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E – Learning development
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By

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ABSTRACT

One of the most rapidly changing and exciting areas of education in the world today is the delivery of assessment and case study using Interactive Multimedia (IMM) technology. This new technology is a solution in overcoming the weaknesses and limitations of traditional method. Combination of multimedia element such as text, graphic, animation as well as simulation can significantly improve the quality of learning environment. Assessment and case studies may be presented more vividly and realistically in interactive way. These project concerns on developing the prototype of designing the IMM Delay Time Modelling assessment and case studies. The main aim is to provide the blueprint as a guide for developers in developing E-Learning modules. In order to achieve the aimed stated, the learning environment and architecture of IMM assessment and case studies need to be defined first prior from designing the storyboards. Microsoft Power Point 2000 had been used in the development of the storyboards. The assessment and case studies in this project are based on maintenance tutorial sheet for the Msc Operational Research and Applied statistics and journal papers.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The convergence of Information, Communication, and Technology (ICT) has brought a new meaning to education. Most universities and other education and training providers are increasingly using flexible delivery technology. Moreover, many businesses are expected to use computer technology to support and manage the changes in their work. The rise of E-learning in recent years has brought online assessment into sharp focus. Subsequently, this has brought a great deal of attention to the use of interactive multimedia (IMM) technologies in delivering the online assessment to students.

For over 30 years now, Case-Based Learning has been used in many learning disciplines, particularly those operating in business working environments. The main aim of this method is to provide students with the experience to cope with complex problems in a real life situation. However, the traditional way of presenting case studies in paper-based format has limited degrees of application. Case studies often contain large number of data, therefore a linear presentation of case studies in paper formats provides a heavy load for the learner. As a result of that, a new method of delivery for case studies needs to be explored and implemented in order to overcome these deficits.

The use of IMM technology that combines non-linear linking capabilities of hypertext with manipulation of various audio, video, graphics and textual media can significantly improve the quality of case studies presentations. This technology provides an ideal environment to explore the depth and richness of the case studies without overwhelming the learners.

The development of IMM technology poses a challenge of a creative and technical nature which involves designing a web-based learning environment. It is important for the designer to be aware of the learners' needs when preparing web-materials such as adding the hypertext , multimedia and deciding on the content. It is also important for the designer to develop user-friendly interfaces in order to make the learning process more interesting and efficient. The

developer of the web-based learning environment will be guided by the blueprints of the design.

1.2 Problem Statement

Currently Maintenance Modelling has been used by different groups of users for different purposes and application scenarios. However, the traditional way of delivering the Maintenance Modelling assessment and case studies using paper-based method poses difficulties and limitations to users in doing analysis as well as decision-making. Furthermore, traditional business cases are static effort to describe an extremely dynamic environment. Although there are some interactive maintenance modelling web-based learning systems, they are focused more towards the content rather than its assessment or case studies. Therefore, IMM technology can be applied to transform both assessment and case studies of Maintenance Modelling from the use of paper based format to the application of interactive multimedia in web-based environment in order to make learning more efficient, effective and interesting. However, design of IMM in web-based environment is challenging since it requires thoughtful analysis and planning according to user needs in order to create motivational, interesting and productive web learning environment. This project provides solution of this problem by providing the design of IMM learning environment.

1.3 Project Objectives and Aims

General purposes of this project are defined in the project objectives, while the expected outcomes of the projects are specifically define in the project aims.

Objectives

i. Review the existing methods for assessment and case studies and discuss the weaknesses of these methods within the current learning environment.
ii. Investigate the role of IMM technology in presenting assessment and case studies.
iii. Explore the theory on Delay Time Modelling and analyse the assessment and related case studies.
iv. Develop the simulation system for one of the case studies being considered.

v. Investigate the environment of existing Delay Time Modelling System.
vi. Identify the factors and architecture in designing IMM learning environment.
vii. Create the storyboards for the IMM assessment and case studies that have been analysed which will include simulation and the Delay Time Modelling System.

Aims

i. Provide a blueprint of IMM Delay Time Modelling assessment and case studies as a guide for developers to develop an E-Learning module.
ii. Provide the designer with the knowledge and skills to design IMM learning system.
iii. Deliver the IMM assessment and case studies online to users, where the Delay Time Modelling module is used as a case study.
iv. Present assessment and case studies in interesting, interactive and effective way using user-friendly interface.
v. Provide a new method in delivering learning using simulation.

1.4 Dissertation Structure

This dissertation contains of six chapters. The deliverables of some chapters are used in the implementation of other chapters. Content of each chapter is as follows:

- Chapter 1 describe a general outline of the dissertation by giving a brief introduction and problem of the project. It is then followed by the statement of the objectives and aims of the project.
- Chapter 2 presents the literature review and background of the project such as overview of E-learning and weaknesses of the current methods in case-based learning and thus investigate the role of Interactive Multimedia (IMM) assessment and case studies.
- Chapter 3 elaborates the theory of Delay Time Modelling. This provides basic information for designing Delay Time modelling assessment and case studies.
- Chapter 4 specifies the methodology that is used in designing the IMM case studies. It consists of the IMM environment, architecture and design.

- Chapter 5 indicates the environment and architecture of the IMM assessment as well as case studies and then illustrates the their blueprints.
- Chapter 6 concludes the activities and outcomes of the project and presents the recommendations on potential future enhancement of the research project.

Figure 1 shows these chapters' flow and interrelationship.

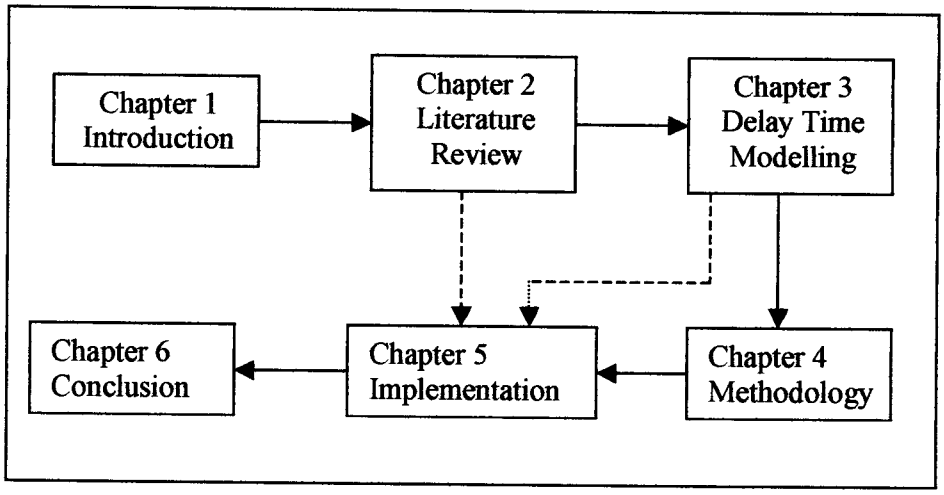

Figure1: Chapter Interrelationship Diagram

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter acts as a background research for the project. First section is an overview of E-learning which is focused on assessment techniques in E-learning. Section 2.3 investigates case based-learning, where the weakness of paper based cases and the role of Interactive multimedia (IMM) cases studies will be discussed . Finally, two IMM examples are illustrate in order to get an idea on how to implement the IMM case studies in e-learning.

2.2 Overview of E-Learning

The development of Internet Technology has opened up new methods for delivery in education. The concept of electronic learning (e-learning) has been used recently by higher learning institutions such as colleges and universities. E-learning is learning through the use of information and communication technologies (ICT) such as PCs, the internet and digital interactive television. E-learning provides many benefits to education. E-learning helps college and university students to reach their goals especially for those who are restricted by time and place . With E-learning, learners can access learning materials such as lecture notes, tutorials, assignments, and quizzes anytime , any place and they will never lost the course syllabus. Moreover, based on their interest and curiosity, students are able to pursue topics in non-linear ways through the hypertext nature of Web-based materials (A.K.Aggarwal and Bento , 2002). E -learning also benefits to faculty and staff. Faculty may support a regular face- to- face lecture when the classroom is equipped with live Web access and projection capabilities by taking students into virtual field trips to publics web sites. Lecturers can use the E-learning materials such as lecture notes or presentations, syllabi, tutorial, assignments or exercise to support presentations and solve problems during lecture. E-learning is also the online revolution that provides lecturers and members with an extremely valuable capability to update content immediately and continuously. Application of E-learning in business sector

like corporate organisations, government agencies and training centers enable increase in productivity, profitability and development of knowledgeable and skilled professionals.

Various technologies are involved in the design, delivery and managing instructions using computers of E-learning. Basically, this concept is a particular method of developing technology for instructions. It not only involves the process of designing, delivery of instructions in different platform and managing instructions, but also the technologies of managing training, authoring and managing contents. (K.Uma and Ghosh, ?)
The quality learning experience cannot be archived just with Web-based syllabus or compilation of lecture notes .The design of learning experience with multiple methods of assessment and evaluation has to be a primary concern to build effective and quality E-learning . The comprehensive assessment and evaluation model for the e-learning environment includes: pre-assessment, formative assessment, summative assessment and program evaluation. (M.Kevin, ?) .Summative assessment is the most commonly used form of assessment in learning. This type of assessment is used to evaluate the students' knowledge and skills gained through their learning experiences. There are numerous advantages as well as challenges of implementing comprehensive assessment and evaluation of online learning courses. Traditional multiple-choice tests cannot tap into the critical ability to frame and resolve ill-defined problems. (H.Stefan and E.C.Gunnar , 1999) . This traditional method make students struggle to make the connections between theory and practice within their academic assignment. More worrying, there is evidence that they continue to struggle to apply useful knowledge in their profession practice after graduation. It is important in designing assessment questions for the online environment to create tool that is applied and meaningful to the overall learning process. Due to lack of direct contact with the instructor and the inherent problems surrounding test-taker authentication, the assessment needs to offer the opportunity to fully demonstrate an understanding of the core course concepts. (M.Kevin, ?). The knowledge workers of the 21st Century workplace are rarely confronted with clearly delineate choices from which they must select; instead they must generate original solutions to unique problems. (H.Stefan and E.C.Gunnar, 1999).

Many types of methods are available for accomplishing the goal of online assessment. M.Kevin(?) stated that the basic methods of evaluation can be added to any online course by incorporating pop-up box answer to stated questions. Figure 2 shows an example of this method of assessment.

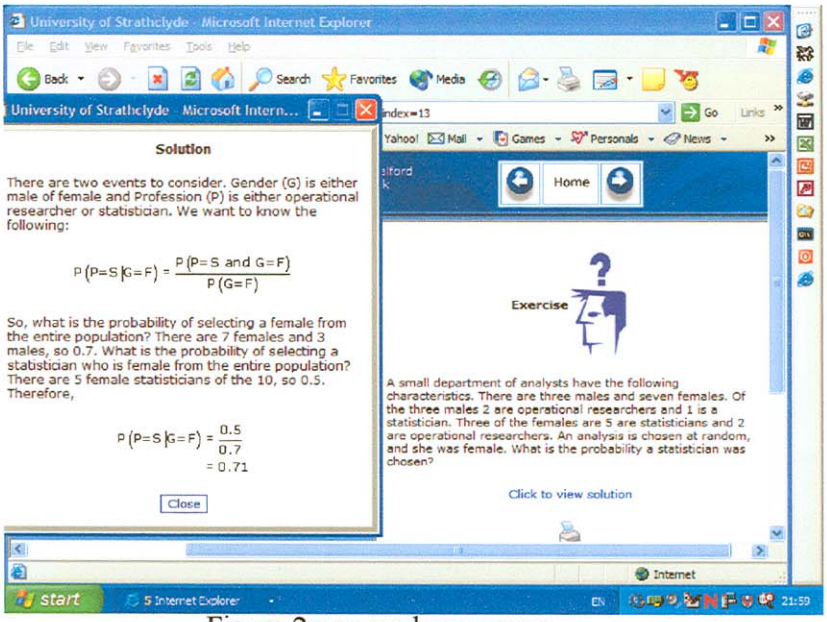

Figure 2:pop-up box answer

One of the most important recent innovations in economics and business pedagogy is the increased use of interactive assessment such as simulations-based, problem-based or case-based assessment. Learners are engaged in a series of increasingly complex problems, complete with detailed guidance and feedback. Figure 3 shows an example of interactive assessment.

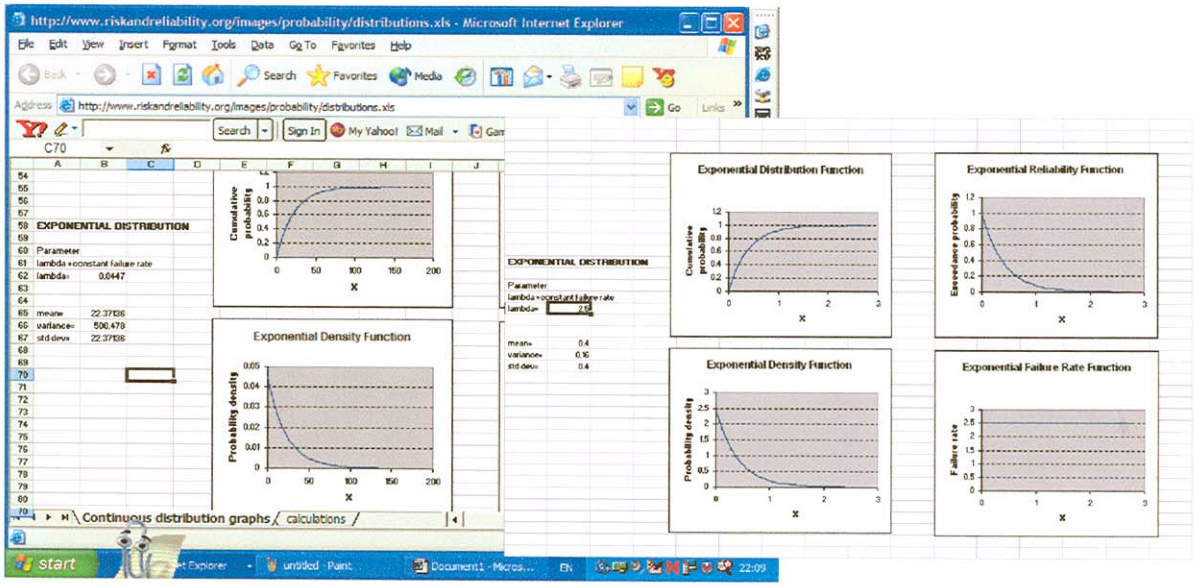

Figure 3: Interactive assessment example

Innovations in technology such as multimedia, hypertext and the Internet can significantly improve the quality of assessment. Learners can participate in a wide variety of activities as they learn, supported by text, audio, video and animations.

The merge of various types of media with computers has presented the field of education with a hybrid technology called Interactive Multimedia (IMM). Interactive Multimedia can be defined as "the integration of text, audio, graphics, still image and moving pictures into a single, computer – controlled, multimedia product" (McCarthy,1989,p.26). Some equate hypermedia with interactive multimedia. The use of hypertext and hypermedia permits links among pieces of information such as text, sound and graphics, that permit the users to "explore ideas and pursue thought in a free fashion "(Bieber and Kimbrough,1992).The use of interactive and non-linear assessment allows learner to navigate and analysis the documents in the order they prefer rather than in the pre-described linear fashion. Therefore, E-learning provides limitless opportunities for innovation, creating fun and engaging learning experience.

2.3 Case-based learning

Case studies have been increasingly used in education. While law and medical schools have been using the technique for an extended period, recently the technique is being applied in a variety of instructional situations.(Yin,R. ,1994) .Schools of business have been most aggressive in implementation of case based learning or active learning (Boisjoly & DeMichiell , 1994).Harvard Business School has become a pioneer in this area. In 1921,Wallace Donham, Dean of the Harvard Business School advised his teachers to use case studies in addition to lectures in students' discussion activities (Erskine & Lenders , 1989, p.13). Today, Case-Based Learning (CBL) becomes the most popular teaching method in business schools around the world. CBL is an approach to teaching and learning developed to enhance the student's ability to function in the professional environment. Learners are required to be actively engaged in problem solving in a way that develops higher level cognitive process such as investigation and analysis. In the process of CBL, learners obtain substantive knowledge, which will develop their analytical, collaborative and critical thinking skills. CBL provides learners to see theory in practice. Therefore, CBL makes subject matter more relevant and learners are more engaged, interested and get involved in the traditional

class setting. However, the question arises if the teaching source still using the paper-based cases.

2.3.1 Paper – based - cases

Case studies are complex because they involve multiple sources of data, may include multiple cases within a study, and produce large amount of data for analysis(Yin.R,1994) .Researchers from many disciplines use the case study method for many purposes such as to produce new theory, to dispute or challenge theory, to explain a situation or to provide a basis to apply solutions to situations. A non-interactive presentation of paper-based case studies often results in further simplification and loss of realism. As a result learners as well as the instructors are faced with difficulties. The learners are faced with heavy reading loads and the prospects of becoming overwhelmed with mass of data involved in a long paper-based case study. Paper-based case studies as well as narrative business case studies do not take advantage of new method of information technology. (S.Jeen , 2000)

2.3.2 Narrative Business Cases

In the rapid evolving areas of business, it is difficult to obtain timely case studies. Traditional business cases are static effort to describe an extremely dynamic environment. The problem is particularly acute in the electronic commerce field, which changes rapidly. Text based presentation and one-way communication in traditional business cases are impractical to be applied in an increasingly interactive, networked learning environment and for learners who live in a highly media rich world.

2.3.3 Interactive Multimedia Cases

No discussion of learning, or e - learning would be complete without considering the impact of multimedia.Case studies may be presented more vividly and realistically using the multimedia technology. IMM cases studies support learning processes better than paper-based cases. IMM provides an ideal environment for presenting the depth and richness of the case studies without overwhelming the learners. IMM has been called as a "hybrid technology". It's environment allows the use of multiple interlinked representations using different symbol system (text, graphic, sound, video, animations) and can communicate rich information in

ways not previously possible.(E.Peter,?) .This is important because symbols can illustrate certain information better than a thousand words .Furthermore , learners will find that visual information is easier to learn and remember and that information will stick in a learners' memory longer. Visualization and simulation supports the development of qualitative understanding.

The user-friendliness of IMM supports the diffusion of interactive cases among users who are not confident with technical approaches. For example, combining text, sound, graphics, animation and simulation to animate technical concepts helps students to understand the concepts better rather than by reading or listening. The goal of interactive case studies is not to lead or guide the learners towards a specific goal but to provide a context in which to explore the real world.(N.Urban,?)The manipulation of certain parameters creates a better understanding of the problems. This interaction combined with instantaneous feedback gives the students a better understanding of the problem. When the structure of linked elements through which the user can navigate is provided, interactive multimedia becomes hypermedia. Hypermedia technologies allow learners to take control and responsibility for their own learning through non-linear access to information, problem identification, access to information on demand, instructional scaffolds, and feedback on problem solutions. New ways of knowledge transfer using new technologies can reach new type of potential users and can be used on demand anywhere either in the office, in seminars or at home whenever people have time and motivation to learn. Furthermore, IMM can be used to solve real-time problems, which means that a person such as a manager, or a specialist who has to innovate a process or an organisation in a certain situation, can first try to find a case study that best fits his problem.

2.3.4 Type of case study

Presented next is some common types of case studies, based on their formats. The format of each case study is chosen depending on how it is used with learners.

i) **Extensive, detailed case study**

This type of case study is used frequently in business courses. It is usually centered on a particular decision.