

**COURSEWARE FOR NONDESTRUCTIVE TESTING
(PENETRANT TESTING AND MAGNETIC PARTICLE TESTING)**

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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**JUDUL: COURSEWARE FOR NONDESTRUCTIVE TESTING
(PENETRANT TESTING & MAGNETIC PARTICLE TESTING)**

SESI PENGAJIAN : 2008/ 2009

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(PENETRANT TESTING AND MAGNETIC PARTICLE TESTING)**

ANG SU IM

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

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2009**

DECLARATION

I hereby declare that this project report entitled
**COURSEWARE FOR NONDESTRUCTIVE TESTING
(PENETRANT TESTING AND MAGNETIC PARTICLE TESTING)**

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

STUDENT :  **Date:** 18th June 2009
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SUPERVISOR :  **Date:** 16/6/2009
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DEDICATION

To my beloved parents, your support and love are factor that keeps me to give out my efforts.

ACKNOWLEDGEMENTS

I grateful and happy I was successfully complete my project. I would like to thank to my family that giving me a lots of support and loves until I complete this project successfully. With their loves and cares, I put more efforts into this Projek Sarjana Muda (PSM).

I would also like to thank to my project supervisor, Encik Muhammad Haziq Lim bin Abdullah that giving me a lots of opinions throughout my project. To all of my friends, I would like thank you all for your support and friendship throughout this project. I would also special thank for Faculty of Information and Communications Technology, Univerisiti Teknikal Malaysia Melaka

ABSTRACT

This project is built to develop a courseware for subject Non-destructive Failure Analysis (NDT). NDT is a study case of Material and Structure which is a technique using in manufacturing areas. In this project, scope of courseware content only covered on two chapters out of several chapters of NDT. These two chapters are such as Penetrant Testing and Magnetic Particle Testing. Objective to create a courseware based on Coherence principle in Cognitive theory for Multimedia learning. ASSURE model as the project methodology and the instructional design of this courseware is Coherence Principle based on Cognitive theory. The analysis of project is basically discussed about the project requirement analysis, and the design stage of courseware begins with the preliminary design which is development of storyboard. The Implementation stage is focus on the technically develop of courseware; the production of media elements will covered the prototype of project testing and evaluation of project will begin after the prototype finished created, the feedback from user will be needed to continue maintenance of project.

ABSTRAK

Pembentukan projek ini adalah bertujuan untuk menghasilkan satu pembelajaran untuk subjek yang bernama “Pengkajian Tanpa Musnah”. Dalam projek ini, kandungan pembelajaran hanya meliputi dua bentuk teknik iaitu “Penetrant Testing” dan “Magnetic Particle Testing”. Objektif penghasilan projek ini adalah untuk menghasilkan satu elemen pembelajaran yang melalui “Cognitive Principle”. Fasa yang berbentuk “Coherence” akan mempersembahkan elemen pembelajaran ini ke tahap yang berbentuk interaksi dengan tambahnya unsure-unsur multimedia. Dalam projek ini, fasa melukis dan penghasilan produk, beberapa langkah digunakan iaitu lukis dalam diagram dan berbentuk “storyboard”. Seterusnya, projek akan berlangsung dengan penghasilan teknik teknik fizikal iaitu menghasilkan produk dengan membentuk multimedia elemen dan membuat kesimpulan dengan “Prototype”. Dalam fasa Menguji produk, kumpulan pelajar dilantik untuk memberi pendapat terhadap produk selepas menggunakan produk itu.

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CHAPTER I

INTRODUCTION

1.1 Project Background

This project is built to develop a courseware for subject Non-destructive Failure Analysis (NDT). NDT is a study case of Material and Structure which is a technique using in manufacturing areas. After done researches about learning content, information in fact shown that e-learning supports new drive for knowledge, this learning method from the ample area of information and knowledge and was once only aligned to information and communication technologies. Concept of courseware promotes operation of methodologies within an educational context for projects of educational materials by use with computers. In this project, the similar concept of learning which courseware is developing as a support material for subject Non destructive failure analysis (Galvao, Joao Ran and Barreto, Antonia M., 2005).

Generally, there are various types of Non destructive Testing methods which are provided in the manufacture areas to distribute the testing on manufacturer's materials. In this project, scope of courseware content only covered on two chapters out of several chapters of NDT. These two chapters are such as Penetrant Testing and Magnetic Particle Testing. After done research on the NDT methods, information found that these two topics are important and needed cover well by mechanical engineering students.

In this project, there are five main modules going to develop including Lecture, Lab, Quizzes, Glossary and help. The platform of this courseware is based on CD-ROM, and the language used to in this courseware is English. Navigational device is use as the input design to support this courseware. Among the five modules, Lecture module is design as teaching module to let user learn about the topic, Lab module is design to show the lab experiments for these two NDT methods, Glossary module is a word searching module to display the scientific words of these two topics and help module is a user guide module.

After research on the e-learning, there are various types of learning theory that applying educational courseware. In this project, the instructional design selected is cognitive learning theory, based on coherence principle learning concept. The courseware built is for the target user such as undergraduate Mechanical Engineering students, the adult learning concept applied to set up the correct method for this higher professional education. This project is mainly focus on the learning for Penetrant Testing and Magnetic Particle Testing based on currently requirements of local industrial areas.

1.2 Problem Statement

In spite of the ever increasing popularity and wide range of the use of this technology by researchers, medical technicians, factory workers, and engineers, according to an author for NDT analysis, there are not have any book and reference material covers both the fundamentals and the advanced applications of this technology (Kundu, Tribikram, 2004). Courseware may be utilized as in a virtual class, lecture, self-learning, such as reference materials, and in the accomplishment of test to evaluate the performance of a student individually or in a group (Galvao, Joao Ran and Barreto, Antonia M., 2005).

The Science of Learning and the Art of Teaching, in this article described the conditions of the typical classroom as particularly averse to learning. “A single teacher cannot individually and appropriately reinforce thirty and more students at the same time”. According to Bebington Prakash (2008), previous teaching method change and today blossomed into e-learning.

After done the researches about the topics, the current available courseware in Malaysia, mostly lack of the information about non-destructive failure analysis. According to the test result from Faculty of Mechanical Engineering, for Bachelor Structural and materials (BMCS) students, there are found that FKM students are not fully achieved the well result and score for this NDT subject.

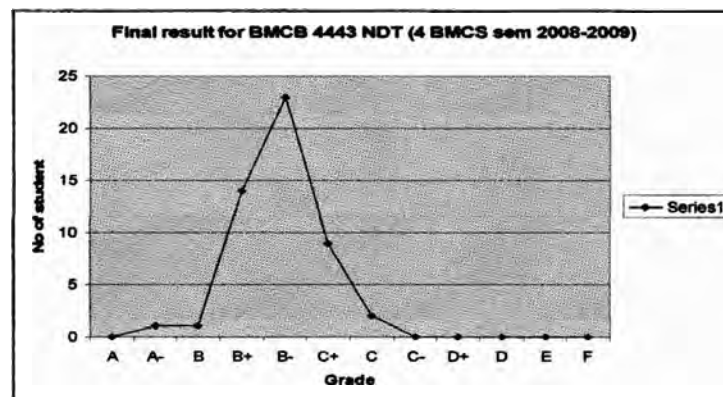


Figure 1.1: Total Result for Subject BMCB 4443 NDT (4 BMCS, 2008-2009)

According to the Figure 1.1, the result shown that majority of BMCS students achieve for grade B-, which is not have a stability result achievement. As a conclusion, the main problem is students can't score well for this subject.

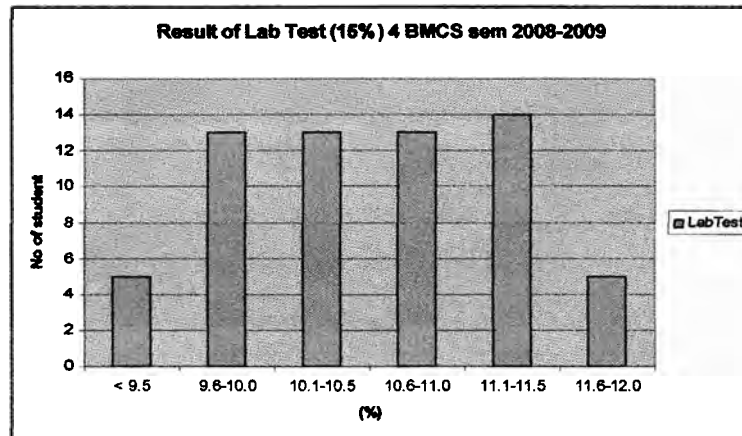


Figure 1.2: Result of Lab Test for BMCB 4443 NDT (4 BMCS, 2008-2009)

According to Figure 1.2, the lab test result shown that majority of students achieve result for marks between 11.1% - 11.5%, and result also shown that have five students in the class achieved the mark below than 9.5%, student's result can be conclude as students not so well in lab practical during lab session. As a conclusion, problem of result and practical achievement by students need to be solving with a new teaching material than previous teaching method, courseware to improve the achievement of students.

Non destructive testing is an elective subject for Structure and Material studies in local university and only available enroll by BMCS students. Beside this, there is lack of reference material covers on this technology, lack of teaching and learning material focus on this subject. In this case, Mechanical Engineering students are suffering with this situation. According to a lecturer, Puan Zakiah binti Abdul Halim, lecturer from Faculty Mechanical Engineering, Universiti Teknikal Malaysia Melaka who teaching for NDT subject, there are no available extra learning material provided by local university, students can not get the extra learning material beside the previous lecture room teaching method. Beside this, Puan Zakiah also gave her opinion about usually students unable to buy the expensively reference books.

1.3 Objective

The main purpose for this project is to develop a courseware for Non Destructive Testing which is cover on two chapters such as Penetrant Testing and Magnetic Particle Testing. This courseware is built to solve the currently problems occurring in University. Study cases about Penetrant Testing and Magnetic Particle Testing analyze and the information given inside the courseware is based on UTeM syllabus. This courseware is develop based on Cognitive theory as instructional design for courseware, cognitive science selected apply into this courseware with purpose to provide knowledge based on mind memory learning based on Coherence principle. Purpose to apply the Cognitive theory into this educational courseware is to understand well how multimedia explanations can be used in ways that are consistent with how people learn (Moreno and Mayer, 2000). Contents of this courseware are develop to fulfill the user requirements such as target users for this courseware are undergraduate students, the adult learning concept applied to fulfill the requirements.

- i. To develop a courseware which is covers on two chapters out of NDT subject.
- ii. To apply a Coherence principle of Cognitive theory in Multimedia learning.
- iii. To develop a stand alone courseware in on CD-ROM.

1.4 Scope

This is a courseware that develops to fulfill the user requirements based on the statement that analyze before starting development of courseware. In this project, the targets users include as the main scope of the project are Mechanical Engineering lecturers and students. Contents of the courseware divided into five modules, for the main subject's contents that included as scope of this project are two chapters out of whole Non destructive testing subject. All sub topics of these two chapters included and the experiments of these two important testing methods include as scope of this project. End product of this project is a courseware that uses CD-ROM as the deliverable object and English as main language. Five modules counted in this courseware are such as Lecture, Lab, Exercise, Glossary, and Help. The language used for the development of this courseware is English.

1.5 Project Significance

Educational courseware has developed to bring the learning environment into digitally and also play the role as interactively teaching material to improve currently classroom teaching performance. Since the target users are under graduate local university students who are famous with the calculation and lab practical, this courseware developed based on the testing method mostly important in local industrial area. The two chapters covered by Penetrant Testing and Magnetic Particle Testing, both are NDT study which are focused on different testing method use to detect the defect onto metal surface areas.

This is a BMCB 4443 subject courseware which is provided the knowledge of nondestructive testing method to let mechanical student study and cover these two