PHYSICS COURSEWARE ON FEATURES OF MATTER

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DEDICATION

To my beloved parents,
whose support replenishes and enriches my soul
during the long hours of writing this thesis

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ABSTRACT

The project that will be developed is Physics Courseware on Features of Matter. This courseware will be used for educational purposes in schools especially by form four and form five students. At the moment, students learn about this topic using text books which are boring and dull. There are a few coursewares which are quite similar to the topic but the existing coursewares do not stress on the importance of effective visualization. From observation, the coursewares are not very user-friendly. The main objective of this courseware is to demonstrate certain Physic's concept through animation. Besides that, the purpose of this courseware is to provide interactive lab sessions for students and to provide interactive activity session for learning about the application of Physic's concept. The courseware will be divided into five sections. The sections are *Laman Utama*, *Konsep Jirim, Aktiviti, Sesi Makmal* and *Kuiz*. The courseware will be build using Macromedia Flash MX as the platform and other software which includes Adobe Photoshop 7.0 and Sound Forge. The development of this courseware will be based on ADDIE model which contains five phases. The phases are analysis, design, development, implementation and evaluation. The expected output of this project is a courseware which contains interesting and attractive design in order to attract users. It will be user-friendly and contains interesting animations demonstrating the concept of features of matter.

ABSTRAK

Projek yang akan dibangunkan ialah koswer Fizik bertajuk Sifat Jirim. Koswer ini akan digunakan untuk tujuan pendidikan di sekolah terutamanya oleh pelajar-pelajar tingkatan empat dan tingkatan lima. Pada masa kini, pelajar mempelajari mengenai sifat jirim melalui buku teks yang tidak menarik dan membosankan. Terdapat beberapa koswer yang hampir sama dengan tajuk sifat jirim tetapi koswer yang sedia ada tidak menekankan mengenai kepentingan visual yang efektif dan dari pemerhatian, koswer tersebut tidak mesra pengguna. Objektif utama pembangunan koswer ini ialah untuk mendemonstrasikan beberapa konsep Fizik menggunakan animasi. Di samping itu, koswer ini menyediakan sesi makmal interaktif dan sesi aktiviti interaktif untuk belajar mengenai aplikasi konsep Fizik. Koswer ini akan dibahagikan kepada lima bahagian. Bahagian-bahagian tersebut ialah Laman Utama, Konsep Jirim, Aktiviti, Sesi Makmal dan Kuiz. Koswer ini akan dibangunkan menggunakan Macromedia Flash MX sebagai platform dan perisian-perisian lain seperti Adobe Photoshop 7.0 dan Sound Forge. Pembangunan koswer ini adalah berpandukan model ADDIE yang mengandungi lima fasa. Fasa-fasa tersebut ialah analisis, rekabentuk, pembangunan, implementasi dan penilaian. Hasil yang diharapkan dari projek ini ialah koswer yang akan mengandungi rekabentuk yang menarik untuk menarik minat pengguna. Ia akan mesra pengguna dan mengandungi animasi-animasi menarik untuk menunjukkan konsep-konsep yang berkaitan dengan sifat jirim.

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CHAPTER I

INTRODUCTION

1.1 Project Background

Courseware, a term that combines the word course with software, 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 knowledge and in this case, Physics subject. The CD-ROM is the most common means of delivering courseware that is not offered online. For this project, the courseware that will be developed is entitled *Sifat Jirim.*

This courseware will be used for educational purposes in schools especially by students and teachers. At the moment, a courseware that focuses on this topic has not yet been developed. There are a few coursewares which are quite similar to the topic. The existing courseware however do not stress on the importance of effective visualization. There is only little or no use of animation explaining the topic involved. Students will usually understand better with the help of useful visualization.

Therefore in this courseware, users will be able to learn about this topic through animation and certain sections require interaction from users. It is a more interesting approach to this topic compared to the usage of text books and reference books. All the information related to this topic will be presented in a more understandable way to help

student masters this topic. The interface will be attractive and user-friendly so that even students or teachers with minimum computer skills can use and navigate through the courseware with ease.

The main purpose of this courseware is to demonstrate certain Physics concept through animation. Hence, it will increase the students' understanding about this topic by providing useful visualization through animation. Besides that, the purpose of this courseware is also to provide interactive lab sessions for students so that students can participate in the experiments and see the process and results clearly. Last but not least, the purpose of this courseware is to provide interactive activity session for learning the application of Physics concept in an enjoyable way.

The courseware will be divided into several sections for easy learning. The sections are arranged according to different types of activities. There are four sections; *Konsep Jirim*, *Sesi Makmal*, *Aktiviti* and *Kuiz*. In *Konsep Jirim*, students will learn all the important concept of matters while in *Sesi Makmal*, students can participate in interactive lab sessions. In *Aktiviti*, students have to explore the surroundings of a house to search for things that apply the concept of Physics. Besides that in *Kuiz*, students will be able to test their understanding about the concept of matter which has been learned earlier.

This courseware will be developed using Macromedia Flash MX, Sound Forge and Adobe Photoshop 7.0. Macromedia Flash MX is chosen as the platform for this project because of its interactivity and provides many advantages compared to other courseware development software and it is also used to produce two-dimensional animation. Sound Forge will be used to edit sound. Graphics and images will be edited using Adobe Photoshop 7.0.

1.2 Problem Statement

Nowadays, students preferred the quick and interesting way to learn something. Students find student-book interaction too boring because books are static and contain long explanation. Books are the least favourite medium preferred by the students. Moreover if the topics are hard to understand, books alone are not enough. Students can understand easier with the help of effective visualization through animation and audio-visual presentations. All of this can be achieved by learning through courseware.

At the moment, a courseware that focuses on the topic, *Sifat Jirim* has not yet been developed. There are a few coursewares which are quite similar to the topic. Usually the courseware that had been developed are either too general or too focus. For example, a courseware that covers all the SPM Physic's syllabus is too general while some courseware focuses on a small specific topic, for example a courseware on Bernoulli Principal. Courseware which is developed according to chapters is hard to find even though students find it easier to study according to chapters.

Moreover, the existing courseware do not stress on the importance of effective visualization. The graphics used to explain about certain topics are static and boring. There is only little or no use of animation to explain the topic involved. The design are not attractive and dull making student lose interest to use it. There are little interactions thus students will find it boring as the courseware is no different from their textbook. The only difference is the medium being used. Besides that, the coursewares are not user friendly. This is because of the usage of hide menu and buttons with no instructions on them.

The courseware that will be developed will contain user friendly interface with attractive design. User friendly feature is the most important element in a courseware. Users sometimes get frustrated when they are lost or can not exit from a certain

interface. This can interrupt their concentration and make them lose interest. Animation will be used to explain certain concept and principles in this topic. Users do not have to wait for an animation or narration to end before proceeding to the next interface. They can navigate through the courseware according to their will.

In this project, the courseware that will be developed will focus on four important factors: the contents of learning materials; the presentation of these materials; the way in which they are taught; and the overall functionality of the courseware. The contents of learning materials will be simplified for easy understanding and the presentation of these materials has to be interesting. The learning materials will be taught using multimedia elements such as graphic, audio and animation. The overall functionality of the courseware has to be satisfying to the users.

1.3 Objectives

The objectives of this project are:

- **To demonstrate certain Physic's concept through animation**
  This courseware contains animation to demonstrate certain Physic's concept such as Archimedes' Principal, Pascal's Principal, Bernoulli's Principal and others. Students can better understand these entire concepts through animation.

- **To provide interactive lab sessions for students**
  This courseware also provides interactive lab sessions for students so that they can participate and see clearly the process and the results for each experiment. It is an enjoyable and a fun way to learn about *Sifat Jirim*.

- **To provide interactive activity session for learning about the application of Physic's concept**

  There is also interactive activity session where students are given the chance to explore a house to search for things that use application of Physic's concept. It is an interesting way to learn and students will be able to understand and remember better as it is related to their everyday life.

1.4 Scope

The courseware that will be developed for Projek Sarjana Muda will demonstrate certain Physic's concept through animation. This courseware also provides interactive lab sessions for students to participate and interactive activity session to ensure an enjoyable way of learning Physics. This indirectly can reduce the time spend learning about this topic as the students will grasp the concept of matter more quickly with the help of visualization. The courseware is tailored according to SPM form four syllabus.

The courseware will be divided into five sections. The first section will contain the introduction for this topic. The second section will include all things related to concept of matters such as kinetic theory of matter, the movement of atom, the power between atom and atom arrangement. The third section will contain interactive lab sessions. In this section, there are ten experiments related to *Sifat Jirim*. This section requires participation from users to conduct the experiments.

For the fourth section, it will contain interactive activity in demonstrating the application of Physic's concept and theory. Users are asked to explore the surrounding of a house and look for things that use the application of Physic's theory and concept.

Once the user finds the specified things, the user can click on them to learn more about the Physic's application that is being applied to the objects.

For the first, second, third and fourth sections, the information about each section will be presented with suitable animation, graphic, text and narration so that user will understand better with the help of effective visualization. Difficult concepts and principles concerning features of matter will be simplified using animation. The last section will contain quizzes. Students will be able to test their level of understanding on the topic by completing the quizzes.

The targeted users for this courseware is form four and form five students who will sit for their SPM examination. Teachers can also use this courseware to help them in their teaching. The courseware will be produced in the form of compact disc so that it can be accessed on any computer without the need for internet. The courseware will use Macromedia Flash MX as its platform. Other software that will be used are Adobe Photoshop 7.0, and Sound Forge.

1.5 Project Significance

The courseware that will be developed will bring many benefits to SPM students and teachers. Students will be able to understand better and grasp the fundamental principles of this topic. Teachers can use this courseware during classes to attract students' attention and make them become more interested with Physic. This project is important since the number of existing Physic's courseware is still small. People tend to focus on other subject such as Biology.

Even though there are already a few Physic's courseware at the moment, the quality of the courseware is still low. The designs of the interface are not attractive and the used of animation to explain about certain things is scarce. The courseware is not user friendly because the buttons are not labeled. Users are forced to try each buttons in order to know their functions. This is frustrating as it slows down the user and interrupts the user's concentration.

For this project, the courseware that will be developed will have a better quality with more interesting design compared to the existing courseware entitled *Jirim* and *Kesan Haba Terhadap Jirim*. The courseware will be user friendly in terms of interface design and buttons design. Users can navigate through the courseware freely without any constraint. The courseware contents will be simplified in order to make it easier for the students to understand and hence master this topic.

1.6 Expected Output

The courseware that will be developed will have interesting and attractive design to attract users. The content will be tailored according to SPM form four syllabus and simplified for easier understanding. The courseware will be divided into five sections according to sub topics. The sections are *Laman Utama*, *Konsep Jirim*, *Sesi Makmal*, *Aktiviti* and *Kuiz*. The purpose of the quiz is to test the students' ability in mastering this topic.

The courseware will contain interesting animations and requires participation from users in order to demonstrate the concept of features of matter so that students will be able to grasp the concept through effective visualization and narration. The feature of the courseware will be user-friendly. Users will be able to navigate through the

courseware according to their will without getting lost as there will be a site map which acts as an indicator to inform users about their whereabouts.

1.7 Conclusion

At the present time, a courseware that focuses on the topic, *Sifat Jirim* has not yet been developed. Furthermore, the existing courseware do not stress on the significance of efficient visualization. The design is monotonous, unattractive and not user friendly. This differs from the courseware that will be developed as it will have attractive design and animation and most importantly user friendly.

The main objective of this courseware is to demonstrate certain Physic's concept through animation. The purpose of this courseware is also to provide interactive lab sessions for students and to provide interactive activity session for learning the application of Physic's concept. This courseware is build according to SPM form four syllabus and targeted users are form four and form five students.

The courseware will be divided into five sections. The sections are *Laman Utama*, *Konsep Jirim*, *Sesi Makmal*, *Aktiviti* and *Kuiz*. The courseware will be built using Macromedia Flash MX as the platform and other software which includes Adobe Photoshop 7.0 and Sound Forge.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

The literature review is one of the least understood parts of a research project. A literature review is a summary of previous research on a topic. Literature reviews can be either a part of a large report of a research project, or it can be a bibliographic essay that is published separately in a scholarly journal. Either way, the purpose is the same, to review the scholarly literature relevant to the topic that is being studied. The review will help in designing methodology and help others to interpret the research being done.

In this chapter, the fact and finding based on development of courseware will be presented. This includes the advantage of courseware, the existing method of learning science, good courseware design, the effectiveness in using animation as a learning tools and important factors in producing quality courseware. Case studies on the existing courseware are also conducted in order to find their good features and their bad features.

This chapter will also discuss about the methodology that is being used to develop this courseware. Methodology is a set of methods that define the process and order of how something is to be achieved. The project methodology that is being used in this project is the ADDIE model since it is suitable for the development process of CD-