

BORANG PENGESAHAN STATUS TESIS[^]

JUDUL: TEACHING "HEREDITY AND VARIATION" USING 2D ANIMATION AND CONCEPT MAPS

SESI PENGAJIAN: 2006/2007

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Teaching "Heredity and variation" using 2D animation and
concept maps / Mok Pei Yee.

TEACHING "HEREDITY AND VARIATION" USING 2D ANIMATION AND CONCEPT MAPS

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This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Media Interactive)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA
2006

DECLARATION

I hereby declare that this project report entitled
**TEACHING “HEREDITY AND VARIATION” USING 2D ANIMATION AND
CONCEPT MAPS**

is written by me and is my own effort and that no part has been plagiarized
without citations.

STUDENT : Pei Yee Date: 20/11/06
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DEDICATION

I would like to make a special dedication to
my beloved parents, family members and my close friends
for giving me encouragement and being supportive throughout this project.

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ABSTRACT

The project is an educational courseware which is named as Teaching “Heredity and Variation” using 2D Animation and Concept Maps. This flash project is purposely developed to help the users easily understand the concept of the heredity and variation in the form 4 Science subject. It is a CD-based e-learning tool. This project is developed specifically for form 4 and forms 5 art-stream students as an alternative revision tool and as a teaching tool for the school teachers. The major software used to develop this project is Macromedia Flash 8 and Adobe Photoshop CS. There are seven major modules included which are Contents, Activities, Summary, Quiz, Glossary, Web Links and Help. Besides that, the content of this project is based on the current syllabus that has been outlined by Ministry of Education Malaysia and it consists of few sub-topics of Heredity and Variation. The application will be developed according to the modularity. In addition, this application will be developed with the concept of human-computer interaction (HCI) where the application will be designed using some fundamental interaction skills.

ABSTRAK

Project ini diberikan nama sebagai “Mengajar Keturunan dan Variasi menggunakan Animasi 2D and Peta Minda (Teaching “Heredity and Variation” using 2D Animation and Concept Maps)”. Projek ini dibangunkan semata-mata untuk membantu pengguna supaya lebih memahami topik Keturunan dan Variasi dalam subjek Sains tingkatan 4. Projek ini ialah bahan pembelajaran dalam CD. Projek ini dibangunkan khas untuk para pelajar tingkatan 4 and 5 aliran sastera dijadikan sebagai salah satu alternatif lain yang berfungsi sebagai medium mengulangkaji dan sebagai medium pengajaran bagi para guru di sekolah. Projek ini dibangunkan dengan menggunakan perisian utama seperti *Macromedia Flash 8* dan *Adobe Photoshop CS*. Terdapat tujuh modul utama yang dimasukkan dalam projek ini iaitu “*Contents*”, “*Activities*”, “*Summary*”, “*Quiz*”, “*Glossary*”, “*Web Links*”, dan “*Help*”. Selain itu, isi kandungan dalam projek ini adalah mengikut sukatan pelajaran terkini yang dikeluarkan oleh Kementerian Pendidikan Malaysia dan ia mengandungi beberapa sub-topik dalam Keturunan dan Variasi. Aplikasi ini dibangunkan berdasarkan modulnya. Di samping itu, aplikasi ini dibangunkan berdasarkan kepada konsep “*human-computer interaction*” (HCI). Dengan ini, ia dapat membantu pengguna menguasai aplikasi sistem ini dengan cepat tanpa sebarang masalah.

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CHAPTER I

INTRODUCTION

1.1 Project Background

Science is one of the compulsory subjects in ‘Kurikulum Bersepadu Sekolah Rendah’ (KBSR) and ‘Kurikulum Bersepadu Sekolah Menengah’ (KBSM) in Malaysia education. This means that every student is required to learn Science subject in primary and secondary school. However, Science subject is different for Form 4 and Form 5 Art stream and Science stream students.

The usage of computer technology for education is not a new approach as it has been introduced since early of the 1960 in the developed country such as United States (Norhashim, 1996). In ‘Teras Pembangunan Pendidikan 2001-2010’, Ministry of Education Malaysia has been increased the teachers’ skills in information and communication technology (ICT) to produce innovative teaching and learning process. As for that, Ministry of Education Malaysia had emphasized on computer software usage as one of the method to solve the understanding of Science subject concept among the students (Kementerian Pendidikan Malaysia, 2001).

This project is a multimedia courseware that is developed specifically for Art stream Form 4 and Form 5 students to learn Science subject more effectively. This

courseware will follow the latest Form 4 Science subject syllabus and the chosen topic is Chapter 3 - Heredity and Variation. This courseware will utilize the visual learning techniques and instructional techniques as Science subject requires systematic study and method especially dealing with substances, life, and natural laws.

This courseware can be used by the students as an alternative way to do their revision about the selected topic as a preparation to face the examination. In addition, this courseware is developed to help the students to have a better understanding about the discussed topic instead of just memorizing the facts to face the examination. Besides that, the school teachers also can use this courseware as a teaching tool in the classroom.

This multimedia courseware is divided into few segments like Contents, Activities, Summary, Quiz, Glossary, and Web Links. In addition, suitable audio will be enhanced to make the learning process more effective and attractive.

1.2 Problem Statements

The traditional teaching and learning process that using 'Chalk and Talk' method is unable to attract the students' enthusiasm in this modern era. Furthermore, Ministry of Education Malaysia has been encouraged school teachers to use the new technique in teaching and learning process which is using educational software as an effective teaching tool in the class. As for that, Ministry of Education Malaysia has been distributed courseware in the CD format for subjects like Mathematics, Science and English to the school teachers.

Most of the students will memorize all the terms and important facts for Science subject especially when they prepare to go for their examination. They will find it boring and difficult to understand the facts as the books did not have many illustrations. Nowadays, some publishers even included a free e-learning CD in the reference book to attract more students to buy their published books.

There are some problems that can be found after checking two available CDs that included in the reference books:

- i. Referring to the e-learning CD from a reference book (Ng and Mohd, 2000), there are only two chosen topics displayed as the content of the courseware even though there are eight chapters in the whole Form 4 syllabus. Besides that, there are only two segments available in the CD which are:
 - a. Experiments
 - Focus on topic "Light, Colour and Sight".
 - Only display four experiments of the chosen topic using video.
 - b. Animation Gallery
 - Focus on topic "Heredity and Variation".
 - Consists of four 2D animations about the selected topic.

- ii. Based on the e-learning CD from a reference book (Chong et. al., 2005), the content of the CD is in Bahasa Melayu but the current syllabus is taught in English. The reference book is suitable for current Form 5 students which their syllabus is still in Bahasa Melayu. So this reference book and the included CD is not appropriate for current Form 4 students as it will cause the students having difficulty in understanding all the scientific terms. Besides that, there is only music enhanced in the CD but there is no animation or illustration that can help the students to understand better. The contents of the CD are:
 - a. Peta Konsep Interaktif
 - Display mind map for each chapter and some explanation is included.
 - b. Laman Web
 - Listed out all the reference website
 - c. Bank Soalan
 - These are quizzes and there are 50 questions to test the students for each chapter.
 - d. Indeks
 - Index of the book
 - e. Glosari Melayu-Inggeris
 - Lists out all the terms and their meaning

1.3 Objective

This multimedia courseware is developed to achieve certain objectives. They are:

- To do research on the visual learning techniques and instructional techniques that can be used for composing the multimedia courseware for the topic.
- To present a test report that shown a better performance of students in understanding the topic after using the prototype.
- To develop a multimedia courseware that demonstrates the use of the proposed techniques in delivering the techniques.

1.4 Scopes

The scopes of this project are:

- This multimedia courseware is developed specifically for Art stream students which take Science subject for their Form 4 and Form 5 studies.
- This multimedia courseware will be developed in English.
- This courseware is based on the current syllabus in the school which follows the Ministry of Education Malaysia outline.
- This courseware will be developed as a stand-alone courseware.
- This courseware is focus on a selected topic called Heredity and Variation.

1.5 Project significance

As the information in the available e-learning CDs in the market is insufficient especially about the important notes and interactivity between the users, this proposed multimedia courseware will benefits the students when as it can be

used as a medium that can help them to learn certain topic in a more effective way. Furthermore, this courseware will apply some learning techniques such as visual learning techniques and instructional techniques that might help the students to understand better about what they have studied. Besides that, the school teachers can use this courseware to teach the students in the classroom as it follows the current syllabus.

1.6 Conclusion

Overall, this courseware is developed for Form 4 and Form 5 students to learn the topic “Heredity and Variation” in a more effective and attractive way. This courseware can be considered as an alternative way for students to do revision and as a teaching tool for teachers. Besides that, it will be divided into few segments and some suitable audio will be added to encourage a more productive learning process.

Some publishers have included an e-learning CD in the reference book as a strategic way to attract more students to buy their reference book but the contents of the CD is very limited. They just display some basic information and questions as the content of the included CD.

The purpose of this multimedia courseware is to help the students and teachers understand the concept of science of genetics that related to the principles of heredity and variation. This courseware is targeted for the Art stream Form 4 and Form 5 students to do their revision for their examination. It also can be used by the school teachers as an alternative teaching tool in the classroom. The chosen topic is included in the Science subject current syllabus and is in English version.

As for the next chapter, it will be discussing about the literature review and project methodology. Literature review will describe all the related research and findings that are related to this project while the project methodology will explain about the selected approach to develop this project.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Literature review is a process of searching, collecting, analyzing and drawing conclusion from all debates and issue raised in relevant body of literature. It describes all the analysis and findings which are related research, case study and other findings that are related to this project. In addition, it also consists of the knowledge of the project elements such as courseware concepts, learning techniques and how these elements related to each other and being combined and composed into one conclusion in order to develop this project.

Project methodology is the description of the selected approach that will be used when implementing this project. Every step in the selected methodology will be justified to suit every phase of the development of this project. The development of the project might run out of track and failed to achieve the project objectives and scopes without an appropriate methodology and approaches.

2.2 Fact and Finding

2.2.1 Courseware

Courseware is educational material included intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer. According to Karmouch (1999), courseware is an educational software entity that contains different knowledge components, yet it resembles the objectives of a traditional course. Courseware can encompass any knowledge area, but information technology subjects are most common. Courseware is frequently used for delivering education about the personal computer and also widely used in information technology industry certification programs, such as the Microsoft Certified Systems Engineer (MCSE) and the Computing Technology Industry Association's A+ examination.

Normally, courseware is differentiated from other programs such as word processors and spreadsheets that are usually called "applications". Courseware is not independent of content like applications. For example, courseware for the study of the Spanish language contains Spanish language materials; that for the study of molecules is designed to allow interaction with molecular models.

Courseware can include material for instructor-led classes for self-directed computer-based training (CBT), web sites that offer interactive tutorials and videos for use individually or as part of classes. The CD-ROM is the most common means of delivering courseware that is not offered online. For teachers and trainers, courseware content may include set-up information, a course plan, teaching notes, and exercises.

Effective courseware is usually interactive; that is, the user of the courseware is prompted for content-related input, the program stores that input and plays it back. Hence, courseware can be created by individuals engaged in teaching or learning. It can also be purchased from commercial sources. Besides that, it can be obtained free (public domain freeware) or at very low cost (shareware) from content specialists who

have developed it and distribute it without commercial incentives.

There are many reasons for using courseware to supplement traditional teaching methods. Courseware can visually present concepts which are not easily rendered on paper or in text. Courseware is portable as learners can access it in computer laboratories and on their own machines. Courseware is available when the instructor cannot be, so it extends the classroom experience. In addition, courseware can be designed not only to present materials but to interact with the learner, and provide the opportunity for feedback (which depending on the program, can be recorded and evaluated).

2.2.2 Visual Learning Techniques

The essential skills for student to success are learning to think and learning to learn. Research in both educational theory and cognitive psychology reveals that visual learning is among the very best methods for teaching students of all ages how to think, and how to learn. Visual learning techniques are graphical ways of working with ideas and presenting information to teach students to clarify their thinking, and to process, organize and prioritize new information. Visual diagrams reveal patterns, interrelationships and interdependencies and they also stimulate creative thinking.

Visual learning techniques can help students to:

- i. Clarify thinking
 - Students will see how ideas are connected and realize how information can be grouped or organized. With visual learning, new concepts are more thoroughly and easily understood.

- ii. Reinforce understanding
 - Students recreate in their own words what they have learned. This helps them absorb and internalize new information, giving them ownership of their ideas.

- iii. Integrate new knowledge

- Diagrams updated throughout a lesson prompt students to build upon prior knowledge and internalize new information. By reviewing diagrams created previously, students will see how facts and ideas fit together.

iv. Identify misconceptions

- Just as a concept map or web shows what students know, misdirected links or wrong connections reveal what they do not understand.

2.2.3 Instructional Techniques

Instructional skills are the most specific category of teaching behaviours and are used constantly as part of the total process of instruction. They are necessary for procedural purposes and for structuring appropriate learning experiences for students. No matter how experienced or how effective a teacher may be, the development and refinement of these skills and processes is a continual challenge.

A variety of instructional skills and processes exist and some are broader than others and more complex in their nature. Some factors which may influence their selection and application include student characteristics, curriculum requirements, and instructional methods. For the purpose of illustrating instructional skills, two examples follow: explaining and demonstrating, and questioning.

In the explaining and demonstrating process, most of the teachers spend much time in the classroom explaining and demonstrating something to the whole class, a small group, or an individual. Student resource materials typically do not provide extensive explanations of concepts, and students often need a demonstration in order to understand procedures.

Some explanations are given to help students acquire or deepen their understanding of a concept, while others help students understand generalizations. Concerning the former, the teacher must select an appropriate concept definition and

suitable examples and non-examples. Regarding the latter, Shostak (1986) suggested that an explanation can show:

- a cause and effect relationship (for example, to show the effect of adding an acid to base).
- that an action is governed by a rule or law (for example, to show when to capitalize a noun).
- a procedure or process (for example, to show the operation of solving a mathematical equation).
- the intent of an activity or process (for example, to show the use of foreshadowing in drama).

Much students learning occurs through observing others. A demonstration provides the link between “knowing about” and “being able to do”. Research reveals that demonstrations are most effective when they are accurate, when learners are able to see clearly and understand what is going on, and when brief explanations and discussion occur during the demonstration (Arenas, 1988).

Among the instructional skills, questioning holds a place of prominence in many classrooms. When questioning is used well:

- a high degree of student participation occurs as questions are widely distributed.
- an appropriate mix of low and high level cognitive questions is used.
- students’ understanding is increased.
- students’ thinking is stimulated, directed, and extended.
- feedback and appropriate reinforcement occur.
- students’ critical thinking abilities are honed.
- students’ creativity is fostered.

Good questions should be carefully planned, clearly stated, and straight to the point in order to achieve specific objectives. Teacher understanding of questioning technique, wait time, and levels of questions is viewed differently by different cultures. The teacher must be sensitive to the cultural needs of the students and aware of the effects of his or her own cultural perspective in questioning.