E-LEARNING ON WAVE EQUATION

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Bachelor in Mechatronics Engineering

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"I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor in Mechatronic Engineering"

Signature : .....

Supervisor's Name : DR TAY CHOO CHUAN

Date : 22 APRIL 2009

"I hereby declared that this report is a result of my own work except for the excerpt that have been clearly declared in my reference"

Signature : .....

Student's Name : YAP HON KHIM

Date : 22 APRIL 2009

Specially dedicated to my family……..

My father, Yap Kong Keong

My mother, Soo Moi Chin

My brother, Yap Hon Sim

My Sisters Yap Shun Min & Yap Shun Ee

For their kind and loving support throughout this project

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ABSTRAK

Dengan kewujudan internet dan adanya komputer-komputer dalam setiap keluarga, satu kesan yang mendalam telah menimpakkan kaedah tradisional untuk mendapatkan pengetahuan iaitu pengetahuan berasaskan kertas. E-Learning merupakan singkatan kepada electronic-learning, yang boleh didapati melalui media yang disalurkan melalui alat-alat elektronik seperti komputer, telah membuat pengetahuan lebih mudah diperolehi. Oleh itu, projek tahun akhir ini bertujuan mewujudkan satu e-pembelajaran untuk persamaan gelombang, di mana persamaan gelombang adalah persamaan pembezaan matematik separa peringkat kedua yang menggambarkan penyebaran ombak, umpamanya: gelombang bunyi, gelombang cahaya dan gelombang air. Pembangunan modul adalah berasaskan carta aliran yang menerangkan dan mendefinasikan aliran daripada satu peringkat ke peringkat seterusnya untuk mendapatkan keputusan project yang berkembang mengikut objektif project. Keputusan yang dijangka adalah untuk mendapatkan suatu interface yang mampu menjanakan animasi gelombang serta satu interface yang dapat menjanakan formula teori gelombang. Akhirnya, laporan ini akan tamat dengan kesimpulan dan pensyoran untuk pembangunan masa depan.

ABSTRACT

With the advent of internet and the commonality of computers in every household, a profound impact has been dealt on the traditional method of obtaining knowledge of paper back medium. E-Learning which stands for electronic learning, and can be sourced through media that is involve in the usage of electronic devices such as computers, has made knowledge more easily available. Thus, this final year project is to create an e-learning module on wave equation, where wave equation is a second order partial difference mathematical equation that describes the propagation of a number of waves, such as: sound wave, light wave and water wave. The development of module is adhere to methodology's project flowchart which highlights and defines the flow from a stage to another stage of the project, then results that are expected are an animating waveform and a function generator. In the end, this report will end by conclusion and recommendation for future development.

TABLE OF CONTENT

Title **Page Number**

Title **Page Number**

LIST OF FIGURES

LIST OF APPENDICES

Chapter 1

Introduction of Project

1.1 Project Background

Besides traditional methods, an alternative method on propagating knowledge is through the new medium which is E-Learning. E-Learning stands for electronic learning, which according to William Horton in his book Tools and Technologies for E-Learning (publish by: John Wiley), e-learning is using technology to make skills and knowledge available to anyone, anytime and anywhere. With the number of computers and rate of computer literacy increasing, e-learning as a medium of transferring knowledge is reaching towards more people, at more location and even at odd hours in any persons' residence.

1.2 Project Problem Statement

Wave equation is an equation that is quite difficult to understand, and not to mention an uninteresting equation. This problem becomes worse if the lecturer lacks of teaching material that can provide lecture in a dynamic and more interesting manner, where such assisting material will bring up interest, directs attention towards the lecture and help to create understanding of the current topic among the students. When the students lack appreciation towards this topic, the students will not make an effort to do well in this topic and will not understand it better. At the end, the lecturer's effort is wasted along with the students' valuable time. Therefore, I propose creating in E-Learning on Wave Equation module which will provide an interesting teaching assistance for the lecturers as well as a helpful self-learning tool for the students to do revision or extra knowledges.

1.3 Project Objective

In order to better define the goal of this project, a few project objectives are drawn:

i. To provide interesting and easy understanding lecturing or teaching assistance material for lecturers on wave equation.

ii. To provide students with an interesting and easy understand in learning assistance module on wave equation.

ii. To design a user friendly and interesting E-Learning module using Matlab for simulation and Macromedia Flash for animation.

1.4 Project Scope

In order to define the work needed for completing this project, the following scopes are listed:

i. To create an animation using macromedia flash to explain the wave equation theory

ii. To create an interface which will provide answers with respect to data inputted, using Matlab and macromedia flash.

1.5 Report Structure

This report is consists of into eight chapters namely: Introduction, Literature Review, Wave Equation Theory, Methodology, Module Development, Project Results, Module Analysis and finally Conclusion and Recommendation.

i. Introduction

This chapter will briefly describe the background of the project and its project problem along with the project objective and project scope.

ii. Literature Review

This chapter will illustrate and discuss previous work done on this topic and discuss the strength and weakness of the previous work done.

iii. Wave Equation Theory

This chapter will briefly explain the definition of a wave equation.

iv. Methodology

This chapter will describe the methods used in developing the project.

v. Module Development

This chapter will describe how to utilize Matlab and Macromedia Flash to create the E-learning Module

vi. Project Results

This chapter will explain the expected results of this project and discuss on the progress of the project.

vii. Module Analysis

This chapter will explain how the wave equation generator GUI and waveform animation generator GUI will function.

viii. Conclusion and Recommendation

This chapter will conclude this progress report and make recommendation if any for the final year project.

Chapter 2

Literature Review

2.1 Chapter Overview

This chapter will briefly describe what a literature review is and will review on two previous works done on similar topic. Next, an analysis on the two e-learning module's structure, content, strength and weakness will be done so that knowledge on how to construct an e-learning module can be gained. Then the knowledge gain from the analysis will be applied to develop my project.

2.2 Introduction

E-Learning which stands for electronic learning, does not necessary refers to learning via internet only, e-learning can also be sourced through other media such as compact disc or other source of media as long as it involve the usage of electronic devices. However, both the review done in this report is sourced from reputable internet sources. In the later part of this chapter I will review two selected previous work done on e-learning on wave equation, and discuss their strength and weakness and ides gain from reviewing both review that will influence the development of my project.

2.3 First Review

The first review is from an article on wave equation from Harvard University's professor for easy access by their students, this article is publish in http://www.scribd.com/ , a reputable online library based in San Francisco, California. The difference between this website and wikipedia is that this website does not allow anyone else except the author of the material to edit any published material on its website, therefore, the published article's originality and authencity is preserved.

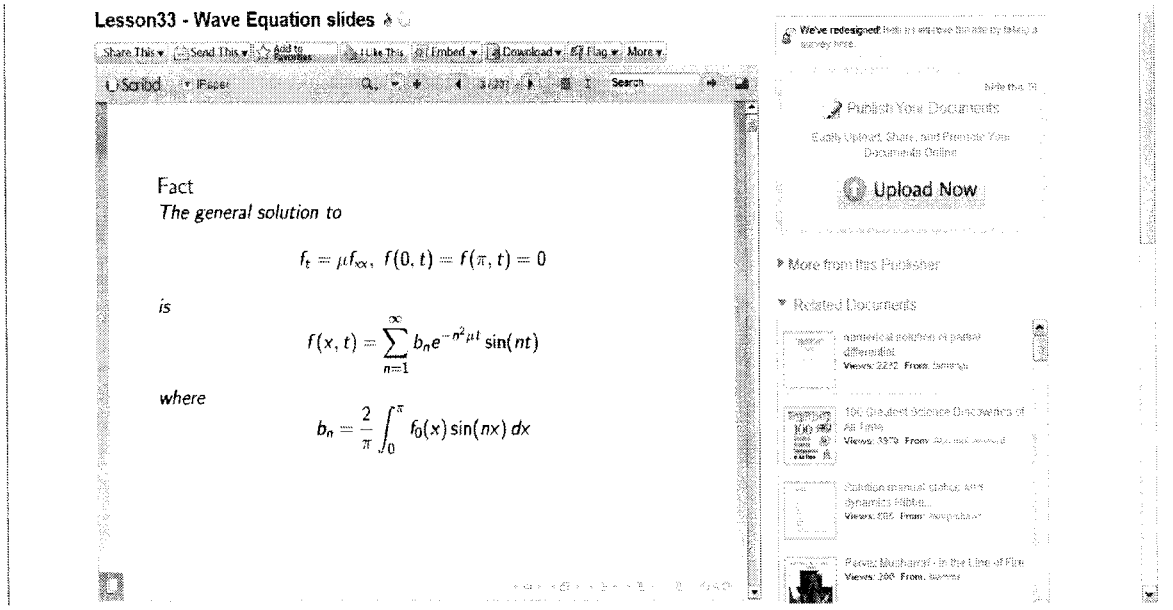

Figure 2.1: Example of First Literature Review

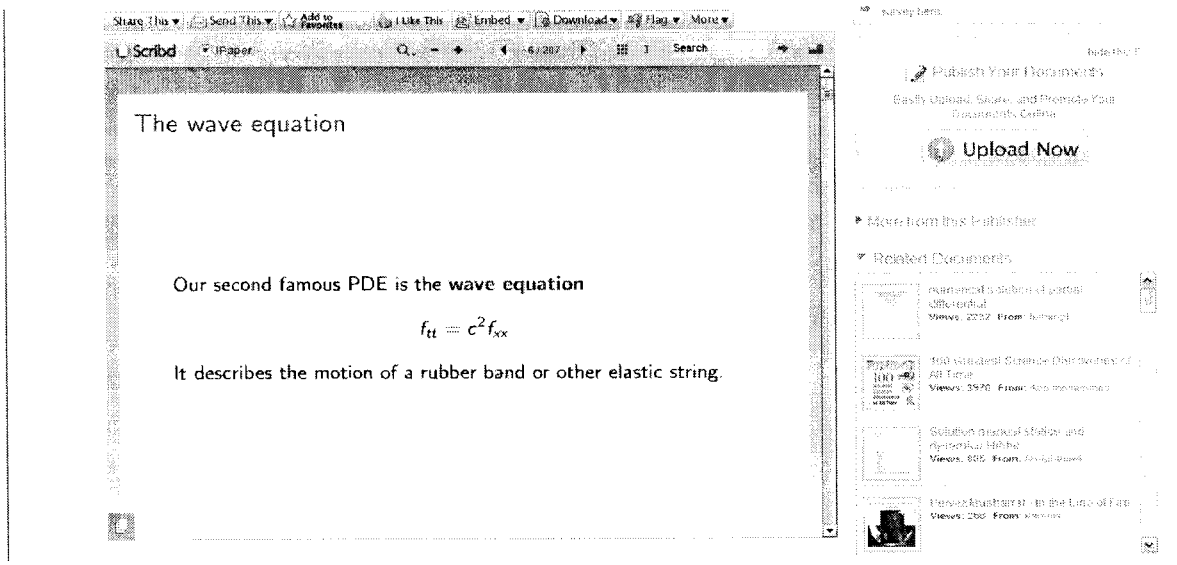

Figure 2.2: Example of First Literature Review

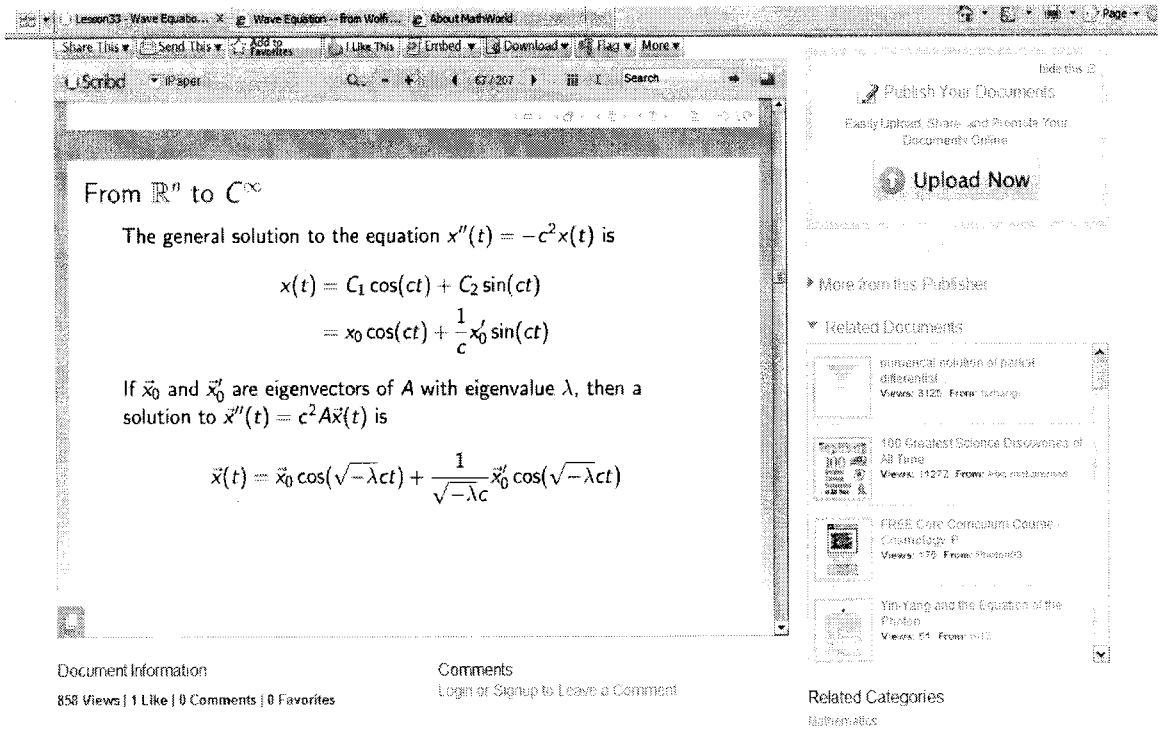

Figure 2.3: Example of First Literature Review

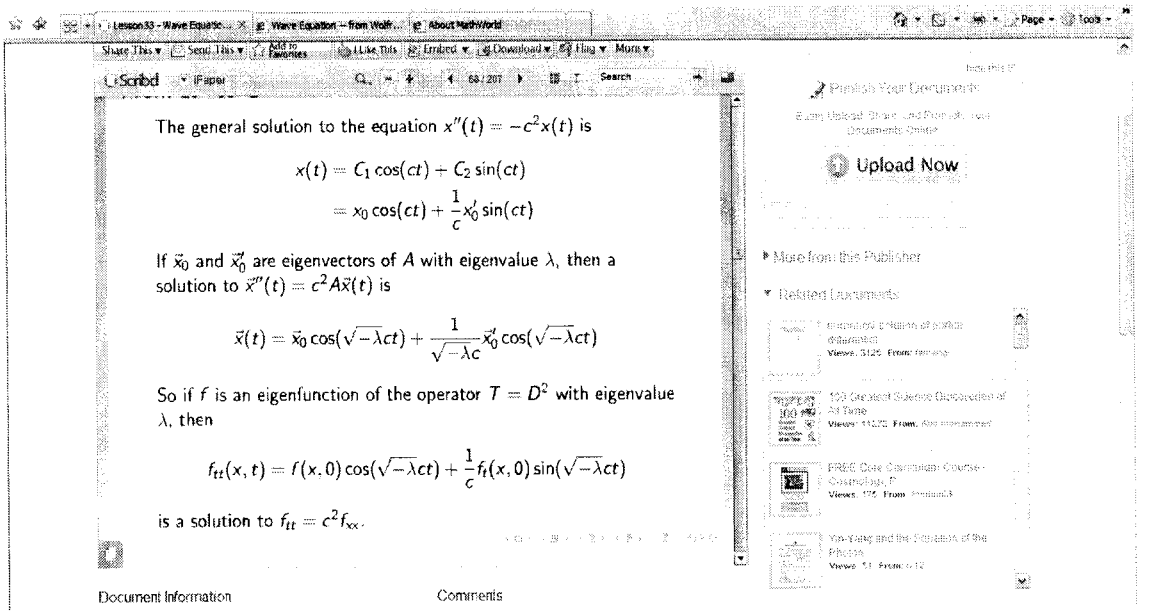

Figure 2.4: Example of First Literature Review

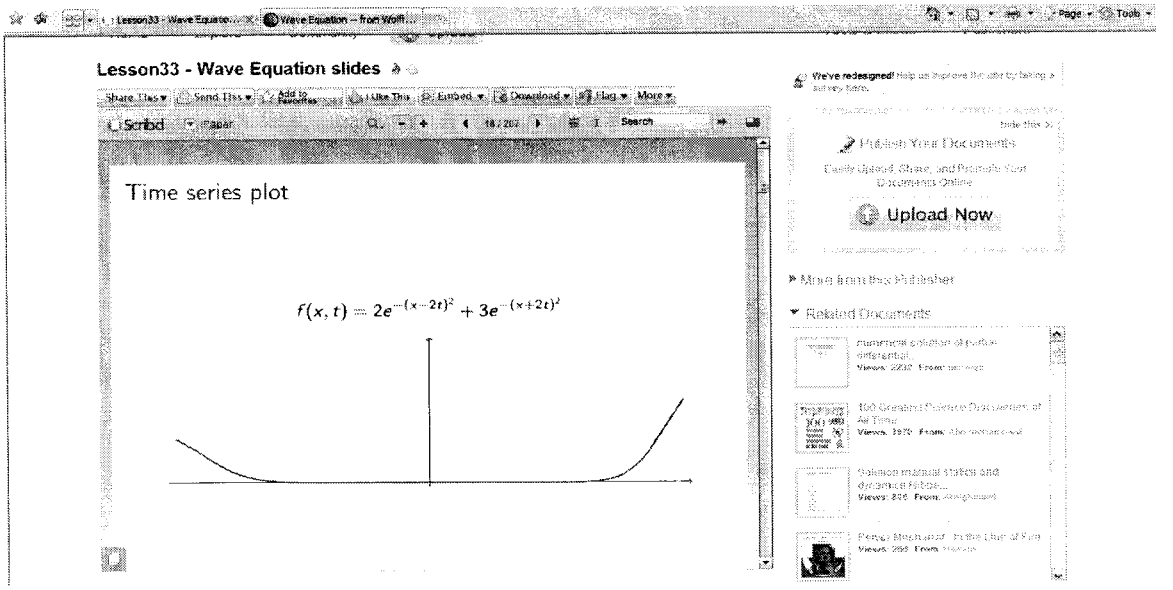

Figure 2.5: Example of First Literature Review

From the above figure, it can be noticed that the article on wave equation publishes in the website is slide based and it has the following criteria:

- Good and in-depth explanation on wave equation
- Lengthy Slides

However, with a good and detail explanation along with two examples on wave equation for the student to better understand the equation's concept, the number of slides is a lot in this publish article. Also, this slide based article is uninteresting without any attractive animation to help draw students attention and interest to it.

2.4 Second Review

The second review is an e-learning module publishes by Eric W. Weisstein in the online portal of Wolfram Research. Wolfram Research is a company founded by Stephen Wolfram where the company specializes in developing scientific and technical computer software. The main software product of the company is mathematica, a computer program used widely in scientific, engineering and mathematical fields.

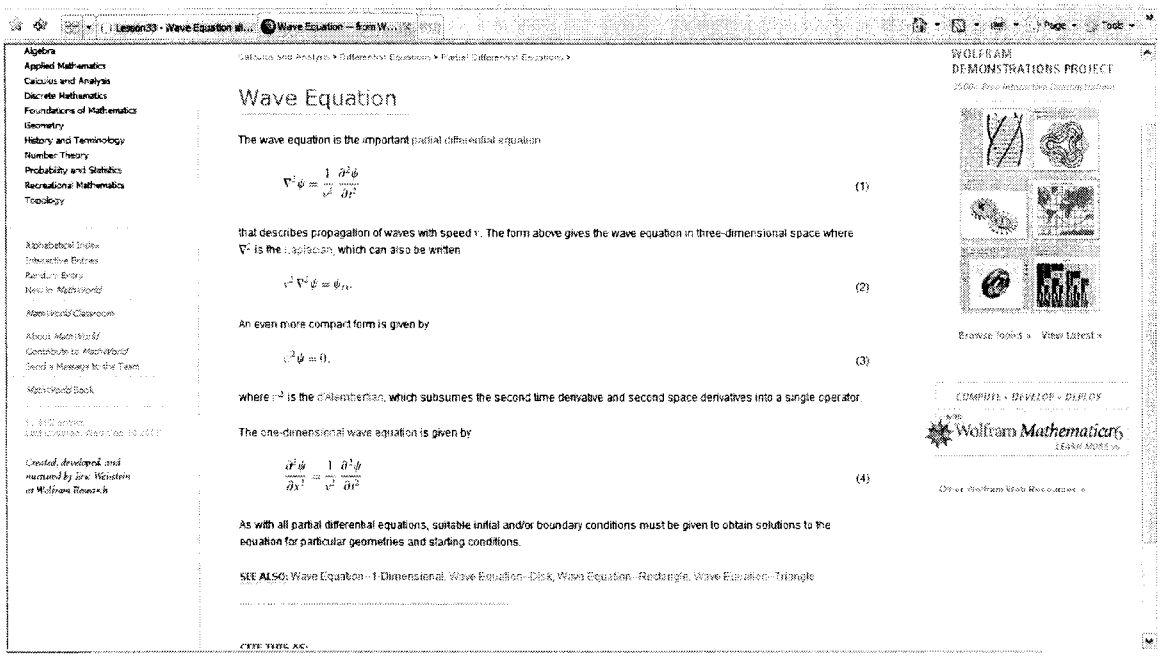

Figure 2.5: Example of Second Literature Review

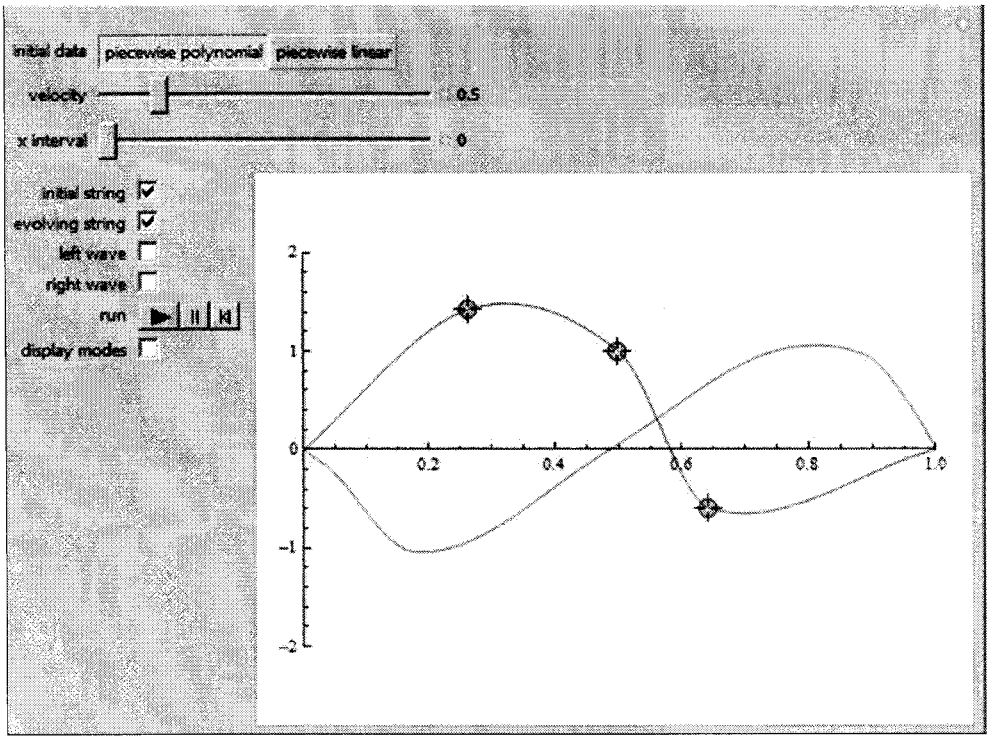

Figure 2.6: Example of Second Literature Review