VIRTUAL INTERACTIVE TUTORIAL SYSTEM FOR CALCULUS

by

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FINAL PROJECT REPORT

Submitted to the Electrical & Electronics Engineering Programme
in Partial Fulfilment of the Requirements
for the Degree
Bachelor of Engineering (Hons)
(Electrical & Electronics Engineering)

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CERTIFICATION OF APPROVAL

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Approved:

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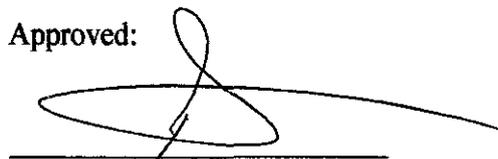
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Project Supervisor

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2011

ABSTRACT

Every higher education nowadays uses e-learning as the best way to interact between lecturers and students. Web-based learning is widely used nowadays to support a process of teaching and learning as it is more interactive than traditional ways of teaching. This paper focuses more on developing a Web-based learning environment for Calculus. The main objective for this project is to develop a Virtual Interactive Tutorial System for Calculus using Web-based learning where students can utilize internet technology to gain Output learning. This project involved three important tools which is PHP programming language, MySQL database management system and XAMPP server. Firstly we write a source code for our system using PHP language, then we store our database using MySQL and finally we test our system on local server using XAMPP.

ACKNOWLEDGEMENT

First and foremost, praise to Allah S.W.T who has helped and encouraged me to complete the Final Year Project (FYP) quite successfully. Without His permission, this FYP will not be a reality.

Secondly, I would like to take this opportunity to express my deepest gratitude to all parties who involved in this project either directly or indirectly such as UTP lecturers, friends and my beloved family. They have been supportive in helping me to complete this project.

My next appreciation goes to my FYP supervisor, Mr. Samsul Ariffin bin Abdul Karim from Science and Applied Mathematics Department who has guided and given me the opportunity to carry out this project. From this project, I have learnt so many new things regarding creating and developing Web-based learning system. Mr. Samsul has given me so much support and brilliant ideas to help me build this Virtual Interactive Tutorial System for Calculus.

Last but not least, I would like to thank to those whose name was not mentioned here but has in one way or another contribution to the accomplishment of this project. Hopefully, this project will help students prepared for their Test and Examination.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

E-learning, Web-based learning, online learning, and distance learning are widely used in education technology nowadays. However, these terms have different meaning for each other. It is important for both instructor and also the learner to know and understand their difference clearly.

The definitions of distance learning and distance education have been proposed by Keegan (1986) and Garrison & Shale (1987). Khan (2001) and Hall (1997) similarly have linked Web-based learning with Web browser technology where the learning is delivered via the Internet or Intranets.

Schank (2001) stated in his paper that learning activities which involve computer networks is an e-learning. He also stresses out that e-learning is not merely distance learning. In [1], the concept of online learning basically refer to the appearance of the Web, but most recent publications about online learning refer to the materials delivered over the Internet or Intranets (Malopinsky, Kirkley, Stein, & Duffy, 2000; Schank, 2001; PBS, 2001).

E-learning basically consists of both computers and also the interactive networks where learners can interact with the instructor. The computer is not the central element of the activity or learning content provider. However, both computer and the network must combine perfectly in the learning activity.

On the other hand, Web-based learning is associated with learning materials delivered in a Web browser, including all the materials packaged on CD-ROM or other media. Besides, online learning is more on a learning process where the learners can get access to all learning material that is ready to use. The learning content may be on the Web, or already installed on a CD-ROM.

For distance learning, it involves interaction between instructor and learners at certain distance. If the learning materials was simply posting or broadcasting to learners, it is not distance learning. This is because in distance learning, the instructors must be involved too in receiving feedback from the learners so that the two ways of learning can be achieved.

(Khan, 1997) said that the use of the Web as an educational tool has provided learners and educators with a wider range of new learning experiences and teaching environments, not possible in traditional inclass education. In [8], the author review that the Web based learning have been developed mainly by instructional designers using traditional instructional design models such as the instructional systems design (Dick & Carey, 1996), cognitive flexibility theory (Spiro, Feltovich, Jacobson, & Coulson, 1991), and constructivist learning environment (Jonassen, 1999).

1.2 Problem Statement

Lack of practice often becomes a great barrier that prevents students from having a good grade in Calculus subject. This is due to the traditional ways of doing exercises where students have to sit with their books wide open in a bored and not conducive condition.

Students need a system that is interactive and easy for them to access anywhere without having to bring a thick book just to do some exercises in Calculus. They have gained a lot of input during their lecture time but now they need a proven method for their OUTPUT Learning so that they can practice what they have got as an input.

1.3 Objective

The main objective for this project is to develop an Interactive Virtual Tutorial System for Calculus using web-based learning (website) as a platform where students can utilize internet technology to gain Output Learning.

1.4 Scope of Study

Scope of study of this project involves developing a system by writing a source code using programming language PHP coding, integrates PHP with database MySQL as well as testing the system on localhost using XAMPP software.

1.4.1 Writing the Source Code

For this project, we will be developing the system by writing some source code (coding) by using PHP programming language. PHP Hypertext Pre-Processor has been used widely nowadays for constructing a dynamic website. I have written the details of this programming language at Chapter 2.7.

1.4.2 Integrate PHP and MySQL

MySQL is a relational database management system (RDBMS). It is used to store all the information that we need to keep. In order to use this software, we need to integrate the PHP language with this MySQL so that it can give the instruction to the software regarding things that need to be stored. In Chapter 2.8, I discussed more about MySQL software.

1.4.3 System Testing

After we have done developing our system, then we need to test it whether it is working or not based on our specification. To do this, we apply XAMPP software where it acts as a server on our computer. By using this software, we can see how our system looks like. To know more about XAMPP software, it is on Chapter 2.9.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of Web-Based Learning

A couple years ago, most of the teaching methods are using blackboard before its transforming and changing with time. When the internet technology introduced, it became a new revolution in information technology industry. The wide use of internet technology all around the world also has affected our education system nowadays. There are many reasons why educators are using internet in education.

Based on [13], the author stated that some of the reasons educators are using internet in education are because of the internet has an infinite resource and students can be active participants. CD-ROM, web-based learning and mobile learning are part of several approaches used by educators to maximize the potential of computer technology but the most popular approaches is web-based learning which involved internet technology.

Web-based learning has become an important key trend nowadays to support learning and teaching process as it is proven method to enhance and upgrading the traditional learning system. Web-based learning is an instruction delivered over the Internet or Intranet to browser-equipped learners. There are a lot of advantages in using Web-Based learning nowadays.

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First of all, it is accessible anywhere, anytime around the world as long as there is Internet connection. Besides, the equipment costs are affordable for each student as almost all computers nowadays equipped with free browser to access the Internet. This proved us that the cost of setup is low. In addition, by using Web-Based Learning, it is easy for teachers to track students while they are connected to the network as it enables the data to be automatically tracked on the server computer.

Furthermore, the content is easy to update. This is a major advantage to Web-Based Learning as learning module frequently change. With Web-Based Learning, it is easier for teachers to update the learning materials and next time students connect to the webpage, they will automatically have access to the latest version of learning materials. Last but not least, by using Web-Based Learning, it may contain hyperlinks to other webs, thus enabling students to access to a different kind of web-based information.

There are two types of learning in web-based learning system which is Asynchronous Learning where there are no interaction between students and teacher and Synchronous Learning where there are interaction among students and teacher online via World Wide Web. In Asynchronous Learning, students need to download the modules and installed it on their computer before they can use it.

(Sudweeks, 2003) stated that Web-based learning environments provide an attractive method for information dissemination, but in many instances they can be just electronic equivalents of printed course materials. To design an effective web-based learning environment, Oliver (2001) has developed a framework which describes the critical elements needed for web-based learning environment.

Table 1: Critical elements for web-based learning environment [14]

Learning Design Elements	Description
Learning Tasks	The activities, problems, interactions used to engage the learners and on which learning is based.
Learning Resources	The content, information and resources with which the learners interact and upon which learning is based.
Learning Supports	The scaffolds, structures, encouragement, motivations, assistances and connections used to support learning.

2.2 Overview of Existing Web-Based Learning

2.2.1 Score A Programme

Score A Programme is a fully interactive and effective web-based learning programmed designed for primary and secondary school students to be exam ready and score A in every subject taken. Score A Programme covers all the subjects taught in National schools which is from Year 1 until Form 5.

The content of Score A Programme is based on school syllabus and curriculum set by the Ministry of Education. With Score A Programme, students will be able to practice their level of understanding for all subjects taken in school with unlimited practices and exercises provided by this programme.

Figure 1: Score A Programme

2.2.2   Wiley Plus

As in [15], Wiley Plus is an online teaching and learning environment that integrates the digital textbook with both instructor and students, allowing for a customizable learning experience. Wiley Plus has been used before for Probability and Statistics subject in UTP but it seems to give a lot of burden to students with its expensive price.

Figure 2: Wiley Plus [15]

2.2.3 UTP e-learning System

Universti Teknologi PETRONAS e-learning system provides a course management system, customizable institution-web portal, online communities and an advanced architecture for both students and also administrative system. This system has been widely used in UTP to connect students with lecturers. Lecturers will post all the notes, announcements and important news for students to take note.
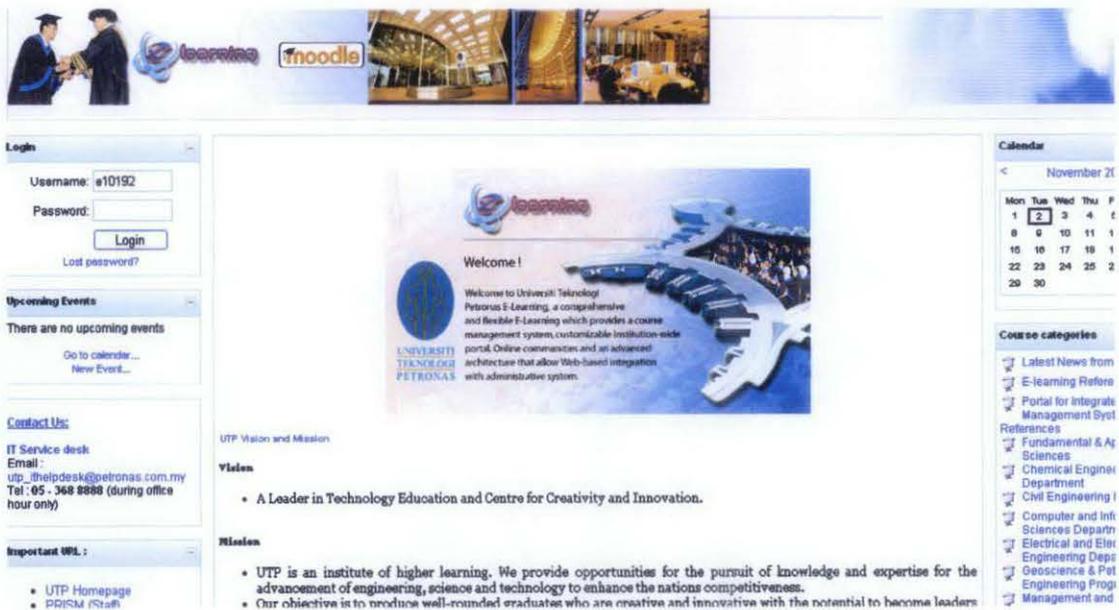
Figure 3: UTP e-learning

2.3 Advantages of Web Based Learning

2.3.1 Distance learning

The main advantage of Web-based learning is that it overcomes distances problem. By overcome this barrier, the learners have a big opportunity to participate in whatever activities provided by instructors regardless of physical location [17]. For university's point of view where all expert lecturers vary across the big area university, this can be an important advantage for students to interact with their lecturer.

2.3.2 Flexible in scheduling

Besides distance learning, Web-based learning also offers flexibility in scheduling especially on participation of the learners. Instead of going to the lectures given at a fixed time in Class, learners now can access a Web-based learning tutorial or virtual tutorial at any time any where upon their availability.

2.3.3 Changes can be easily updated

Changes in syllabus often trouble the teachers to update their course. With Web-based learning, such changes can be made quickly and easily, where it can avoid the expense of reprinting the course syllabus. In [17], the author said that even students can update the course if using Web-based learning. It is proven products that will last for a long time even after the course ends. Learners can return back to access the tutorial when ever they want. It can be their reference for a test or final examination.

2.3.4 Individualized learning

Individualized learning is another advantage of Web-based learning. Learners will be given a full control to select from among multiple different learning opportunities within a given course and they also can move at their own pace suitable for their needs [17]. Student will be given a freedom to choose what topic that they want to practice, how much time they require and how many questions that they want to answer. This indeed will give students a lot more space in their study.

2.3.5 Assessment and documentation

Finally, Web-based learning also facilitates the assessment and documentation of educational objectives [17]. In addition, online assessment also has the same flexibility like distance and timing as discussed before. Instructors can monitor the learners by using an automatic record-keeping where it can store the details on what content that the learners reviewed and how about their performance for the tutorial.

2.4 Disadvantages of Web Based Learning

2.4.1 Cost

Creating and developing the Web-based learning system is more costly than simply converting the textbook or course material into web-based format. Experience web designer with high technical abilities will be required to develop the system effectively. There are so many considerations required as we want the Web-based learning is compatible with the students.

2.4.2 Technical problems

Since Web-based learning requires a computer, internet connection and of course the World Wide Web, technical problems is the common problem that will happened to either instructors or learners. There are so many technical problems that can disrupt the Web-based learning. For example, slow internet connection, not enough bandwidth, and internet down and so on.

2.4.3 Poor instructional design

Instructional design is very important aspect in education. It is where the instructor will prepare a learning material that can help students in their learning process. Once the Web-based learning is accessible on internet, it can be an issue if the instructional design is poor for the students [17]. In Web-based learning, the instructor must plan their material precisely so that the learners will know what to expect from the Web-based learning.

2.5 Creating Effective Web-Based Learning

Web-based learning environment is a great asset only if they are designed carefully and effectively. Web-based learning environments can serve as a powerful tool for motivational, instructional, feedback, and assessment. Creating an interactive website involves more than putting together a colorful webpage.

There are ten important steps in creating an effective Web-based learning. The first four steps are initial steps which should be completed before starting to design a website. Below are the ten steps to develop effective web based learning [18]:

1. Perform a needs analysis and specify goals and objectives.
2. Determine your technical resources and needs.
3. Evaluate commercial software and use it if it fully meets your needs.
4. Secure commitment from all participants and address potential barriers to implementation.
5. Develop content in close coordination with website design.
6. Encourage active learning – self assessment, reflection, self directed learning, problem based learning, learner interaction and feedback.
7. Facilitate and plan to encourage use by the learner.
8. Evaluate both learners and course.
9. Pilot the website before full implementation.
10. Plan to monitor online communication and maintain the site by resolving technical problems, periodically verifying hyperlinks and regularly updating content.

In order create an effective Web-based learning, the instructors must carefully plan, design and construct a learning material that combine active learning, motivation and evaluation with creative web design [18]. This is very important steps for the instructors to follow if they want their learners to get much from their website.

2.6 Interactivity for Web Based Learning

Interactivity is an important aspect for Web-based learning. It is instructor's responsibility to design a website that can attract the learners to learn. Draves (2000) argues that the real learning is measured by the quality of interaction and not the content. Students need an interactive learning environment so that they will find the learning process is fun.

Sim (1997) in his paper stated that interactivity is very crucial especially in knowledge acquisition and the development of cognitive skills. He also stated that interactivity in computer technology was limited to simple menu selections, clicking on objects, and linear sequencing.

According to Sim (1997), he stated that basic interactivity should not be deemed as inappropriate, but it should be scrutinized according to the levels of interaction that are relevant to knowledge acquisition or skills development [19]. Berge (1999) and Northrup (2001) stated that interaction does not happen accidently; it must be planned carefully and planted into the Web-based learning design.

There are many researches and developers that offered guidelines for designing technically interactive web-based learning. French, et al (1999) argue that many web pages have built-in interactively, even in the absence of interaction with other learners or instructors.

Ha and James (1998), have defined interactivity as the extent to which the communicator and audience respond to [19]. They have successfully identified five parts of web interactivity to fulfill different communication needs as discussed below [21]:

1. Playfulness: it is measured by the presence of such curiosity-arousing devices as question and answer format.

2. Choice: it is measured by the number of alternatives for color, speed, language and other non-informational aspects.

3. Connectedness: it is measured by the presence of information about the product, company, third-parties, and other content of interest to visitors.

4. Information Collection: it is measured by the presence of such monitoring mechanism as registration forms and counters.

5. Reciprocal Communication: it is measured by the presence of response mechanism including the webmaster's email address, surveys and purchase orders.

2.7 PHP (PHP Hypertext Pre-Processor)

PHP (PHP Hypertext Pre-Processor) is a HyperText Markup Language (HTML) programming language. This language was developed to construct a dynamic website easily. Firstly, the PHP code is embedded into the HTML source document, and then it will be interpreted by a web server with a PHP processor module, which finally generates the web page document.

The main reason why PHP is popular is because of its ability to interface with a larger database system. It can be used on most web servers and on almost every operating system. Besides, PHP is open source software released under the PHP license and incompatible with GNU General Public License.

Earlier, PHP was designed to help developers to create dynamic website easily but now it focuses more on server-side scripting similar to Microsoft's Asp.net, Sun Microsystems' JavaServer Pages, and mod_perl. In addition, it also has attracted the development of many frameworks to promote rapid application development (RAD) such CakePHP, Symfony, CodeIgniter, and Zend Framework.

Today, there are more than 20 million Internet domains had PHP installed on their web hosting servers. PHP has been used as programming language on 75% of all web servers nowadays. MediaWiki, Joomla, eZ Publish, WordPress, Drupal and Moodle are the examples of web content management systems (CMS) that is written in PHP language.

2.8 MySQL

MySQL is a famous relational database management system (RDBMS). It is software used to create a large database, provide access to the data using query language and provides high security level to the data stored. The SQL is stands for Structured Query Language.

MySQL is open source software under the terms of the GNU General Public License. It has become the world's most popular open source database software nowadays. Large companies like Google, Yahoo and even Facebook used MySQL as their database management system. It also been used by the most frequently visited websites on the internet such as Youtube, Flickr and so on.

MySQL runs on many different system platforms such as AIX, BSDi, FreeBSD, HP-UX, eComStation, i5/OS, IRIX, Linux, Mac OS X, Microsoft Windows, NetBSD, Novell NetWare, OpenBSD, OpenSolaris, OS/2 Warp, QNX, Solaris, Symbian, SunOS, SCO OpenServer, SCO UnixWare, Sanos and Tru64 [33].

MySQL comes with no GUI (Graphical User Interface) tools to administer MySQL databases or manage the data. The official MySQL Workbench was developed by MySQL AB and it enables users to administer MySQL databases graphically and visually design database structure. Users can manage the following on MySQL Workbench:

- Database design & modeling
- SQL development – replacing MySQL Query Browser
- Database administration – replacing MySQL Administrator

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2.9 XAMPP

XAMPP is an open source cross-platform web server package of Apache HTTP Server, MySQL database, PHP and Perl programming languages that all run from a removable drive. This software is widely used for dynamic web development projects. This software is useful if our dynamic web pages were created using programming languages like PHP, JSP, and Servlets.

XAMPP will be updated due to the latest releases of Apache/MySQL/PHP and Perl. XAMPP is open source software under the terms of the GNU General Public License and it acts like a free web server operating on our computer. Originally, XAMPP only used as a development tool which is to allow website designers, developers and programmers to test their work on their own computers without any access to the Internet.

As a result, many important security features are disabled by default. However, today, XAMPP is sometimes used to actually serve the web pages on the Internet where a special tool is provided to password-protect the most important features to prevent the data from stolen or hacked by other people.

3.0 JavaScript

JavaScript (ECMAScript) is a prototype-based object-oriented scripting language that is dynamic and has first-class functions. It is also considered as a functional programming language because it has closures and it also supports higher-order functions.

JavaScript basically used in the form of client-side JavaScript where it is implemented as a part of the web browser so that it can enhanced user interfaces and dynamic websites. The primary use of JavaScript is to write functions that are embedded in or included from HTML pages and that interact with the Document Object Model (DOM) of the page. Some simple examples of this usage are:

- Opening or popping up a new window with programmatic control over the size, position, and attributes of the new window (e.g. whether the menus, toolbars, etc. are visible).
- Validating input values of a web form to make sure that they are acceptable before being submitted to the server.
- Changing images as the mouse cursor moves over them: This effect is often used to draw the user's attention to important links displayed as graphical elements.

CHAPTER 3

METHODOLOGY

In this section, I will explain the method that I used to complete this project. Firstly, I will identify the project background. This can be accomplished upon thorough research via internet, journal, and conference paper and so on. Then, I will tackle what is the suitable problem statement for this project.

After that, I will do a deeply study about developing Web-based learning and compile all information that I got in Literature Review. In this section also, I review about the tools that I will be using upon completing this project. A clear review about the software will help me through along the way.

After completed the literature review, I began to develop the overall model of this project. It is a model that tells me the flow of the pages that I need to create and develop for this system. Once I got a clear model, then I will proceed with the planning where I have to plan and decide the software that I want to use to develop this system.

After I have a clear model of the system and all the software needed, then I will begin to develop and build the system. This is the hardest part of all as it takes a lot of hard work and courage to learn something new and to cope with a lot of error occurred during programming.

Once I have developed the system, the next part is to test it whether it is working or not. For this step, I tested the system on my own computer (localhost) first. This can be done by using XAMPP software. When the system successfully functioning based on the initial model, then I will make a conclusion based on what I have done for this project.

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│         PROBLEM STATEMENT           │
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│         LITERATURE REVIEW           │
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│      DEVELOP AN OVERALL MODEL       │
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│             PLANNING                │
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│            CONCLUSION               │
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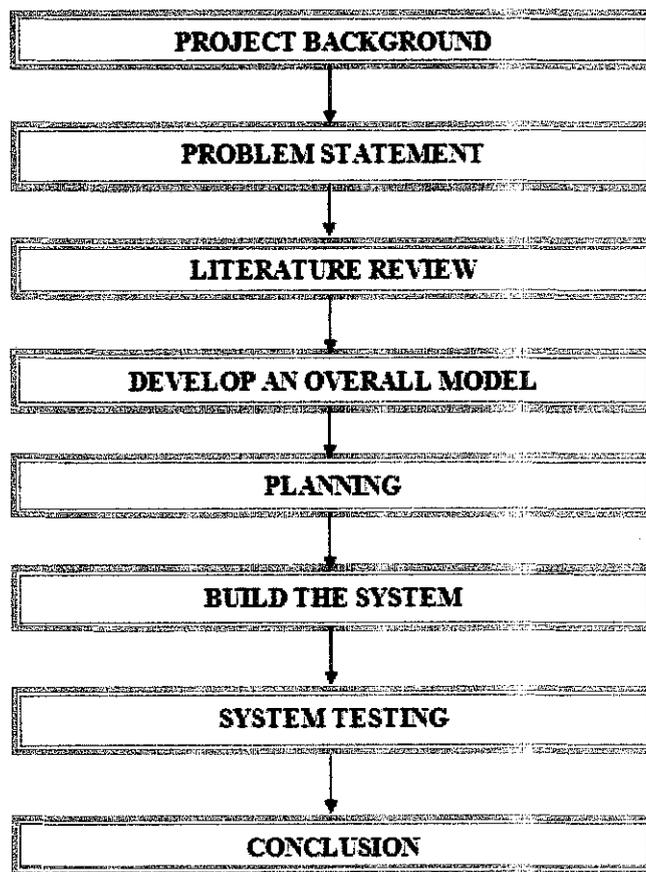
Figure 4: Project Flow

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## 3.1 Process 1: Develop an Overall Model
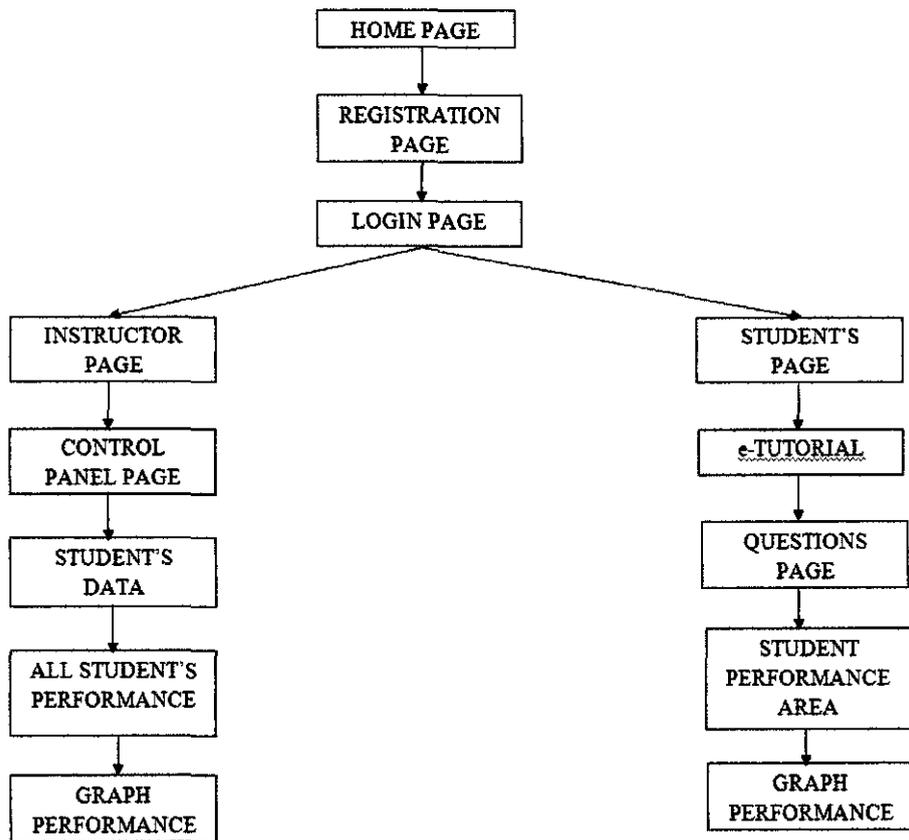
Figure 5: Project's Overall Model

This is an initial activity that I have done to build the system. It is important to have a clear picture of what I want my system to be by the end of this project. Above figure is the model of the whole system.

For e-Tutorial, I planned to build a system where the students can do the exercise via online with every question have multiple choices of answer. Once they have done, they will be given a mark based on their performance. This mark will be stored on admin database where admin can monitor every activities participated by the students.

3.2 Process 2: Planning

For the second process, after I have a clear picture about my system, the next step is to determine what method and tools that I want to use for my system throughout this project. Planning is a very important process as it will determine whether the whole process afterwards will go smoothly or not.

For this project, I have planned to use PHP as my programming language where I will develop the source code. MySQL will be my database management system that will store all students' data later. For initial testing of my system, I planned to use XAMPP server as my localhost.

3.3 Process 3: Build the System

For this process, I have divided it into two parts. For the first part, my aim was to build some basic features of the website such as Home page, Login page, Register page, Contact page and so on. It is important to build the base of our website first so that we can add any other features if needed later.

For the second part, I will focus more on developing e-Tutorial and other features based on my model before. Refer to the next chapter to see all the things that I have done so far for the system and please refer to the appendices for the coding and source code.

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│                        ┌──────────────┐                      │
│                        │  HOME PAGE   │                      │
│                        └──────┬───────┘                      │
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│     FYP 1           ┌──────────────────┐                     │
│                     │  REGISTRATION    │                     │
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│                      │  LOGIN PAGE  │                        │
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│     │  INSTRUCTOR  │                 │  STUDENT'S   │        │
│     │    PAGE      │                 │    PAGE      │        │
│     └──────────────┘                 └──────────────┘        │
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│     ┌──────────────┐                 ┌──────────────┐        │
│     │  CONTROL     │                 │  e-TUTORIAL  │        │
│     │  PANEL PAGE  │                 └──────┬───────┘        │
│     └──────┬───────┘                        ▼                │
│            ▼                         ┌──────────────┐        │
│     ┌──────────────┐                 │  QUESTIONS   │        │
│     │  STUDENT'S   │                 │    PAGE      │        │
│     │    DATA      │    FYP 2        └──────┬───────┘        │
│     └──────┬───────┘                        ▼                │
│            ▼                         ┌──────────────┐        │
│     ┌──────────────┐                 │   STUDENT    │        │
│     │ ALL STUDENT'S│                 │ PERFORMANCE  │        │
│     │ PERFORMANCE  │                 │    AREA      │        │
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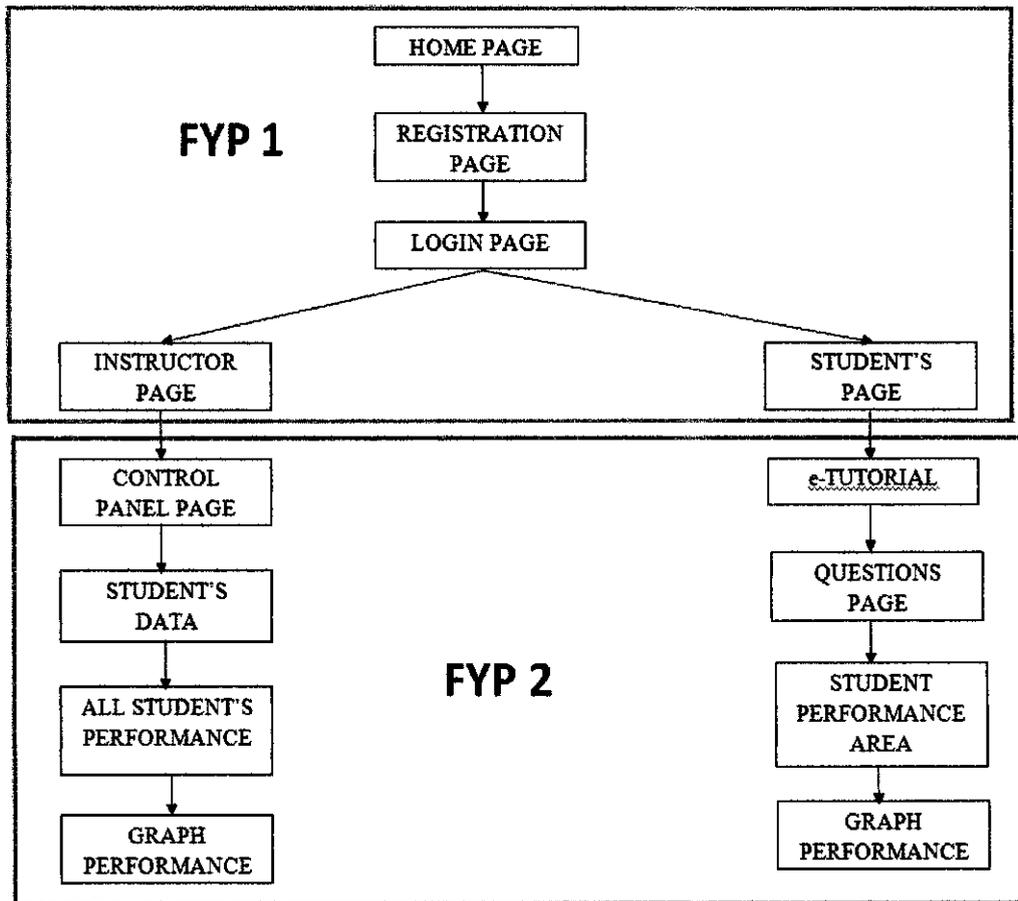
Figure 6: Two parts in building system

3.4 Process 4: System Testing

For this process, once the system is developed, the next part is to test it whether it is working or not. In this particular process, I used XAMPP software to serve like a localhost for the system. In simple words, my computer will be the temporary server for the system.

CHAPTER 4

RESULTS AND ANALYSIS

For the first part of this project (FYP 1), I have managed to write several coding for Home Page, Login Page, Register Page and Contact Page. Apart from that, I also have tested my website on my localhost (XAMPP) and it works successfully. Below are the pages that I have developed in the first part (FYP 1):
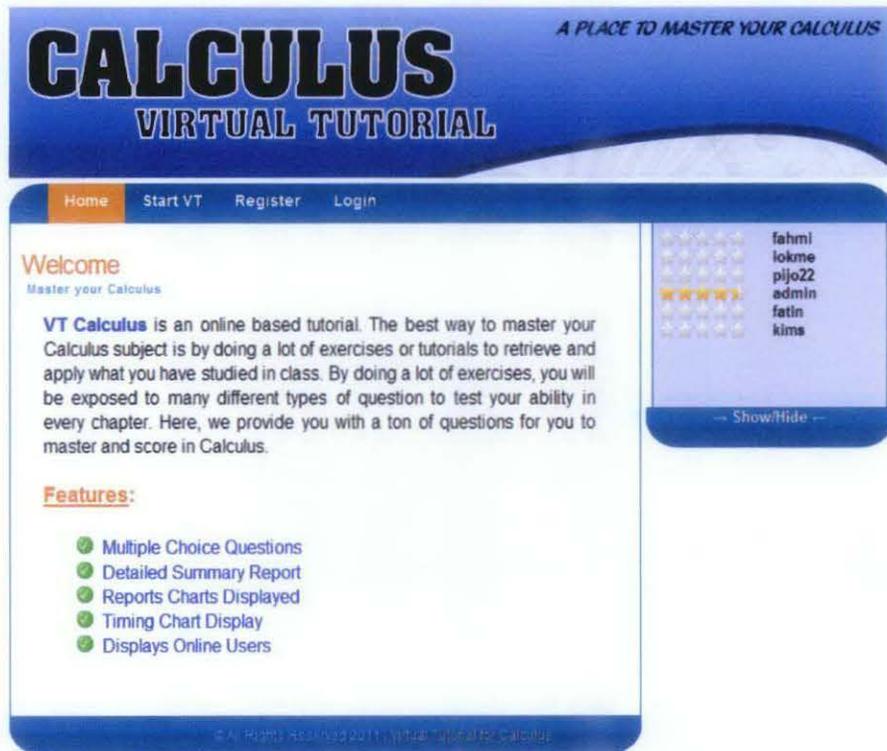

Figure 7: Home Page

Virtual Calculus
Please Fill in The Details for a New Account...

REGISTER	
First Name	
Last Name	
Email address	
Username	
Password	
Confirm Password	
ID Number	
Date Of Birth	DD-MM-YYYY
Gender	○ Male ○ Female
Profile Photo	Browse...

sUn3DM   Enter Captcha

Register   Reset

Figure 8: Register Page

Virtual Calculus
Please Login to Continue...

LOGIN	
Username	
Password	
	FORGOT YOUR PASSWORD...

Login   Register

Figure 9: Login Page
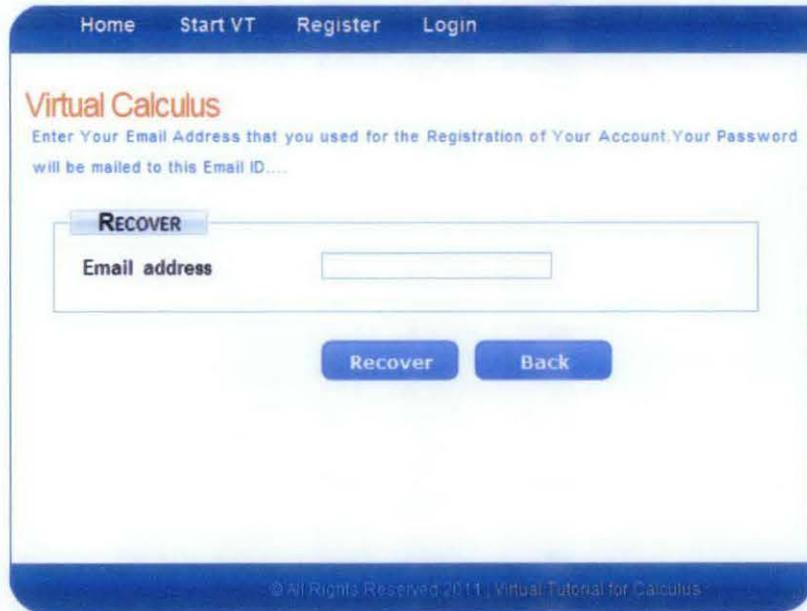
Figure 10: Forgot Password Page
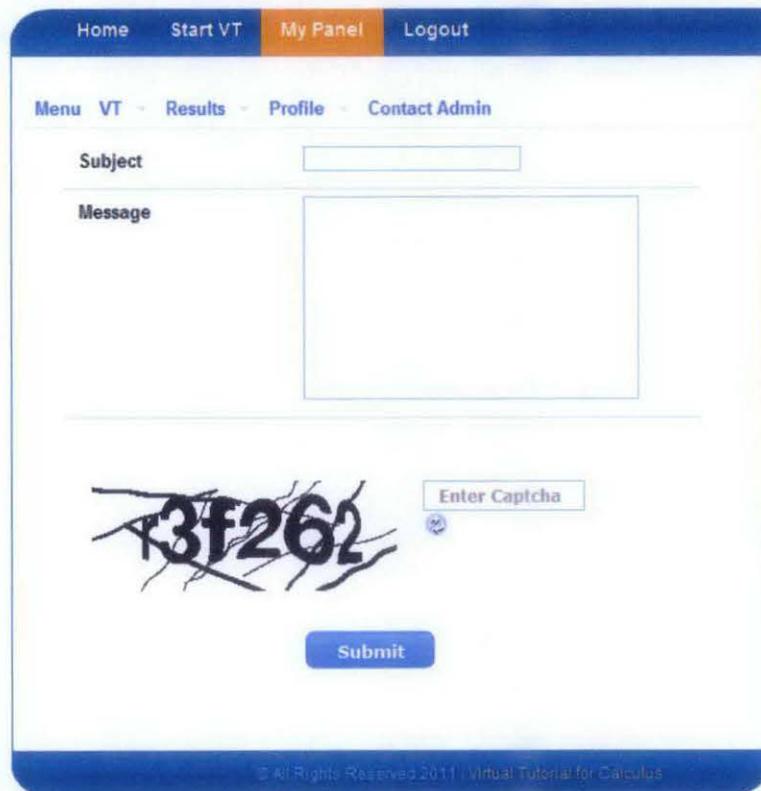
Figure 11: Contact Admin Page

For the second part, I have developed several more function for this web-based system to achieve the objective of this project successfully. Below are the interfaces of the functions that I have developed for this project.

4.1 Start Virtual Tutorial (VT)

This is where students who have registered and login to our system will experience the new output learning of Calculus. Once the students are ready, they will click at Start VT icon as shown in figure below to start their exercise.
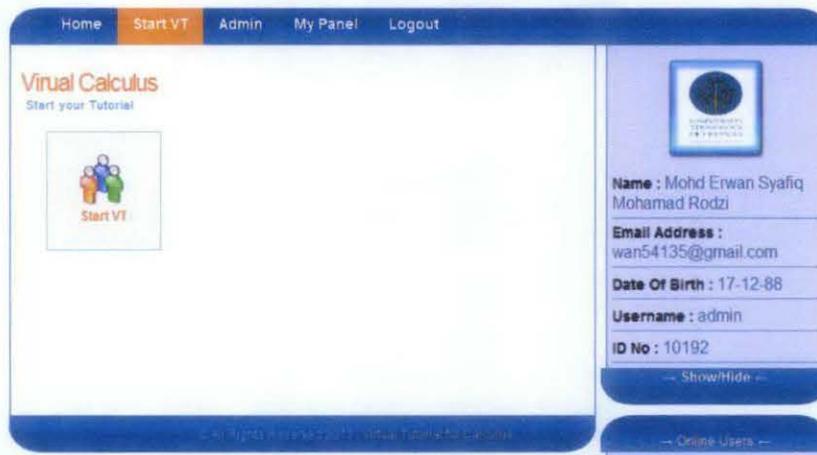
Figure 12: Start VT front page

Then, they will be directed to another page where they need to choose what topic they want to practice, how many questions they want to test themselves and how much time they require. This is important for them to be exam ready as in real situation, time management is very important. We have to know how much to spent for every single question in final exam and here, they can practice their timing perfectly as preparation.

30
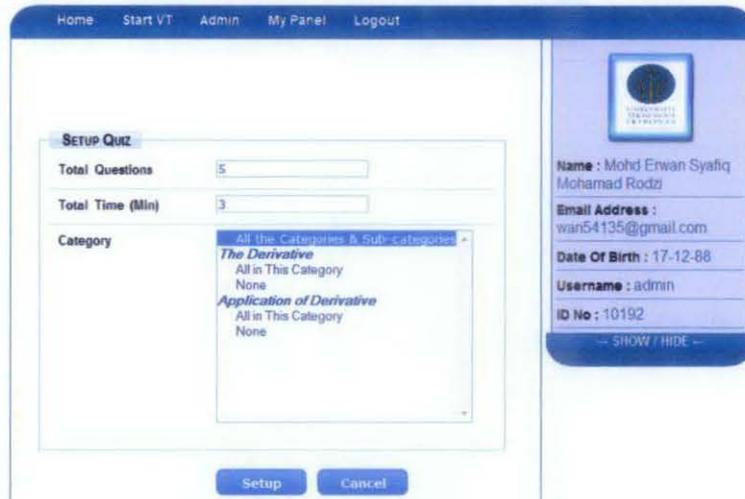
Figure 13: Total Questions, Time and Category

4.2 Timer

After students started the VT, they will be a timer at the top of the page as their references for how much time left for them to complete the exercise. This will be a great psychology for the students to complete their exercise within time range.

Figure 14: Timer

4.3 Multiple Choice Questions (MCQ)

Below is the interface of question that students will see. It is very interactive where the question was bolded clearly with a lot of color to attract our eyes.

31
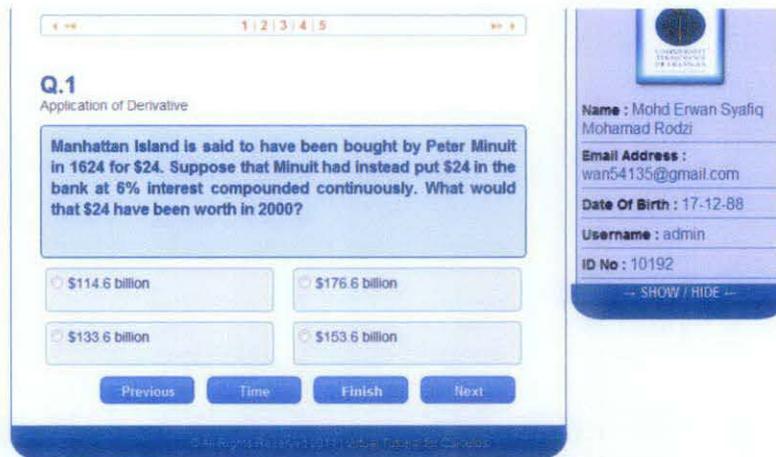
Figure 15: Multiple Choice Questions Interface

When students have finished answering all questions within time limit, they will be directed to another page where they will be a statistics or details of the exercise that they have done. They will be given the percentage and the most interesting part is they will be ranked based on their performance. This is to ensure that all students will compete with each other to get a good result.
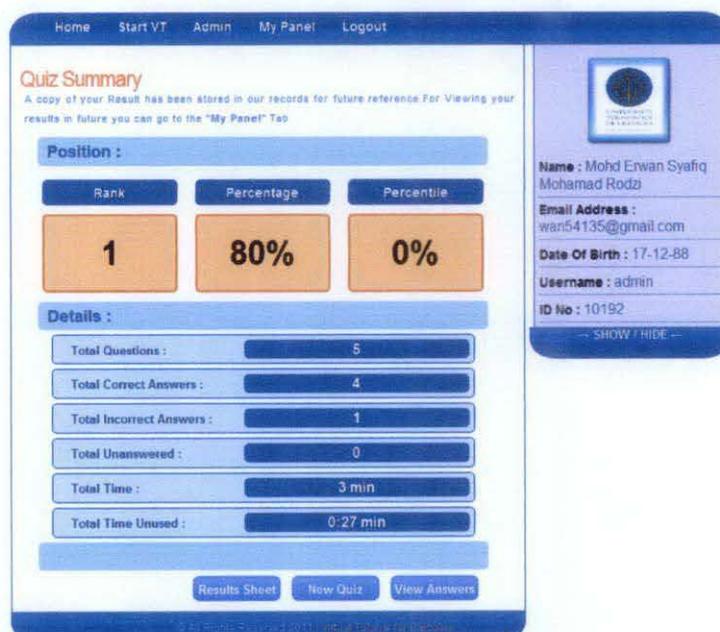
Figure 16: MCQ Summary

At the same page also, student will be given a timing chart based on their performance. This unique feature will help students to manage their time better for next time. The timing chart indicates how much time the students take for each question. By having this chart, students will notice whether they took so much time or not for certain question.

Figure 17: Timing Chart

On the summary page, there will be View Answer button where students can check which question is wrong so that they will continue to work to get the right answer. The red color box indicates the answer that the students chose before is wrong and the green color box indicates the correct answer for that question.

Figure 18: View Answer Interface

4.4 Functions on Admin Page

In admin page, there will be several functions added which is to activate VT Questions, activate Categories and Sub-Categories, manage users of this system which is the students, edit the website content so it will always new and fresh and last but not least is a function to change the necessary settings of the website.
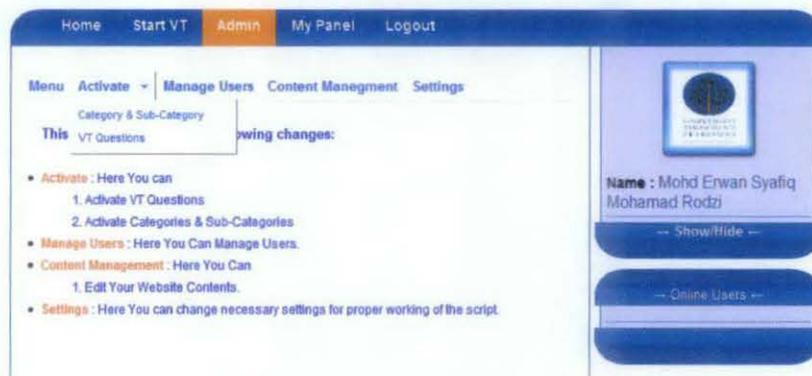
Figure 19: Admin Page

Figure 20: Activate Category and Sub-Category Page

35

Figure 21: Activate VT Questions Page

Figure 22: Manage Users (Students) Page

4.5 My Panel Page

My panel page was created so that the admin can add or edit VT Questions, Categories and Sub-Categories. Also, students can view their exercise results as well as all results where it is arrange based on rank. So, students can see who the top performance among them in Calculus is.
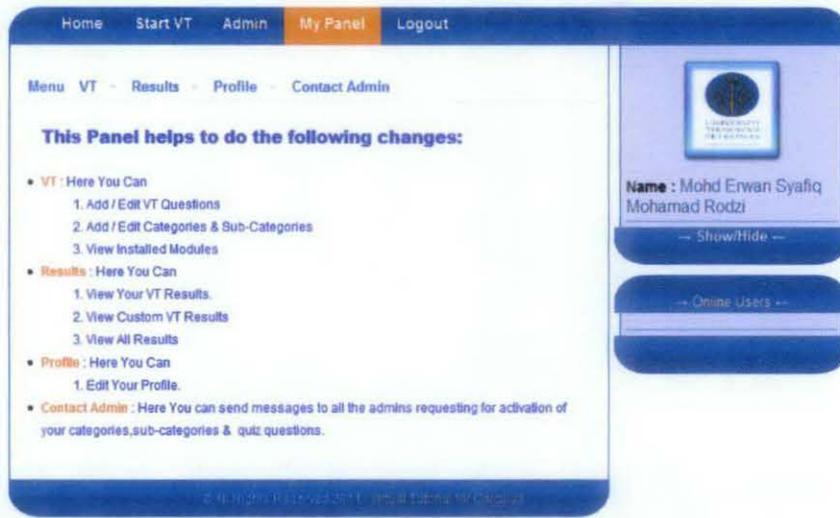
Figure 23: My Panel front page

Figure 24: All Results Page

Below is the interface that the admin will see if they want to add a new question (MCQ). There will have to select the categories and sub-categories first before they can proceed to add a new question. There's also the answer's option where the admin can put all the answers that possible for the question.

Figure 25: Add New Question Page

Figure 26: Answer's Option

4.6 Special Features

In order to develop a Web-based learning system which is unique and different from the existing one, I have manage to develop some pages with special features that can help student study more interactively with a lot of colorful pages. Below are the lists of special features that I have developed for this system:

1. Timer to indicate how much time left for the students to finish the tutorial.

Figure 27: Special Features – Timer

2. MCQ Summary where students can see all the data about their tutorial like how many questions they got correct and wrong and how much percentage did they got for that particular tutorial.
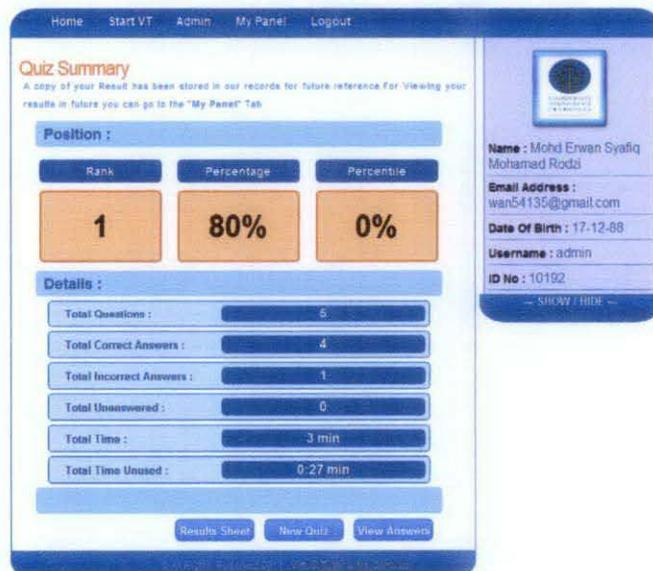

Figure 28: Special Features – MCQ Summary

3. Timing Chart to tell the students how much time they took to answer certain question.

Figure 29: Special Features – Timing Chart

4. View Answer pages with green and red color to indicate correct and wrong answer respectively.

Figure 30: Special Features – View Answers Page

5. Activate VT Questions page where instructor can choose what the questions to be given to the student are.
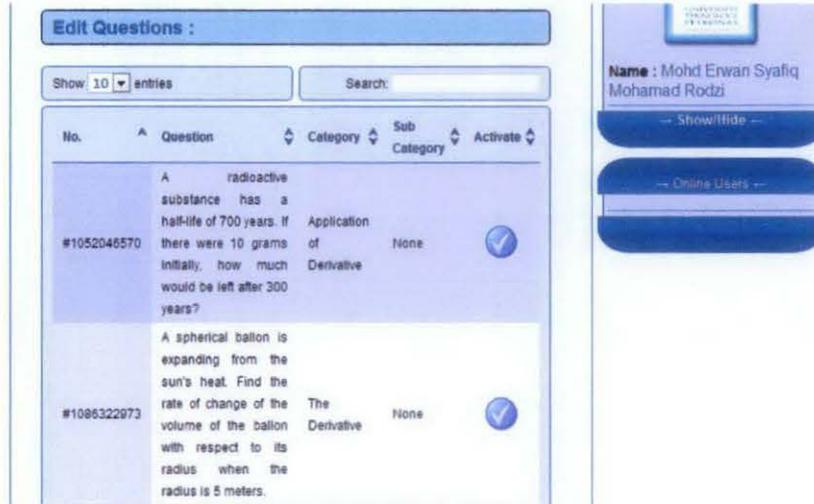

Figure 31: Special Features – Activate VT Questions Page

6. All results page where all students' performance will be ranked based on their marks. This surely will make the students become more competitive. It is also have green color to indicate pass and red color to indicate fail.

Figure 32: Special Features – All Results Page

7. Add new question page where instructor can copy and paste from Microsoft Word to this interface.
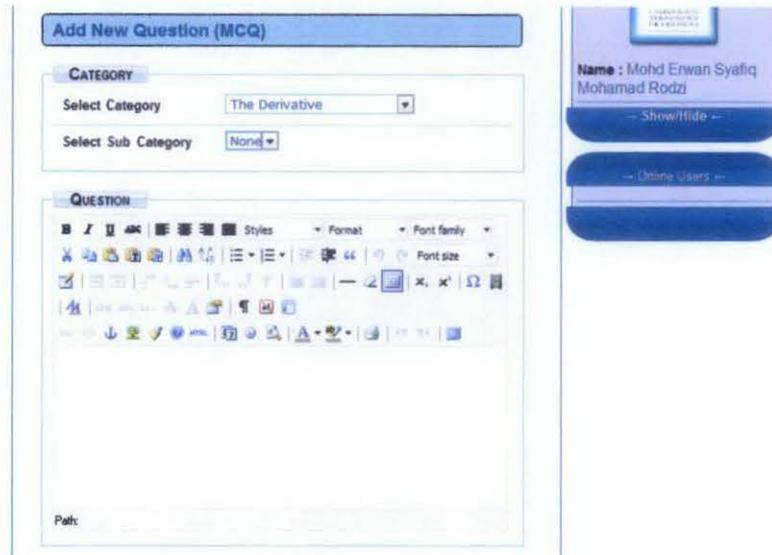
Figure 33: Special Features – Add New Question Page

8. To add math-equation, instructor can use equation editor icon, a special features to display complicated mathematic equation into Web-based learning.

Solve this equation $\int_0^\pi \sin\left(\frac{x}{2}\right) dx.$
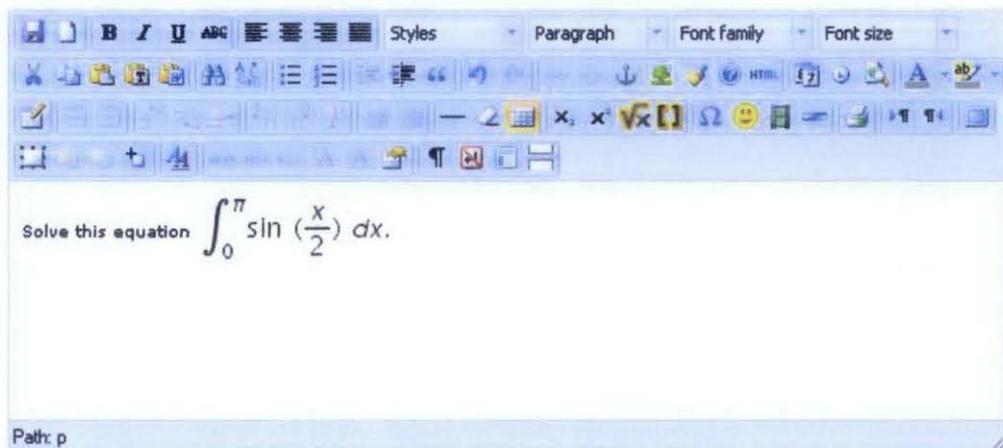
Figure 34: Special Features – Equation Editor Icon

Figure 35: General Symbol inside Equation Editor


Figure 36: Operators inside Equation Editor
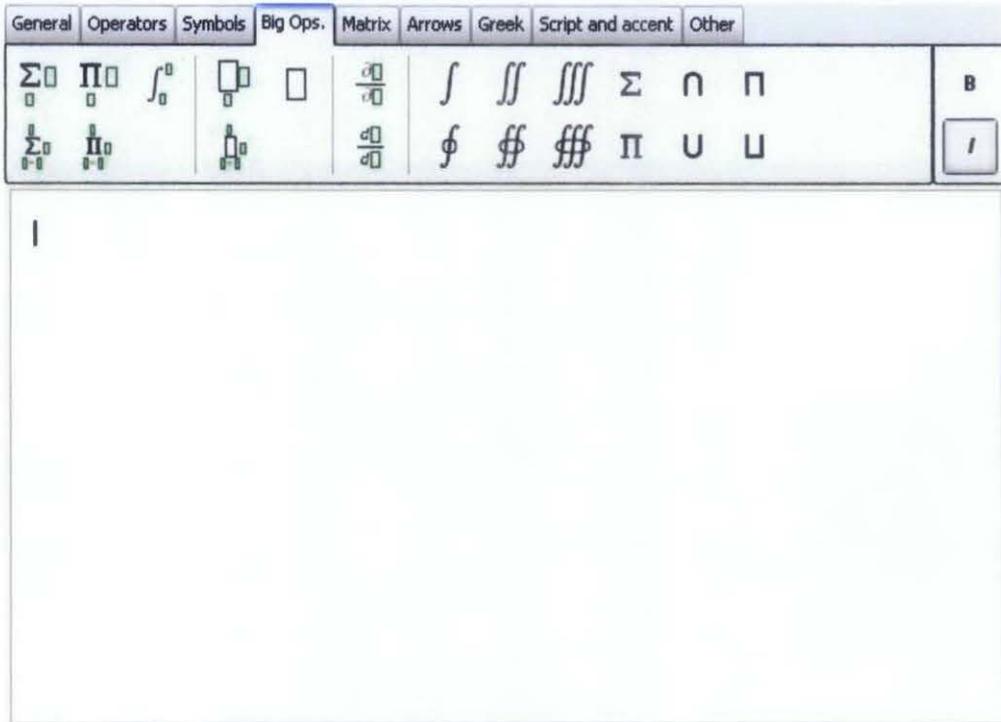
Figure 37: Other Operators inside Equation Editor
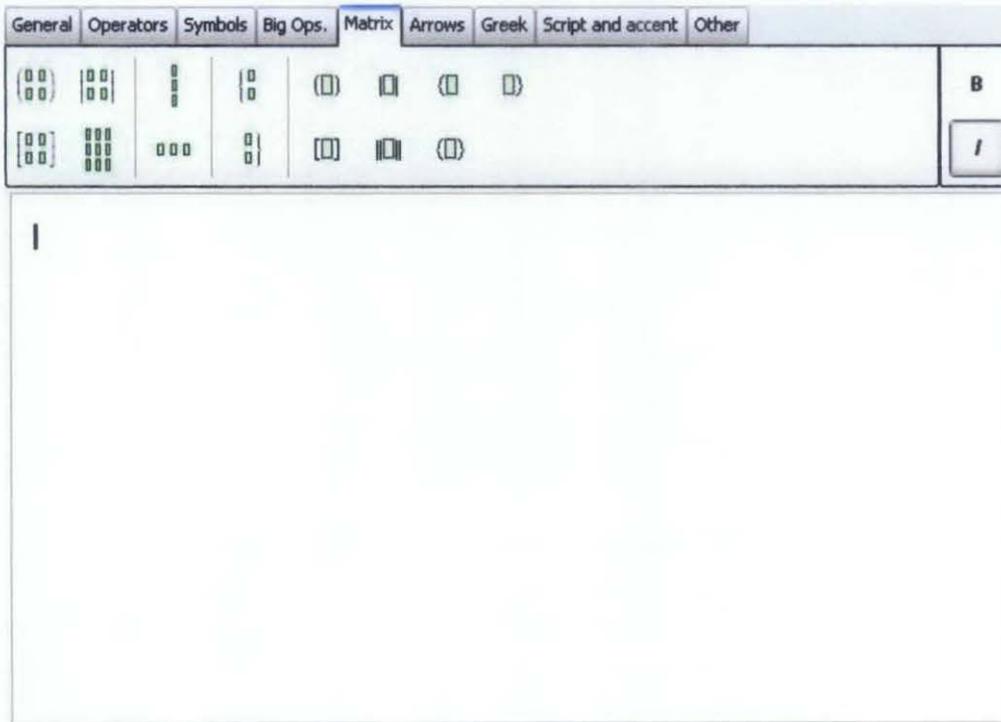
Figure 38: Matrix Operators inside Equation Editor

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

As a conclusion, upon completing this project, I have managed to develop all the pages successfully based on my initial model in Chapter 3. All the pages are functioning well on my computer (localhost). I hope that this project can motivate student to do well for their Calculus and be more prepared for their upcoming Examination.

Table 2: Summary of All Special Features and its Advantages

NO	SPECIAL FEATURES	ADVANTAGES
1	Timer	Students will alert about their timing precisely.
2	MCQ Summary	Students can view all the data about their tutorial like how many questions they got correct and wrong and how much percentage did they have for that particular tutorial.
3	Timing Chart	Students will know how much time they took to answer certain question. This is important as we want students to learn how to manage their time perfectly.
4	View Answers Page	Students can see which is the correct answer for all the tutorials question they took before. This will help students to try even harder to get the correct answer.

5	Activate Questions Page	Instructor can choose what the questions that they want students to answer are. They can prepare several questions and they can activate which question that students can view.
6	All Results Page	All students' performance will be ranked based on their marks. This surely will make the students become more competitive.
7	Add New Question Page	Instructor can add new questions for the students using this word editor which is acting like a Microsoft Word but in Web-based learning format.
8	Equation Editor Icon	To add math-equation, instructor can use equation editor icon, a special features integrated inside word editor to display complicated mathematic equation into Web-based learning.

5.2 Recommendation

As a recommendation, this project can be upgraded by adding some more additional features to enhance the student's ability in Calculus subject. For example, features like iTeacher, data extraction to Excel for instructor or maybe we can develop online test with fixed time to add more value in student's learning.

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