IMPLEMENTATION OF AN ONLINE COLLABORATIVE LEARNING THROUGH GRID PORTAL TECHNOLOGY

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Specially dedicated to

My beloved mom and dad,
Zakaria Bin Arshad & Mashitoh Binti Ahmad

My beloved sisters,
Ida Zuraida & Ayni Syariza

My greatest Supervisor,
Dr. Dayang Hajah Tiawa Binti Awang Haji Hamid

Dedicated to all lecturers
and friends

Thank you for your support and encouragement
May Allah bless all of us…
Amin….

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بِسۡمِ ٱللَّهِ ٱلرَّحۡمَٰنِ ٱلرَّحِيمِ

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ABSTRACT

Individual work is significant in any learning course but, student should also learn the collaborative behavior. Students' involvements are required in group attempt. Group works in designing and authoring a courseware is not an easy task. The purpose of this study is to identify student's difficulties in completing their authoring activity or collaborative work in conventional environment. This study was conducted to design and develop an online collaborative tool through grid portal technology. UTM Grid Portal is developed for students of Faculty of Education to accomplish their courseware development project. Students engaged in collaborative learning might use blog as a medium to discuss with group members in order to gather information sharing ideas and distributing task. The evaluation process was conducted to obtain students engagement and involvement in collaborative environment activity. The study sample consisted of 36 undergraduate students enrolled in SPM 2332 (Authoring Language) course. Data was gathered using qualitative approach which was through blog discussion as a link in UTM Grid Portal. Result from the analysis shows that student's activity in group work can be divided into three main categories which are cooperative and collaborative, support as well as task distribution. Cooperative and collaborative in students activity involves sharing ideas, sharing information, sharing problem as well as opinion and suggestion. Besides that, students support other group members by giving motivation, updating progress and show respect to others.

ABSTRAK

Kerja individu adalah sangat penting dalam setiap program pembelajaran namun, pelajar juga harus mempelajari cara bekerjasama dalam kumpulan. Penglibatan pelajar adalah perlu dalam usaha berkumpulan. Kerja berkumpulan dalam merekabentuk dan memantau sesuatu perisian bukan tugas yang mudah. Tujuan kajian ini dijalankan adalah untuk mengenalpasti kesulitan pelajar dalam menyiapkan tugasan rekabentuk atau kerja berkumpulan secara tradisional. Selain itu, kajian ini dijalankan untuk merekabentuk dan membina suatu alat kerjasama atas talian menerusi teknologi grid portal. UTM Grid Portal dibina untuk pelajar Fakulti Pendidikan untuk menyiapkan tugasan membina perisian. Pelajar yang terlibat dalam kerja kumpulan mungkin menggunaan blog sebagai medium perbincangan bersama ahli kumpulan dalam mengumpul informasi, kongsi idea dan pembahagian tugas. Proses penilaian dijalankan untuk memperoleh penglibatan pelajar dalam aktiviti berkumpulan. Sampel kajian ini terdiri daripada 36 orang pelajar sarjana muda yang mendaftar dalam kursus SPM 2322 (Bahasa Gubahan). Data dikumpul menggunakan pendekatan kualitatif menerusi perbincangan di blog yang merupakan pautan dalam UTM Grid Portal. Hasil daripada analisis menunjukkan aktiviti pelajar dalam kumpulan boleh dibahagi kepada tiga kategori utama iaitu kerjasama, sokongan dan pembahagian tugas. Kerjasama dalam kumpulan merangkumi kongsi idea, kongsi informasi, kongsi masalah serta memberi pendapat. Selain itu, pelajar menyokong ahli kumpulan dengan member motivasi, melapor perkembangan dan menghormati antara satu sama lain.

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LIST OF ABBREVIATIONS

ICT	-	Information and Communication Technology
CBT	-	Computer Based Training
WBT	-	Web Based Training
UTM	-	Universiti Teknologi Malaysia
WBE	-	Web Based Education
CD-ROM	-	Compact Disk – Read Only Memory
CPU	-	Central Processing Unit
SGE	-	Sun Grid Engin
WSDL	-	Web Service Definition Language
SOA	-	Service Oriented Architecture
PVM	-	Parallel Virtual Machine
UGP	-	UTM Grid Portal
HPC	-	High Performance Computer
CICT	-	The Centre for Information and Communication Technology

CHAPTER 1

INTRODUCTION

1.1 Introduction

The rapid developments of Information and Communication Technology (ICT) give a very high impact in almost aspect to human life including the educational field. The rapid developments of multimedia interactive give impact to teaching and learning aspect whereas it gives facilities to the students to search for information and knowledge. Over the past few decades, Computer Based Training (CBT) solutions evolve from standalone to web-based package (Web Based Training – WBT) with rich multimedia element content. Today, most of the web-based solutions influence on various load-balancing techniques to increase their performance, availability and reliability.

Learning process can classified as synchronous and asynchronous. Asynchronous learning process means a process which interaction between instructors and students occurs discontinuously with time delay. Examples of asynchronous

learning are online discussion group and email. While synchronous learning process is a process where instructor lead real-time event in which all participants are logged on at the same time and communicate directly with each other. Interaction also may occur via video conferencing or audio. Most of conventional web-based education practices the synchronous learning process due to limited space of memory as well as slow performance.

Collaborative learning is one of the teaching method practices in the teaching and learning process. The collaborative learning can be in small or large group of people with different ability or level of intelligence. This teaching method allows students to give and share their idea among the group members. It also encourages pleasant interaction among the group members for a more comfortable learning situation.

A large body of research has shown that collaborative approaches to learning can be effective in producing achievement gains, promoting critical thinking and enhancing problem solving in both face-to-face learning contexts (Cobb,1988; King, 1989; Webb, 1989; Webb & Palincsar, 1996) and more recently in computer-supported learning environments (Weinberger, Fischer & Mandl, 2002).

The introduction of the internet into the educational arena has rapidly changed the way individuals learn and paved the way to widespread collaborative and cooperative learning that was not perceived possible until recent years (Dabbagh & Bannan-Ritland, 2005). Web and interactive multimedia form can also support the collaborative learning in order to create an attractive environment during the teaching and learning process.

Online collaborative tool and collaborative authoring environment will support online collaborative effort of students. Some of the activities involves in authoring environments are interactive educational multimedia example Authorware and HyperCard, multimedia formats in various form (bitmap graphic, vector graphic, etc.), e-learning content editors and many more. The grid portal technology enhance the authoring support web based collaborative group works by improving speed up in term of searching, supporting the huge memory, high quality of visualization and increasing the computational performance.

1.2 Background of Study

Individual work is significant in any learning course but, student should also learn the collaborative behavior. Students' involvements are required in group attempt. Stunkel (1998) identified an increasing use of teams and groups as one of the predominant trends in higher education. Teams have proven to be an excellent vehicle for accomplishing interactive, cooperative instruction (Lengnick-Hall & Sanders, 1997). Besides that, research has shown that students learn most effectively when working in groups, where they can verbalize their thoughts, challenge the ideas of others and collaborate to achieve group solutions to problems (Deutsch, 1962; Johnson & Johnson, 1989, 1994).

Group works in designing and authoring a courseware is not an easy task. One of the major problems in collaborative work is time constraint for the group members and unequal distribution of task among the group members. In order to overcome this problem, it is essential to provide the collaborative tools and collaborative authoring environment online. On the other hand, the conventional web-based education support

on only one server result in very slow operation of searching, uploading, visualizing output and file saving (Dayang, 2010).

Currently, the web-based education used in the Universiti Teknologi Malaysia (UTM) is e-learning through Moodle open-source. Unfortunately, the e-learning by Moodle has some limitation especially for synchronous learning activity where the traffic or database was overloaded (Marliah, 2007). Besides that, students only can interactively use the application to download the notes, discussion in the forum and send message to their peers. Students can also submit their assignment through uploading the files but only for small size of file because it cannot support the huge memory. In other words, e-learning is an asynchronous learning process which interaction between instructors or lecturers and students occurs intermittently with time delay.

Therefore, the design and authoring activities in group on-line requires efficient and powerful web server in parallel fashion, which will support collaborative efforts among students on-line. Grid portal technology with high performance computing platform in supporting Web Based Education (WBE) is very high speed in terms of searching, supporting the huge memory, high quality of visualization and increasing the computational performance. Therefore, grid portal technology with high performance can be a potential in enhancing the authoring support for courseware design.

1.3 Problem Statement

Students are encouraged to learn collaborative behavior besides individual work. This is because collaborative work could practice the students to give and share their ideas with other group members. These will lead to producing a better product as well as enhancement in their performance. It has been shown that by having collaborative learning with peers, they may come to externalize their knowledge, monitor each others' learning and jointly negotiate meaning. These activities may trigger significant individual cognitive processes that ultimately lead to individual knowledge construction (Webb & Palincsar, 1996).

Designing and authoring a courseware in a group work is not as easy as we think. Many problems could occur during the development of the courseware. As mention before, one of the major problems in collaborative work is unequal distribution of task among the group members. Some of the group member might give ideas and do the works while some of them might just sit back and wait for the other members to complete the work. On the other hand, the lecturer has difficulty to evaluate the work group based on the contribution of the group members. With the introduction of collaborative technologies, there are opportunities for collaborative to take place across barriers of time and space.

The conventional web-based education may not essential to be the collaborative tools and online collaborative authoring environment in future educational technology. This is because the conventional web-based education results slow operation of searching, uploading, visualizing output and file sharing. Therefore, a new strategy or alternative is needed to overcome as well as upgraded the conventional web-based education in order to perform high speed up in terms of searching, supporting huge memory, high quality of visualization and so on especially in courseware design.

1.4 Objective

The objectives are to:

1. Identify students' difficulties in completing their authoring activity or collaborative work in a conventional environment.
2. Design and develop an online collaborative tool through grid portal technology.
3. Identify the effectiveness of the grid portal in courseware development project.

1.5 Research Question

The research questions are:

1. What difficulties did the students encounter in completing authoring activity or collaborative work in a conventional environment?
2. How could online collaborative tool through grid portal technology help students overcome some problems in group work?

1.6 Scope of Project

The target group of the research would specially consist of undergraduate students of Faculty of Education in Universiti Teknologi Malaysia that take multimedia

subjects. Multimedia subject offered in Faculty of Education including graphic, animation and video digital which covers the video usage, audio, text animation as well as graphic digital. Moreover, some of the activities involves in authoring environments are interactive educational multimedia for example Authorware and HyperCard, multimedia formats in various form (bitmap graphic, vector graphic, etc.), e-learning content editors and many more. This portal will be put forward to a number of groups, which will consist of the undergraduate students attend course SPM2322 (Authoring Language).

1.7 Significance of Research

The purpose of the research is to develop an online collaborative tool through grid portal technology to overcome some problems in group work as well as allows the lecturer a new easier approach to monitor the students. The research is proposed after taking into consideration the present e-learning has some weakness need to be overcome or upgraded.

This particular research would be significant to the following parties, on the basis of the reasons stated by student, lecturers and Universiti Teknologi Malaysia.

1.7.1 Students

The development of the online collaborative tool through grid portal technology will create an interesting teaching and learning process by the students. It also will

overcome some problems such as time constraint as well as transportation because students could use this application at any time and anywhere. Students could make their task online and discuss problems occurs during completing the task or learning process with their peers in the forum. The successful application of authoring activities environment through grid technology provides enhancements in work group performance, helps to lower cost, and encourages innovation.

1.7.2 Lecturers

The online collaborative tool through grid portal technology will give benefit to the lecturers as well. The lecturers could monitor the progress of the task given to the students through online time by time without need to see face to face. Besides that, one of the advantages of virtual teams, from the assessment point of view is the ability to have an accurate record of the discussions that have occurred within the team (Ferris & Goddar, 2005). Therefore, this portal will help the lecturer evaluate the group work easier as the lecturer could see the contribution of each student. In addition, it also helps lecturers to facilitate and support work group students in their design and developing a courseware.

1.7.3 University

The grid portal technology will help the member universities build a network of facilitators to support e-learners such as forum with advanced Information and

Communication Technology (ICT), i.e., with the use of massive parallel processors of globally distributed and yet interconnected mini-supercomputers through global neural computer network.

1.8 Terminology

1.8.1 Implementation

Implementation is to put into effect (The Oxford Study Dictionary, 1994). In this study, we want to know the effect of this authoring environments tool which is the portal to the students in their collaborative learning.

1.8.2 Online

From the Oxford Dictionary, online means activity or service available on or performed using the Internet or other computer. In this study, the portal is available through online.

1.8.3 Collaborative Learning

Collaborative is produced by or involving two or more parties working together (The Oxford Study Dictionary, 1994). Collaborative learning is two or more students learning and working together for example in group work.

1.8.4 Grid Portal Technology

The term Grid is chosen as an analogy to a power Grid that provides consistent, pervasive, dependable, transparent access to electricity irrespective of its source. These technology opportunities have led to the possibility of using distributed computers as a single, unified computing resource, leading to what is popularly known as Grid computing. Grids enable the sharing, selection, and aggregation of a wide variety of resources including supercomputers, storage systems, data sources, and specialized devices that are geographically distributed and owned by different organizations for solving large-scale computational and data intensive problems in science, engineering, and commerce (Mark Baker *et. al*, 2002).

1.9 Conclusion

For the conclusion, the development of online collaborative tool through grid portal technology is right at the time since the need of this technology for teaching and

learning is increasing. This technology is one of the alternatives for interesting and effective in learning activities to the students accordance with the present development of technology. Besides that, the grid portal technology gives the lecturer facilities in facilitating and monitoring the group work activities by the students. Therefore, the development of the online collaborative tool through grid portal technology is hopefully will be used wisely and accomplish the objective.

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