

BORANG PENGESAHAN STATUS TESIS*

JUDUL: LOCK AND KEY MECHANISM IN ENZYME

SESI PENGAJIAN: 2009/2012

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LOCK AND KEY MECHANISM IN ENZYME

NOR AMIRAH BINTI MOHD AMINUDDIN

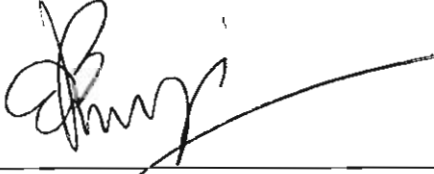
This report is submitted in partial fulfilment of the requirement for the
Bachelor of Computer Science (Interactive Media)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DECLARATION

I hereby declare that this project report entitled
LOCK AND KEY MECHANISM IN ENZYME

is written by me and is my own effort and that no part has been plagiarized
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ACKNOWLEDGMENTS

I would like to thank Puan Shahrul Badariah Bt Mat Sah for giving me assistant to complete this project successfully.

I would also like to thank my beloved family who have been giving me support and motivation throughout my project.

Last but not least, I would like to thank Sekolah Menengah Kebangsaan Bukit Katil and Sekolah Menengah Kebangsaan Taman Desaminium for letting me to interview Biology teachers and their students.

ABSTRACT

This project is about 3D Animation of Lock and Key Mechanism in Enzyme. Enzyme is molecules which help n the digestion of food in human body. This project is using Multimedia Production Process and the domain is 3D Animation in learning. The 3D animation is developed by using Autodesk Maya. This 4:40 minutes animation, has been tested by 13 respondents. The respondents are form four Biology students from Sekolah Menengah Kebangsaan Taman Desaminium in Seri Kembangan, Selangor. The product can be said as a successful product by the result from user understanding testing. However, it still need enhancement from various side in order to make it an excellent product in future.

ABSTRAK

Projek ini adalah mengenai 3D animasi *Lock and Key Mechanism in Enzyme*. Enzim ialah molekul yang membantu dalam pencernaan di dalam tubuh badan manusia. Projek ini menggunakan *Multimedia Production Process* sebagai metodologi dan domain untuk projek ini ialah 3D animasi di dalam pembelajaran. Produk ini dibangunkan dengan menggunakan Autodesk Maya. Animasi 4:40 minit ini telah diuji oleh 13 orang responden. Responden tersebut ialah pelajar tingkatan empat dari Sekolah Menengah Kebangsaan Taman Desaminium di Seri Kembangan, Selangor. Produk ini boleh dikatakan sebagai berjaya melalui keputusan uji kaji selidik *user understanding*. Walaubagaimanapun, produk ini masih memerlukan peningkatan dari pelbagai segi supaya produk ini dapat menjadi produk yang cemerlang pada masa hadapan.

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LIST OF ABBREVIATION

SMK	-	Sekolah Menengah Kebangsaan
GB	-	Gigabyte
MB	-	Megabyte
fps	-	frame per second
3D	-	3 Dimensional
PSM	-	Projek Sarjana Muda

CHAPTER I

INTRODUCTION

1.1 Project Background

Enzymes are crucial in every aspect of physiology. Tons of enzymes in a human body help to develop large complex molecules. Related to that, there is a theory which is called Lock and Key Mechanism purposed by Emil Fischer in 1894. In this analogy, the lock is the enzyme and the key is the substrate. Only the correctly sized key (substrate) fits into the active site of the lock (enzyme).

Enzymes are proteins that control the speed of chemical reactions in our body. In enzymatic reactions, the molecules at the beginning of the process are called substrate and the enzyme. The substrate binds with the enzyme's active site, and an enzyme-substrate complex is formed. Then, substrate is transformed into one or more products, which are then released from the active site and then active site is free to accept another substrate molecule.

Without enzymes, these reactions would take place too slowly to keep us alive. Some enzymes, example amylase in the saliva, break down large molecules into smaller ones so that it can be absorbed into the blood. Others, like the enzymes that make DNA, use small molecules to build up large complex ones.

Enzymes also help cells to communicate with each other, keeping cell growth, life and death under control.

Lock and Key Mechanism is a Form 4 Biology syllabus which is in Chapter 4. There are characteristics of enzyme such as can be reused, denatured if in high temperature and specific as to their reaction. There are several factors that contribute into the enzyme activities such as concentration of enzyme, concentration of substrate, pH, and temperature. The development of this 3D animation will be more specific on the enzyme characteristic and the lock and key mechanism. In other media references, such as YouTube, information for this enzymatic reaction is insufficient.

By taking the chances to develop a three minutes 3D animation for Form 4 secondary students; I would like to show the relation of the lock and key mechanism and the enzymatic reaction.

1.2 Problem Statement

Nowadays, learning is no longer synonym with book only. There is also conventional learning method such as by watching video. The problem statement in this Lock and Key Mechanism are:

1. It is difficult for students to learn and understand by reading textbook and laboratory experiment only.
2. Through laboratory experiment, students can only see the results/output for the enzymatic reaction. They do not see what and how exactly the enzymatic reaction process is happens.
3. By reading textbook, students do not get the clearer picture of how the process moves from one phase to another phase. Animation is a great way to visualize the process.

4. Current media references provide insufficient information needed in the learning process.

1.3 Objective

Based on the problem stated, several objectives to be achieved are:

1. To identify the requirements for students in learning this topic.
2. To develop an animation as a new alternative in learning.
3. To compare the effectiveness of learning using animation and textbook.

1.4 Scopes

1.4.1 Target User

This project target users are Secondary School Biology students (Form 4) and for students who sits for Sijil Pelajaran Malaysia (SPM) Biology examination paper.

1.4.2 Module

Table 1.4.2(a): Description of Modules in the Animation

Module	Description
Introduction of enzyme	Shows what enzyme is. -The definition of enzyme
Characteristics of enzyme	Shows characteristics of enzymes
Lock and Key Mechanism	Shows how the process of enzymatic reaction based on the theory.
Factors affecting the enzymatic reaction	Shows the four important factors that will speed up or slow down the enzymatic reaction process in the body.

1.4.3 Entertainment

The development of this 3D animation is to give a clearer picture for the students in learning Enzyme topic, in order to enhance their understandability in this current biological process.

1.4.4 Software

- Operating System – Windows XP
- Autodesk Maya 2011
- Adobe Soundbooth CS4
- Adobe Premiere CS4
- Adobe After Effects CS4

- Text to speech

1.4.5 Hardware

- Microphone
- Headphone
- Mouse
- Graphic Card
- Keyboard

1.5 Project Significance

The significance of the project is to bring a new platform to students in learning process and to evaluate the effectiveness of using multimedia elements. Multimedia is comprised of several elements including graphic, text, animation, video and sound.

This project will benefit the educational sectors. Educational sectors would get benefits if the product is introduced to the students. If this product is used widely by the students, it will help educational sector in improving their target and achievement for students to get better result in Biology. In addition, students will have fun and will not get bored while learning. Thus, it enhances students' understanding.

1.6 Conclusion

As a conclusion, this Lock and Key Mechanism in Enzyme 3D animation will help Biology students in their learning process as it can enhance the students understanding. Indirectly this project is also useful for Biology teachers in their teaching process. Moreover, it is good if this product can be introduced by the sectors as a good learning program to the students.

In this chapter, the introduction of the project is discussed. The background of the project had explained what enzyme is and the process.

For the Chapter 2, it is literature review and project methodology. All related literature will be review and make comparison of existing system to determine the suitable method that will be used in development process. Besides that, it will also explain what the suitable methodology that will be used is and it will also state clearly what hardware and software that are going to be used in this project.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

In this chapter it will give a thorough explanation about literature review and project methodology. It is important to do a literature review and plan the methodology properly as well as determine the most suitable methodology that is going to be used in the development of this 3D animation.

Literature review is a review at the existing research that is relevant to the research that is going to be carried out. All related journals, books, thesis or other information will be granted together according to research element that has been proposed. The existing research will be evaluated in order to show the relationship between different works and show how it relates element that has been done.

Project methodology describes what techniques, methods and tools that are going to be used in development phase. The methodology that is suitable to develop 3 Dimension (3D) animations is Multimedia Production Process. There

are several phases which include conceptualize, pre- production, production, post-production and documentation.

2.2 Domain

The domain of this project is 3D animation in learning. Animation is to create many stable images which show an object in a movement and to direct us to think as if it moves by the helps of playing these images one after the other. By the helps of technological improvements the transfer of traditional two dimensional animation production to computers made many things easy for the animators.

3D animation is the projecting of two-dimensional pictures one after the other which is rendered in the means of width, length and depth in the space supplied by computer software. 3D animation create object from 3 dimension; x-axis, y-axis and z-axis where the object and animation has height, width and depth. It can be viewed from several angle and these concepts make the 3D animation more realistic. 3D animation has some characteristics that are different from the traditional animation in terms of method and techniques. Besides, the 3D animation is popular and gets more attention especially from students.

Enzymes are proteins which are synthesized by living organisms. In enzymatic reaction, enzymes bind to their substrates and convert them to products. The overall process can be summarized as follows:

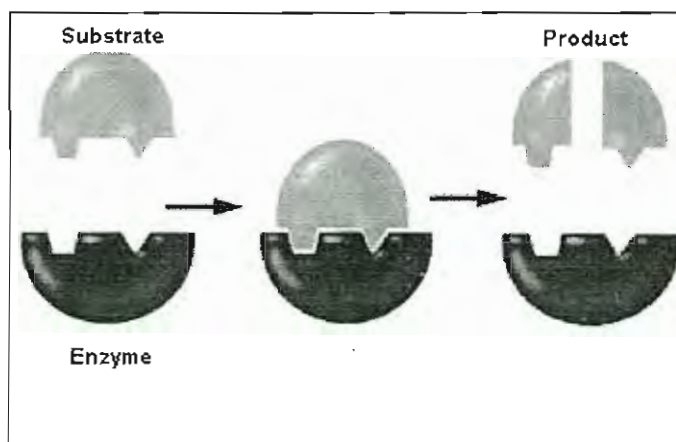


Figure 2.2.(a): The Lock and Key Mechanism

Enzymes alter or speed up the rates of chemical reactions but remain unchanged at the end of the reactions. Enzymes are not destroyed by the reactions they catalyze. It has specific active sites to bind to specific substrates. Each enzyme can only catalyze specific substrate; this explains why enzymes are highly specific.

Enzymes are needed in small quantities because they are not used up but released at the end of a reaction. The same enzyme molecule can process a large quantity of substrate molecules. Most enzyme-catalyzed reactions are reversible. They can catalyze the reaction in either direction. Inhibitors can slow down or completely stop the activity of an enzyme. In order to function well, many enzymes require helper molecules, called cofactors. There are inorganic and organic cofactors. Examples of inorganic cofactors are iron and copper, while examples of organic cofactors are derivatives of water-soluble vitamins such as B vitamins.

There are several factors affecting enzyme activities such as temperature, pH, substrate concentration and enzyme concentration.