courseware is focused and designed the content of the topics by putting more animation and audio. Besides that, animation and audio are divided into various different types of topics for ease to use. The attractive animation and audio can increase students' interest to learn Science knowledge and able to understand the subject deeply by voice teaching in the short time.

### **2.5.4.3 Weakness (Cons)**

#### **1) Lack of interest without game module**

This courseware can't attracted attentions of most of students as it didn't involve game module in this courseware. The game module is allowed the students to play some mini flash games which are related to their courses to reduce their learning stress in the daily life. Besides that, those students are able to learn the Science knowledge and reinforce their learning memories while playing games in game module. Thus, the students will lack of interest by using this multimedia courseware.

#### **2) Without subtitle in video lectures**

The video lecture is good for voice teaching. However, the students can't follow up the speed of the video and lack of understanding to the contents without any subtitle in this multimedia courseware. For the students who are weak in English language, they will can't understand the voice teaching and just watch the graphics in the video.

#### **3) Backup and restore**

The students can't keep the record for their tutorial's result as this courseware didn't had the backup and restore features. The students can't make the comparison between their current tutorial's results and previous results. Hence, they can't determine their progressive in learning the Science subject and this will affected the performance of the students in the learning progress.

### 2.5.5 Hippocampus

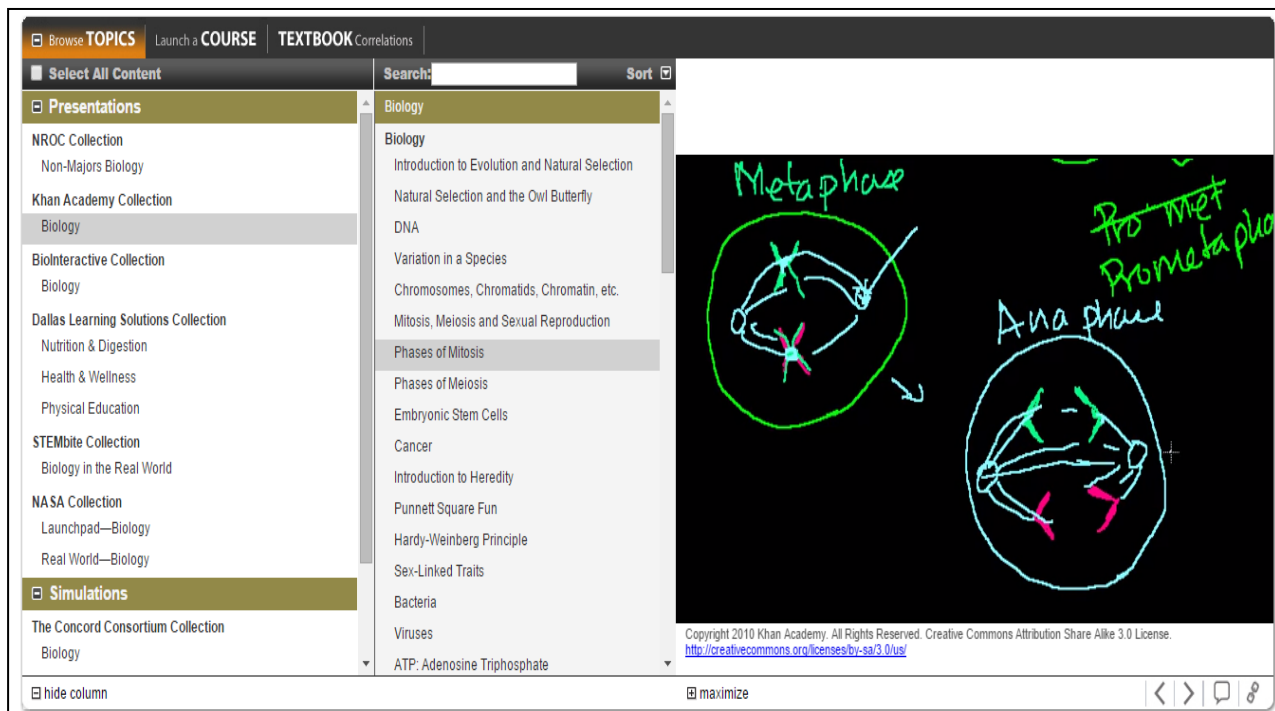


Figure 2-5-5-F1 Screenshots of Hippocampus

#### 2.5.5.1 Introduction Courseware

Hippocampus (NCS-TECH 2015) is provided totally free multimedia courseware for the students to learn the various different types of topics. It is just visited the page and clicked on the related course such as Environmental Science and Biology, no registration is needed.

#### 2.5.5.2 Strength (Pros)

##### 1) Authoritative content aligned to distinct and clear learning objectives

Hippocampus courseware is included authoritative contents designed and developed by a group of subject matters experts as well as instructional designers. The content, knowledge and assessments in this multimedia courseware are organized in a simple, logical as well as easily customizable order, which enable the students to customize the content in the short time to attain the objectives which is set before.

**2) Video lectures are provided for voice teaching**

This courseware will offered different types of video lectures for the students which consist of voice teaching for easy understanding. Besides that, this courseware provided the video lectures which divided into various different types of units for ease to use. Those fully descriptions and explanations in the video are able to strengthen students' memories during the learning process. The students are able to understand the subject deeply by voice teaching in the short time.

**2.5.5.3 Weakness (Cons)**

**1) Lack of interest without game module**

This courseware can't attracted attentions of most of students as it didn't include game module. The game module is allowed the students to play some mini flash games which are related to their courses to reduce their learning stress in the daily life. Moreover, the students are able to enhance their critical thinking and problem-solving skills by playing the meaningful games in the courseware. Thus, the students will lack of interest by using this courseware without provided some games.

**2) No tutorial and exercise module**

Every exercise and tutorial helped to test the understanding of the students about the related topic. This module is a process for the students to find out the solution for the multiple-choice questions. However, this courseware didn't provide any related tutorial questions and exercises for the students. Hence, the students are unable to determine their own understanding level about the Science topics.

**3) Without subtitle in video lectures**

The video lecture is good for voice teaching. However, the students can't follow up the speed of the video and lack of understanding without the subtitle in this courseware. For the students who are weak in English language, they will can't understand the voice teaching and just watch the video. Therefore, most of the students can't improve their learning performances after using this courseware as they not really understand the contents in the video provided.

2.5.6 SCO



Figure 2-5-6-F1 Screenshots of SCO

2.5.6.1 Introduction Courseware

The SCO education courseware (SCO 2010) is designed for the preschool children who would be learning Science subjects. It provided various types of features such as practice, games and other for the children to gain Science knowledge.

### **2.5.6.2 Strength (Pros)**

#### **1) Colourful and attractive user interface design**

This courseware consists of colourful and attractive user interface based on the children's requirements and needs. This courseware with the attractive and wonderful images to develop the background can attract the attentions of children and kept on using this courseware in the daily life. Therefore, the children can fully understand the contents and memorize the knowledge by continually applying this courseware.

#### **2) Consists of game module**

The game module allowed the children to play some mini flash games that develop by the author to reduce their stress during studying. This module is act as powerful forces in the development of the children's mind as it let the children to establish, reflect as well as work out their own understanding about the topic. The mini flash games which are full of challenge and fun will motivate the children to play it regularly. Thus, the children can reinforce memory about some parts of the topic and understand the topic deeper.

#### **3) Provided tutorial questions and exercises**

The tutorial module is conducted after the children study the learning module of the software. Every exercise and tutorial helped to test the understanding of the children about the related topic. This module is a process for the students to find out the solution for the multiple-choice questions. After doing the tutorial questions, the children are able to realize their own understanding level about the topic.

### **2.5.6.3 Weakness (Cons)**

#### **1) Multiple language support**

This courseware only supports English language and can't fulfill some students' requirements. If the students are weak in English language, they even can't understand the knowledge and information which is provided in this courseware. Therefore, some parts of individual users will not selected this courseware as their learning materials.

## 2.6 Learner Centered Approach

Learner centered approach is also known as child-centered learning. It is a learning that mainly majors on the demands of the learners other than those of other involved parties like teachers and administrators in the education system. By applying learner centered approach, the teachers are placed to promote the learning, concentrate on their interests, learning styles and requirements of students.

There are a lot of benefits for using learner centered approach in the education system. First and foremost, the benefit of learner centered approach is knowledge base. The conclusive outcome of decades of research on knowledge base is that what an individual already knows widely determines what new data and information he or she attends to, how to organize and represents new knowledge, as well as how to filter new experiences, and even what he or she determines to be significant and relevant. (Alexander & Murphy, 2000)

Secondly, benefits of learner centered approach is included strategic processing and executive control. The necessary aspect of learning is the ability to reflect on as well as regulate learners' ideas, thoughts and also behaviors. Successful students are able to perform well in their learning process such as involved in their own learning actively, reflect on their learning, monitor and control their own thinking as well as assume responsibility for their own learning. (Lambert & McCombs, 2000)

In the addition, one of benefit for using learner centered approach is related to affect and motivation. It can increase and enhance learners' motivation for learning and even larger satisfaction with school. Then, both of these results lead to larger achievements. Based on the research, it is shown that intrinsic motivation, personal involvement, personal commitment, confidence in individual's abilities to succeed, as well as a perception of monitor and control over the learning process lead to more learning and also greater achievements in learning environment such as school and university. (Alexander & Murphy, 2000)

Besides that, benefits of learner centered approach is included development and individual differences. Both inherited and environmental elements are influenced the progress of individuals through different common phases of development. It was depending on the tasks or contexts, alters in how individual think, behave or believe are

## CHAPTER 2 LITERATURE REVIEW

dependent on association of individual's inherited abilities, phases of development, individual differences, performances, experiences as well as various conditions of environmental. (Alexander & Murphy, 2000)

Moreover, another benefits of learner centered approach is about situation or context. Theories of learning that highlight the roles of active engagement and also social interaction in the learners' own construction of information and knowledge are extremely support this approach. Learning is acted as a social process. There are various types of environmental factors such as teaching methods of instructors, how actively engaged the learner in the learning process positively or negatively affect how much they learn. In the comparison learning between active learning process and learners in lecture, those learners are significantly more learning gains in the active learning course rather than in lecture. (Springer, Stanne, & Donovan, 1999)

User learner approach is going to be use for this project. This approach is being encouraged in education nowadays. User learner approach emphasizes variety types of ways that shifted the role from givers of knowledge to facilitate the learning of students, but not just employ in a single learning method. This approach is placed the emphasis on the people who is doing the studying (Weimer, 2002) and focused on the learning process. Both of these phrases are applied to identify their critical role in process of learning. The phrase user learner approach is used to have a focus of consumer and encourages students to become more powered. When the focus become user learner approach in learning process, secondary school achieved higher rates of student retention as well as had better intended graduates for those students who are more trained traditionally.



## **2.7 Suggested Features**

There are few strengths and weaknesses on each multimedia courseware reviewed. To develop a better project, the courseware will inherit the strengths of each multimedia courseware and also enhance the weaknesses. Thus, some improvements features are suggested as below.

### **2.7.1 Dynamic learning analytic dashboards**

This idea is enable to monitor and control the students' learning progress in real-time as well as anytime. When the students undertake activities of studying in the courseware, dynamic learning analytic dashboard will gathered, analyzed and stored the data that are generated. This feature can coordinate those activities to definite learning objectives and to the component skills needed to master those objectives in the projects. This enables the students to adopt a learning model to analyze and store the related data as well as supply a highly actionable solution.

### **2.7.2 Time-limited tutorial exercises**

Every exercise and tutorial assists to test the understanding of the students about the related topic. This is a process for the students to find out the solutions for the multiple-choice questions in the limited time. The time-limited tutorial exercises can test the students' speed and increase their efficiency and effectively.

### **2.7.3 Import soft music to courseware**

Some soft music should be imported to the multimedia courseware. The soft music is enable to reduce the stress of students and would not disturbed students to learn the Science topics. In the addition, the imported music can increase the students' learning interest as well as will not feel bored while using this multimedia courseware.

### **2.7.4 Comic dialogue exercises**

This idea can increase the students' learning interest and is enabling to enhance their memory during studying. The comic dialogue exercises can make the traditional style of tutorial questions become more funny and amusing. This idea can attract the interest of students to keep on using the courseware for learning.

Multimedia Courseware Name	Multimedia Element					
	Text	Audio	Animation	Graphic	Video	Game
Acrobatiq	✓	✓	✓	✓		
MIT OpenCourseware	✓	✓	✓	✓	✓	
Media Foundry	✓	✓	✓	✓	✓	
WebCT and Moodle Supported Animated Courseware	✓	✓	✓	✓	✓	
Hippocampus	✓	✓		✓	✓	
SCO	✓	✓	✓	✓	✓	✓

**Table 2-7-T1 Courseware reviewed features comparison (Part 1)**

CHAPTER 2 LITERATURE REVIEW

Multimedia Courseware Name	User Interface Design			Content	Interactivity
	Colour	Usability	Navigation		
Acrobatiq	3	1	1	1	2
MIT OpenCourseware	3	1	1	1	2
Media Foundry	1	2	1	2	1
WebCT and Moodle Supported Animated Courseware	2	3	2	3	3
Hippocampus	3	2	2	2	3
SCO	1	2	1	2	1

1-Excellent    2-Good    3-Average    4-Poor    5-Bad

**Table 2-7-T2 Courseware reviewed features comparison (Part 2)**

## **2.8 Propose Solution**

The purpose of multimedia courseware is to act as a studying aid for students in order to attract their interest to learn the Science subject. It also encourages the students and users in improving their learning skills and abilities. Next, it motivates the students to understand the information and contents of Science deeply.

### **2.8.1 Improving courseware quality**

Multimedia courseware consists of animation, image, video, graphics and other. The author should choose appropriate media to present different knowledge and information and prevent just the pure text. In the addition, the author should control the using of text and image regularly. Otherwise, it will make the problem of interference factors and cannot provide any help in learning. The good quality of multimedia courseware will help the understanding of students as well as able to master the content of subject better. The key is author need to apply the methods used appropriately.

### **2.8.2 Controlling information and improve understanding input**

The author should pay more attention to control the information and knowledge quantity during making the multimedia courseware. The author input knowledge should set slightly higher than the current standard of students. If the input knowledge is too easy and simple, it cannot improve the studying interest of students. However, it can discourage the study enthusiasm of the students during learning if the input knowledge is too complex. So, a slightly higher level of the input information can promote the learning motivation of students and increase their problem-solving skills. Therefore, the multimedia courseware must act as an elaborate design. Besides that, the author can use various types of colours to display the input information in order to highlight the importance. This project is able to strengthen their acknowledgement as well as enhance their memory and also understanding to the related topics.

### **2.8.3 Designing more open practice and increase positive thinking of students**

The author should prepare more and more practices and exercises into the multimedia courseware. The author should prepare some adequate questions for thinking and determining. The students need to try to deepen the related problems and questions step by step during discussing. Next, it is stimulate students to discover the principle and rules by themselves. The author can also prepare some extra input information and knowledge to increase students' understanding of the contents which are related to the particular subject.

### **2.8.4 Improve the user interface and focus on animation design**

The author needs to design the user interface based on the users' requirements and needs to prevent any complex features which can included into the system. The author can apply the questionnaire to improve the standard of multimedia courseware. Then, authors should focus and design the content of the subject by putting more funny animation. They need to apply more attractive image and graphics to design the background. In the addition, the button can also use different colours or put some cute picture to represent it in the multimedia courseware. Various studies have showed that the interactivity has a well positive effect for the learners on studying.

### **2.8.5 Reduce time for understand the content and provide voice teaching**

The author should use the animations, graphics, videos and others to represent the content rather than a lot of words which try to carry out the meaning of content. The students are able to understand the subject by using graphical or charts in the short time. Besides that, the author will provide the voice teaching for easy understanding. The students can play the mini flash game which is related to the subject at the same can study the pronunciation. It is great in the educational fields.

## Chapter 3.0 System Design

### 3.1 Overview

In this chapter, the author will discuss about the system requirements. There are consist of two types of system requirements, which are software requirements and hardware requirements. The author had suggested different software for implementing multimedia elements such as audio, animation, text, graphics, video and others. Besides that, the suggested development tools in this project are included Adobe Flash, Adobe Director, Microsoft PowerPoint, Adobe Photoshop, Adobe Premiere, Digital Audio Editor and others. In the additions, the hardware requirements are differentiate into two types, which are minimum requirements and optimal requirements.

### 3.2 System Requirements

#### 3.2.1 Software Requirements

Multimedia Elements	Software
Audio	Digital Audio Editor
Animation	Adobe Director MX 2004
Text	Microsoft PowerPoint 2013
Graphic	Adobe Photoshop CS5
Video	Adobe Premiere Pro CS5.5
Authoring Tool	Adobe Director MX 2004

**Table 3-2-1-T1 Table of software requirements**

#### 1) Adobe Director

Adobe Director can combined and integrated a large amount of media types such as video, animation, sound, picture and other technologies into single work. It can develop a stunning multimedia interactive program, with a high quality of animation and interactivity. After that, the author can created the three-dimensional animation effects by applying its distinct engine of Shockwave 3D. However, the image which is

processing by Adobe Director is not too fine as the size of file is relatively greater than Adobe Flash.

## **2) Microsoft PowerPoint**

Microsoft PowerPoint is one of the important and significant software which is produced by Microsoft Company. The purpose of the Microsoft PowerPoint is make the production of audio, images, video and other. In the addition, this tool can import wonderful images, enter tables and text easily to produce the colourful film sides as well as wonderful speeches for teaching, reports and other. Then, it is easy to study, had a high efficiency and use less time for students to understand the contents. Although the Microsoft PowerPoint has far away from the multimedia courseware's needed, but the author cannot deny the quick advantages and convenient of it.

## **3) Adobe Photoshop**

Adobe Photoshop is a professional graphics rendering as well as image processing tool. It can allow the images to attain the desired effect and result. The author can create the wonderful background of the page in the multimedia courseware by applying Adobe Photoshop.

## **4) Adobe Premiere**

Adobe Premiere is a popular and famous software for editing the video which produced by the Adobe Company. This tool had a good editing screen as well as high compatibility during designing the multimedia courseware. Besides that, it also allowed to cooperate mutually with other efficiency software which is created by Adobe Company. The author is used the Adobe Premiere to edit any video elements to supply the high quality of visual materials for the design multimedia courseware.

## **5) Digital Audio Editor**

Digital audio editor is one of the useful software to record and edit the audio for the project. The digital audio editor can record audio from various types of different sources and applied variety of effects as well as functions such as noise equalization to increase the quality of the multimedia courseware. It also allowed the sound clips by ordering the sequential of clips or cutting out the certain parts of the audio. After that, this tool can mixed the multiple tracks into one output track for the project.

### 3.2.2 Hardware Requirements

#### 1) Minimum Requirements

Hardware	Specification
Platform	Windows XP
Processor	1 GHz Intel Core i3
Number of Cores	Dual-Core
Memory	512 MB RAM

**Table 3-2-2-T1 Table of minimum hardware requirements**

#### 2) Optimal Requirements

Hardware	Specification
Platform	Windows XP, Windows 7, Windows 8
Processor	2.4 GHz Intel Core i7
Number of Cores	Quad-Core
Memory	4 GB RAM

**Table 3-2-2-T2 Table of optimal hardware requirements**



### 3.3 ADDIE Model

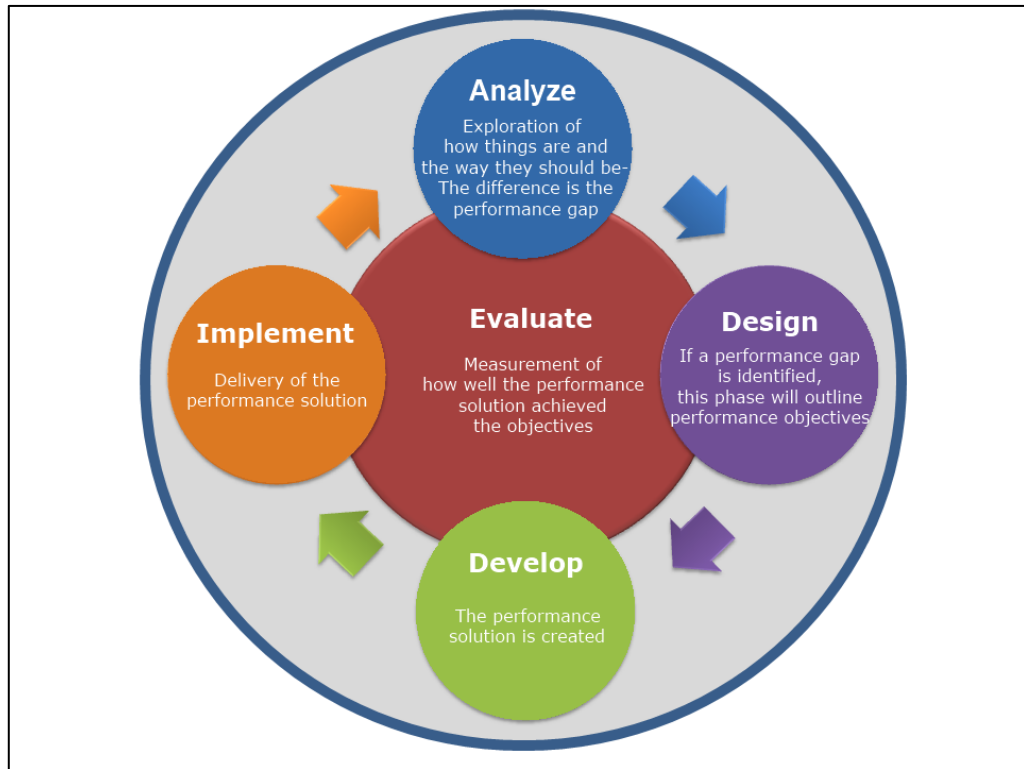


Figure 3-3-F1 ADDIE model

### 3.3 ADDIE Model

The ADDIE model is the model of instruction design, which applied as a principle to their models of others form of instructions (McGriff 2000). It is also a model which provided an organized process. The ADDIE model consists of five phases which was included analysis, design, development, implementation and evaluation.

#### 3.3.1 Analysis

The analysis phase is the first and most important phase in ADDIE model as it will uncover the errors and problems of the unit under learning. During this phase, the author must define the problem of traditional teaching method and identify the problem sources of existing multimedia courseware in educational. Then, the author is required to determine possible solutions to solve the existing problems and also analysis as well as identify the need and requirements of the students or users. This phase should include the specific research techniques like task analysis, job analysis and others. The outputs of this phase are included instructional goals of the project. The outputs will become the inputs for the design phase.

### **3.3.2 Design**

The design phase used the outputs from the analysis phase for the following activities. This systematic approach allows everything falls within a well-planned or rational strategy which contained an ultimate target to achieve the instructional goals. The author focused on writing the project objectives, planning of lesson, conducting a subject matter analysis, content and others in this phase. In the addition, the author also needs to develop test items as well as identify the resources. The design phase should be specific and must be executed with attention to details. The outputs of design phase will become the inputs for the development phase.

### **3.3.3 Development**

The development phase is built on the analysis and design phase. The goal of this phase is to generate the lesson plans and prepare the lesson materials. The author will applied all the data and information which gathered from the previous stages to create a program. Besides that, this phase is all about putting the efforts into actions and it is included three tasks such as drafting, production as well as evaluation. The development stage is involved software (computer-based instruction) and hardware (simulation equipment). The author should work with the producers and develop flowchart, workbook as well as program in this phase.

### **3.3.4 Implementation**

The implementation phase is showed that continuous modification of the program to obtain the positive and correct results as well as reach the maximum efficiency in the project. So, the aim of this phase is delivery of instruction effectively and efficiently. In the implementation stage, it enhances the students' understanding of material, support the mastery of objectives which set by the students and others. The author should regularly analysis, redesign and promote the product to ensure effective and efficient delivery of products. No program or project should execute its course by itself with the absence of the proper and well evaluation from the ADDIE model. The author is provided teacher training and tryout for the target users.

### **3.3.5 Evaluation**

The last phase of the ADDIE model is evaluation phase. This phase gauge the efficiency and effectiveness of the instruction in the project. Then, the author should conduct this important phase throughout the entire process such as within stages, between stages and after implementation phase. The evaluation phase can be separated into two parts, which are formative evaluation and summative evaluation. Formative evaluation is ongoing during as well as between the stages. The aim of formative evaluation is to enhance the instruction before implementing the final version of the project. On the other hand, summative evaluation is usually applied after implementing the final version of the instruction, which means that this part will continuous the tasks after the formative evaluation. Data and information that can obtain from the summative evaluation is regular used to make a decision or judgment which related to the instruction. The author is able to evaluate the overall effectiveness and efficiency of the instruction by conducting the summative evaluation phase into the project. The author can record time data, interpret results of test, survey students as well as revise meaningful activities.

### **3.3.6 Reason of Using ADDIE Model**

There are few reasons of using ADDIE model to develop the multimedia courseware. Firstly, ADDIE model is a systematic and step-by-step framework which helps in developing the prototype. The ADDIE model is able to provide an extremely distinct, clear as well as transparent way, so that the author can design the multimedia courseware accordingly. Besides that, this model also supplies an overall view of the studying process. It is characterized by a sequential process for collecting and analyzing the information and the target users' requirements. This project will choose the ADDIE model as it matches and reinforce the objectives of study as well as it will also add some function to the selected model to produce a new model. In the addition, the evaluation of the effectiveness and efficiency of the multimedia courseware will be done and also make improvement from the user's feedback and suggestions (Hammza, Daw & Faryadi 2013).

### **3.4 Implementation Issues and Challenges**

The issues and challenges in the multimedia courseware of the Science subject is the design of the user interface. Sometimes, the author needs to design the user interface of the system which is based on the target user requirements. Although the students are preferred video, animation and also colourful items, but different students love different colours. So, it is very hard for the author to design the multimedia courseware which matched all the users. In the addition, based on the questionnaire from the data collection, many users are unsatisfied the user interface's design of the system and feel the existing multimedia courseware is not attractive as well as feel bored about it. As the result, the author is very difficult to define the pattern and structure of design which can match the most requirements of the users (Sidhu & Ramesh 2006).

Besides that, the author is determined what the property and features can add into the system, so that the students can feel more interesting while using the courseware. The features must be designed not too complex as some students will lack of computer technical skills and can't use the system easily. In the addition, due to the target users are still young and not yet mature, they don't know what they actually needed. At the end, the author is difficult to design the multimedia courseware based on the students' requirements. In the system development life cycle (SDLC), the author must identify the user requirements and needs as well as also the problem statements.

Last but not least, the author is not always made an obvious distinction between different teaching methods. For example, some teachers may overlap in their teaching ways during the lecture or tutorial class. Then, some of them have the different opinions of the function of tutorial. Thus, the author is very hard to visualize exactly the consciousness of students pertaining to lectures, tutorials and others.

### 3.5 System Flow Diagram

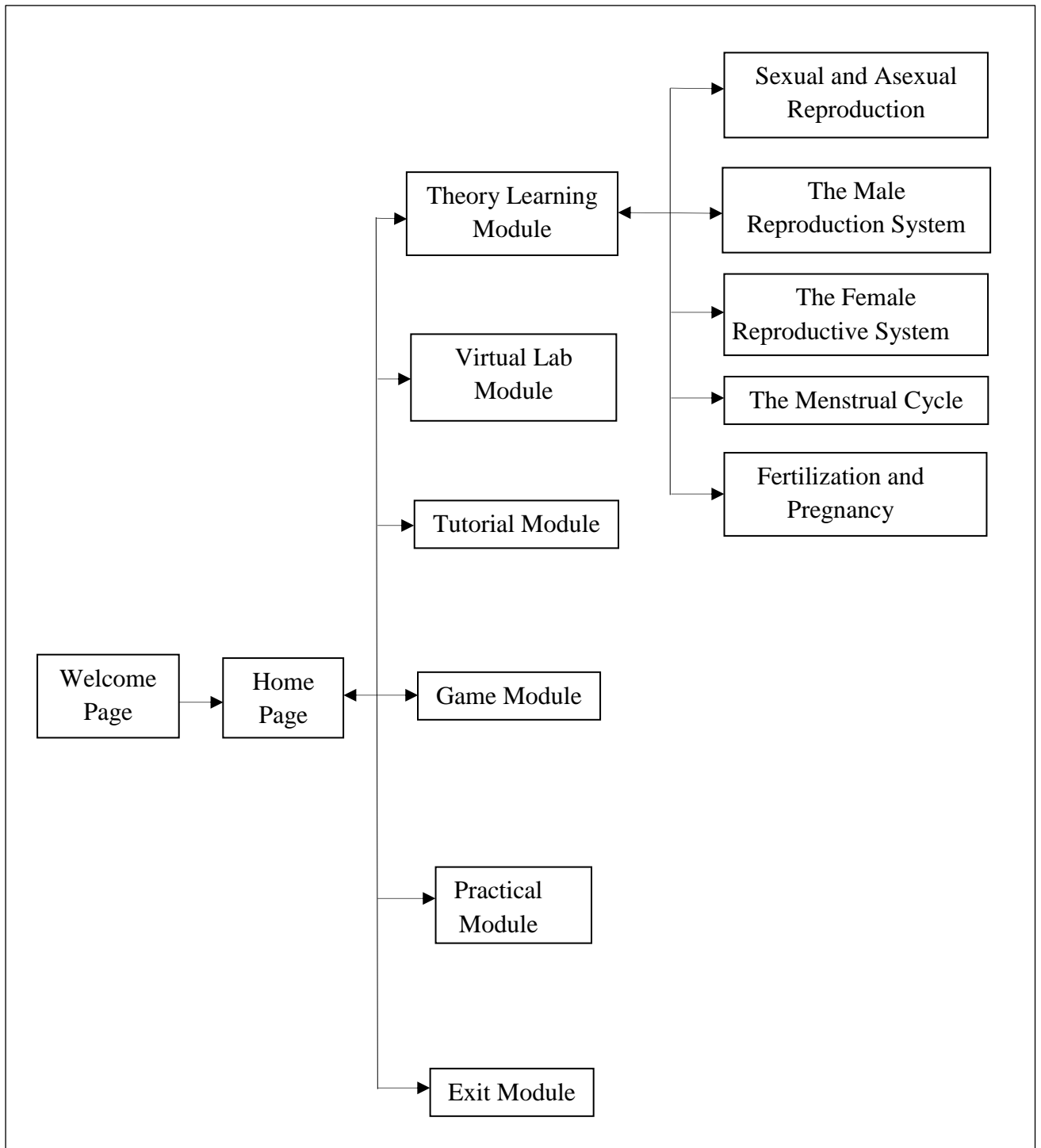
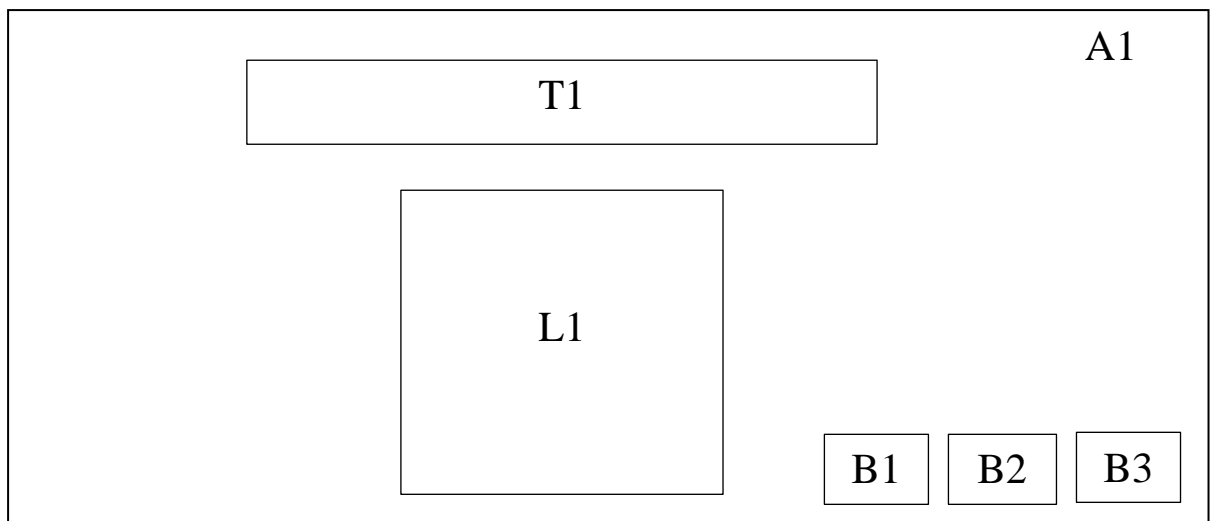


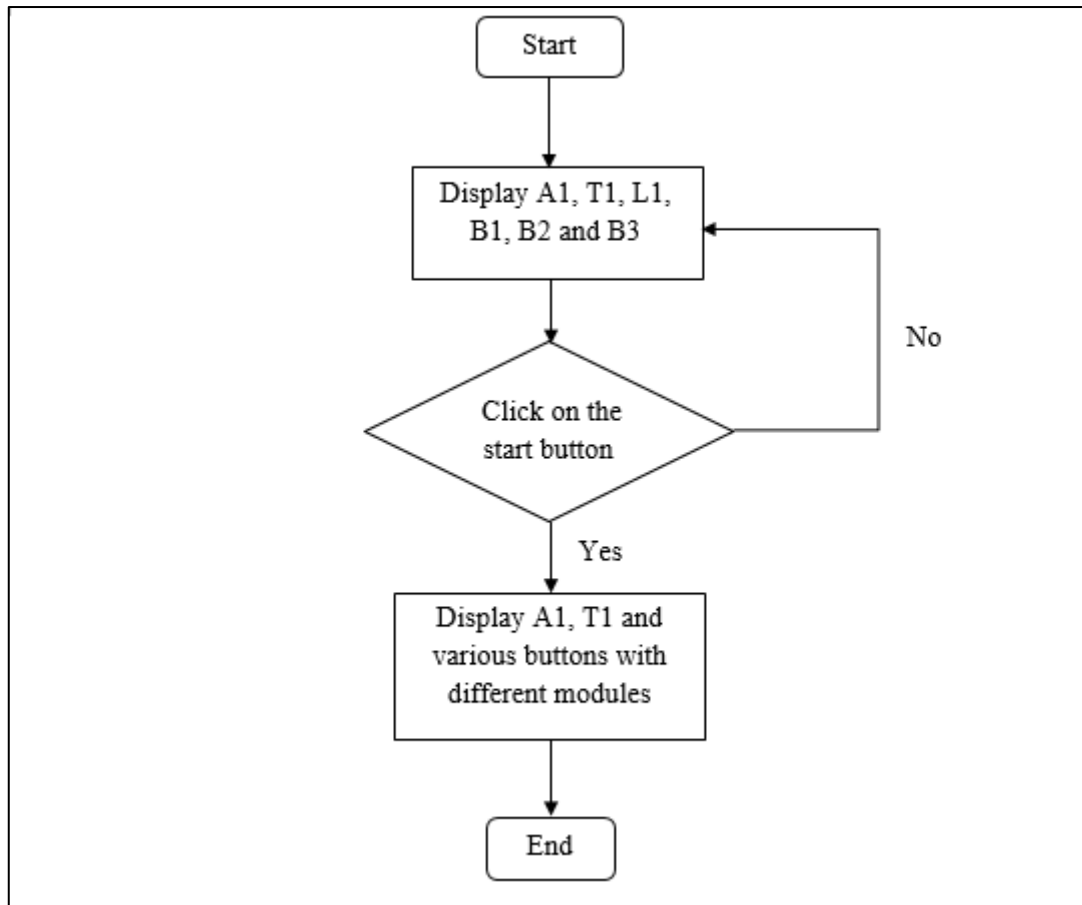
Figure 3-5-F1 System Flow Diagram

### 3.6 Storyboarding Design



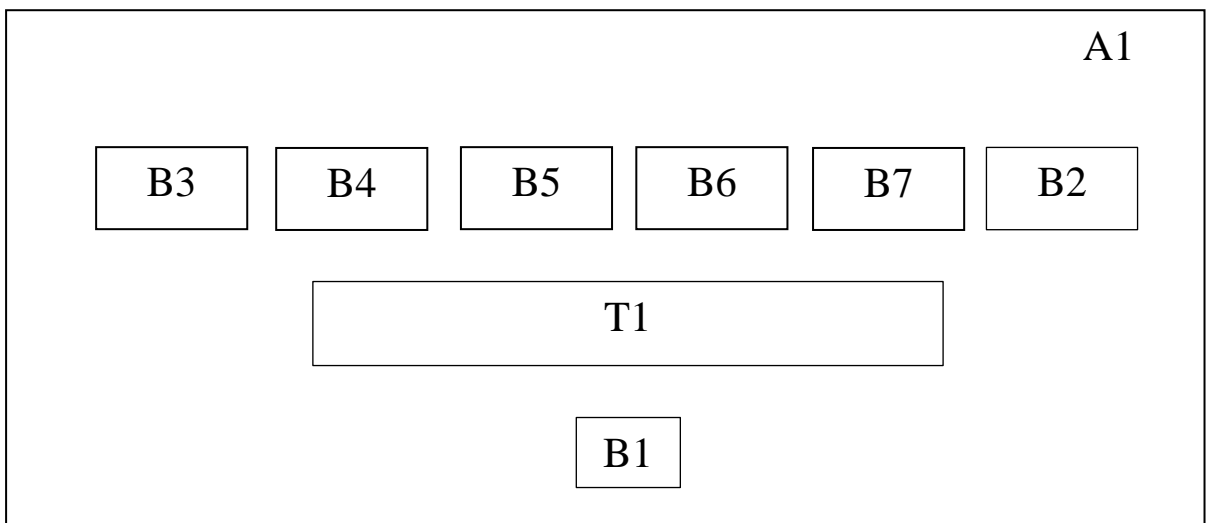
**Figure 3-6-F1 Welcome Page**

Label	Description
A1	Background of multimedia courseware.
T1	Title of welcome messages to users.
L1	An animation will display in this page.
B1	“Sound” button will play and mute the sound.
B2	“Start” button will link to the Main Menu.
B3	“Exit” button will exit the application.



**Figure 3-6-F2 Flow Chart Diagram of Welcome Page**

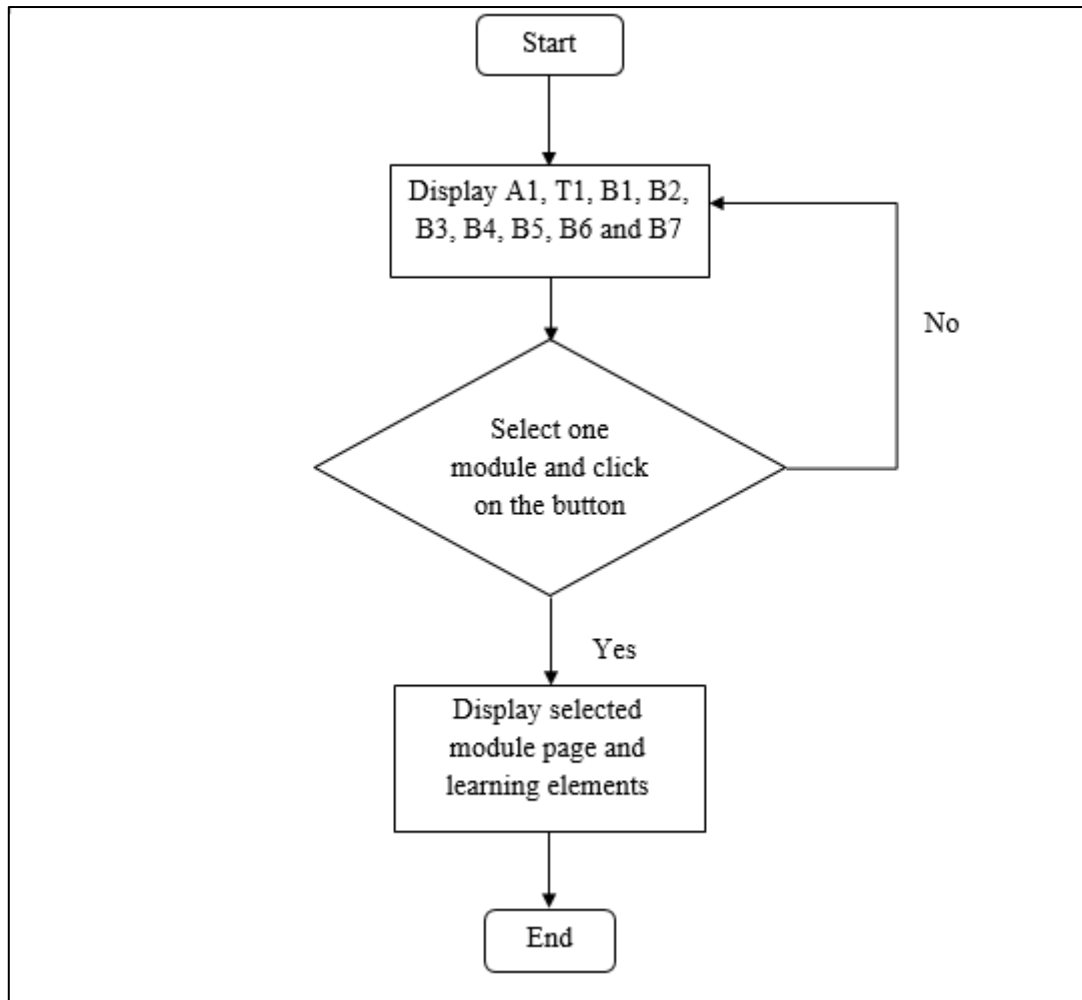
- No of Storyboard : 2
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Main Menu
- Internal Link Page : Theory Learning Page, Tutorial Page, Game Tutorial, Virtual Lab Page and Practical Page
- Description : This page will display different buttons to let users to select the section which they wish to enter.



**Figure 3-6-F3 Main Menu**

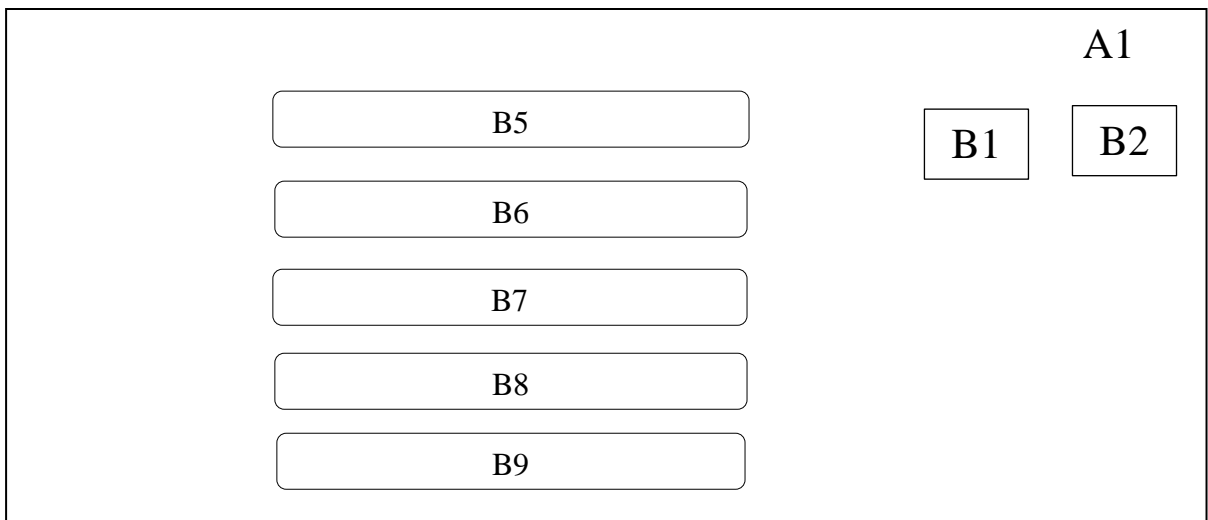
Label	Description
A1	Background of multimedia courseware.
T1	The title of multimedia courseware in Science.
B1	“Sound” button will play and mute the sound.
B2	“Exit” button will exit the application.
B3	“Theory Learning” button will link to the Theory Learning Page.
B4	“Tutorial” button will link to the Tutorial Page.
B5	“Game” button will link to the Game Page.
B6	“Virtual Lab” button will link to the Virtual Lab Page.
B7	“Practical” button will link to the Practical Page.





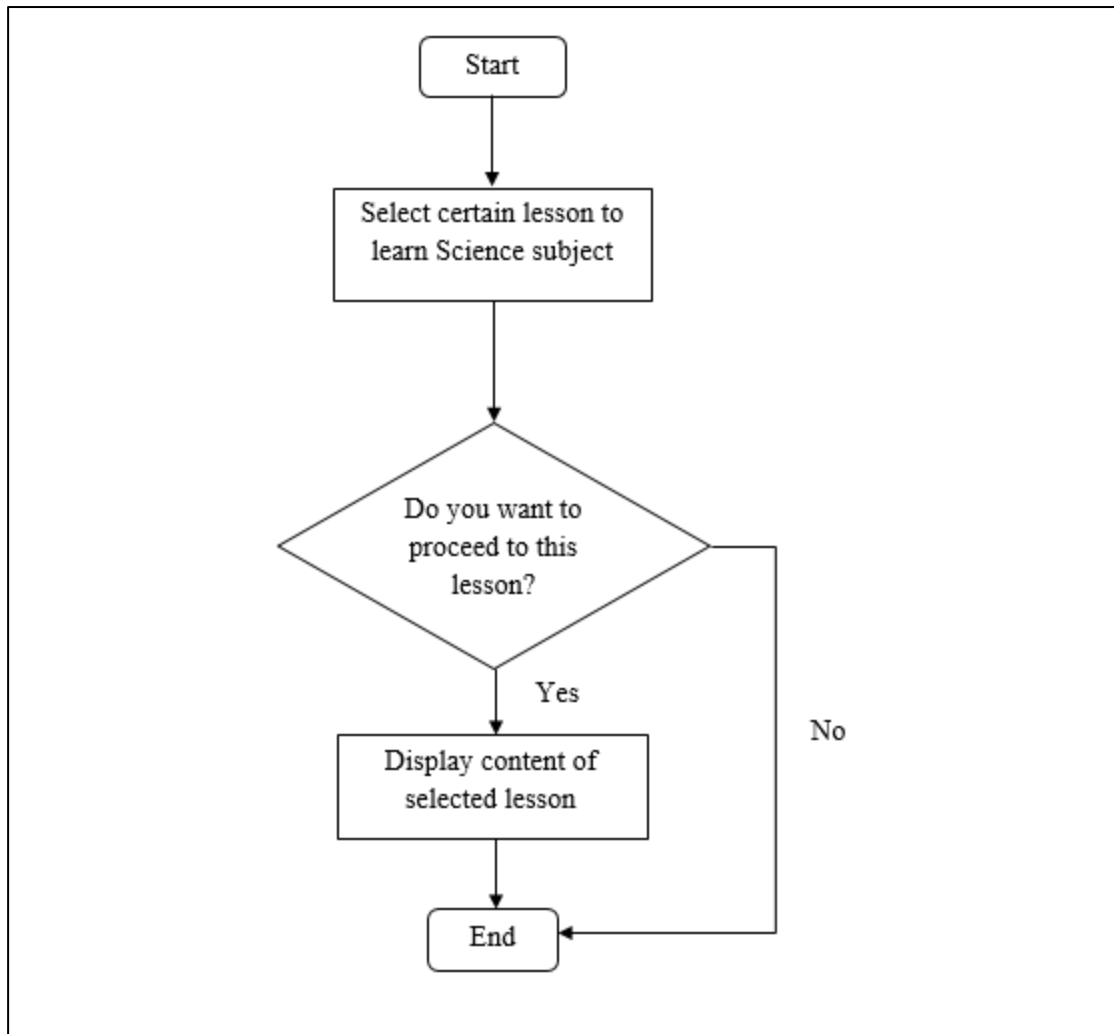
**Figure 3-6-F4 Flow Chart Diagram of Main Menu**

- No of Storyboard : 3
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Theory Learning Page
- Internal Link Page : Main Menu
- Description : This page will display an animation and text for opening the application to welcome the users.



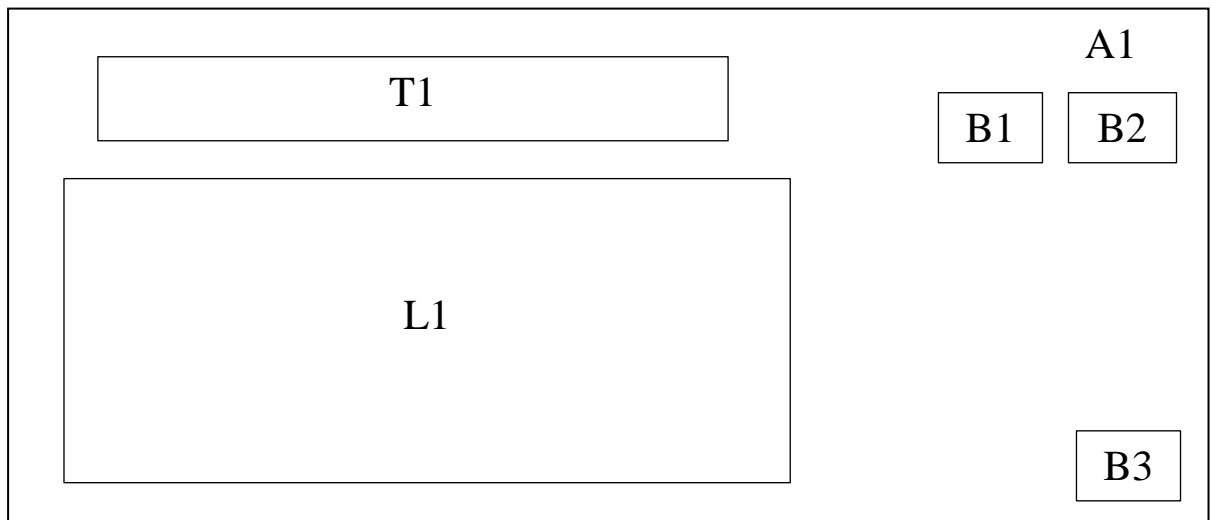
**Figure 3-6-F5 Theory Learning Page**

Label	Description
A1	Background of multimedia courseware.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B5	“Lesson 1” button will link to the lesson 1.
B6	“Lesson 2” button will link to the lesson 2.
B7	“Lesson 3” button will link to the lesson 3.
B8	“Lesson 4” button will link to the lesson 4.
B9	“Lesson 5” button will link to the lesson 5.



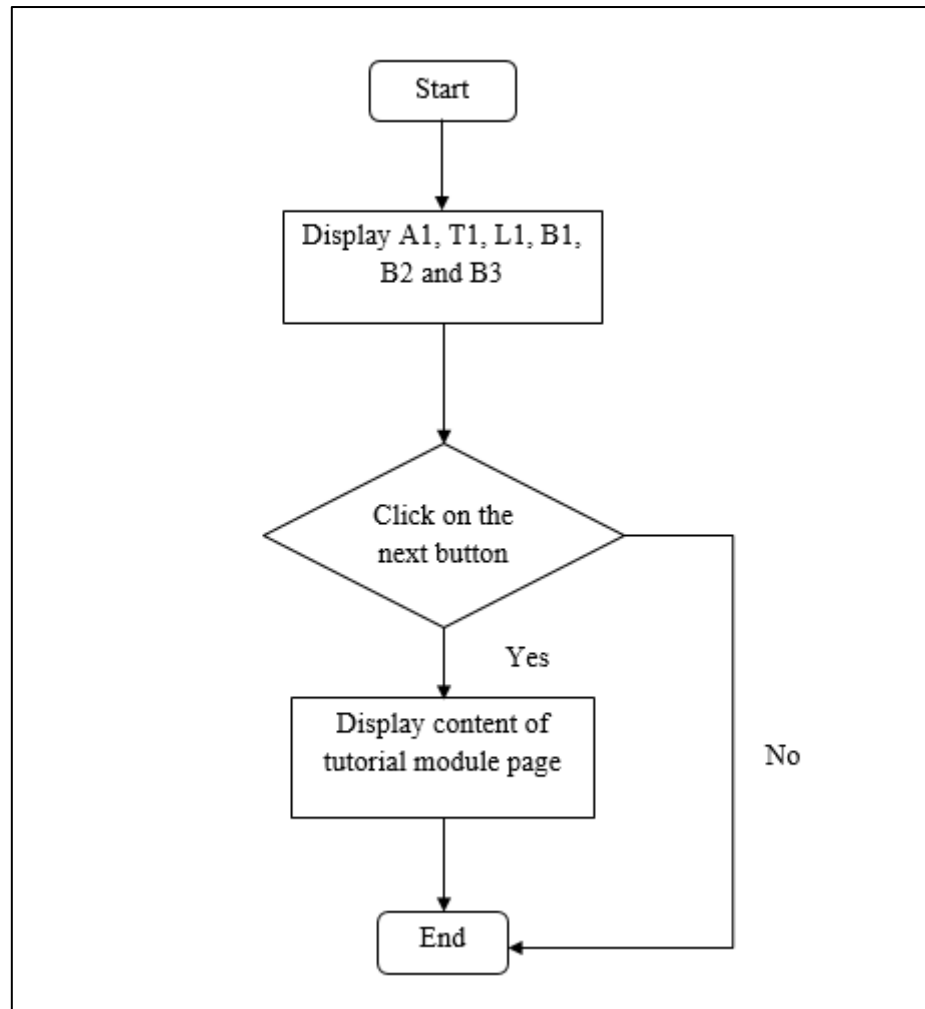
**Figure 3-6-F6 Flow Chart Diagram of Theory Learning Page**

- No of Storyboard : 4
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Instruction Page
- Internal Link Page : Main Menu and Tutorial Page
- Description : This page will display instructions to guide the users for doing the exercises in the Tutorial Page.



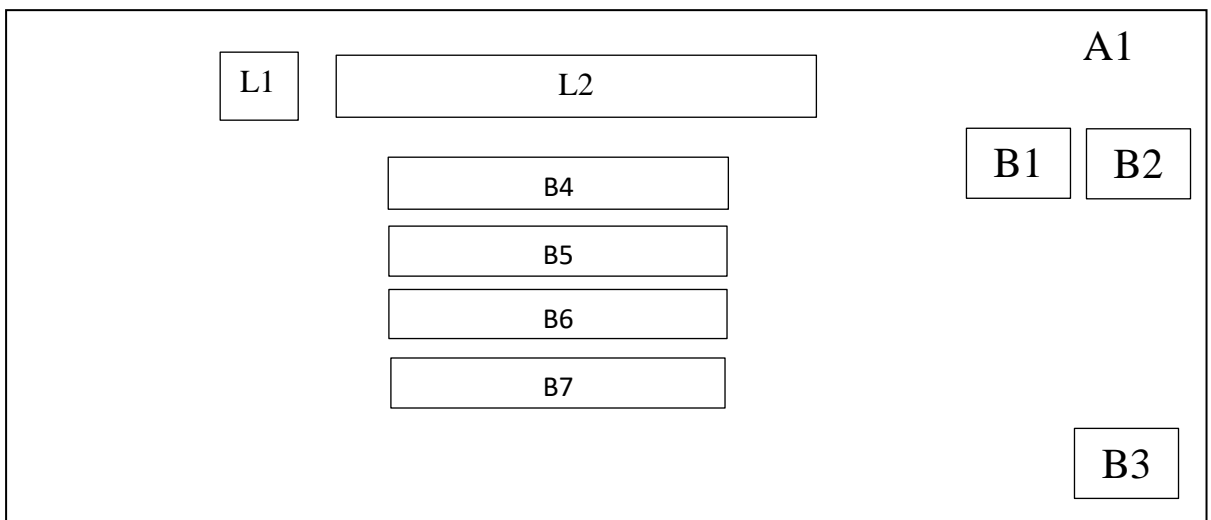
**Figure 3-6-F7 Instruction Page**

<b>Label</b>	<b>Description</b>
A1	Background of multimedia courseware.
T1	Title of instruction for those users.
L1	Display the instructions to guide the users for doing practical.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B3	“Next” button will link to the Tutorial Page.



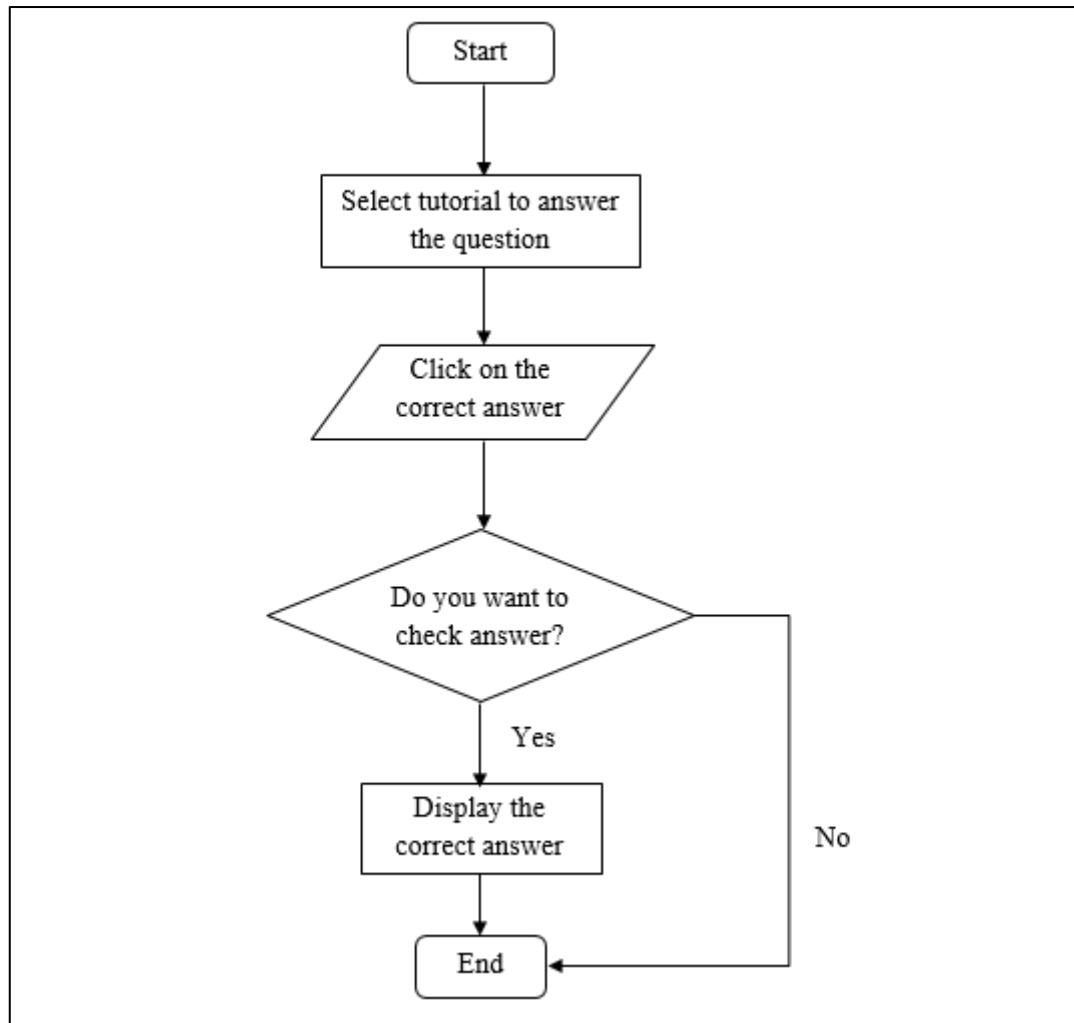
**Figure 3-6-F8 Flow Chart Diagram of Instruction Page**

- No of Storyboard : 5
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Tutorial Page
- Internal Link Page : Main Menu
- Description : This page will allow users to do the tutorial questions which is categorized by different lessons.



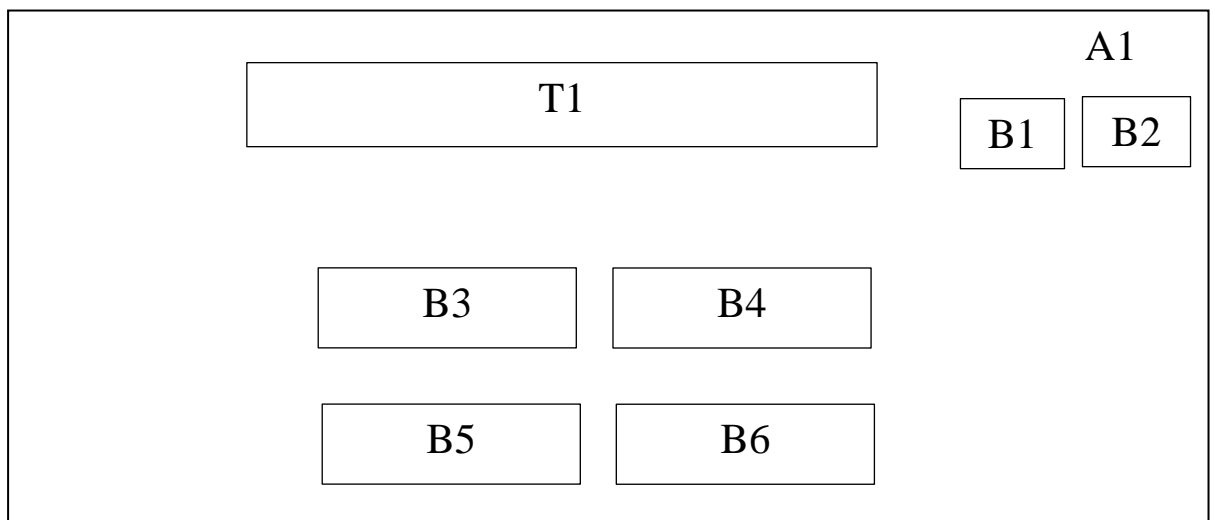
**Figure 3-6-F9 Tutorial Page**

<b>Label</b>	<b>Description</b>
A1	Background of multimedia courseware.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B3	“Next” button will link to the next lesson.
L1	Label for number of tutorial question.
L2	Label for tutorial question in this page.
B4	Multiple choice for answer A button.
B5	Multiple choice for answer B button.
B6	Multiple choice for answer C button.
B7	Multiple choice for answer D button.



**Figure 3-6-F10 Flow Chart Diagram of Tutorial Page**

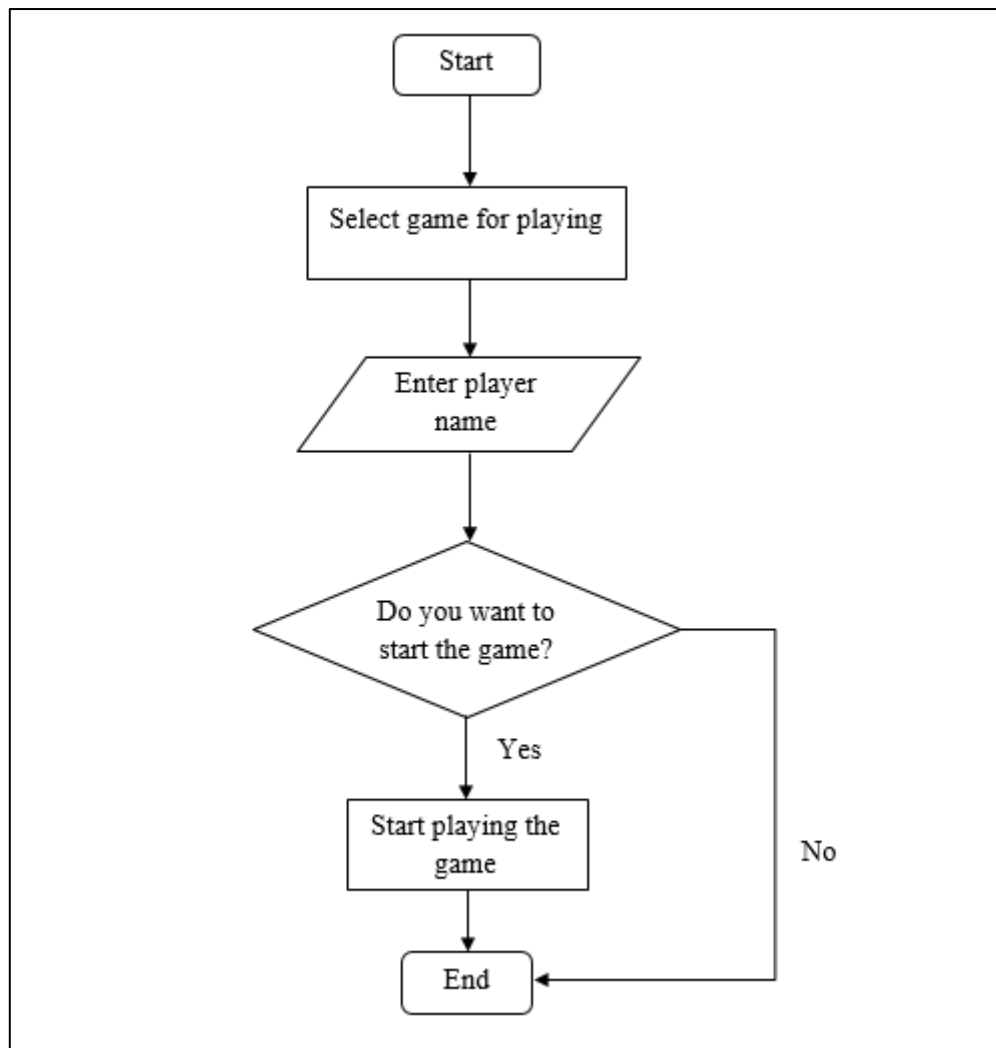
• No of Storyboard	: 6
• Title of Project	: Multimedia Courseware for Learning Science Subject
• Page Name	: Game Page
• Internal Link Page	: Main Menu
• Description	: This page will allow users to play some games which are related to the Science subject.



**Figure 3-6-F11 Game Page**

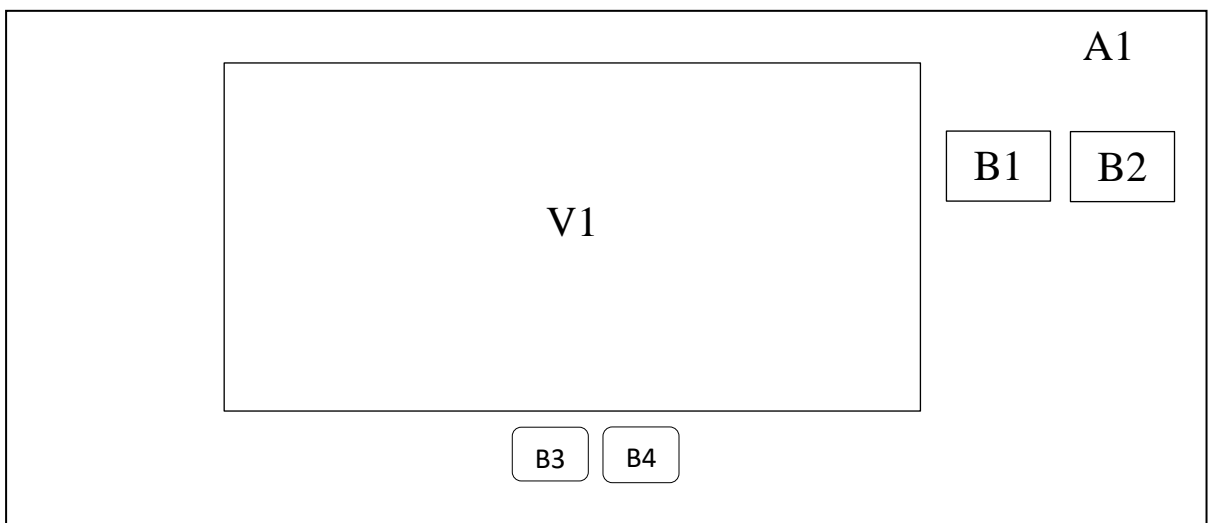
Label	Description
A1	Background of multimedia courseware.
T1	Display the title of the game for users.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B3	“Start” button will start the game.
B4	“Help” button will give some instructions to guide the uses how to play.
B5	“Exit” button will exit the Game Page and go back to Main Menu.
B6	“High Score” button link to the High Score page.





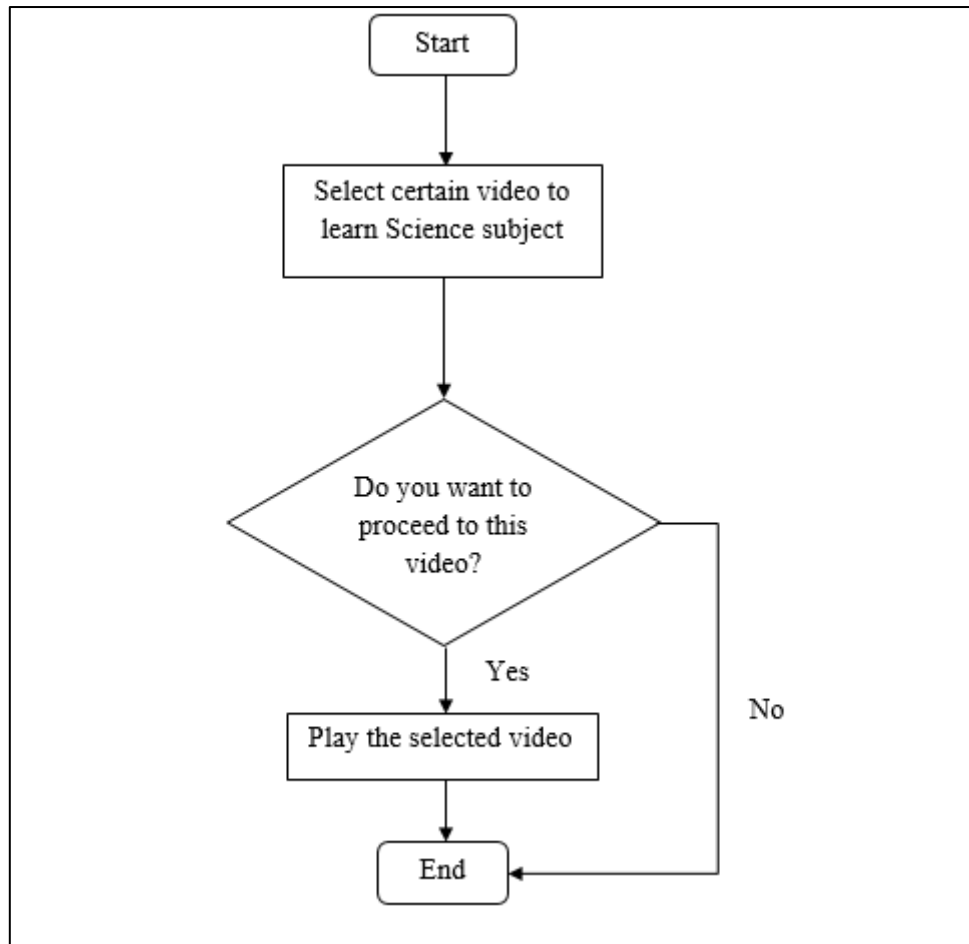
**Figure 3-6-F12 Flow Chart Diagram of Game Page**

- No of Storyboard : 7
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Virtual Lab Page
- Internal Link Page : Main Menu
- Description : This page will allow users to play some video which are categorized by the different lessons.



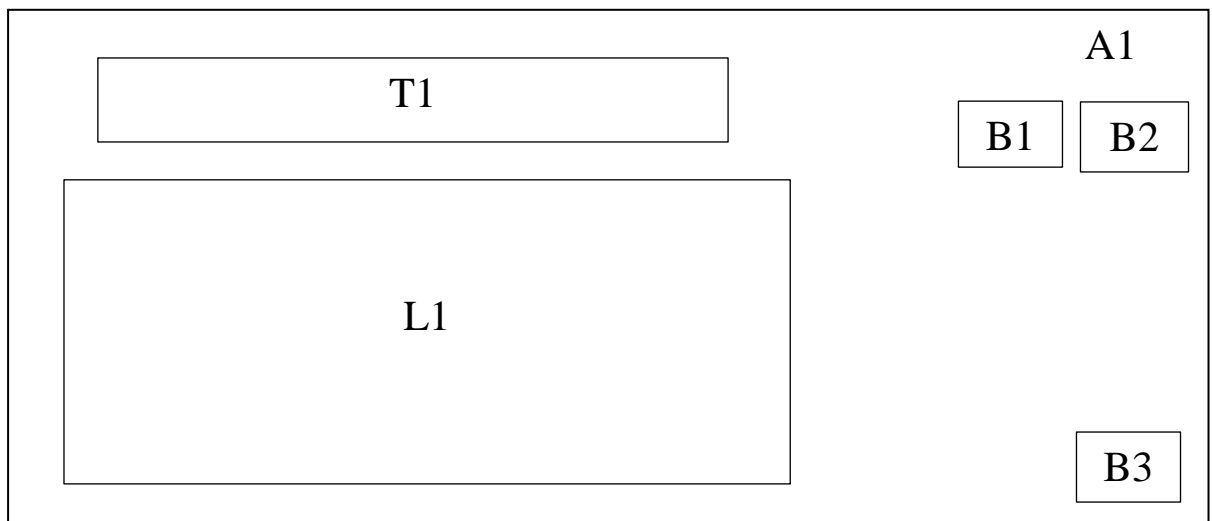
**Figure 3-6-F13 Virtual Lab Page**

Label	Description
A1	Background of multimedia courseware.
V1	Display the related video for users.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B3	“Play” button will play the video.
B4	“Stop” button will stop the video.



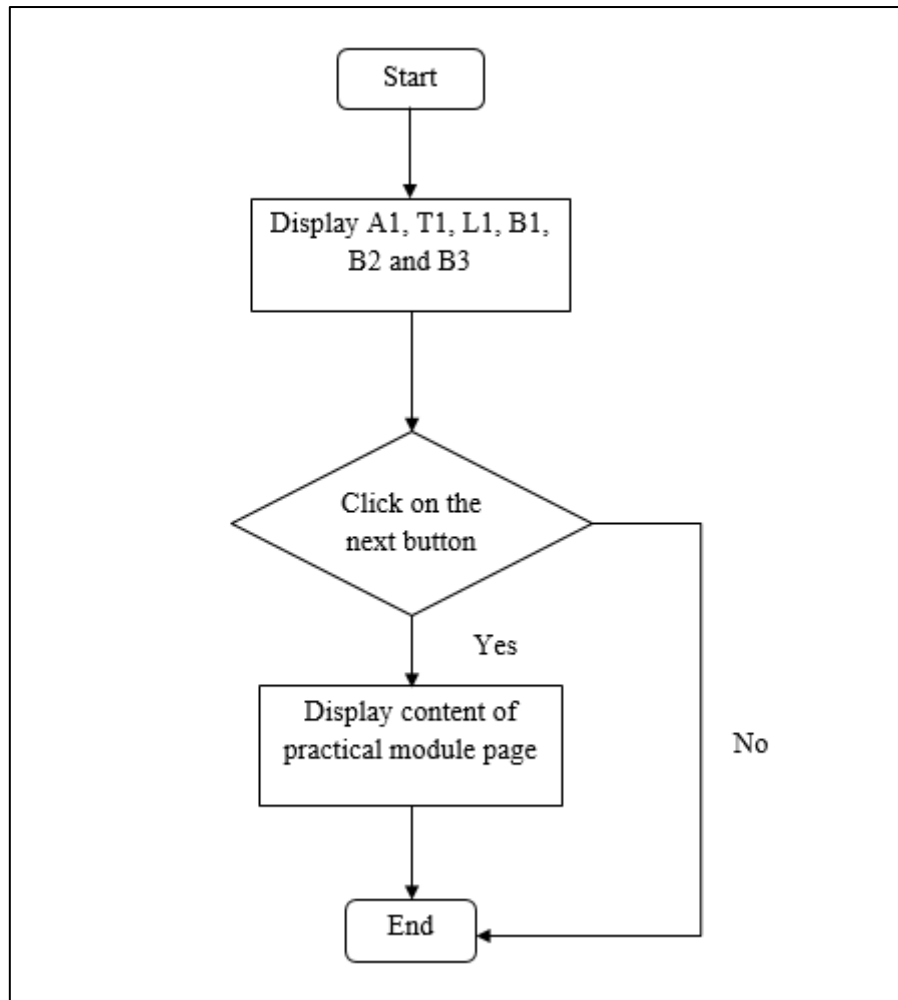
**Figure 3-6-F14 Flow Chart Diagram of Virtual Lab Page**

- No of Storyboard : 8
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Instruction Page
- Internal Link Page : Main Menu and Practical Page
- Description : This page will display instructions to guide the users for doing some practical in the Practical Page.



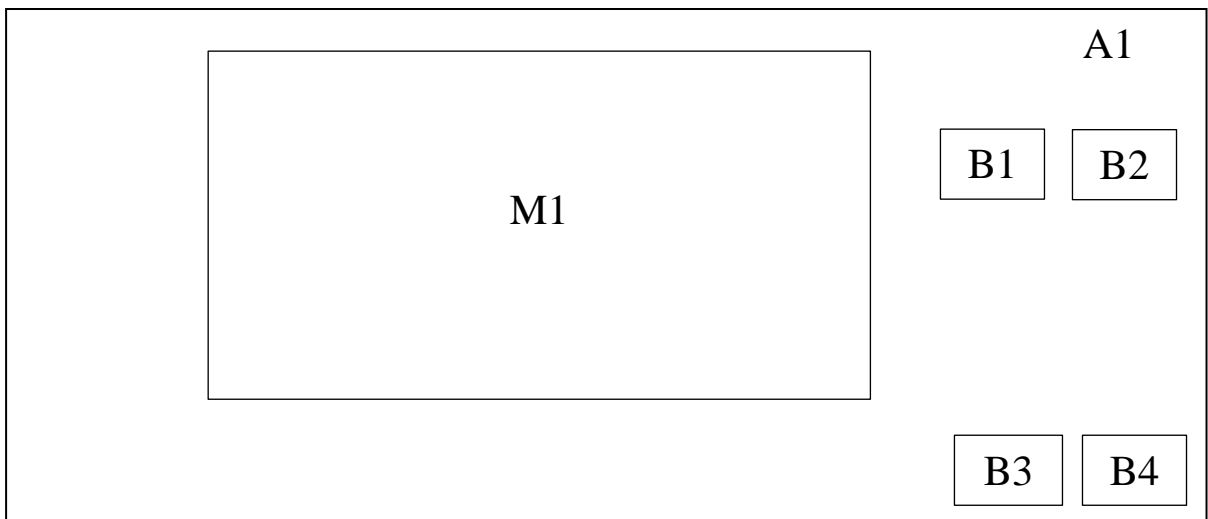
**Figure 3-6-F15 Instruction Page**

Label	Description
A1	Background of multimedia courseware.
T1	Title of instruction for those users.
L1	Display the instructions to guide the users for doing practical.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B3	“Next” button will link to the Tutorial Page.



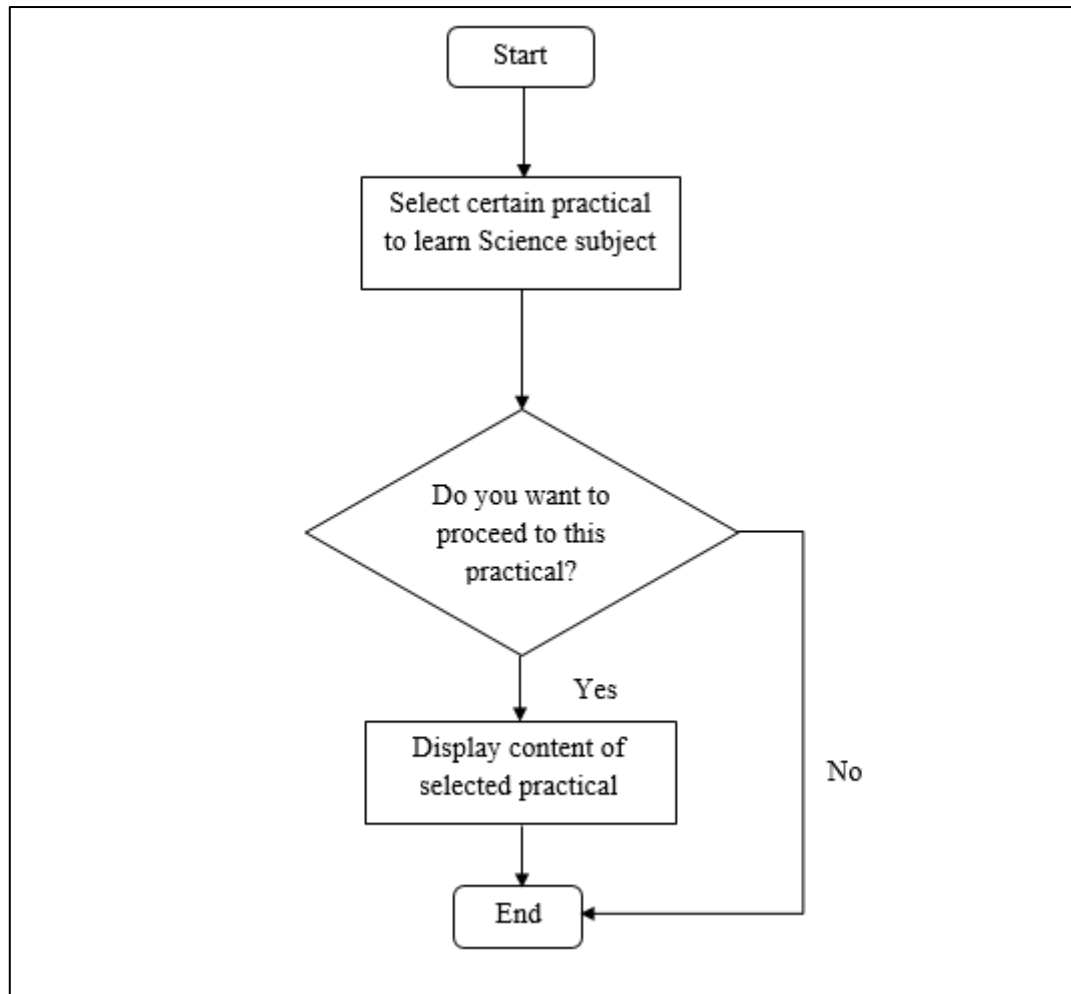
**Figure 3-6-F16 Flow Chart Diagram of Instruction Page**

- No of Storyboard : 9
- Title of Project : Multimedia Courseware for Learning Science Subject
- Page Name : Practical Page
- Internal Link Page : Main Menu
- Description : This page will allow users to do some practical exercises which are categorized by the different lessons.



**Figure 3-6-F17 Practical Page**

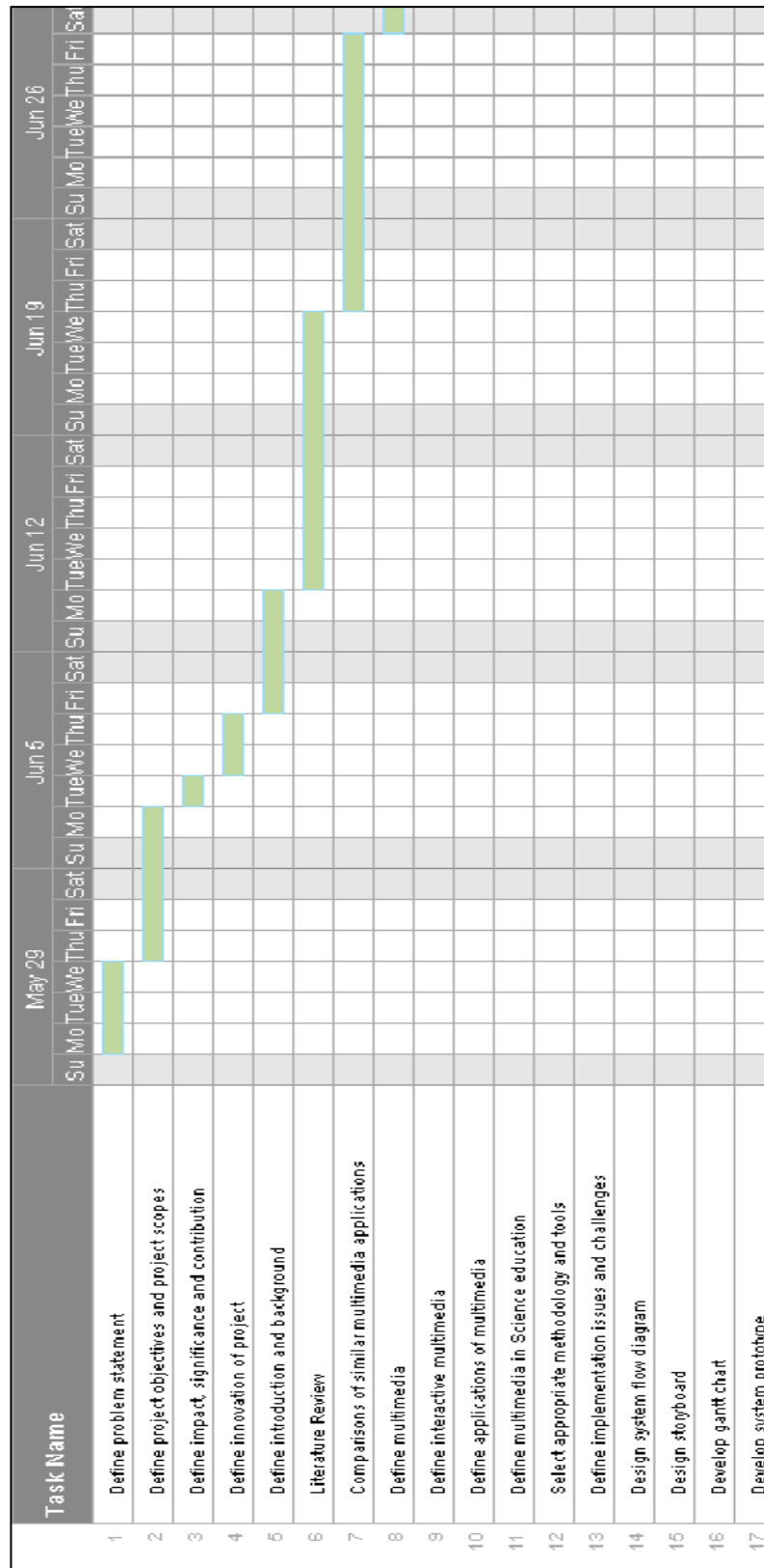
<b>Label</b>	<b>Description</b>
A1	Background of multimedia courseware.
M1	Display the learning material for users.
B1	“Sound” button will play and mute the sound.
B2	“Home” button will link to the Main Menu.
B3	“Previous” button will link to the previous lesson.
B4	“Next” button will link to the next lesson.



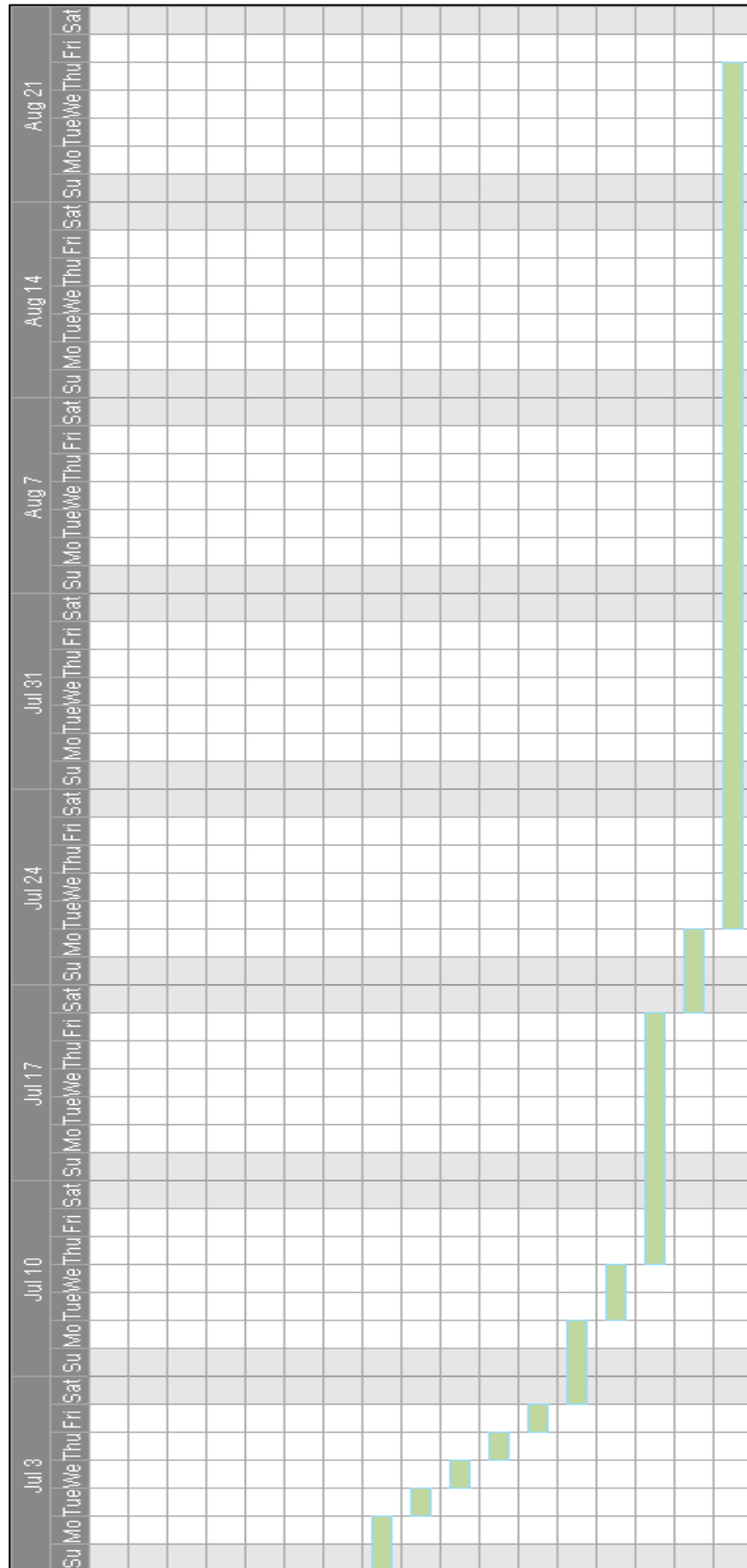
**Figure 3-6-F18 Flow Chart Diagram of Practical Page**

### 3.7 Project Planning

#### 3.7.1 Project Timeline (Final Year Project 1)

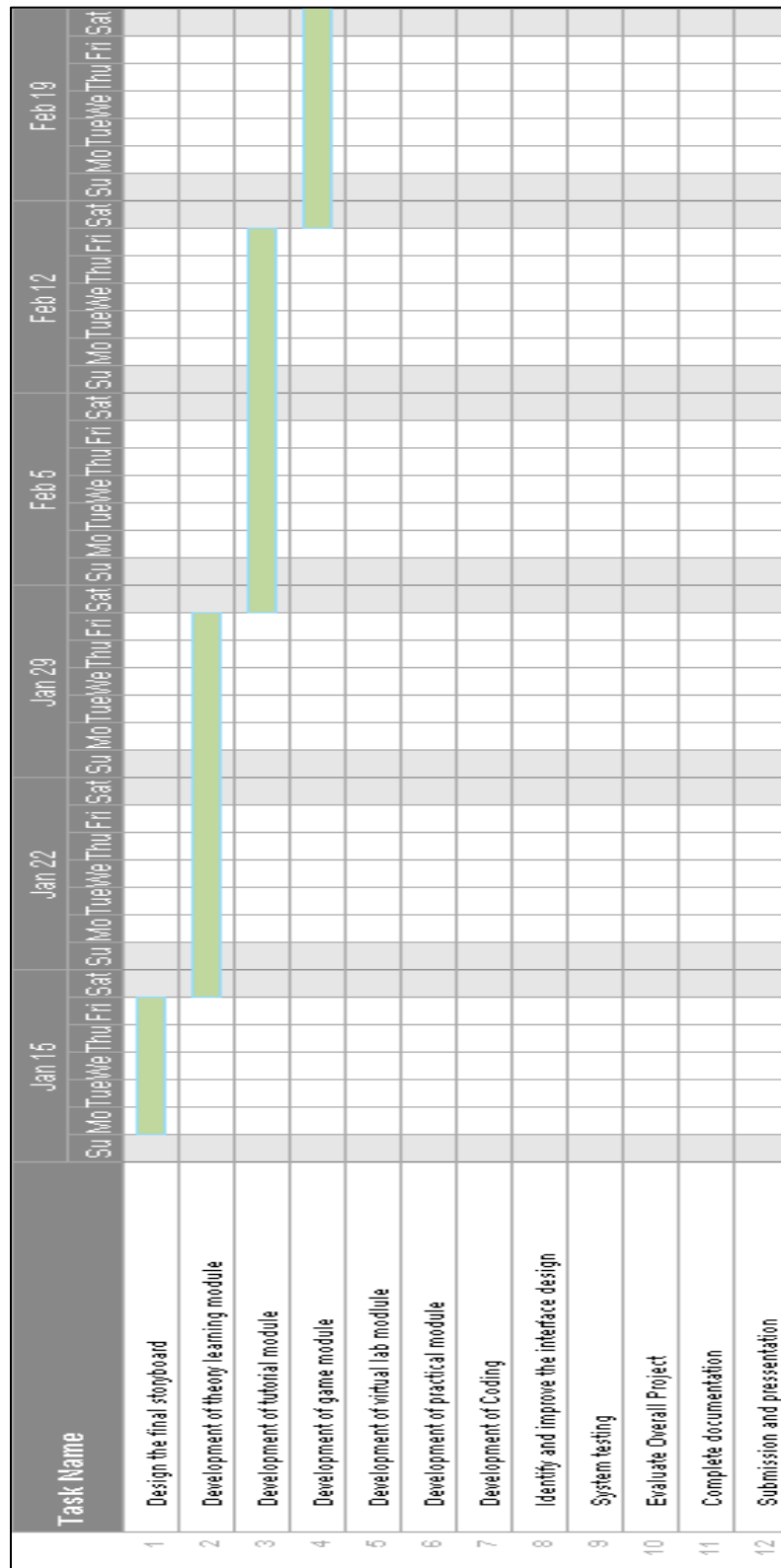


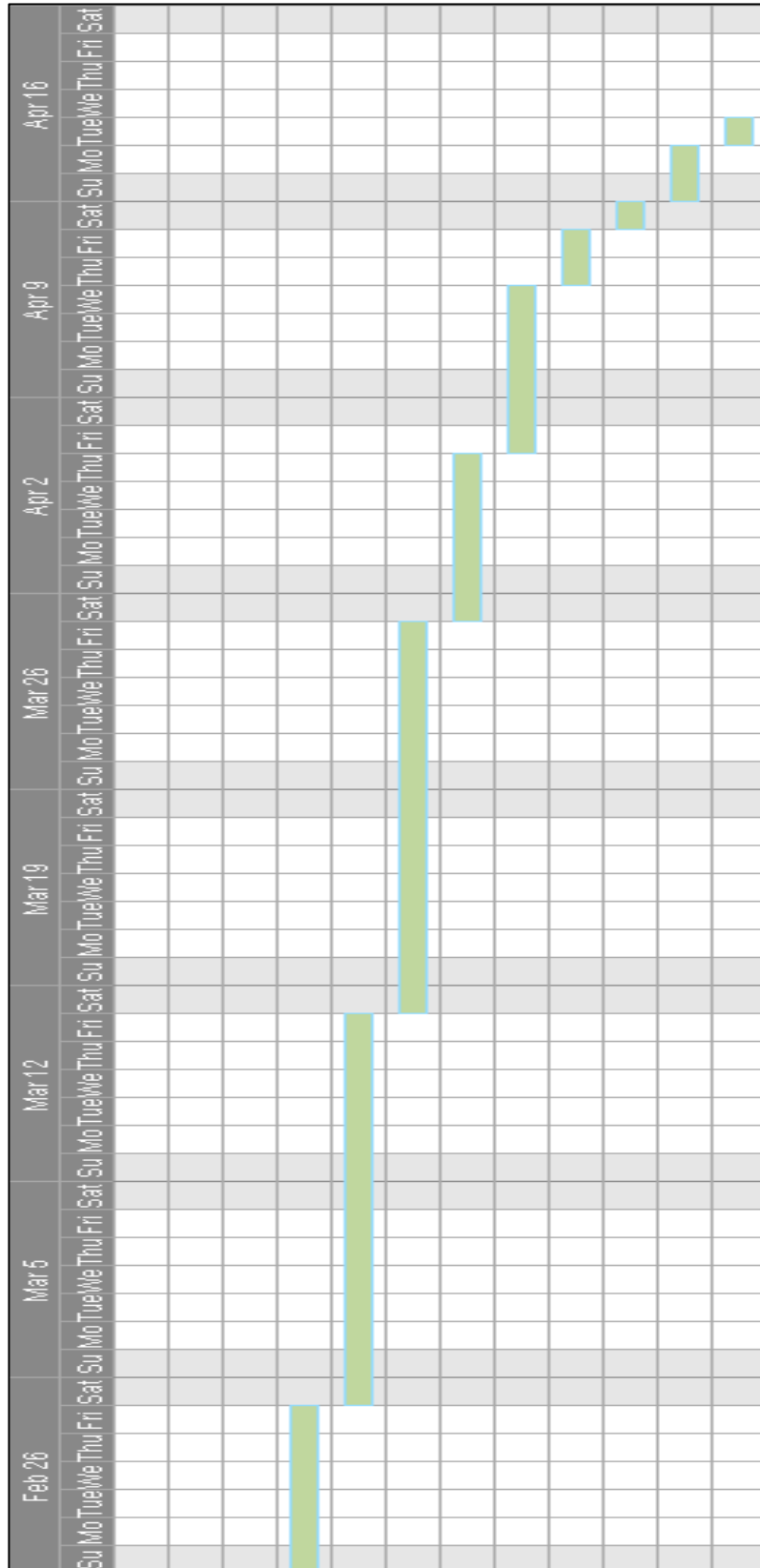




**Figure 3-7-1-F1 Gantt chart for Final Year Project 1**

3.7.2 Project Timeline (Final Year Project 2)





**Figure 3-7-2-F1 Gantt chart for Final Year Project 2**

## **Chapter 4.0 Development**

### **4.1 Overview**

This chapter is related to the development of the project. In this process, it can be divided into three stages, which are pre-authoring, authoring and post-authoring. It means that the developing of the project is from early stage until the end, those essential steps and different tools that it had to be done.

### **4.2 Development Process**

Pre-authoring process is the stage for selecting the multimedia computer and its components. It acquires the multimedia elements and the necessary software for creating and editing. Besides that, authoring process is the core process for the development of project. In this stage, the author is required to choose an authoring tool to best suit the needs. Then, they use the chosen authoring tool to import the element or outcome that generate from pre-authoring process and add some special effects, navigation and interactivity to integrate it into the project. Next, post-authoring process is decided on the storage medium for the finished interactive multimedia application and also determined on a delivery medium for the target audiences. After the system is being developed, it has to be packaged into a program for testing and distributed to the market or general public.

#### **4.2.1 Pre-authoring Process**

Pre-authoring process is a stage that need to prepare everything such as elements, tools and so on to develop the project. The preparation of the elements and tools is to determine the suitable multimedia authoring tools, those elements that included in this project such as logo, graphics, buttons, text, interface and others. With the well planning before development of project, it is very important and finally able to produce a high quality of system for audiences.

### 4.2.1.1 Process of Creating and Editing Text

Font characters may have a number of sizes. Size is usually specified in a unit, which is called point (pt.) where 1 point equals to 1/72 of an inch and 1 picas equals to 12 pt. Besides that, some specific font types can be displayed in a various types of styles. Some of the common styles of text are including bold, underline, italics and others. Some packages allow some special effects on text to make it more funny and interesting. This included changing the appearance in different ways, such as rotating, adding shadows and others. Other ways of manipulating text are including animations, such as fading, changing colors and so on.

The most common process of inserting text into software by typing the text using an input device, such as keyboard. The author is used a text editing software, Microsoft PowerPoint 2013 to control the appearance of text and manipulate variables such as font, size, style, color and others. Firstly, the author is clicked on the insert menu and selected the textbox or clicked on the text box icon on the drawing toolbar. After that, author is clicked and hold down the left mouse button while drag the mouse. When the textbox is the size they want it, release the mouse button. Now, the author is able to click inside the textbox and start typing. After creating and editing the text, the text is saved as picture in the portable network graphics file (.PNG) and imported into Macromedia Director in the bitmap form later.

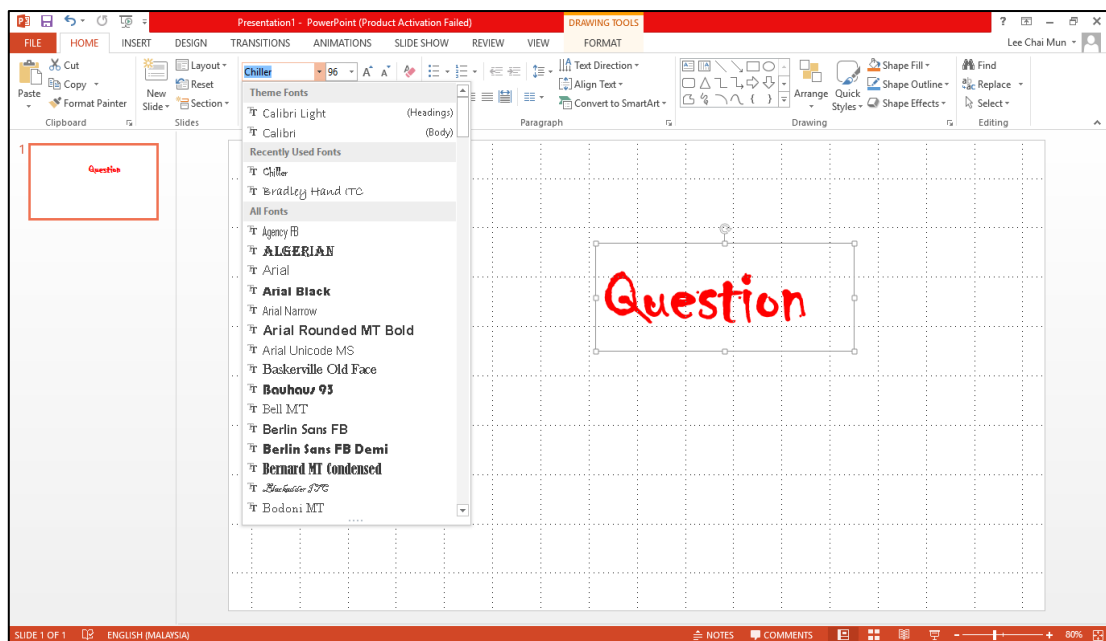
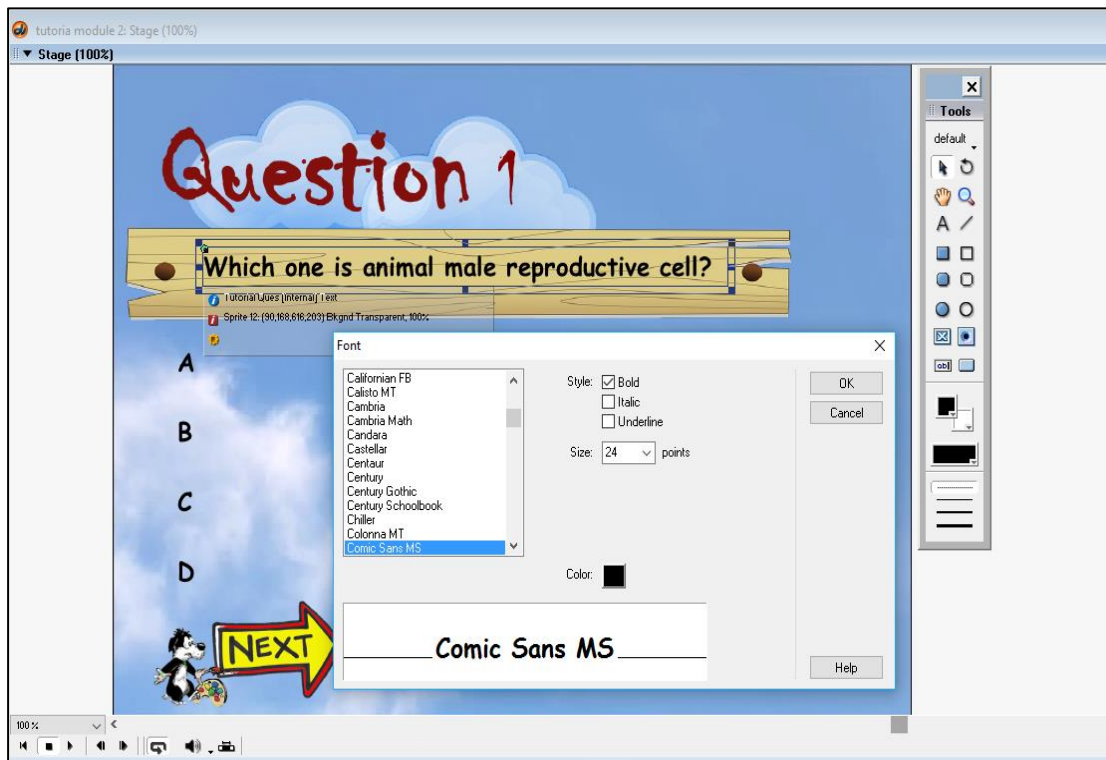


Figure 4-2-1-1-F1 Screenshot of Microsoft PowerPoint 2013

In addition, the author is creating and editing text by using Macromedia Director MX 2004. First and foremost, the author is clicked on the Window menu and selected the Tool Palette. After that, the author is clicked on the text icon in tools box, then clicked once time on the stage and finally the textbox is occurred. Now, they are allowed to start typing to create text. The author is able to edit the text by right click on the textbox and select the Font option. A prompt out window is occurred for the author to edit the size, spacing, kerning, color and style such as bold, italic, underline, superscript, subscript and strikeout.



**Figure 4-2-1-1-F2 Screenshot of Macromedia Director MX 2004**

#### 4.2.1.2 Process of Creating and Editing Graphics

A picture or graphic being “worth a thousand words” can be made to impart a large amount of information in a compact way. It is a fact that most people dislike to go through pages of text, especially on a computer screen. Therefore, it has been the endeavor of most multimedia developers to supplement words with picture in presentation. Graphic is allows creation of point and click items of a graphical user interface such as menus, button and others. Complex tasks can be completed by clicking or dragging the cursor over times or frames in the graphic user interface (GUI).

The author is used Adobe Photoshop to change the saved image into the image slice. An image slice is done by taking a bigger image and slicing it up into smaller images. First and foremost, the author is required to search and save some particular graphics from internet. After starting the Adobe Photoshop CS5, the author is clicked File in the menu of the application and a drop down menu will occurred. Select Open and search for the graphic that previously saved from the internet in the laptop. After that, select Image from the upper menu of the window and choose the Mode from the drop down menu. The author need to make sure that the RGB Color is selected. Then, select the rectangular shape to create the image slice. The author is clicked and hold the Slice tool in the toolbox and then choose the Slice Tool. Next, the author is clicked the top left corner of the section of the image and drag the pointer down to the bottom right corner of it. Finally, an image slice is created after releasing the mouse. The author is able to edit the image by repeat process with as many slice as desired.

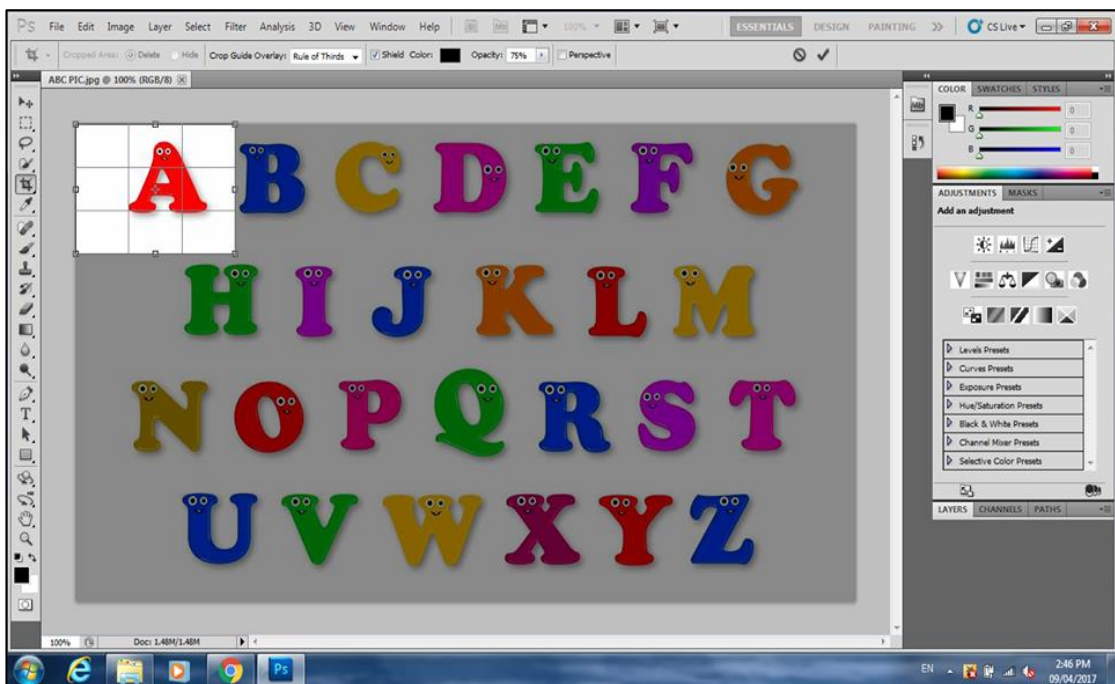


Figure 4-2-1-2-F1 Screenshot of Adobe Photoshop CS5

### 4.2.1.3 Process of Creating and Editing Animations

Since animation is involved the movement of still hand drawn images, something that does not seem to display naturally, but it is able to increase the interest of audiences and can develop a lasting impression. By adding the appearance of movement to a still object, the resulting image builds excitement as well as stimulates emotion. Therefore, animations are widely used in education industry as it provides an amazing way to explain dynamic process which is not easily captured by video.

The author is used Macromedia Director MX 2004 to create and edit animations in the project. The path-based animation does not exist as a collection of frames but rather as mathematical entities, called vectors, stored by the sprite that moves an independent object. Firstly, the author is required to drag the image from desktop on to the stage and change it to become background transparent. After that, the author is clicked on the image and will noticed that a dot in the centre of the clicked image. This is the dot by which will use it to develop the path animation. The author need to drag the dot to create a path. Lastly, the author is clicked on the play button and see the animation effect.

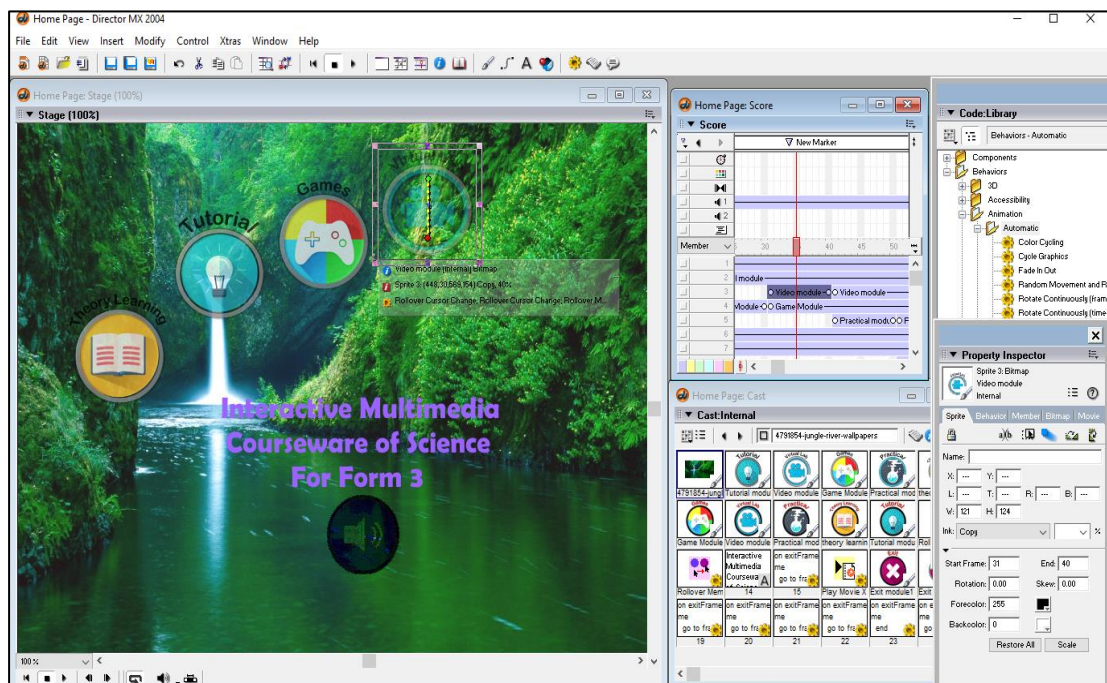


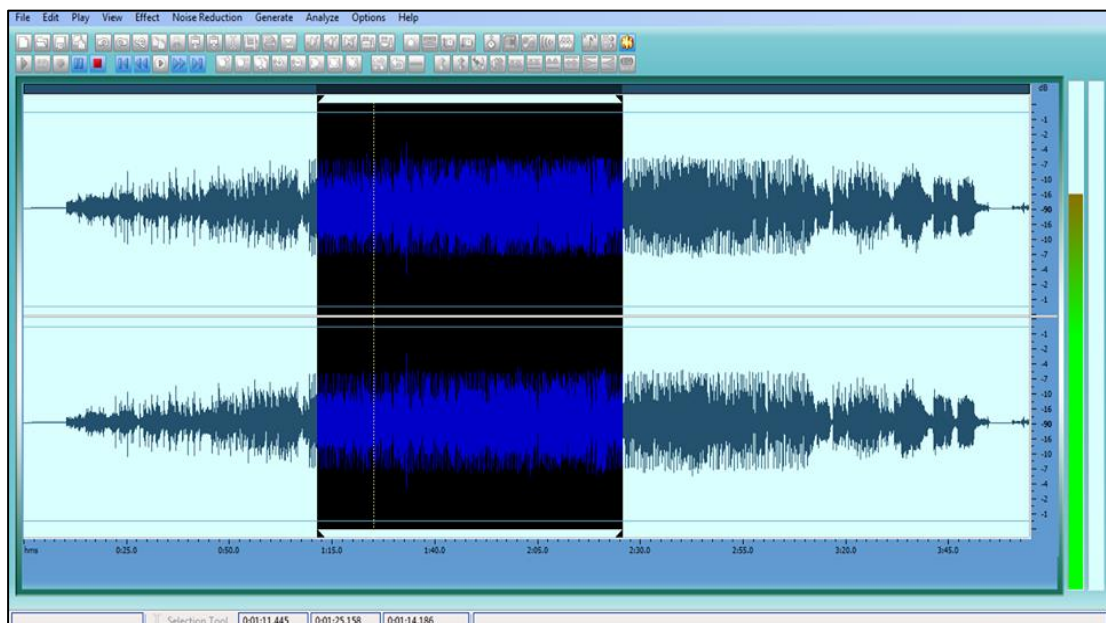
Figure 4-2-1-3-F1 Screenshot of Macromedia Director MX 2004



#### 4.2.1.4 Process of Editing Audio

The nature of sound (audio) is the conversion of energy into vibrations in the air or some other elastic medium. Most of the sound vibrate in complex ways leading to sounds with components at several different frequencies. In additions, waveform is a plot of amplitude against time. It provides a graphical view of characteristics of a changing sound and able to identify syllables of speech, rhythm of music, quiet and loud passages and others. There are various type of audio in a presentation which is included speech, music and sound effects.

The author is used Digital Audio Editor for editing audio. Firstly, the author need to import an audio file by selecting File and clicked Open, then choose the audio file (.mp3) from the laptop. Where the waveform is reached closer to the top and bottom of the track, the audio is become louder (and vice versa). The author is allowed to click the Play button to listen the audio and Stop button to stop playback. After that, the author is clicked on the point where they want to start, and then right clicked on the position where they wish to stop. Next, the author is clicked on the CUT button with scissors icon to cut out the particular audio. Then, the author is required to open a new file and paste the particular audio for further editing and saving.



**Figure 5-2-1-4-F1 Screenshot of Digital Audio Editor**

#### 4.2.1.5 Process of Editing Video

Video is an excellent tool for delivering multimedia. The term “video” consists of a set of still images called frames displayed on the user one after another at a specific speed, known as the frame rate measured in number of frames per second (fps). Sometimes, the audio is added and synchronized with the apparent movement of graphics. Therefore, the motion video is acted as a combination of image and audio for target audiences or general public.

The author is used the Adobe Premiere Pro CS5.5 to edit the video. First and foremost, the author is required to set up the new project by selecting the project and workplace settings. Then, the author is used the Media Browser to bring photos and audio files into the project, and also organized those assets in the project panel. Next, created a sequence and added some graphics and audio clip to the timeline panel, where they are allowed to adjust volume for the music and narration. Then, the author is remembered to start the video with a professional-looking title using the font and style prefer. Finally, the author is clicked on File and selected Export and Media option. After that, they are selected from many industry-standard format presents for the final output of the video.



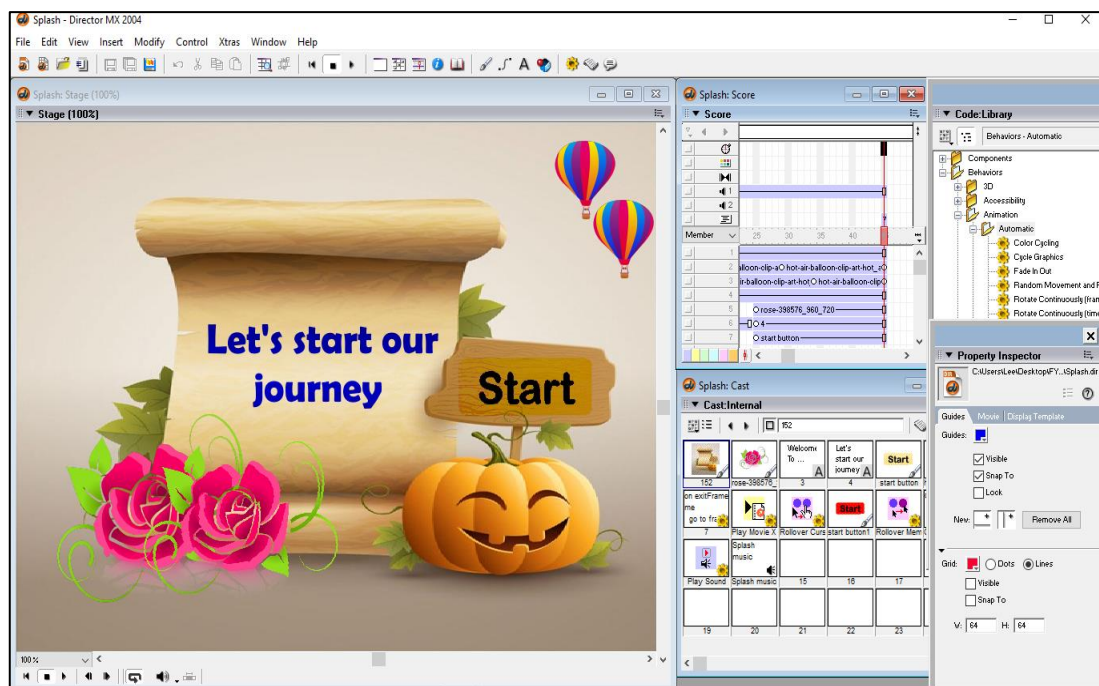
**Figure 4-2-1-5-F1 Screenshot of Adobe Premiere Pro**

## 4.2.2 Authoring Process

Authoring process is included in developing a meaningful digital multimedia presentation. The author is used Macromedia Director MX 2004 for implementing authoring process. This useful software is replaced the complex text-based world of programming with a graphical one where multimedia components can be moved around on-screen, as well as all the decisions can be made by choosing from menus of simple commands. Therefore, Macromedia Director MX 2004 is applied in the project to manage individual multimedia elements and also provide user interaction.

### 4.2.2.1 Splash Screen Design

This is the splash screen design of this project. The hot air balloon is acted as an animation to make the graphic user interface become more attractive. User need to click the Start button to enter into Main Menu page of multimedia courseware.



**Figure 4-2-2-1-F1 Screenshot of Splash Screen Design**

### 4.2.2.2 Main Menu Module Design

The main menu module is prepared for users to select which module that they wish to enter. Theory Learning Button enters into theory learning module, Tutorial button enters into tutorial module, Games button enters into games module, Virtual Lab button enters into virtual lab module, Practical button enters into practical module and Exit button will leave the multimedia courseware. Then, users can click Sound button to turn on and mute the background music.

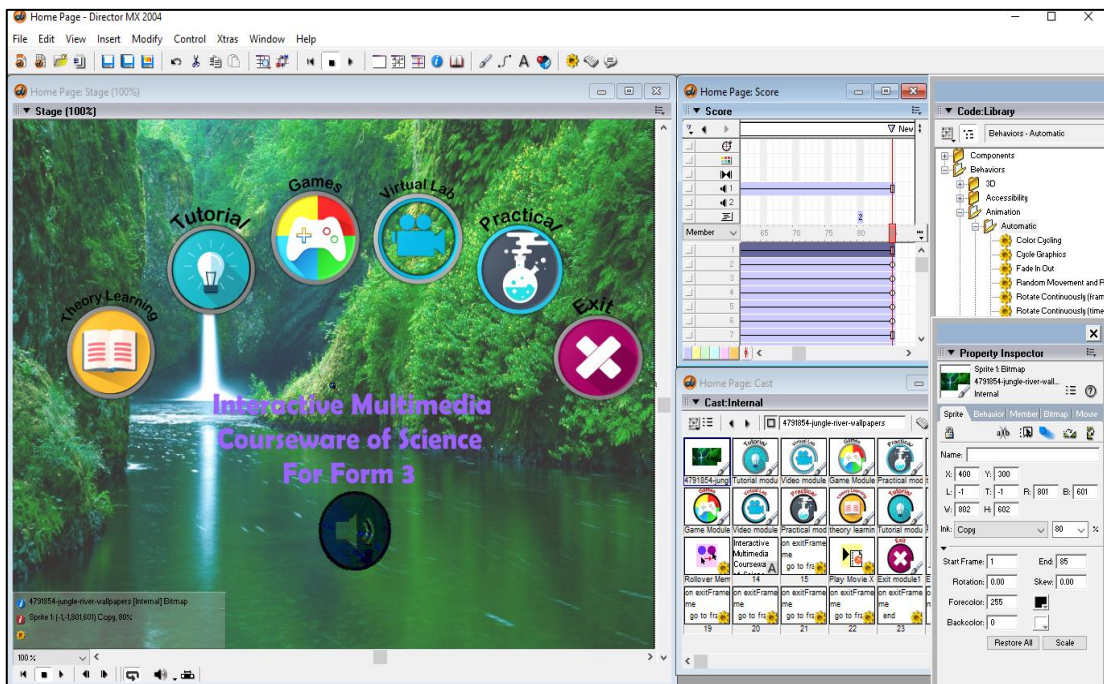


Figure 4-2-2-2-F1 Screenshot of Main Menu Module

```
On mouseDown me
```

```
    The soundEnabled = not (the soundEnabled)
```

```
end
```

### 4.2.2.3 Theory Learning Module Design

After selecting the subtopic, the users can start their learning process. This module is used graphics and text in teaching. Click Previous button bring users back to previous page. Click Next button to next page. Users can click Home button to go back to home page. Sound button is used to turn on and mute the background music.



Figure 4-2-2-3-F1 Screenshot of Theory Learning Module

```

On mouseEnter me
    go to frame 680
end
    
```

```

On mouseLeave me
    go to frame 665
end
    
```

```

On mouseDown me
    go to frame 1240
end
    
```

```

On exitFrame me
    go to frame 80
end
    
```

#### 4.2.2.4 Tutorial Module Design

Tutorial module is designed to test users' understanding on the chapters that had learned in theory learning module. They can select one answer out of four. After clicking the answer, this module will show the users' answer whether correct or wrong, together with detail explanation immediately to enhance their knowledge and understanding. Click Next button to proceed the next question. The author is applied some coding to set the tutorial question randomly to avoid users just remember the answer without understanding.

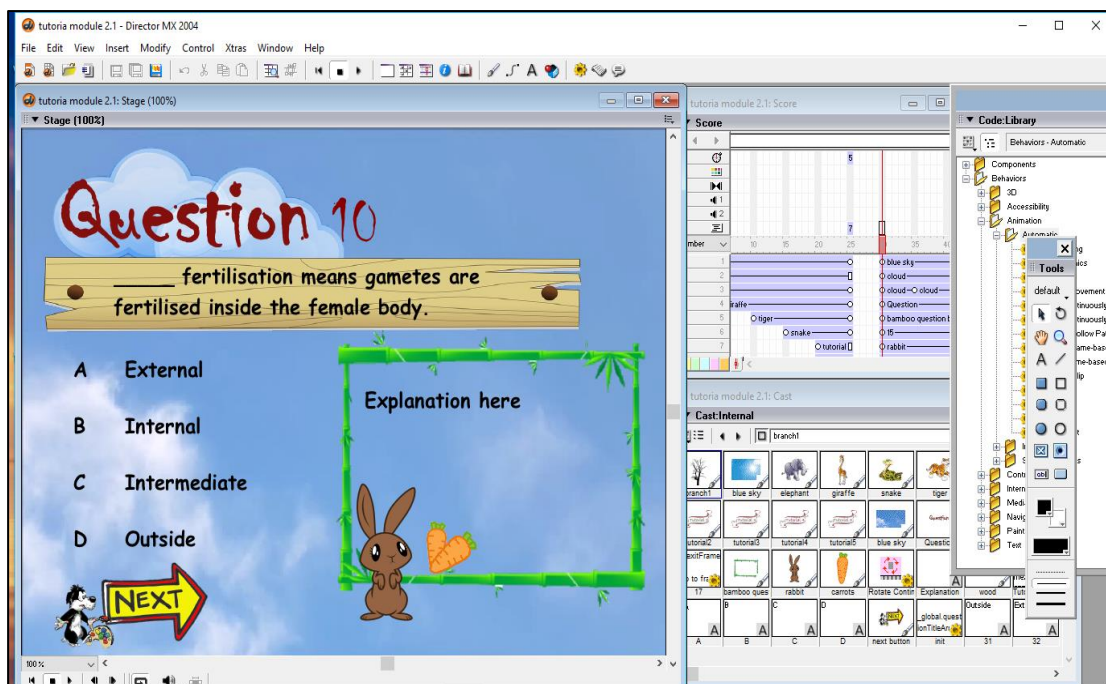


Figure 4-2-2-4-F1 Screenshot of Tutorial Module

```

_global.questionTitleArray = ["Reproduction is the
ability of living thigs to produce _____.",
"_____ fertilisation means gametes are fertilised
inside the female body.",
"_____ fertilisation means gametes are fertilised
outside the female body.",
"Which one is the example of binary fission?",
"Which one is the example of budding?",
"Which one is the example of regeration?",
"Which one is the example of vegetative reproduction?",
"Which one is the example of spore formation?",
"Inherits characteristics of asexual reproduction from
_____ parent.",
"Inherits characteristics of sexual reproduction from
_____ parent."
];
_global.questionAnswerArray=
[["offspring", "amoeba", "hydra", "yeast"],
["External", "Internal ", "Intermediate", "Outside"],
["External", "Internal ", "Intermediate", "Outside"],
["bird", "fish ", "amoeba ", "insects"],
["mammal", "starfish ", "hydra ", "bird"],
["insects", "fish ", "yeast ", "planaria
"], ["insects", "mammals ", "bacteria ", "ginger "],
["mosses ", "mammals ", "paramecium ", "bird"],
["one ", "two ", "three ", "four"],
["one ", "two ", "three ", "four"]
];
_global.explanationArray =
["explanation1", "exp2", "exp3"];
_global.answerlimit = "true";

_global.answer1 =
["true", "false", "true", "false", "false", "false", "false",
"true", "true", "false"]
_global.answer2
=["false", "true", "false", "false", "false", "false", "false
", "false", "false", "true"]
_global.answer3
=["false", "false", "false", "true", "true", "false", "false"
, "false", "false", "false"]
_global.answer4
=["false", "false", "false", "false", "false", "true", "true"
, "false", "false", "false"]

```

```

_global.randomarray =
random(questionTitleArray.length);
sprite(12).member.text =
questionTitleArray[randomarray-1];
sprite(18).member.text =
questionAnswerArray[randomarray-1][0];
sprite(19).member.text =
questionAnswerArray[randomarray-1][1];
sprite(20).member.text =
questionAnswerArray[randomarray-1][2];
sprite(21).member.text =
questionAnswerArray[randomarray-1][3];
var count = 1;
sprite(10).member.text = "";
sprite(6).member.text = count.toString();

```

```

function mouseUp ()
{
sprite(10).member.text = "";
if (questionTitleArray.length != 1)
{
questionTitleArray.splice(randomarray-1,1);
questionAnswerArray.splice(randomarray-1,1);
explanationArray.splice(randomarray-1,1);

answer1.splice(randomarray-1,1);
answer2.splice(randomarray-1,1);
answer3.splice(randomarray-1,1);
answer4.splice(randomarray-1,1);
_global.randomarray=random(randomarray-1,questionTitleArray.length);
sprite(12).member.text =
questionTitleArray[randomarray-1];
sprite(18).member.text =
questionAnswerArray[randomarray-1][0];
sprite(19).member.text =
questionAnswerArray[randomarray-1][1];
sprite(20).member.text =
questionAnswerArray[randomarray-1][2];
sprite(21).member.text =
questionAnswerArray[randomarray-1][3];
count = count +1 ;
_global.answerlimit ="true";
}
sprite(6).member.text = count.toString();
}

```



```
function mouseUp(me) {  
    var boolAnswer = _global.answer1[_global.randomarray-  
1];  
    if (answerlimit == "true"){  
    if (boolAnswer == "false")  
    {  
        sprite(10).member.text = "false"  
    }  
    else  
    {  
        sprite(10).member.text = "correct";  
    }  
    _global.answerlimit = "false";  
}  
}
```

### 4.2.2.5 Games Module Design

In the games module, users need to guess the word based on the graphic provided. They have only one chance to guess the word. The users can enter their answer into textbox by clicking the keyboard that already prepared on the screen or use their own keyboard. After entering the answer in upper case, they can click OK button and enter the explanation page. The explanation page will show the users' answer whether correct or wrong, together with accurate answer if answered wrongly to enhance their knowledge and understanding. They need to answer 10 questions in this module. After that, the author is also applied some coding in this module to set the questions differently and randomly. Therefore, the users will feel more challenges and fun while playing the games.

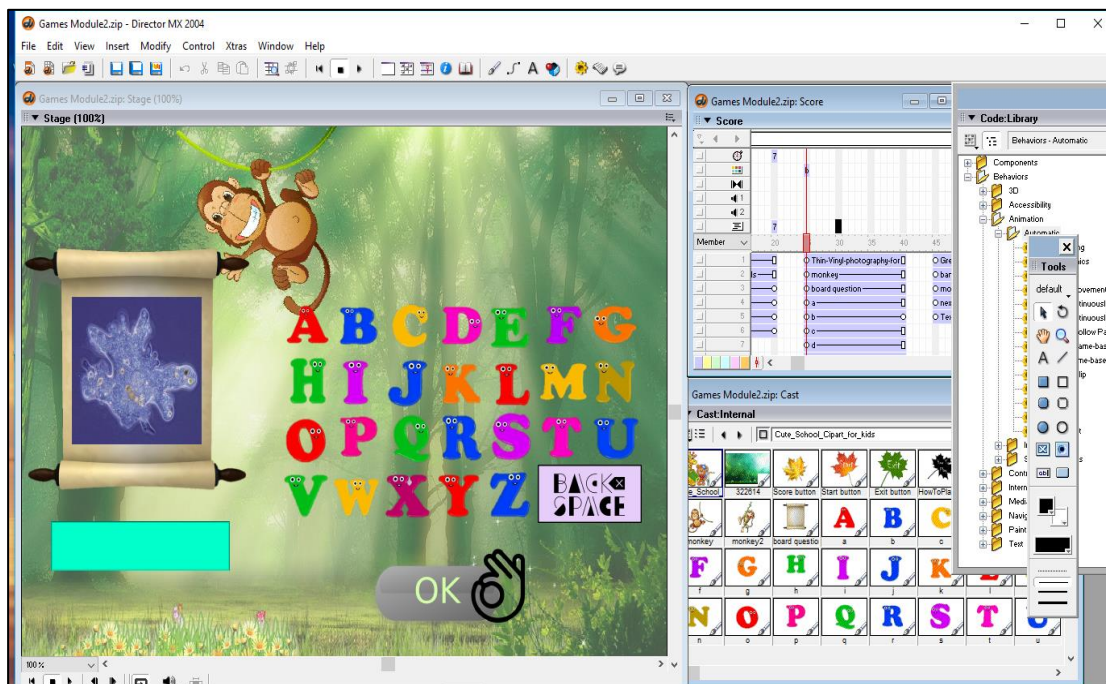


Figure 4-2-2-5-F1 Screenshot of Games Module

## CHAPTER 4 DEVELOPMENT

This page is designed to show each question whether the users are answered correctly or wrongly. It also show the summary about total amount of wrong question and correct question for users. Therefore, this result page is able to evaluate their own understanding for this chapter.

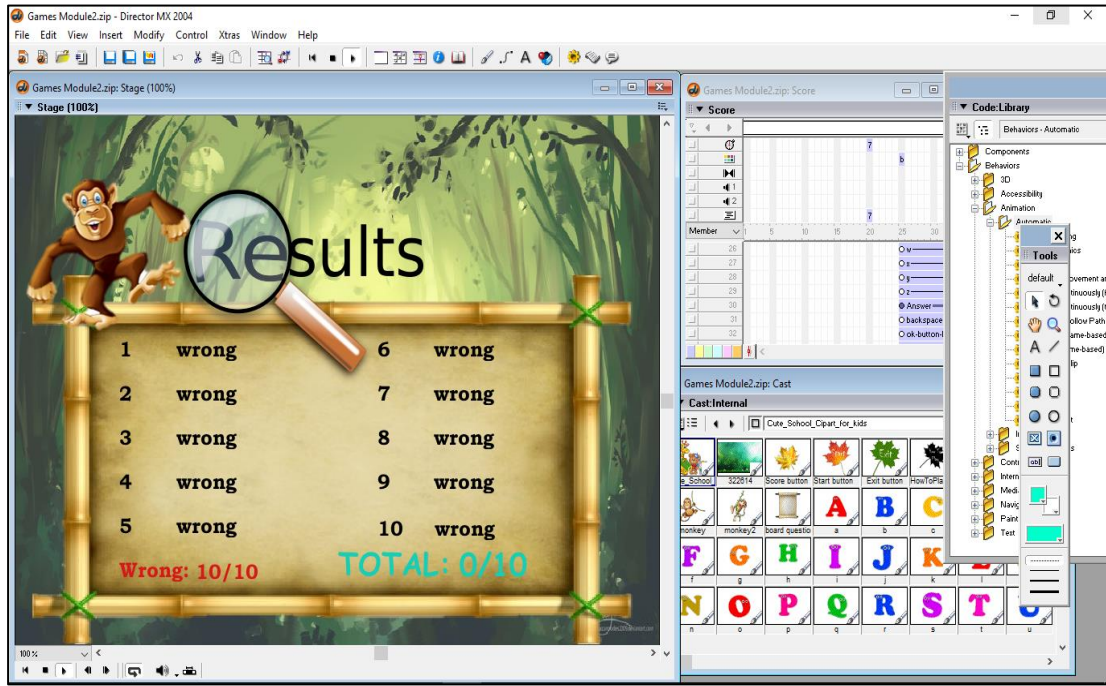


Figure 4-2-2-5-F2 Screenshot of Result Page in Games Module

```

function beginSprite ()
{
  sprite(30).member.text = ""
  if (_global.answer.length != 0)
  {
    sprite(spriteNo[_global.randomNumber-1]).blend = 100
  }
  _global.inputAnswer = ""
}

function mouseUp(me) {

  if (sprite(30).member.text == correctanswer)
  {
    _global.statusMessage = "this is correct"
    _global.userResponse.push("correct")
    _global.countCorrect = _global.countCorrect + 1
  }
  else{
    _global.statusMessage= "this is wrong, correct answer
is : " + _global.correctanswer
    _global.userResponse.push("wrong")
    _global.countWrong = _global.countWrong + 1
  }
  trace(_global.statusMessage)
  for (i=0;i<_global.answer.length;i++)
  {
    sprite(_global.spriteNo[i]).blend = 0
  }
  if (_global.answer.length != 0)
  {
    _global.answer.splice(_global.randomNumber-1,1)
    _global.spriteNo.splice(_global.randomNumber-1,1)
    trace("this is length:" + _global.answer.length)
    if (_global.answer.length != 0){

      _global.randomNumber = random(_global.answer.length)
      _global.correctanswer =
      _global.answer[_global.randomNumber-1]
      sprite(_global.spriteNo[_global.randomNumber-1]).blend
      =100
    }
  }
  sprite(30).member.text = ""
  _global.inputAnswer = ""
}

```

```

_global.answer =
["AMOEBEA", "MENSTRUATION", "OVUM", "SPERM", "OVARY", "PENIS"
, "SCROTUM", "TESTIS", "UTERUS", "BABY", "BUDDING", "COPULATI
ON", "EMBRYO", "EPIDIDYMIS",

"FERTILISATION", "FOETUS", "IMPLANTATION", "OVULATION", "RE
GENERATION", "ZYGOTE",

"CONDOMS", "CYTOPLASM", "MENOPAUSE", "NUCLEUS", "NUCLEUS", "
PLACENTA", "PREGNANCY", "PUBERTY"
, "TAIL"]
_global.spriteNo =
[34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51,
52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62]
_global.totalAnswer = _global.answer.length
_global.countCorrect = 0
_global.countWrong = 0
_global.userResponse = []
_global.testing = []
_global.randomNumber = random(answer.length)
_global.correctanswer = _global.answer[randomNumber-1]

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "A"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "B"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "C"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "D"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "E"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "F"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "G"
  sprite(30).member.text = _global.inputAnswer
}

```

```

_global.inputAnswer = ""
function mouseUp(me) {
  _global.inputAnswer = _global.inputAnswer + "H"
  sprite(30).member.text = _global.inputAnswer
}

```

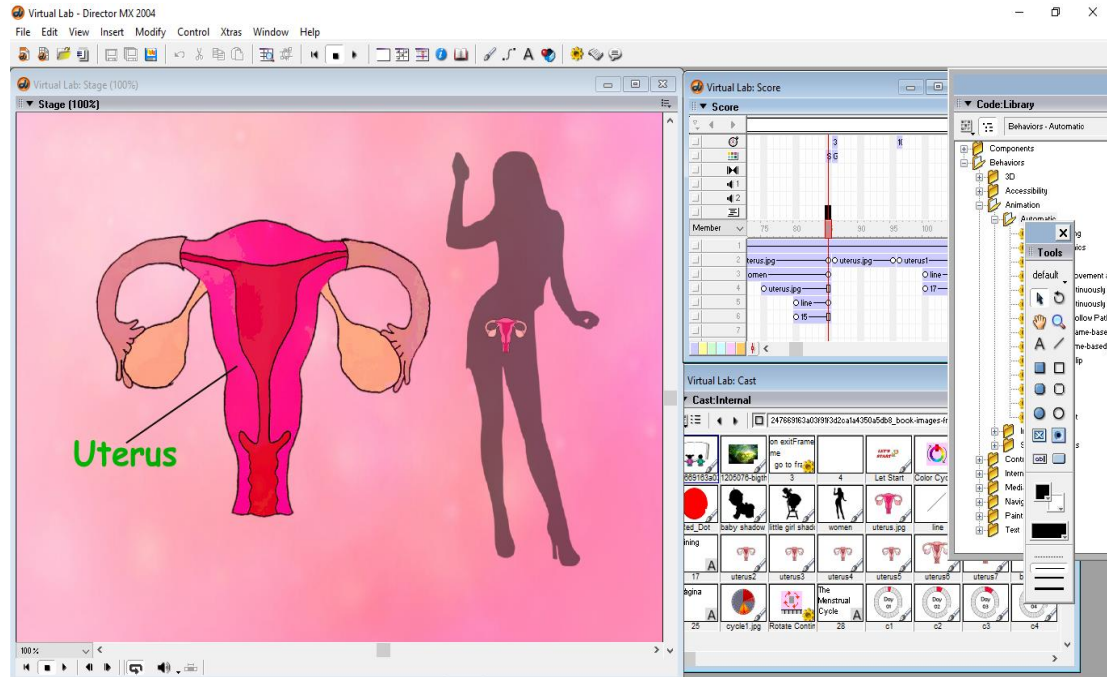
```

function mouseUp(me) {
  _global.inputAnswer =
  _global.inputAnswer.substring(0, _global.inputAnswer.length-1)
  sprite(30).member.text = _global.inputAnswer
}

```

### 4.5.2.6 Virtual Lab Module Design

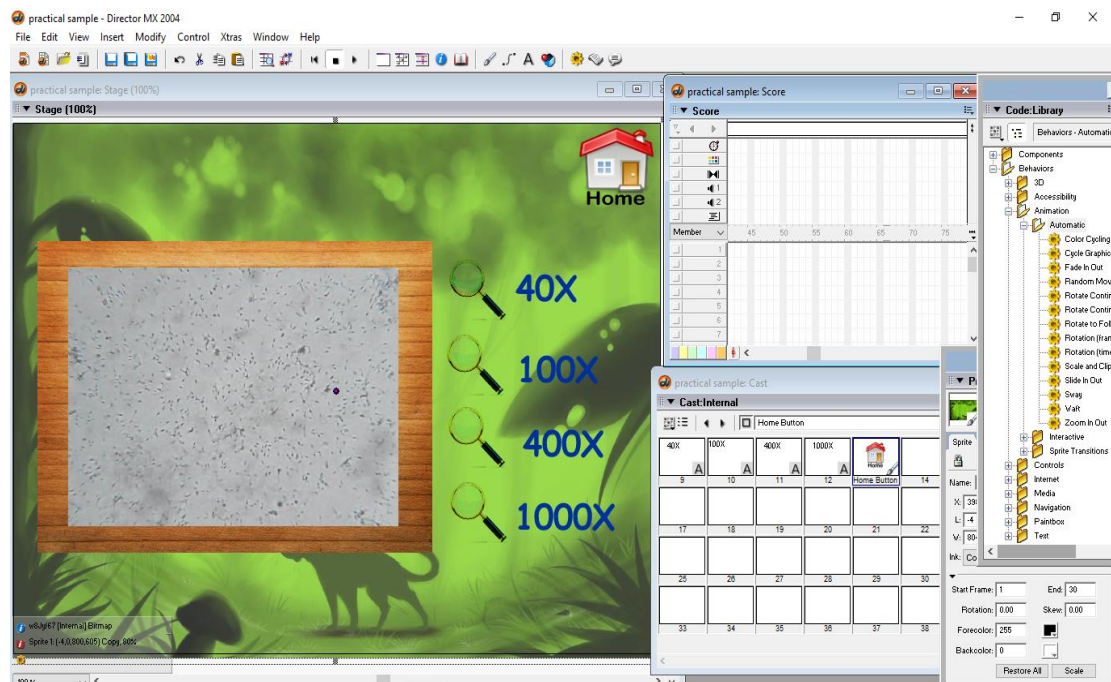
In this module, users can watch the animation video about the menstrual cycle. It also provides some interaction for users to motivate and improve their learning interest. Through the interesting animations, the users are able to get into better understanding or may absorb some extra knowledge and Science information.



**Figure 4-2-2-6-F1 Screenshot of Virtual Lab Module**

### 4.5.2.7 Practical Module Design

In the practical module, the users can click on the magnifier button to watch the human sperm cell in different resolutions under the microscope. This module is designed for increasing users' knowledge and able to do some revisions which is related to the practical lab.



**Figure 4-2-2-7-F1 Screenshot of Practical Module**

### 4.2.3 Post-authoring Process

The final process in the development schedule is the delivery of the application to the target audience. It can be done through choose the file from Macromedia Director, then select publish setting to choose the format for publishing. Usually the runtime version (.exe) of the application files are copied into CDs or DVDs and physically handed over to the target audiences. Therefore, those audiences are able to test the multimedia courseware in offline mode. Moreover, the author should only distribute the runtime version (.exe) file instead of the source file to avoid other persons from editing the work subsequently.



## **Chapter 5.0 Testing, Results and Discussions**

### **5.1 Overview**

This chapter is discussed about the system testing after the development of system. Testing is an activity to check whether the actual results is match with the expected results. The author need to conduct the testing to find the errors and bugs for the systems to ensure that the software system is defect free. It is very important to find out any defects and solve the crucial problems before the system is disseminated to the market. It is because the software bugs could be expensive or even dangerous and finally cause the monetary loss. In additions, testing is able to obtain confidence for the system quality and improve the performance of system too. The author is unable to produce a high quality of software system without testing. At the end, the author is applied two types of testing for this proposed multimedia courseware, which are alpha testing and beta testing.

### **5.2 Method of Testing**

#### **5.2.1 Alpha Testing**

Alpha Testing is a type of acceptance testing to identify all possible issues or bugs before disseminating the product or system to publics. Alpha testing is performed by the author and will not involve the end users or clients (ISTQB Exam Certification 2015). Thus, the author has executed the alpha testing as the first phase or process to test the software development of the multimedia courseware for learning Science subject. The purpose of conduct the alpha testing is help the author to reduce the amount of error occurred when implementing the user evaluation of the multimedia courseware for Science. Those critical issues can be addressed by author immediately in alpha testing. Therefore, alpha testing is important to ensure the quality of the system before moving to beta testing. The first phase of alpha testing is included unit testing, integration testing and system testing.

### 5.2.1.1 Unit Testing

A unit is the smallest testable part of an application (ISTQB Exam Certification 2015). Unit testing is a level of software testing where individual components of a software is tested. The purpose of unit testing is to validate that each unit of the software is performed as designed. In this project, unit testing is applied to test each of the module of multimedia courseware and make sure each of the modules can be run and function properly as well as meet the expected result of end users. Furthermore, validation and appearance of each module will tested to improve the quality of the system. For example, user clicks on the button or graphics and what output will display for the user. Once the error occurred during the unit testing, it will be solved by the author as soon as possible to make sure that the system can performed accurately for the users.

#### 5.2.1.1.1 Main Menu Page

No.	Test Field	Expected Result	Test Result	Remarks
1.	Click on “Theory Learning Module” button	Link to Theory Learning Module Page	Same with expected result	Success
2.	Click on “Tutorial Module” button	Link to Tutorial Module Page	Same with expected result	Success
3.	Click on “Game Module” button	Link to Game Module Page	Same with expected result	Success
4.	Click on “Virtual Lab Module” button	Link to Virtual Lab Module Page	Same with expected result	Success
5.	Click on “Practical Module” button	Link to Practical Module Page	Same with expected result	Success
6.	Click on “Sound” button	Able to turn on and mute the background music	Same with expected result	Success
7.	Click on “Exit” button	Exit the program	Same with expected result	Success

**5.2.1.1.2 Theory Learning Module Page**

No.	Test Field	Expected Result	Test Result	Remarks
1.	Click on “Home” button	Link to Main Menu Page	Same with expected result	Success
2.	Click on “Sound” button	Able to turn on and mute the background music	Same with expected result	Success
3.	Click on “Sexual and Asexual Reproduction” button	Link to Sexual and Asexual Reproduction Page	Same with expected result	Success
4.	Click on “The Male Reproductive System” button	Link to The Male Reproductive System Page	Same with expected result	Success
5.	Click on “The Female Reproductive System” button	Link to The Female Reproductive System Page	Same with expected result	Success
6.	Click on “The Menstrual Cycle” button	Link to The Menstrual Cycle Page	Same with expected result	Success
7.	Click on “Fertilization and Pregnancy” button	Link to Fertilization and Pregnancy Page	Same with expected result	Success
8.	Click on “Previous” button	Link to previous page in same module	Same with expected result	Success
9.	Click on “Next” button	Link to next page in same module	Same with expected result	Success

**5.2.1.1.3 Tutorial Module Page**

<b>No.</b>	<b>Test Field</b>	<b>Expected Result</b>	<b>Test Result</b>	<b>Remarks</b>
1.	Click on “Home” button	Link to Main Menu Page	Same with expected result	Success
2.	Click on “Sound” button	Able to turn on and mute the background music	Same with expected result	Success
3.	Click on “Tutorial 1” button	Link to Tutorial 1 Page	Same with expected result	Success
4.	Click on “Tutorial 2” button	Link to Tutorial 2 Page	Same with expected result	Success
5.	Click on “Tutorial 3” button	Link to Tutorial 3 Page	Same with expected result	Success
6.	Click on “Tutorial 4” button	Link to Tutorial 4 Page	Same with expected result	Success
7.	Click on “Tutorial 5” button	Link to Tutorial 5 Page	Same with expected result	Success
8.	Click on “Previous” button	Link to previous page in same module	Same with expected result	Success
9.	Click on “Next” button	Link to next page in same module	Same with expected result	Success
10.	Click on “Back” button	Back to Tutorial Module Main Page	Same with expected result	Success

**5.2.1.1.4 Game Module Page**

No.	Test Field	Expected Result	Test Result	Remarks
1.	Click on “Exit” button	Link to Main Menu Page	Same with expected result	Success
2.	Click on “Sound” button	Able to turn on and mute the background music	Same with expected result	Success
3.	Click on “Start” button	Start the game	Same with expected result	Success
4.	Click on “Instruction” button	Link to Instruction Page	Same with expected result	Success
5.	Click on “High Score” button	Link to High Score Page	Same with expected result	Success
6.	Display score	The score will be calculate automatically and displayed at the end of the game	Same with expected result	Success
7.	Click on “Back” button	Back to Game Module Main Page	Same with expected result	Success

**5.2.1.1.5 Practical Module Page**

No.	Test Field	Expected Result	Test Result	Remarks
1.	Click on “Home” button	Link to Main Menu Page	Same with expected result	Success
2.	Click on “Sound” button	Able to turn on and mute the background music	Same with expected result	Success
3.	Click on “Microscope” button	Link to Microscope Page	Same with expected result	Success
4.	Click on “Pregnancy Week by Week” button	Link to Pregnancy Week by Week button	Same with expected result	Success
5.	Click on “Back” button	Back to Game Module Main Page	Same with expected result	Success

**5.2.1.1.6 Virtual Lab Module Page**

No.	Test Field	Expected Result	Test Result	Remarks
1.	Click on “Home” button	Link to Main Menu Page	Same with expected result	Success
2.	Click on “Sound” button	Able to turn on and mute the background music	Same with expected result	Success
3.	Click on “The Menstrual Cycle” button	Link to The Menstrual Cycle Page	Same with expected result	Success
4.	Click on “Fertilization and Implantation” button	Link to Fertilization and Implantation Page	Same with expected result	Success
5.	Click on “Back” button	Back to Game Module Main Page	Same with expected result	Success

**5.2.1.2 Integration Testing**

Integration testing is acted as a level of software testing where individual units are combined and tested as a group. The different between unit testing and integration testing is the testing is no longer tested independently, however it is tested in the groups (ISTQB Exam Certification 2015). The aim of this level of testing is to expose faults or defects in the interaction between integrated units. Integration testing is essential to the author as it is able to avoid any confusing during the author combined the whole modules into one system.

**5.2.1.2.1 Images and Sound**

No.	Test Field	Expected Result	Test Result	Remarks
1.	Import sound	Import sound to Macromedia Director MX	Same with expected result	Success
2.	Import image	Import images that edited by Adobe Photoshop	Same with expected result	Success
3.	Import picture	Import picture to Macromedia Director MX		
4.	Integrate sound into frame	Integrate the background music into the key frame	Same with expected result	Success
5.	Integrate sound into button	Integrate the sound effect into the particular button, thus the sound will play when mouse is clicked	Same with expected result	Success

**5.2.1.2.2 Each Module**

No.	Test Field	Expected Result	Test Result	Remarks
1.	Integrate different types of modules with Main Menu Module	Success integrate all modules together, therefore the user is able to enter into each module	Same with expected result	Success

### 5.2.1.3 System Testing

System testing is acted as a level of the software testing where an integrated and complete software system is tested. The main purpose of this testing is to evaluate the compliance of system with some specified requirements. Once the integration testing is completed by the author, the system testing will be performed. System testing is the final test to evaluate that the system to be disseminate meets the requirements and its objectives. The behavior of whole complete system is tested as defined by the development project's scope (ISTQB Exam Certification 2015). If the output of the system is not match with the expected result, the author is required to do some modification and come out with the more satisfy outcomes.

No.	Test Field	Expected Result	Test Result	Remarks
1.	Run the system in: - Asus Laptop 14" - Windows 10 - Intel Core i5 Processor - 6.00 GB RAM - CPU 1.80 GHz	Success run the system without any error	Same with expected result	Success
2.	Run the system in: - Toshiba Satellite Pro B40-A - Window 7 Pro - Intel Core i3-3120 - 2.00 GB RAM	Success run the system without any error	Same with expected result	Success
3.	Run the system in: - HP 1000-1409 TX Notebook - Window 7 - 2.3 GHz Intel Core i3 - AMD Radeon HD 7450 - 4.00 GB RAM	Success run the system without any error	Same with expected result	Success



### 5.2.2 Beta Testing

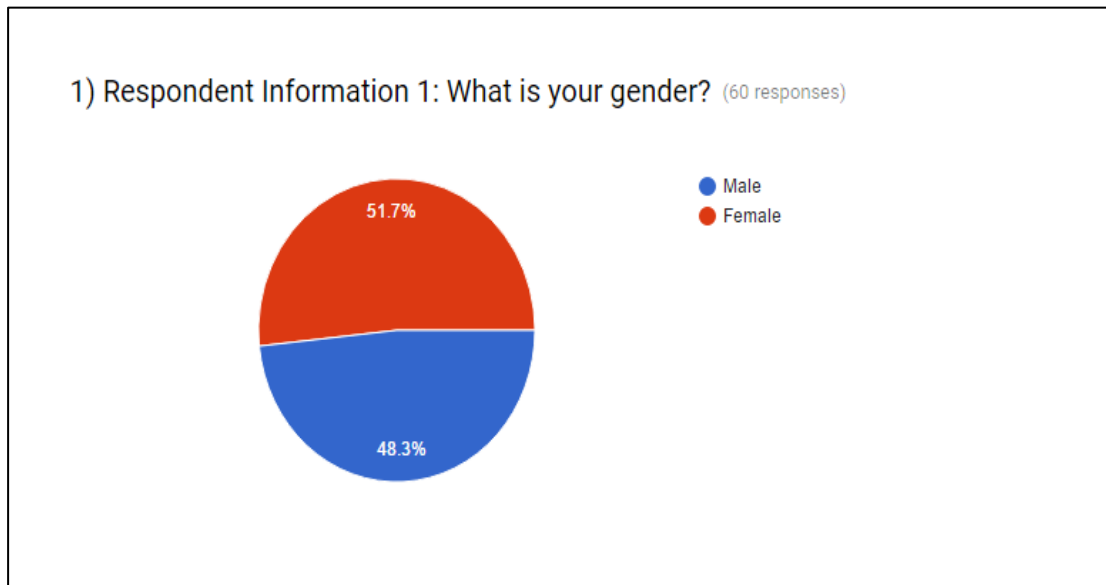
Beta testing is also known as field testing. Beta testing is performed on the product or system to the “real end users” of the software application in the “real environment”. It is considered as pre-release testing and acted as a form of external user acceptance testing. The beta version of the system is distributed to a limited amount of targeted users of the system to gain feedback on the system quality. Direct feedback from target users is a major advantage of beta testing. This testing is able to reduce the system failure risks as well as enhance the system quality through customer validation. Therefore, it is the final test before shipping a system to the public.

There are two types of beta testing, which are open beta and closed beta. Open betas are from a bigger group to the general public and anyone interested. Besides that, closed beta versions are released to a specific people or select group of individuals for a user test and are invitation only (ISTQB Exam Certification 2015). During the beta testing, those testers are able to discover issues with your software application that the author may have not noticed. The author can use the feedbacks from the testers and solve the problems before it is disseminated to the general public. The more bugs or problems the author fix that solve the end user issues, the higher the system quality when release it to the general public. Sometimes, the testers will also provide some useful suggestions that they think should be available in the system.

Furthermore, beta testing is acted as the second phase of the proposed system testing which involving the target audience who are Form 3 students in the secondary schools to try out this proposed multimedia courseware.

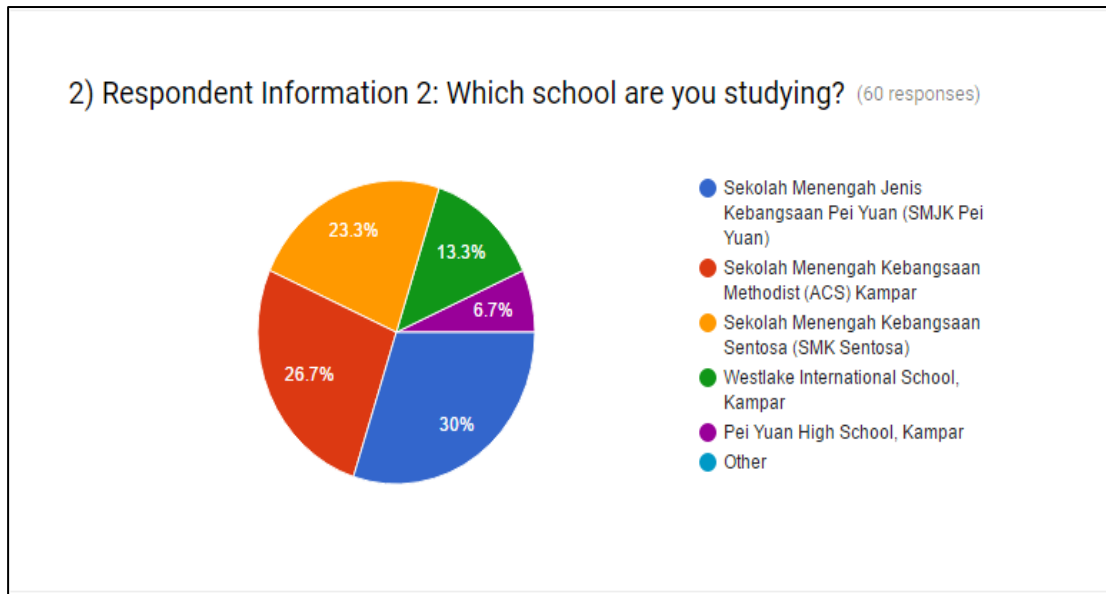
### 5.3 Testing Analysis

During beta testing, this proposed multimedia courseware is burned into CDs or DVDs and distributed to the target user. The purpose of user evaluation is to gather the feedbacks from the participants. Therefore, those target users are required to conduct a survey through the questionnaire to find out any error or problems and prove that the effectiveness of multimedia courseware learning system for secondary school.



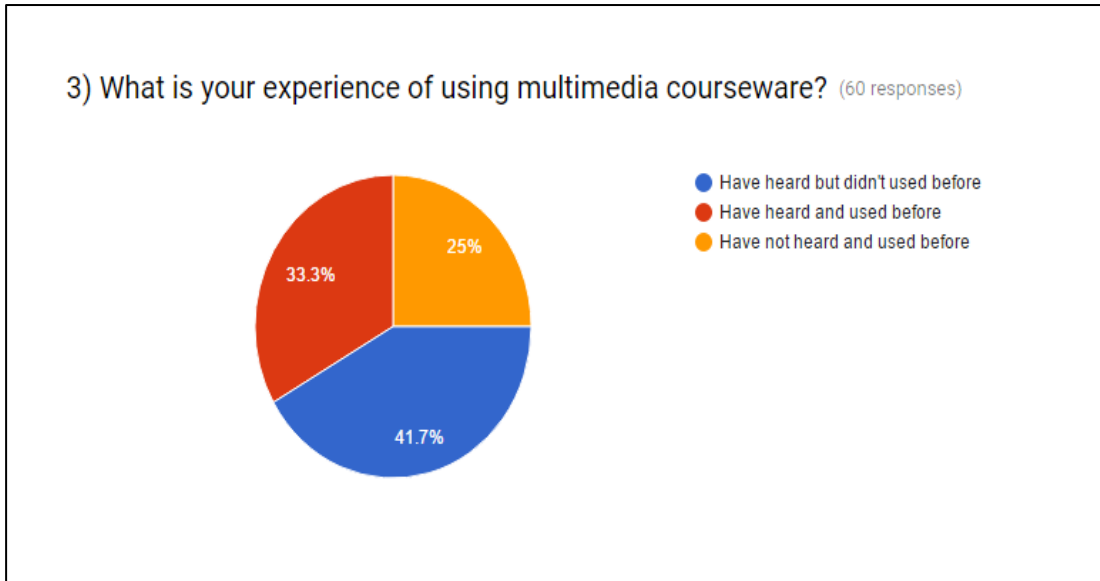
**Figure 5-3-F1 Screenshot of Survey Question 1**

The first question of this survey is about the gender of respondents. According to the Figure 5-3-F1, among 60 respondents, 29 of respondents are male and other 31 of respondents are female.



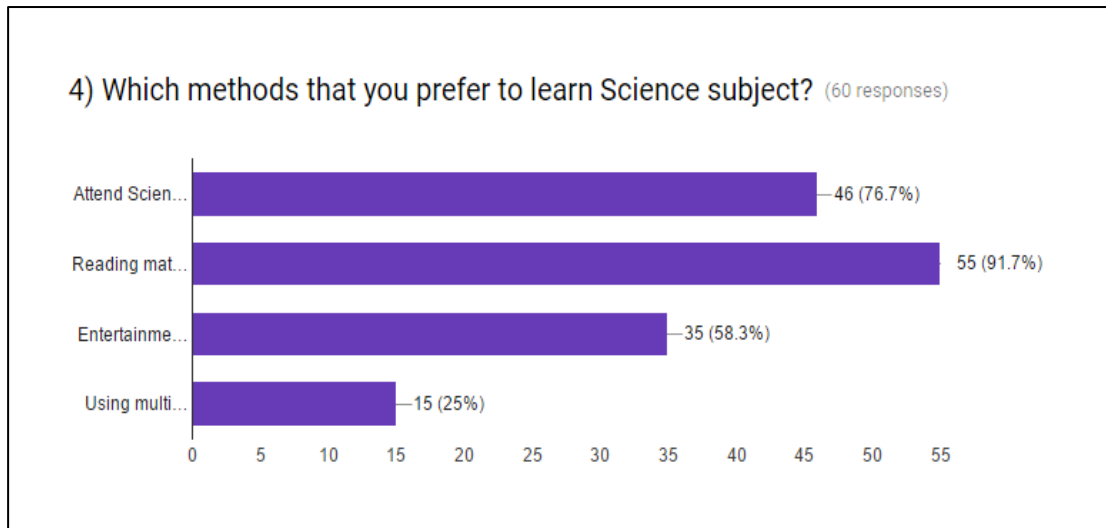
**Figure 5-3-F2 Screenshot of Survey Question 2**

The second question of this survey is about the secondary school of respondents are studying. From the Figure 5-3-F2, out of 60 respondents 14 of respondents are come from Sekolah Menengah Kebangsaan Sentosa (SMK Sentosa), 8 of respondents are come from Westlake International School Kampar, 4 of respondents are come Pei Yuan High School Kampar, 16 of respondents are come Sekolah Menengah Kebangsaan Methodist (ACS) Kampar and 18 of respondents are come from Sekolah Menengah Jenis Kebangsaan Pei Yuan (SMJK Pei Yuan). There are no other respondents to choose the other options in this question.



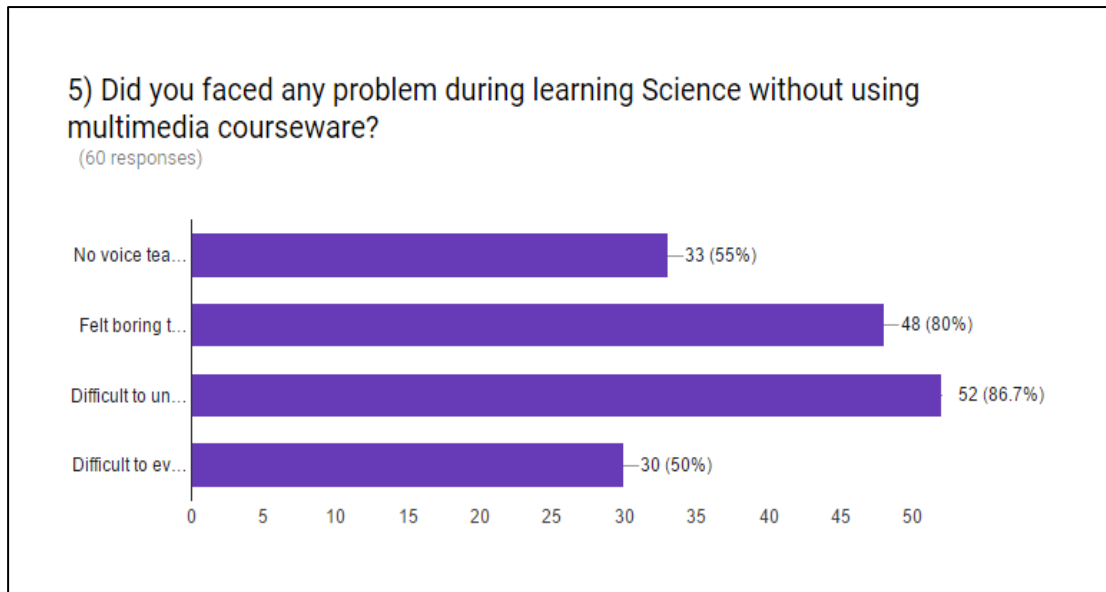
**Figure 5-3-F3 Screenshot of Survey Question 3**

Diagram Figure 5-3-F3 has shown the respondents' experience of using multimedia courseware. According to the survey, out of 60 respondents, there are 20 respondents have heard and used multimedia courseware as their learning tools before. Next, this figure also shows that there are 25 respondents have heard but didn't used before and another 15 respondents choose the option of have not heard and used multimedia courseware before.



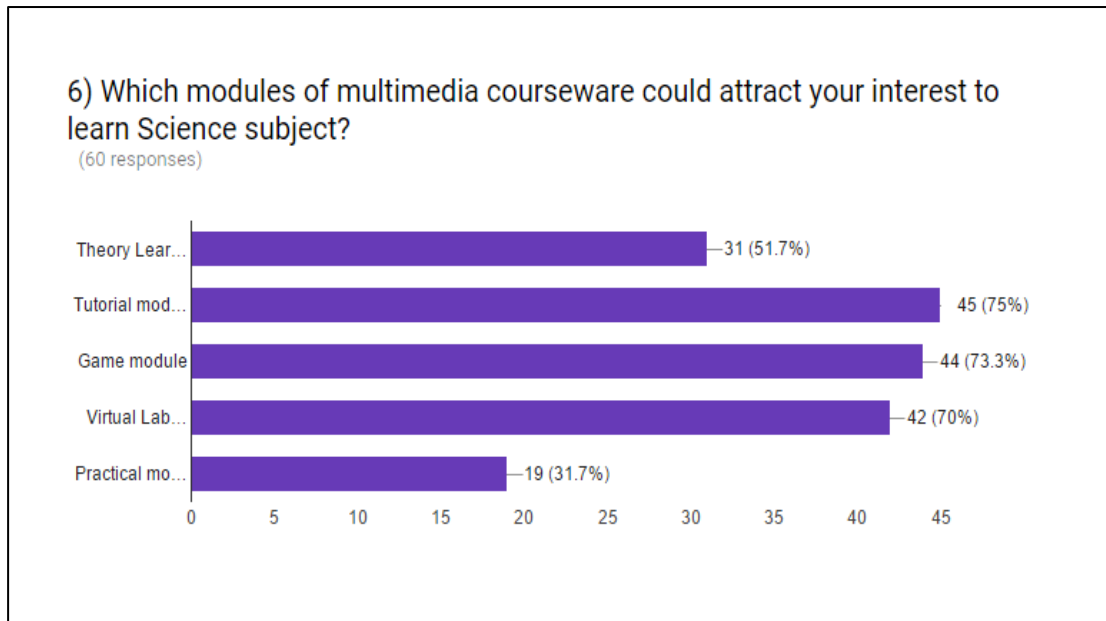
**Figure 5-3-F4 Screenshot of Survey Question 4**

The figure above shown the methods that respondents prefer to learn Science subject. Based on the Figure 5-3-F4, it shows that there are 46 respondents (76.7%) prefer to attend Science tuition class and another 35 respondents (58.3%) are used entertainment materials to gain Science knowledges. In a majority, there are 55 respondents (91.7%) prefer to use the reading materials such as textbook and references book to learn Science subject whereas just 15 respondents (25%) prefer to use multimedia courseware as their learning tools.



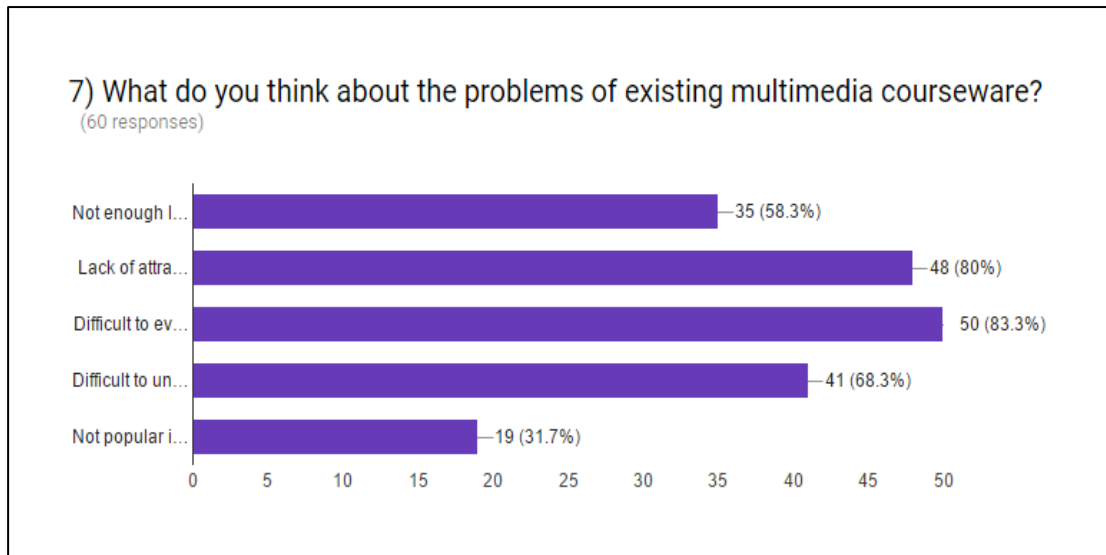
**Figure 5-3-F5 Screenshot of Survey Question 5**

Based on the Figure 5-3-F5 above, the fifth question of this survey is used to evaluate the problem faced by respondents during learning Science without using multimedia courseware. According to the results, there are 33 respondents (55%) faced the problem of no voice teaching and 48 respondents (80%) felt boring to learn Science subject through the textbook. Moreover, in the majority, there are 52 respondents (86.7%) are felt difficult to understand and learn the Science subject through the traditional learning method. After that, there are 30 respondents (50%) are felt difficult to evaluate their own understanding about Science subject without using multimedia courseware as their learning tools.



**Figure 5-3-F6 Screenshot of Survey Question 6**

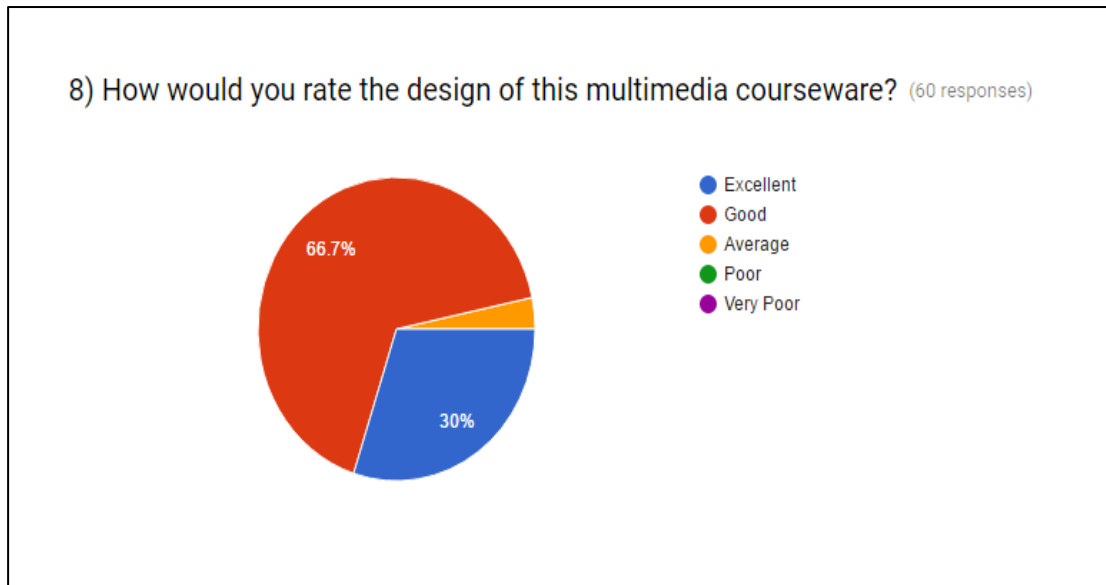
Figure 5-3-F6 has shown the types of modules of multimedia courseware which could attract the respondents' interest to learn Science subject. According to the results, there are 31 respondents (51.7%) choose the theory learning module, 45 respondents (75%) choose the tutorial module and 44 respondents (73.3%) choose the game module to learn Science subject. Besides that, 42 respondents (70%) choose the virtual lab module and just only 19 respondents (31.7%) choose the option of practical module which is able to attract their interest to learn Science subject by using interactive multimedia courseware.



**Figure 5-3-F7 Screenshot of Survey Question 7**

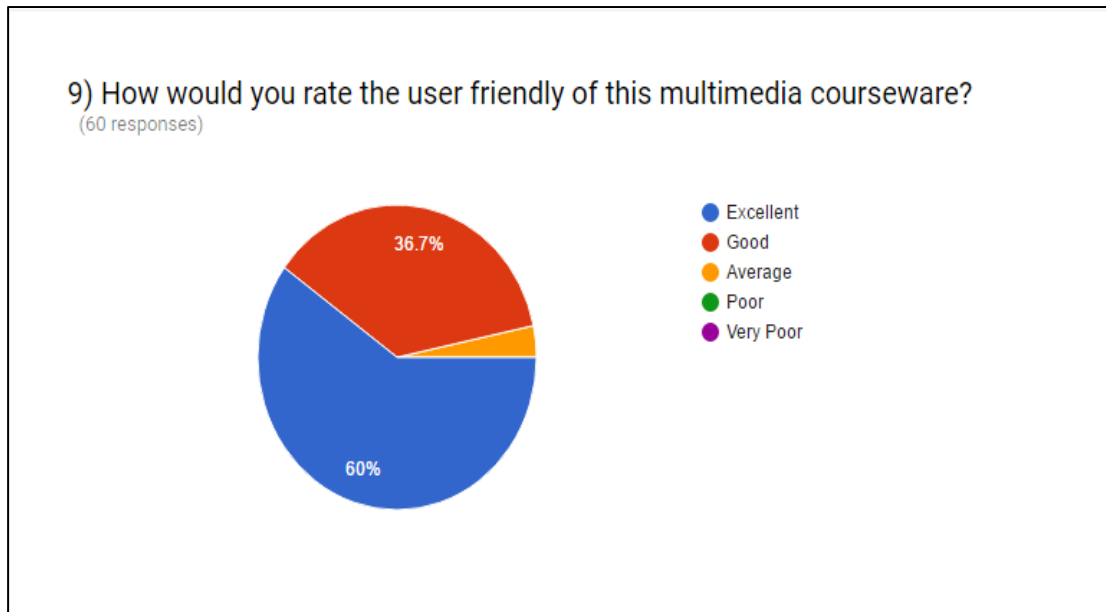
Figure 5-3-F7 had shown the respondents' opinion or thought about the problems of existing multimedia courseware in the general public. According to the survey results, 35 respondents (58.3%) felt that the courseware is not enough lessons for users to learn and 48 respondents (80%) felt that the existing multimedia courseware is lack of attractive design and content. However, in the majority, 50 respondents (83.3%) think that the existing multimedia courseware is difficult to evaluate the understanding and ability of users. Next, there are 41 respondents (68.3%) felt difficult to understand the content and knowledge as well as 19 respondents (31.7%) think about the existing multimedia courseware is not popular in the public.





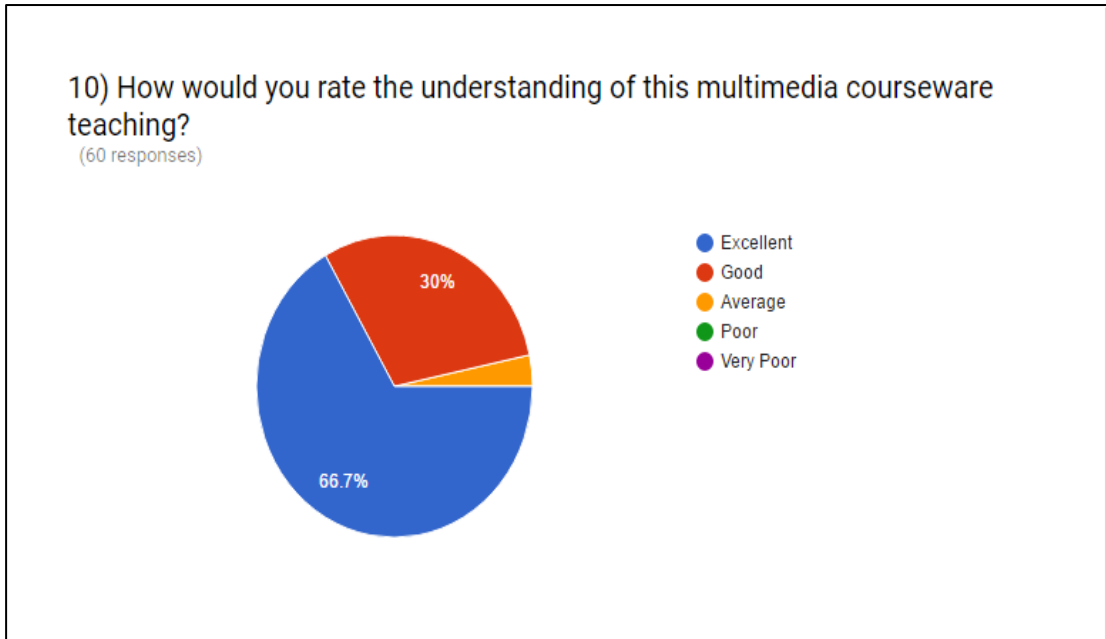
**Figure 5-3-F8 Screenshot of Survey Question 8**

This survey question is about the rating of respondents for the design of this multimedia courseware. According to the Figure 6-3-F8, among 60 respondents, 40 of respondents (66.7%) rate good, 18 of respondents (30%) rate excellent and another 2 of respondents (3.3%) rate average. There are no respondents are rate poor and very poor for the design of this multimedia courseware. Therefore, overall all opinions of users, the good design of this multimedia courseware has successfully attracting users to apply this software as their learning tools.



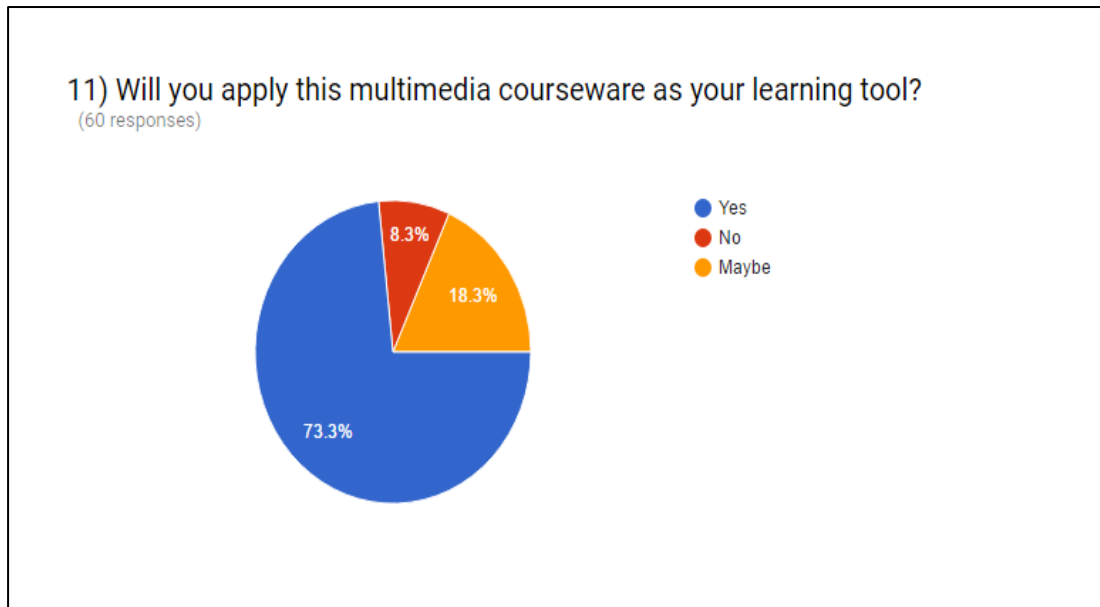
**Figure 5-3-F9 Screenshot of Survey Question 9**

Figure 5-3-F9 has shown the rate of the user friendly of this multimedia courseware which providing by respondents. According to the results, among 60 respondents, 36 of respondents (60%) rate excellent, 22 of respondents (36.7%) rate good and another 2 of respondents (3.3%) rate average. There are no respondents are rate poor and very poor for user friendly of this multimedia courseware. Therefore, this proposed multimedia courseware has good user friendly interface for end users to learn Science subject.



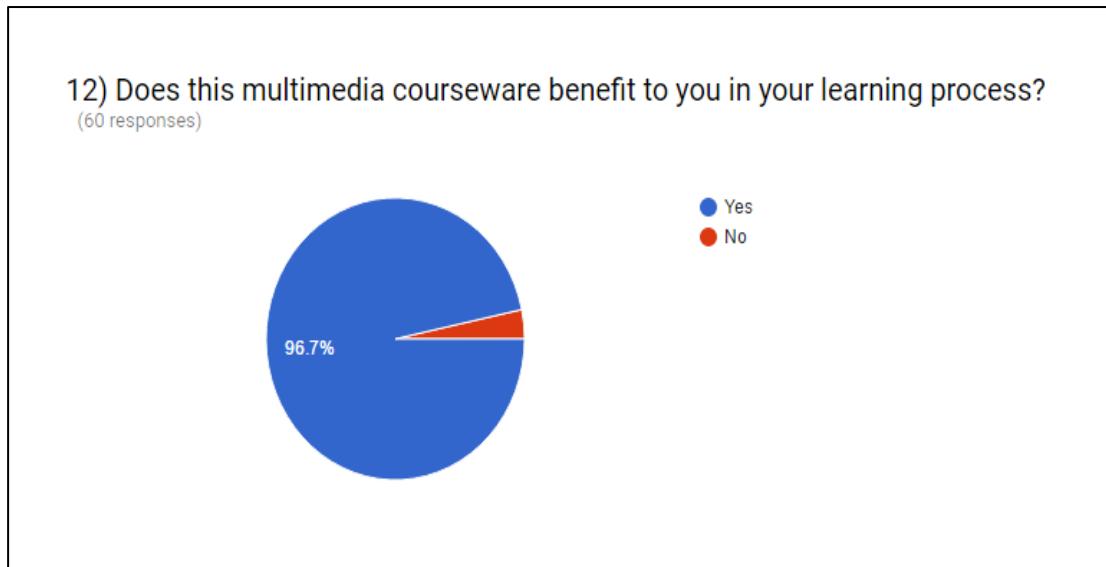
**Figure 5-3-F10 Screenshot of Survey Question 10**

Figure 5-3-10 has shown the rate of understanding of this multimedia courseware which providing by respondents. Based on the survey results, there are 40 respondents (66.7%) rate excellent of the understanding of this multimedia courseware. After that, there are 18 respondents (30%) rate good and another 2 respondents (3.3%) rate average. There are no respondents are rate poor and very poor for the understanding of this multimedia courseware. Therefore, most of the respondents are able to understand what multimedia courseware teaching.



**Figure 5-3-F11** Screenshot of Survey Question 11

Figure 5-3-F11 has shown the decision make of respondents to apply this multimedia courseware as their learning tools. According to the survey results, out of 60 respondents, 44 of respondents (73.3%) are chosen yes, which means that they will apply this multimedia courseware as their learning tools. Next, there are 11 respondents (18.3%) choose the option of maybe and another 5 respondents (8.3%) are chosen no, which means that they will reject to use this multimedia courseware as their learning tools.



**Figure 5-3-F12 Screenshot of Survey Question 12**

Figure 5-3-F12 has shown the feeling of respondents about benefit of multimedia courseware to them in their learning process. Based on the survey results, out of 60 respondents, 58 of respondents (96.7%) are chosen the option of yes, which means that this multimedia courseware is benefit to the users' learning process. However, there are a small portion of respondents answered no, which means that this multimedia courseware would not provide benefit to the users' learning process. This small portion is occupied about 3.3%, which is just only 2 respondents.

#### 5.4 Results and Discussions

Each set of the questionnaire have 12 questions and printed in 60 copies. After that, these questionnaires are disseminated to target audiences in the secondary school to answer the questions and constructed a simple analysis through this survey. In additions, this questionnaire had focused on the different types of aspect and involvements of areas such as background information of respondents, issues of traditional learning method, problems of existing multimedia courseware and future enhancements for this multimedia courseware.

The survey question of what is your experience of using multimedia courseware is used to evaluate the respondents' experience for multimedia courseware. Based on the results, most of the respondents are chosen the option of have heard but didn't used before as well as just a small portion of respondents are chosen the option of have not heard and used before. This results had shown that the interactive multimedia courseware is not unfamiliar for them, but they just doesn't have any chance to experience and try it out during the learning process.

Then, the survey question of methods that you prefer to learn Science subject is to evaluate the learning methods of respondents. Most of the respondents will prefer to keep on using the traditional learning method, which is reading Science materials such as references book, textbook and others. The popular traditional learning method is included paying fees to attend Science tuition class. Again, there is a small portion of respondents prefer to using multimedia courseware as their learning tools. According to the results, most of the respondents are unbelieve to the content of multimedia courseware as they worried about there are some differences in content between multimedia courseware and traditional textbook.

Besides that, this set of questionnaire also determined the problem faced by respondents during learning Science without using multimedia courseware. According to the results, most of respondents also faced the same problems such as no voice teaching, felt boring for learning Science through the textbook, difficult to evaluate their understanding and others. The majority of respondents are felt difficult to understand and learn the Science subject because most of the time the students are unable to follow up the speed of teaching in school. Then, those students doesn't do any revision after

school as the traditional reading materials with only text and graphics are unable to attract their interest and motivate them.

In additions, this survey is determined the types of modules of multimedia courseware which could attract respondents' interest to learn Science subject. Most of the respondents are chosen the option of tutorial module and game module. This is because the students are able to learn faster and easily remember the Science knowledge, if there are tutorial questions available for students to test their understanding after learning the theory. Besides that, the game module which is full of challenges and fun will motivate the students to play it regularly until able to reinforce their memories at the end.

Moreover, this set of questionnaire is also used to evaluate the problems of existing multimedia courseware. According to the survey results, the majority of respondents felt that the existing multimedia courseware is lack of attractive design and content as well as difficult to evaluate the understanding and ability of users. Most of the existing multimedia courseware are provided the similar design and content for students to reduce the production costs and increase profits. However, those fixed questions in the tutorial module without randomly is difficult to evaluate the understanding of users fully.

According to the analysis, it is proved that the interactive multimedia courseware for secondary school is effective. From the testing, the author found that there are three aspects of design are important for the development of a high quality software system. The three aspects are included content design, interface design and navigation design. For interface design, the respondents comment that the design of this multimedia courseware is good, which is able to attract their interest and attention on the learning environment before they start the learning lesson. Besides that, for navigation design, the respondents strongly agreed that this multimedia courseware is providing a clear navigation and user friendly for each module of the system. The end users are able to enter the module of they wish easily without wasting time for searching. Moreover, for content design, the respondents also agreed that this multimedia courseware is suitable for secondary school students. They feel satisfy and fully understand regarding the interactive ways for content of the lesson as the students are able to learn faster as well as absorb the knowledge and information easily.

Last but not least, according to the survey results, the majority of respondents will apply this multimedia courseware as their learning tools. This is because this interactive multimedia courseware is offered well content design, good navigation design and attractive interface design for the end users during their learning process. Besides that, most of the respondents also felt that this multimedia courseware is able to bring some benefits to them in their learning process. Those benefits are included increase their learning motivation, provide deeply explanation about the particular topic, evaluate their understanding of Science and also reinforce their memories during the learning process.



## **Chapter 6.0 Conclusion**

This chapter is about the summary of the project. It will included various types of components such as overview, research findings, problem faced, knowledge gained, limitations and future enhancement.

### **6.1 Overview**

In the conclusion, author believe that the proposed multimedia courseware is able to provide a complete guidelines for the secondary students to learn Science subject easily. Nowadays, lack of students in the secondary schools learn and understand Science subject by using multimedia courseware due to low quality of courseware in the market. Therefore, author believe firmly without any doubt about the proposed multimedia courseware is able to motivate and enhance the interest of learner since this project is involves simple contents, consists of attractive graphics, includes some funny animations, meaningful video and other useful module for the learners to understand the Science subject in the easiest way.

In the additions, the existing multimedia courseware in the market, which is involved the simple design without animation, funny video and audio will make the students feel boring to learn the knowledge by using multimedia courseware. Therefore, the author will not worries about this type of problem as they already put much efforts and attentions into the system design. The attractive and colorful interface of multimedia courseware will enhance the students' motivation to apply it and keep learn new knowledges in the daily life.

Furthermore, the traditional teaching style is difficult for the students to understand the contents and information in the textbooks or reference books as there are too many words and no attractive. Then, the students can't understand the subjects easily in the short time without voice teaching. However, the proposed multimedia courseware will settle this type of issue through present the data information in the project by colorful graphics, attractive animations and meaningful video with voice teaching to make sure that the students can understand and absorb new knowledges

easily. This project also can improve the students' memories about the subjects by performing the voice teaching with correct pronunciation.

In a nutshell, this proposed multimedia courseware will assist the secondary students who wish to study Science subjects and able to guide them in an easiest method to success in the education domain.

### **6.2 Research Findings**

Based on the data analysis, it was found that students preferred to apply multimedia courseware as their learning tools. It was fulfilled the first objective, which is to study the usage of multimedia in Science using learner centered approach because most of them are agreed that the multimedia courseware is able to provide benefits in their learning process. Besides that, according to the data analysis, the target audiences were feel satisfy and fully understand regarding the interactive ways for content of the lesson as the students are able to learn faster as well as absorb the knowledge and information easily. This interactive multimedia courseware is included different types of elements which is able to attract the users' learning interest. Moreover, based on the data analysis, the target audiences feel that the one of the problem of existing multimedia courseware is difficult to evaluate the understanding and ability of users. Therefore, they are able to understand the content fully by using multimedia courseware during their learning process. The data analysis in this project is fulfilled the objectives that had mentioned before.

### **6.3 Problems Faced**

By developing this multimedia courseware for learning Science, the author had faced some problems and issues during the process in the following:

#### **6.3.1 Lack of Time for Learning**

The author is required to learn and understand all the related information from the beginning as well as do various types of researches on the particular topics. Besides that, the author also required to spend a lot of time to learn the multimedia developing tools such as Macromedia Director MX since the author never learn before. The author need to learn the tutorial through internet and also find some related references book in UTAR library to gain the knowledge of Lingo Script for coding part. This is a new challenge for author to absorb new knowledge and learn a new coding language by themselves within a short period.

#### **6.3.2 Integrate Module**

After developing all the modules successfully, the author is required to integrate all the modules become a complete interactive multimedia courseware. However, the author had faced some problems and issues when trying to combine the module together in the developing tools. Therefore, author need to do some researches through reference book, internet and consult to the supervisor to solve these problems.

#### **6.3.3 Implementation Phase**

The problems faced in this phase are designing and coding the multimedia courseware. The graphic design for different types of pictures, logo and user interface is not easy because it should be creative and interesting enough to attract the users' attentions. In additions, the coding part is most difficult for the author. The author is not familiar with the Lingo Script, therefore it consumed much more time for the author to learn, understand and master it. Furthermore, the preparation of tutorial is not easy. The author is tried to use different types of recording software, but some of them are not really useful and clear enough for the users.

#### **6.3.4 Testing Phase**

During the testing phase, this multimedia courseware system will burn into CDs or DVDs and then distribute to the target users. The author also provided a link which had a set of questionnaire to the respondents for testing purpose. Some of respondents might simply do the testing and answering the questionnaire, thus it will cause the result of analysis become not accurate.

#### **6.4 Knowledge Gained**

By developing this interactive multimedia courseware, the author had gained some extra new knowledges and able to enhance some skills in the following:

##### **6.4.1 Project Management Skill**

Any task that need some preparation to accomplish a successful outcome, will probably be complete better by applying good project management skills in the process. Project management skill is able to assist in the planning and managing of all kinds of tasks, especially complex works. To ensure this project is done successfully, each stage of the planning such as analysis, design, development, implementation and evaluation should be planned according to the time manner without any delaying. The author ensures that the outcome of each stage can be completed, therefore the system is done before deadline.

##### **6.4.2 Research Skill**

Research skill is important in the process of developing a project because it is being able to provide in depth of knowledge, related information and advice on a particular topic. Doing research is able to help author discover new options for solving issues and problems as well as explore methods to make better changes. Author is done by reviewing a lot of facts to find out the related information through reference books, internet and others. Those finding facts in reference sources can assured that the statement that mentioned before is accurate and support the ideas viewpoints or for developing the project.

### **6.4.3 Developing Multimedia Skill**

By developing this multimedia courseware, the author had done some self-learning through online to design a multimedia courseware system by using Macromedia Director MX. Besides that, the author also do a lot of researches through internet, textbook, reference book and others to learn and apply the Lingo Script in the tutorial and games modules. These coding for Lingo Script are able to make the system become more interactive and attractive to users.

### **6.4.4 Project Writing Skill**

A proper and complete documentation is very essential for a project. The author is practiced a lot for writing a report during this project. Thus, it enhances the writing skills and reading skills after completed this multimedia courseware project.

## **6.5 Limitations**

There are some limitations in this multimedia courseware project. Those users are just allowed to enter the capital letter while answering the question in the game modules. Besides that, this multimedia learning system is not as attractive as other multimedia courseware.

## **6.6 Future Enhancement**

An enhancement is a noteworthy improvement to the product or system as part of a new version of it. Future enhancement is able to solve the project limitations and let the system become better and more attractive for the target users.

### **6.6.1 Game Module**

Future enhancement will be improving the limitation of this project, especially on the game module. The author can make some improvement in the coding part, so that the multimedia learning system can detect the correct answers in upper case or lower case.

### **6.6.2 Tutorial Module**

In tutorial section, the tutorial questions with different level of difficulty can be developed, so that the secondary student is motivated to learn more deeply and clearly to answer those more difficult questions. The different difficulty level of tutorial question is acted as a challenge for the users to let them learnt and gained more knowledges or information of Science as well as enhance their understanding in this particular topic.

### **6.6.3 User Interface**

User interface can be further enhances on the text, animation, graphic, color used and so on. The graphic design of the multimedia courseware can be improved by adding in some more interesting and colorful graphics to attract the attention of students to apply the multimedia courseware for learning in the daily life.

### **6.6.4 Pronunciation Testing**

Since the current multimedia courseware for learning Science is only test for the reading, writing and listening abilities of the secondary students, so pronunciation testing can add in the future project for enhancement. The pronunciation testing can be created by allowing users to speak some scientific words such as amoeba, progesterone and testosterone through the microphone. The system will check whether the pronunciation of the students is accurate or not. By adding this testing, the users an easier to learn the pronunciation of the scientific words.

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Appendix A

Print Screen of Turnitin Originality Report

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 By Chai Mun Lee

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**say thanks to my lovely parents and my friends for their love and support.**

They give me some useful advices to solve my problems during the period of developing Final Year Project. Moreover, they encourage me not to give up easily when I faced some troubles in this project. I will try my best to do well on this project to repay an obligation to all of them. ABSTRACT This project is to discuss about the multimedia courseware for learning Science subject and the target audience of this proposed project is secondary students. The objectives of this project is to create and develop an educational yet high quality multimedia courseware for those individual users to learn Science subject. In the addition, this project is to develop an attractive user interface, meaningful content and funny animations to motivate as well as attract students' attentions to learn Science subject. Moreover, this project is able to provide voice teaching for learners and let them understand the contents well in the short time. Furthermore, this project is also figured out some existing problems and provide some effective solutions to solve it. There are few problems existing while the secondary students learn Science subject through multimedia courseware. Those problems are included quality of courseware is not high, formalist answer is limiting the thinking of students, lack of interesting about unattractive design of multimedia courseware and difficult to understand the contents and no voice teaching. Thus, this project has to solve the issues. Besides that, the

**methodology applied in this project is ADDIE model. The**

ADDIE model is one of the familiar

**model which is consists of five phases, which is analysis, design, development, implementation and evaluation.**

**Each of the phases in this model is performed their own tasks to design**

and develop the project. It also used to solve the existing problem which is faced by secondary students. In the conclusion, since the content and information of this project is easy and simple for learners to understand, this project is good to assist the secondary students to learn Science subject well in the daily life. Then, this project is provided some colourful graphics, funny animations as well as meaningful video to motivate and encourage the students to learn Science subject. This project also able to evaluate the understanding level of secondary students in the learning process.

**TABLE OF CONTENTS TITLE REPORT STATUS DECLARATION FORM DECLARATION OF ORIGINALITY ABSTRACT TABLE OF CONTENTS LIST OF TABLES LIST OF FIGURES i ii iii iv v xi CHAPTER 1 INTRODUCTION 1 1- 1. Introduction 1 1-2 Background Information 3 1-3 Problem Statement**

427 PM 4/11/2017

## Appendix B

Universiti Tunku Abdul Rahman			
Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programmes)			
Form Number: FM-IAD-005	Rev No.: 0	Effective Date: 10/04/2017	Page No.: 1 of 1



**FACULTY OF INFORMATION AND COMMUNICATION  
TECHNOLOGY**

<b>Full Name(s) of Candidate(s)</b>	Lee Chai Mun
<b>ID Number(s)</b>	13ACB05489
<b>Programme / Course</b>	Information Systems Engineering
<b>Title of Final Year Project</b>	The Design and Development of Computer Aided Learning Application For Science Domain (Learner Centered Approach)

Similarity	Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)
<b>Overall similarity index:</b> _____ %  <b>Similarity by source</b> Internet Sources: _____ % Publications: _____ % Student Papers: _____ %	
<b>Number of individual sources listed of more than 3% similarity:</b> _____	
<b>Parameters of originality required and limits approved by UTAR are as follows:</b> (i) Overall similarity index is 20% and below, and (ii) Matching of individual sources listed must be less than 3% each, and (iii) Matching texts in continuous block must not exceed 8 words <i>Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.</i>	

Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

*Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.*

\_\_\_\_\_  
Signature of Supervisor

Name: \_\_\_\_\_

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

\_\_\_\_\_  
Signature of Co-Supervisor

Name: \_\_\_\_\_

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

## Appendix C

**FINAL YEAR PROJECT WEEKLY REPORT***(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 2</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>	
<input type="checkbox"/> Define the version of Lingo Script needed to apply <input type="checkbox"/> Define the final version of storyboard	
<b>2. WORK TO BE DONE</b>	
<input type="checkbox"/> Develop the final version of storyboard	
<b>3. PROBLEMS ENCOUNTERED</b>	
<input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>	
<input type="checkbox"/> On schedule.	

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**Supervisor's signature**


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**Student's signature**

## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 3</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>  <input type="checkbox"/> Develop Theory Learning Module	
<b>2. WORK TO BE DONE</b>  <input type="checkbox"/> Develop Theory Learning Module successful	
<b>3. PROBLEMS ENCOUNTERED</b>  <input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>  <input type="checkbox"/> Can be improved	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 4</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>  <input type="checkbox"/> Develop Tutorial Module	
<b>2. WORK TO BE DONE</b>  <input type="checkbox"/> Develop Tutorial Module successful	
<b>3. PROBLEMS ENCOUNTERED</b>  <input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>  <input type="checkbox"/> On schedule	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 5</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>  <input type="checkbox"/> Develop Games Module	
<b>2. WORK TO BE DONE</b>  <input type="checkbox"/> Develop Games Module successful	
<b>3. PROBLEMS ENCOUNTERED</b>  <input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>  <input type="checkbox"/> On schedule	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 6</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>	
<input type="checkbox"/> Develop Virtual Lab Module	
<b>2. WORK TO BE DONE</b>	
<input type="checkbox"/> Develop Virtual Lab Module successful	
<b>3. PROBLEMS ENCOUNTERED</b>	
<input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>	
<input type="checkbox"/> On schedule	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 7</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>  <input type="checkbox"/> Develop Practical Module	
<b>2. WORK TO BE DONE</b>  <input type="checkbox"/> Develop Practical Module successful	
<b>3. PROBLEMS ENCOUNTERED</b>  <input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>  <input type="checkbox"/> On schedule	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 8</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>	
<input type="checkbox"/> Distribute the system and questionnaire for target audiences for testing	
<b>2. WORK TO BE DONE</b>	
<input type="checkbox"/> Collect data is done successful	
<b>3. PROBLEMS ENCOUNTERED</b>	
<input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>	
<input type="checkbox"/> On schedule	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 11</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b>  <input type="checkbox"/> Complete the testing analysis and results discussions	
<b>2. WORK TO BE DONE</b>  <input type="checkbox"/> Complete the data analysis and discussions successful	
<b>3. PROBLEMS ENCOUNTERED</b>  <input type="checkbox"/> No	
<b>4. SELF EVALUATION OF THE PROGRESS</b>  <input type="checkbox"/> Can be improved	

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## FINAL YEAR PROJECT WEEKLY REPORT

*(Project I / Project II)*

<b>Trimester, Year: Y3S3</b>	<b>Study week no.: 12</b>
<b>Student Name &amp; ID: LEE CHAI MUN 13ACB05489</b>	
<b>Supervisor: MR. LEE CHEN KANG</b>	
<b>Project Title: THE DESIGN AND DEVELOPMENT OF COMPUTER AIDED LEARNING APPLICATION FOR SCIENCE DOMAIN (LEARNER CENTERED APPROACH)</b>	
<b>1. WORK DONE</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Print screen the system</li> <li><input type="checkbox"/> Complete the conclusion part</li> </ul>	
<b>2. WORK TO BE DONE</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare for presentation</li> </ul>	
<b>3. PROBLEMS ENCOUNTERED</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> No</li> </ul>	
<b>4. SELF EVALUATION OF THE PROGRESS</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Can be improved</li> </ul>	

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**Supervisor's signature**

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**Student's signature**

## Appendix D

Questionnaire – Multimedia Courseware for Learning Japanese Language Level 1  
(After Development)

**[Please place a “√” on the blank space]**

1. Respondent Information 1: What is your gender?
  - Male
  - Female
  
2. Respondent Information 2: What is your region?
  - Chinese
  - Indian
  - Malay
  - Others
  
3. Which school are you studying?
  - Sekolah Menengah Jenis Kebangsaan Pei Yuan (SMJK Pei Yuan)
  - Sekolah Menengah Kebangsaan Methodist (ACS) Kampar
  - Sekolah Menengah Kebangsaan Sentosa (SMK Sentosa)
  - Westlake International School, Kampar
  - Pei Yuan High School, Kampar
  
4. What experience of respondents using multimedia courseware?
  - Have heard but didn't used before
  - Have heard and used before
  - Have not heard and used before
  
5. Which methods that preferred by respondents to learn Science subject?
  - Attend Science tuition class
  - Reading materials
  - Entertainment materials
  - Using multimedia courseware

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6. Did respondents faced any problem during learning Science without using multimedia courseware?
- No voice teaching
  - Felt boring to learn Science through the textbook
  - Difficult to understand and learn the Science subject
  - Difficult to evaluate our own understanding about Science subject
7. Which modules of multimedia courseware could attract respondents' interest to learn Science subject?
- Theory Learning Module
  - Tutorial module
  - Game module
  - Virtual Lab module
  - Practical module
  - All of above
8. What do you think about the problems of existing multimedia courseware?
- Not enough lessons fo users to learn
  - Lack of attractive design and content
  - Difficult to evaluate the understanding and ability of users
  - Difficult to understand the content and knowledge
  - Not popular in the public
9. How would you rate the design of this multimedia courseware?
- Excellent
  - Good
  - Average
  - Poor
  - Very Poor

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10. How would you rate the user friendly of this multimedia courseware?

- Excellent
- Good
- Average
- Poor
- Very Poor

11. How would you rate the understanding of this multimedia courseware teaching?

- Excellent
- Good
- Average
- Poor
- Very Poor

12. Will you apply this multimedia courseware as your learning tool?

- Yes
- No

13. Does this multimedia courseware benefit to you in your learning process?

- Yes
- No