A TUTORING SYSTEM FOR ENGINE – LIVING SKILLS SUBJECT

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I dedicate this to:

My dad, my mom, my brother and my sister who have always been supporting me all through the years. Also, to my nephew, Emir Naqiuyuddin for making things cheerful. Thank you very much.

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ABSTRACT

The usage of technology in the 21st century has lead into many innovations in the educational area. As we can see, from the elementary education to the university's level, there are many innovations with technology usage that needed to be aligned with the educational background. These technologies are used to help improve the student's knowledge in their learning environment. There is variety of Computer Aided Instruction (CAI) that have been developed and used but unfortunately; there have not been many products that implements the educational theories according to the needs of users. This project is about implementing a tutoring system in engine subject, where it could help the students to understand better on how an engine works as well being a side-guide tutor. The guided notes that is provided in the tutoring system is aligned with the syllabus of Kemahiran Hidup Bersepadu (Living Skills) in Form 3. Also, there are a few simulation graphics of engine to help students learn on how the engine process is carried out. On the other hand, it includes an assessment where a quiz is provided in order to help students have a better understanding of an engine. Furthermore, the students can share their knowledge by signing up in guestbook, so they can communicate with others to share their knowledge. By learning the theories in classrooms, it will block the student's perception as how an engine works and cannot relate to the real world. With the Dreamweaver UltraDev as an editing tool, this tutoring system uses image maps and links as a dynamic process to attract the student's attention in learning engine. The main objective is to help the students to have a better knowledge about engine system.

ABSTRAK

Pada abad ke-21 ini terdapat pelbagai penggunaan teknologi maklumat di dalam semua bidang. Pada masa yang sama, penggunaan teknologi maklumat amat luas sekali sehingga membuatkan para penyelidik ingin menghasilkan satu produk yang menggabungkan penggunaan multimedia, sistem perisian dan elemen-elemen pendidikan. Berdasarkan penyelidikan yang telah dibuat, terdapat beberapa cadangan yang telah dikemukakan oleh para penyelidik dan sistem pakar untuk menghasilkan satu produk yang boleh membantu meningkatkan motivasi pembelajaran pelajar. Sistem tutorial yang dihasilkan oleh penulis dapat membantu kefahaman pelajar dalam mempelajari subjek enjin berdasarkan silibus Kemahiran Hidup Bersepadu (KHB) Tingkatan 3. Sistem tutorial ini mengandungi nota yang telah disediakan berdasarkan silibus KHB. Ia juga mengandungi kuiz untuk menguji kefahaman pelajar. Terdapat juga pengkalan data untuk menyimpan maklumat pelajar yang mendaftar di Enjin.com Pelajar-pelajar boleh berinteraksi dengan pelajar lain serta berbincang mengenai topik-topik yang berkaitan dengan enjin. Di dalam sistem tutorial ini, penggunaan Dreamweaver UltraDev adalah untuk membantu dalam merekabentuk serta mengurus laman web yang dibangunkan. Objektif utama sistem tutorial ini adalah untuk membantu kefahaman pelajar di dalam subjek enjin.

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LIST OF ACRONYMS

ACRONYM   **DESCRIPTION**

ACRONYM	DESCRIPTION
ASP	Active Server Pages
CAI	Computer Aided Instruction
CAL	Computer Aided Learning
CAT	Computer Assisted Teaching
CBL	Computer Based Learning
CBT	Computer Based Training
CCP	Computer for computing and processing
CGI	Common Gateway Interface
CFR	Computer For Research
CSS	Cascading Style Sheets
DHTML	Dynamic HTML
ELC	Electronic Courseware Learning
ET	Educational Technology
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
IE	Microsoft Internet Explorer
ICT	Information Communication Technology
IT	Information Technology
ITS	Intelligent Tutoring System
ITT	Intelligent Tutoring Tool
KBSM	Kurikulum Bersepadu Sekolah Menengah
KHB	Kemahiran Hidup Bersepadu

ACRONYM   DESCRIPTION

KHPP	Kemahiran Hidup Program Peralihan
MCE	Malaysian Certificate of Examination
MSC	Multimedia Super Corridor
PMR	Penilaian Menengah Rendah
SDLC	System Development Life Cycle
SPM	Sijil Pelajaran Malaysia
SPMV	Sijil Pelajaran Malaysia Vokasional
TILT	Teaching & Learning Technology Initiative
TLTP	Teaching & Learning Technology Programmed
VI	Visual Interdev
WWW	World Wide Web
VMCE	Vocational Malaysian Certificate of Examination

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CHAPTER I

INTRODUCTION

1.1 Overview

As the saying goes, learning is a continuous experience through out a person's life. The information age has sparked a new trend in education where computer based learning gets more and more important in education. Now days, educators are implementing computer technology with basic theories in education in order to achieve active learning environment for the students. Basically, a student can really test his or her knowledge on a certain subject, which is learned in school.

Computer-based training (CBT) and computer aided instruction (CAI) were the first such systems deployed as an attempt to teach using computers. In these kinds of systems, the instruction was not individualized to the learner's needs. Instead, the decisions were made directly on how much percentage does the student can answer some question throughout the learning process. The learner's abilities were not taken into account.

While both CBT and CAI may be somewhat effective in helping learners, they do not provide the same kind of individualized attention that a student would receive from a human tutor. For a computer based educational system to provide such attention, it must reason about the domain and the learner. A survey of several Stanford

instructors introducing online technology into their courses reveals they believe both teaching and learning have improved as a result. They report that students are more consistently prepared and more willing to enter into class discussion. With the presentation of background information taken care of through electronic communication, faculty are able to present more complex material and spend more time answering substantive questions during class. Faculty using the case method, for example, is able to summarize student feedback and responses to questions on overheads prepared for the class, thus beginning discussion of cases from a more advanced point than they had been able to in the past. (Technology and Teaching, 96)

Material   Teaching

Teacher   Computer   Student
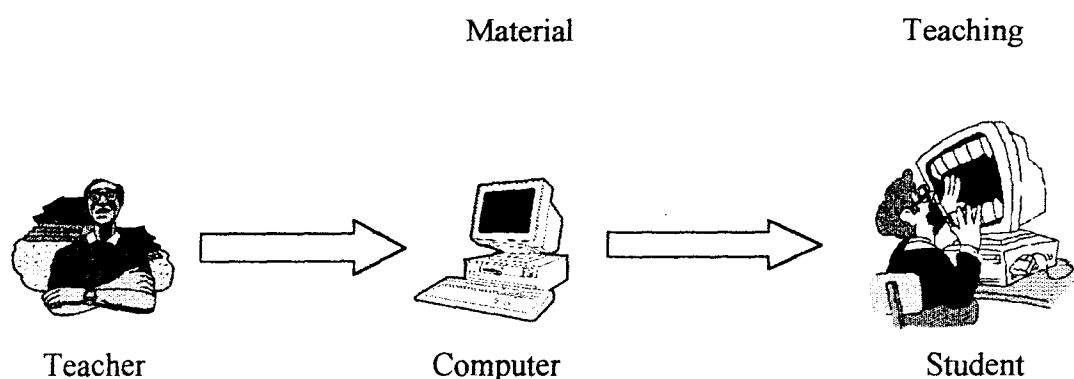
Figure 1.1: Computer Based Learning

Many factors can influence the design of a learning experience. To help analyze the particular factors that will influence web-based classroom, which are:

i.   **Outside factors** – the changing era in the educational institution, local region and country where the learning experiences have become different approaches in order to gain a better knowledge through different ways.

ii.   **The course** – The academic program in which the students enroll, including the content, field of knowledge, mode of delivery and other academic characteristics

iii.   **Students** – Their age, background, culture, language and preferred style of learning all influence the design of classroom.

iv.   **Educators** – The people, who are responsible for creating and teaching subjects, which can also influence the classroom environment through their background, age, preferred teaching style, experience and personality.

v.   **Technical factors** – The facilities, which are getting more advanced in technology such as computers, software, networks, medium, technical, support and training required implementing the web-based classroom.

Basically, there are many different names that can be name for this particular computer based learning. Overall, the terms such as Computer Aided Instruction (CAI), Computer Based Instruction (CBI), Computer Aided Learning (CAL) or Computer Based Learning (CBL) have one main objective and that is implementation of computer through teaching and learning process. Furthermore, with the Information Communication Technology (ICT) era has started, educational system has been looking forward toward teaching education through distance learning, web- based classroom, tutoring systems where basically, these processes are implementing online education.

This has prompted research in the field of tutoring systems. For example, there is one factor that had been mentioned in tutoring system and that is the power of multiplicity in learning and teaching. Multiplicity decreases efficiency in the short run, but it encourages the development of powerful new learning and teaching environments in the longer term.

If multiplicity is embedded in a systematic evaluation framework, then students can learn from comparisons of what worked and what did not. The comparisons of multiple ways of learning and teaching encourage the examination of the instructional goals and resources available and suggest new ways to choose the technology, activities, format, contexts, and evaluation and assessment tools that are most appropriate for these goals and resources. These factors allow to determine both formatively and summative the effects these educational innovations have on learning and teaching. As for examples: assessment techniques, contexts for learning, course development, educational technology classes, evaluation, instructional formats, instructional media, multiplicity, online instruction, student learning activities.

Considerable experimentation is going on with the use of the Web or online medium as an alternative to the classroom (face-to-face) medium for postsecondary learning. In addition to providing the capability to present text and graphics, the online medium enables individuals to interact at a distance with others via conferencing, where individuals send text messages to a central site at which they can be read by others, and chat, where individuals join a site at a given time and send text messages that can be immediately read and responded to by others.

Controversy continues as to the appropriateness of online medium as a basis for education. (Jaffee, 1998) Most studies suggest that it is possible to create an acceptable learning design in which most or all transactions occur via online media, as opposed to a classroom.

Tutoring system offers considerable flexibility in presentation of material and a better guide accordingly to the student needs. These systems can allow students to have a better understanding toward a subject that they felt is harder to comprehend during learning process in classroom. This system could be a guide as representing pedagogical decisions about how to teach as well as information about the learner. This allows for greater versatility by altering the system's interactions with the student.

The main method of the system is to provide a better understanding of a subject and testing the student's knowledge. It should be used in combination with traditional learning methods like textbooks or classes and help to extend knowledge by revision and application to new knowledge. Furthermore, there is a hypermedia component to help presenting the case data as close to reality as possible.

1.2   Background Study

Teaching process involves a detailed plan in order to achieve lesson objectives that has been stated in the teaching plan. As for achieving the set of objectives, teaching process should be carried out accordingly to teaching plans, implementation and assessment. Main components in planning lessons are topics and its contents, the natural ability to teach and lesson objectives. On the other hand, components of delivering lessons include strategies of teaching and learning, time, contents of lesson, resources, and managing classrooms. On the other hand, components of assessment include aspect of achievement, lesson objectives, analysis and feedback, which includes any innovation in teaching process. In the living skills curriculum, there are many problems arises such as having difficulties to finish the syllabus and having the students to understand. Also, the time that students spent their time in the classroom is not enough to comprehend the topic discussion that is being taught by the teacher during class. Producing a similar computer aided instruction that can be retrieve online in the Internet can solve this problem. Furthermore, there are many different approaches with traditional teaching and educational technology. The differences are shown between Figure 1.1 and Figure 1.2.

```
┌─────────────────────────┐
│    Lesson Objectives     │◄──────────────────────────────┐
└─────────────────────────┘                                │
            │                                              │
            ▼                                              │
┌─────────────────────────┐                                │
│    Present Knowledge     │◄──────────────────────┐       │
└─────────────────────────┘                        │       │
            │                          ┌────────────────────┐
            ▼                          │     FEEDBACK       │
┌─────────────────────────┐           └────────────────────┘
│    Teaching Methods      │◄──────────────────────┘       │
└─────────────────────────┘                                │
            │                                              │
            ▼                                              │
┌─────────────────────────┐                                │
│      Assessment          │───────────────────────────────►
└─────────────────────────┘
```
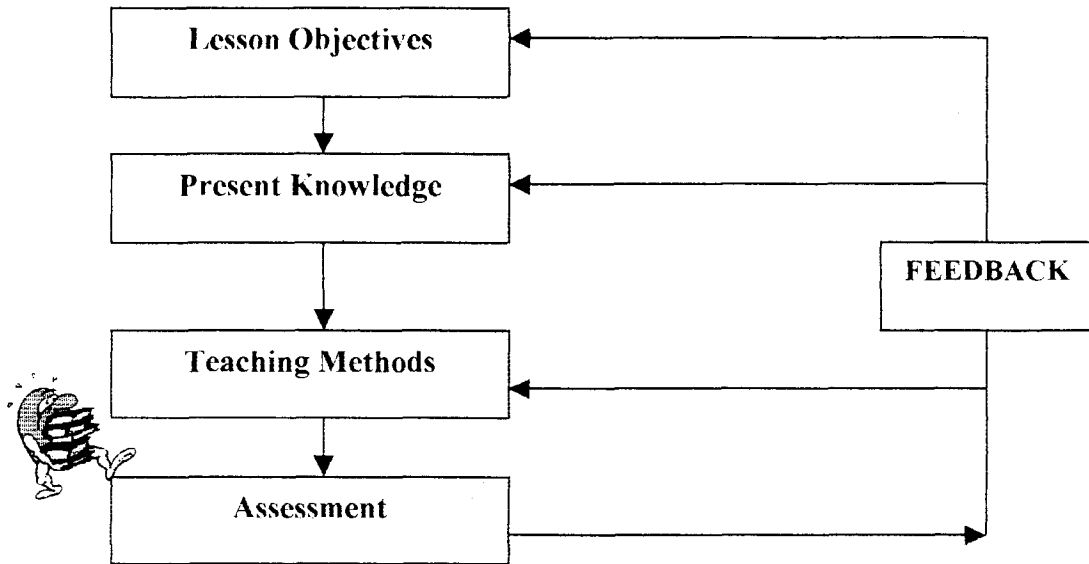
Figure 1.2: Traditional Method of Teaching

INPUT	THE SYSTEM	OUTPUT
Target Students; Human resources; Technical resources; Financial resources; Information	**Educational or Learning Process (black box)**	Students whose performance has been improved in specific areas.
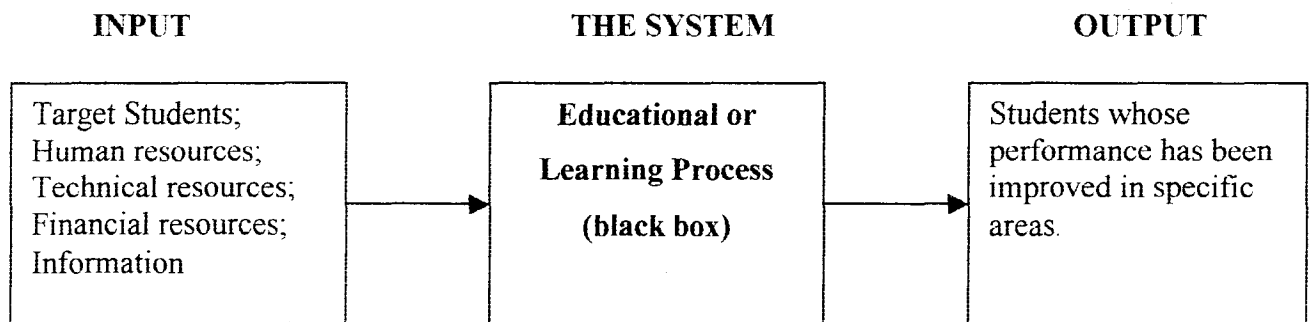
Figure 1.3: The 'systems'' model of educational or learning process

As the usage of information technology is being widely use in all different kind of schools and having to achieve an excellent percentage of achievements in the education level is very important to see how well the students can be developed to suit the needs and aspirations of the country. The Ministry of Education will determine the selection of students and academic streaming to the upper secondary level. At the end

of the two-year period in upper secondary education, the students will be assessed by a compulsory national examination, *Sijil Pelajaran Malaysia* / Malaysian Certificate of Examination (*SPM* / MCE) *or Sijil Pelajaran Malaysia Vokasional* Vocational Malaysian Certificate of Examination (*SPMV* / VMCE), as in the case of the vocational streaming. The *SPM* / MCE / *SPMV* / VMCE certificates are equivalent to O-level Cambridge University Examinations.
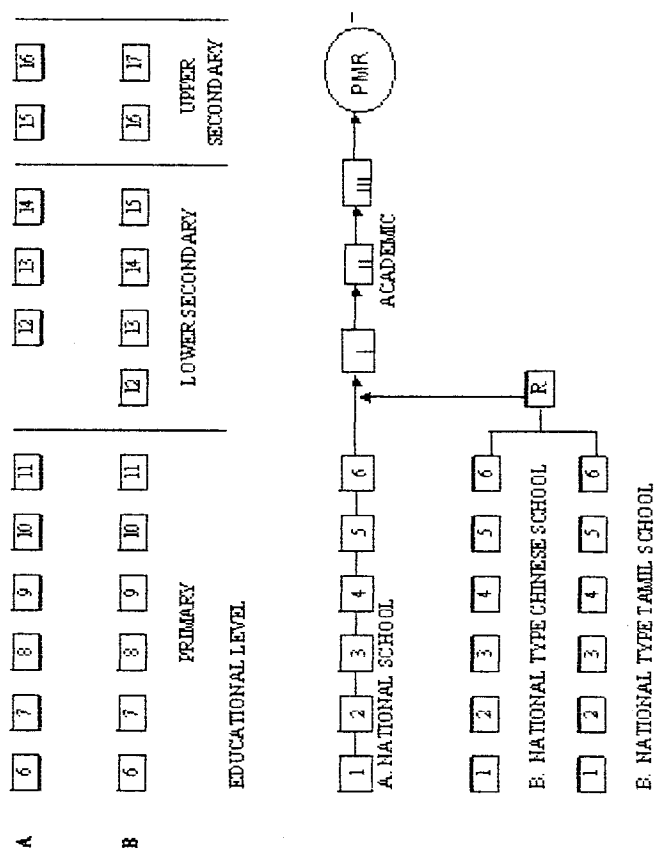

Figure 1.4: The Structure of the Malaysian Educational System

Also there would be development of Smart Schools for the educational system. Also, there are new curriculums for secondary schools where implementation of computer based learning and web-based classroom is being done. On the other hand, a few researches have been made in order to verify on how effective and efficient a

tutorial system would be. According to W. Wide (Wide, 1994) points out the advantages of flexible learning as follows: "In its broadest sense, flexible learning ... enables the learning to take place at the time, place and pace which suits the learner's own circumstances and needs". Computer based learning (CBL) is the flexible way it can be used and learning with computers can also helps students to be more free in their actions so that they do not feel the pressure to do well. They would feel free to ask stupid questions and try stupid actions, from which they can learn in a trial & error manner.

Although, tutorial systems are used in order to give motivations and have been shown to be highly effective at increasing students' performance (Joseph Beck, 1996), there are still problems that has arise from learning with the tutorial system.

The few main problems are as below:

i. **Topic Selection**

The tutor must decide the content of the material to be presented to the student. This involves decisions about the topic, the problem, and the feedback. Also, the tutor has to consider whether the topic is new or already learned by the student.

ii. **Problem generation**

Once the topic has been selected, a problem must be generated for the student to solve. The domain determines the grain size of the problem.

iii. **Feedback**

Most tutors work smoothly as long as students get everything right. Problems arise when the student has difficulties and needs help from the tutor. In these situations, the tutor must determine the kind of feedback to provide. The issue of how much help to

provide the student is also a very complex issue as too little feedback can lead to frustration or on the other hand, too much feedback can interfere with learning.

iii.   Visualization

Most students are having a hard time to visualize the concepts in theories relating to any subjects they learned in school that makes it hard to learn how an actual engine for example, might work or the process of a combustion in an engine. (Mohd Yusof Arshad, 2000)

As for now, the system retrieve information on student's achievement in the quizzes, it must determine the content of the advice. It means that the feedback should contain enough information so that the student can proceed to the next step in learning and solving any problems that is given. Furthermore, the advice given to the learner should be appropriate for his or her ability level.

1.3   Problem Statement

The problem statement is on how to produce a tutorial system for engine in Living Skills subject.

1.4   Purpose of the study

The purpose of the study is to develop a tutoring system for engine in Living Skills subject in Bahasa Malaysia.

1.5   Objectives of the Study

Objectives of the project are:

a. Having an explanation of engine parts and functions of four-cycle engine.

b. To access database by updating, inserting student's personal data and feedback.

1.6   Scope of the study

Scope of the study has been stated as below:

a. To understand the concept of engines by having graphic images.

b. Identify each process inside an engine.

c. Identify the parts and function of an engine.

1.7   Concept Definition

In this thesis, there are a few concept and key words that have been used. A few of the concept and key words are:

1.7.1   Active Server Pages (ASP)

Active Server Pages (ASP) is a variation of standard HTML pages that are processed on the web server before being delivered to the web browser client. Asps

contain standard HTML tags and scripts (VBScript) statements as well as references to special objects that reside on the server. When the web server processes the ASP, it literally produces an HTML page on the fly. This HTML page is transmitted to the web browser client, where the client –side scripts are processed along with the HTML page prior to displaying page. This means that the client never sees the server scripts, because they were executed on the server.

1.7.2 Client-Server

Client-server is a concept where a network of computer which at least two or more computers that have functions as a client and a server in a computer network. A computer, which acts a client, would retrieve information or data from a computer, which acts as a server. The server would process the data or information that has been sent and sending data that has been processed back to the client. In this particular structure, a part of the data would be processed by the client and minimize the amount of data that has been sent through the network.

1.7.3 Computer Based Learning (CBL)

Computer based learning is defined as the implementation of computer to teach students with the aid of certain learning software in a certain topics.

1.7.4 Tutoring System

Implementing computer based learning on web based.

1.7.5 Internet

Internet is a global network where the entire computer network would be connected with one another and allows free access to the information that contains a vast of subject. In this case, it allows user to send messages and retrieve a variety of product and services.

1.7.6 Conclusion

In designing the software course in this case, tutoring system, the main problem arises where implementing the conventional computer based learning. The main issue is upgrading the contents of a subject accordingly to the changing syllabus in school.

1.8 Project Advantages

The project is meant to provide a better knowledge of function of four-cycle engine for the process of learning about a subject in engine. The advantages are:

1.8.1 Tutor guide in learning subject engine

To provide guide notes for students so they can understand functions in four-cycle engine. Also, they know how each process is being done.

1.8.2 Direct access via Internet

This particular web-based tutor can be accessed from any location that has stable Internet access (schools, home, libraries, etc.) User can also accessed the web-based tutor anytime that is convenience.

database.

10. To include only some of the table's columns in the recordset, click Selected and choose the desired columns by Control-clicking (Windows) or Command-clicking (Macintosh) them in the list.

11. To include only some of the table's records, complete the Filter section as follows:

- From the first pop-up menu, select a column in the database table to compare against a test value you define.

- From the second pop-up menu, select a conditional expression to compare the selected value in each record against the test value.

- From the third pop-up menu, select Entered Value.

- In the fourth box, enter the test value.

- If the specified value in a record meets your filtering condition, the record will be included in the recordset.

12. If the records are to be sorted, select a column to sort by, then specify whether the records should be sorted in ascending order (1, 2, 3... or A, B, C...) or descending order.

13. Or, click Test to connect to the database and create an instance of the recordset.

14. A table appears displaying the data in user recordset. Each row contains a record and each column represents a field in that record. Click OK to close the recordset.

15. Click OK.