

Implementation of an Online Collaborative Learning through Grid Portal Technology

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Abstract. Individual work is noteworthy 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 are not an easy task. The purpose of this study is to identify student's difficulties in completing their authoring activities or collaborative works in conventional environments. 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 tasks. The evaluation process was carried out 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 discussions as a link in UTM Grid Portal. Results from the analysis show that students' activity in group work can be divided into three main categories which are cooperative, collaborative, and support as well as task distribution. Cooperative and collaborative in students' activity involve sharing ideas, information, and problems as well as opinions and suggestions. Besides, students support other group members by giving motivations, updating progresses and showing respect to others.

Keywords: Grid portal, online courseware development, group work, collaborative learning.

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.

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-

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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.

1.1. Background of the 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). The conventional web-based education supports on only one server result in very slow operation of searching, uploading, visualizing output and file saving (Dayang, 2010).

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.

1.2. 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 objectives are to, identify students' difficulties in completing their authoring activity or collaborative work in a conventional environment, to design and develop an online collaborative tool through grid portal technology and to identify the effectiveness of the grid portal in courseware development project.

1.3. Research Framework

In this paper, we provide a sketch of the research framework which explained our approach to this study. It includes the model used in the design of teaching and learning to assist developers in producing quality learning materials. There are several phases involved in the development process based on the selected instructional design model. The discussions will also cover on the population, study samples and research instruments used and data analysis.

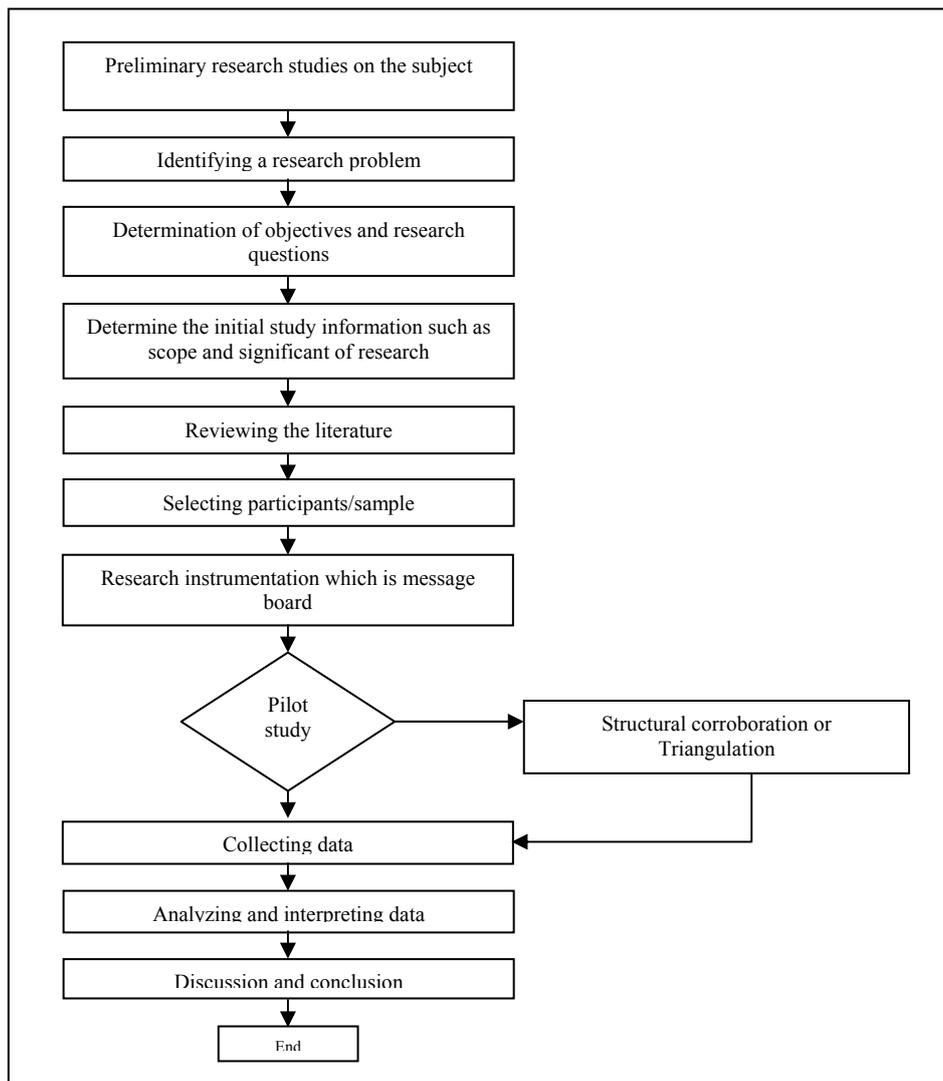


Figure 1: Flowchart of Research Framework

2. Research Design

Overall, the design of this research was in qualitative form. The data were collected by email interview and discussion through blog.

2.1. Research Population and Sampling

In this research, the researcher uses the purposive sample to meet the requirements of the research (Mohd Najib, 2003). Purposive sampling is the process of selecting the sample that is believed to be representative of a given population. The advantage of using purposive sampling is the sample selection is based on the researcher's knowledge and experience of the group to be sampled using clear criteria to guide the process (Gay, 2009). Therefore, the population which is also the sample of this research consists of undergraduate students who enrolled SPM2322 (Authoring Language) course in semester I session 20102011. The number of students enrolled this course is 36 students. The SPM2322 (Authoring Language) course allow students to learn an overview of basic concept of authoring language, authoring process and types of authoring language for a standalone application development. It will also give opportunities for students to learn and to build their skills in developing educational courseware or digital learning objects by using current authoring language software. This subject will also emphasize on other aspects such as basic programming concept in Authoring Language, packaging and distributing multimedia files for standalone applications.

2.2. Email Interview

Personal e-mail interview was the main instrument used in conducting the needs analysis. The aim of conducting e-mail interview was to draw out important clues from the participant that can be used in explaining characteristic and their experience working in team. This can be extracted by getting the target participant to talk through their own words of how they perceive a particular idea or issue. E-mail interviews are another relatively new approach to interviewing research participants.

Below are the three questions was posted to target participant intend to find out characteristic, their experience working in team and their personal problems in conventional authoring activities environment.

- What are your thoughts about group work in this course?
- Do you “hate” group work?
- List down your personal problems in designing the graphic assignment and authoring project given.

2.3. Blogs

The method in this forum is open-ended interview. The researcher guides the discussion by introducing the topics or leading questions from the discussion outline and posting follow-up questions. Respondents are free to express their opinion in the forum based on the leading question given by the researcher. Some of elements will be discussing by the respondents are on task distribution, problem occur during developing courseware, support to other group members and so on.

The duration of the discussions for data collection can be designed as long as needed to accomplish the research objectives. However, 3 days to 2 weeks are the most common lengths. On the other hand, for this research, the duration of data collection is a bit longer, 1 semester of study because the researcher would like to study the data in depth.

A blog is created to evaluate the effectiveness of the portal. This blog is a link from the UTM Grid Portal for the users to give feedback and make discussion among the group members. The blog also can be access directly through <http://utmgrid.blogspot.com>. The blog is created using Blogger, a free website from the internet.

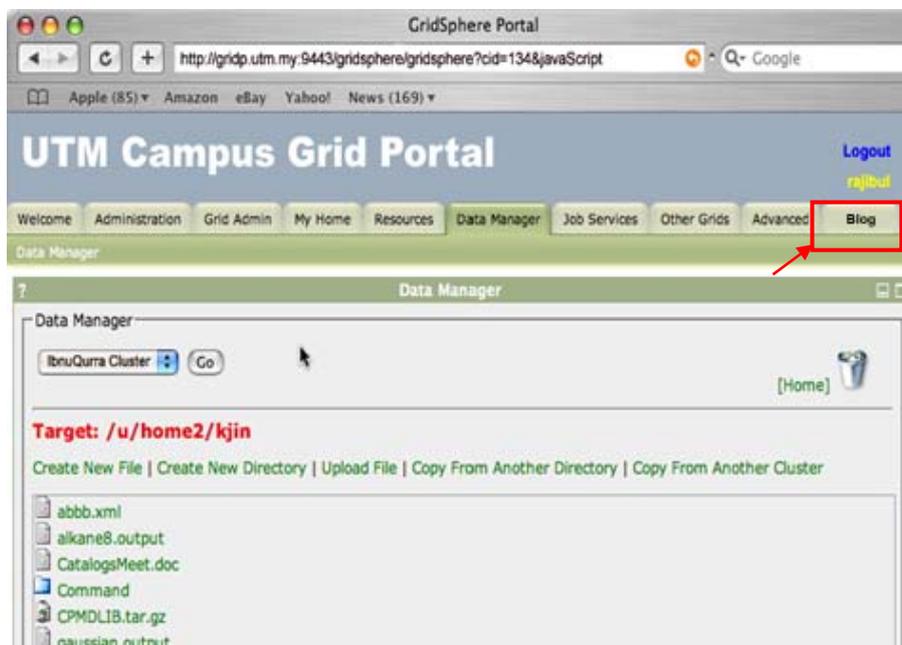


Figure 2: Link to Blog from UTM Grid Portal

2.4. Pilot Study

In this study, pilot study was done to a group of 37 students who enroll in SPM4332 CD-ROM Based Multimedia Development course. First, they have to give their email address so that they will be invited by the researcher to be an author to the blog. The blog for pilot study could be access through <http://spm4332.blogspot.com>. Figure 2 below shows an example of pilot study blog interface.

However, this blog is not accessible by the students after a period of time. Based on the feedback through email, they do not know how to access this blog. Therefore, to overcome this problem the researcher posts an entry to guide the students how to accept the invitation to become an author of this blog.

As a result, some students managed to accept the invitation even though majority still do not give any respond. There are also some students did not managed to accept the invitation although alternative ways to access the blog were given. According to Wynne (2010), adults learn at various rates and in different ways according to their intellectual ability, educational level, personality and cognitive learning styles.

From the pilot study, some weaknesses and deficiencies were identified and steps to overcome these were taken such as posted some guides in the blog. This proved that pilot study is very essential as the blog could be improved before implementing to the real experiment.

2.5. Dependability

This research used the within-method triangulation which is the subtype to methodological triangulation. The within-method triangulation involves the use of varieties of the same method to investigate a research issue (Denzin, 1989as cited in Flick, 2009). A combination of approaches which are entry posting, comment and chat box involved in the blog of this research.

2.6. Credibility

To measure the credibility of this research, within-method of methodological triangulation is used. The approaches involved in triangulation for credibility is similar to the triangulation for dependability.

3. Data Analysis, Result and Discussion

Researcher performs the data analysis to get in depth understanding and find the meaning of the data. This section discussed further the result obtained from the study consists of the need analysis and the data collected from discussion in Grid Portal Blog.

3.1. Discussion on Need Analysis

Need analysis was analyzed based on the three questions posted to target participants in order to find out characteristics, their experience working in team and their personal problems in conventional authoring activities environment. Followings are the results of need analysis that have been obtained. The data collected are divided into several categories and subcategories.

From the first question, researcher wanted to know the students thought about group work in the course. From the feedback given, five categories were created to represent their thoughts on group work. These categories include cooperation and collaboration, support, task distribution, self management and problem within group members.

In cooperation and collaboration category, students believed that they can work and learn together from other group members. Most of the students said that group work is about sharing ideas among group members. According to Damon & Phelps (1989), peer collaboration where students share ideas to jointly solve the task is one of the peers learning that characterized by the type of engagement that is fostered. Besides that, in group work activity they could share problems regarding the task given as well as sharing information and knowledge.

Support category stated that peer support can help students create a healthy social responsibility commitment to get work done by giving motivation and interaction between each other. Students felt more motivated in completing the task and they could work in more effective and productive when working in group. Besides that, some students felt that working in group will develop self management as well as enhance the soft skill. According to Educational Broadcasting Corporation (2004), mixed-skill groups can be especially helpful to students in developing their social abilities.

The very crucial element in work group is task distributions. Equal task distribution will reduce the workload as well as ease the burden of the students. In addition, doing work in group also is time saving as they could complete the task given in within a shorter period. Therefore, the collaborative approach to teaching and learning supported by electronic classroom can support a variety of topics and areas within a

short period of time (Koschmann, 1992 as cited in Noriah *et al.*, 2002). The disadvantage of group work is the problems within group members. Less communication, inactive and dominant involvements are some examples of problems occur within the group members.

The second question was posted to identify whether the students like or not doing group work. Most of the students like the group work however there are also a number of students who do not like group work. Students like group work because they could support one another, share ideas and thoughts as well as complete the task faster, easier and more creative. On the other hand, some students dislike group work due to problems with group members such as low commitment and contribution as well as less cooperation.

Lastly, researcher wanted to know the problem students faced in designing the graphic assignment. One of the problem faced by students was time constraint in completing the task since everybody have their own activity plus the task in designing software requires lots of time. Another problem occurred was lack of skills in using the software and lack of creativity. Sometimes different person have different idea and this might lead to misunderstanding and disagreement within group members. Conflict in group work can also arise from personal issues such as some members not completing the task given, or disagreement over intellectual interpretation of some themes being discussed in the group (Noriah *et al.*, 2002).

3.2. Emerging Result

Besides respond to the questions given, the students come out with some suggestion as well. One of the suggestions was to have an online program as a medium for students to meet their group members virtually, make discussion and do the tasks through online. The students also requested to choose their own group members the numbers of members should not exceed four people per group. Teams were allowed to select their own members for a number of reasons. Trust within a team improves the likelihood of success (Jarvenpaa *et al.*, 1998 as cited in Alexander, 2004).

3.3. Analysis of Blogs

Initially, some categories were determined and the data related to the topics or categories were being searched. Some of the pre-determined categories are cooperative and collaborative in terms of sharing ideas, task distribution and support by giving motivation and showing respect. Then, from the data collected, several other categories appear in to be repeatedly in the data. Hence, new categories for the data defined in addition to the existing categories such as sharing problems, sharing information, opinion and so on.

The cooperative and collaborative category consists of sharing ideas, sharing information, opinion and suggestion, and sharing problems. From the students' discussion it can be seen that there was sharing ideas activity among students in group work. Besides, they also shared the problems occur during the development process with other group members especially problems in using the software. Then, other group members tried to help to overcome the problems. Collaborators engage in sharing, proposing, discussing, ratifying, and disseminating to create and maintain a common ground (Alexander, 2004 as cited in Moran, 2000)

The good part in collaborative learning activity was the students shared any additional information related to the task with group members such as link to other webpage, video and so on that might be useful in completing the task. Each student can exchange information on research design with others using computer mediated communication, thereby shortening the time needed to accumulate the different examples (Noriah, Siti Rahayah, Rosseni & Aidah, 2002). Furthermore, group work allowed the students expressed their opinion and give suggestion to other group members.

Next, students gave support to peers by motivating them with words of encouragement and enthusiasm. The motivation could rise up their spirit and increase their effort in doing the task. Furthermore, the interaction provides students with the synergy and motivation to excel (Alexander, 2004 as cited in Leidner & Jarvenpaa, 1995).

“As for team spirit, they experienced a sense of accomplishment and well-being. Their motivation was very high. They had mutual respect for each other’s capabilities and strengths as they had worked together as a team in the classroom before.” (Raja Maznah Raja Hussain, 2004)

The students also showed respect to others opinion and take it positively where it established an essential working environment. Collaborative activities are both socially and emotionally demanding and most often

require students not only to articulate their own points of view but also to listen to the views of others (Noriah *et al*, 2002). The students also updated the current progress of their project in the discussion.

Finally, task distribution is very crucial in group work. From the data collected, the students did divide the task equally among group members. Cooperation is associated with tasks that are fairly structured and this makes it relatively easy for group members to divide up the work and to work on sections separately (Alexander, 2004 as cited in Strijbos, Martens, & Jochems, 2004). Task distribution caused less workload and eased the burden of the students.

4. Conclusion

The project has presented a collaborative tool and an authoring environment which is the UTM Grid Portal using the grid portal technology with high performance computing platform supporting Web Based Education (WBE) and has been implemented to the users through blog. This project has been completed successfully fulfilling the objectives and scope specified.

From the need analysis, researcher could identify student's difficulties in completion their authoring activity or collaborative work in conventional environment. According to the data collected, some of the problems faced by the students in authoring activity are time constraint, lack of skills using the software and clash of ideas within group members. The results also show the need of having an online program as a medium for students to meet their group members virtually, make discussion and do the tasks through online. Therefore, by developing the UTM Grid Portal is the best solution to overcome the problems.

The grid portal overcome problems occur in group work especially in time constraint because students can do discussion in the blog with group members virtually without have to meet face-to-face at anytime. Besides, lecturer could monitor the students' job activity and performance through grid portal.

Finally, from the blog discussion researcher identified the activities that take place in the work group. According to the results obtained, students cooperate and collaborate with other group members by sharing ideas, sharing information, sharing problems on coursework as well as giving suggestion and opinion. Besides that, students show their support in the group work by motivating others with words of encouragements and update the project progress frequently. Furthermore, the students also do divide the task equally among group members.

The results show that the virtual group work activities obtained perform the criteria on group work activities in need analysis such as sharing ideas, task distribution, support and so on.

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