

Exploiting Network Technologies to Support Blended Learning and Collaborative Problem Solving in E-learning System

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ABSTRACT

Educational benefits of online collaborative group work and blended learning have been confirmed in numerous studies for e-learning. Many of its advantages have been well cited including the development of skills of critical thinking, improved problem solving, knowledge discovery and construction of knowledge. However, a major challenge facing e-learning providers in the area of online collaboration and blended learning is the provisions of meaningful social experience and the emphasize of “live” mentor; need of virtual tutor that readily help learners in their difficulty; and sharing of learning materials that automatically accessed, modified and published among the groups. While this environment has been extensively studied and increasingly becoming an instructional approach, to the best of our knowledge, it has not yet been applied and exploited readily available network technologies to support online collaboration and blended learning. In this paper, we present an initial study of the use of social network media such as FB, YM, WLM, Skype to support social aspect of learning while Team-Viewer and NetMeeting act as “live tutor” and virtual support mechanism as well as the use of DropBox for sharing learning materials to support online collaboration and blended learning.

KEYWORDS

Online collaborative learning, network blended learning, social media, network technology, collaborative assignments.

1 INTRODUCTION

Network learning is the used of internet-based ICT to enhance and promote collaboration and

learner’s connectivity: between learner to learners; between learners and instructors; between learning group and its learning resources, so that participants can extend and develop their understanding, skills and capabilities in ways important to them [1]. This concept is adapted and became network blended learning to emphasize more active learning and active participation of students in a networked environment. The notion of network blended learning has changed the way of teaching and learning process today. The teacher is no longer in full control and learners are actively taking responsibility and starting to coordinate and regulate their own collaborative learning process [2]. While, in educational practice, there is still a strong and much needed focus on the role of the teacher; researchers are pointing out a changing teacher-student relationship [3]. The teacher has increasingly become a “watcher on the side”, which implies that the students are encouraged to take control over their own and collaborative learning processes. This allows students to fulfill their particular learning intentions and needs [4], and coordinate their learning by agreeing on rules, deadlines and responsibilities. It allows student to actively schedule their activities and assign roles within the group, instead of just exploring the content in order to finish their learning task [5]. Though the teacher continues to be fully responsible for the overall coordination of the educational goals, a new pedagogy that requires teachers to design and facilitate more student-oriented approach to learning is needed. Teaching online requires different and often new, skills for the teachers, as well as how collaboration technically possible and accepted.

Usually in e-learning system, student needs to go physically to attend classes to support blended learning to clarify certain issues not readily available in the e-learning module. The teacher gives more examples and address questions pertaining to the current lesson and then assessment. The teacher diagnosed which topics students have difficulty and provide further learning or reinforcements such as more exercises, problem solving and analysis. With the emergent of social media and other networking technologies, it is inevitable that teacher shifted his/her pedagogical strategy into network blended learning to conform with digital revolution. The student can socialize, collaborate, share and modify learning materials on time and becomes more student-centered approach. The teacher becomes a virtual facilitator that watches student progress at the background. Advocates of network blended learning say that, when done well, it is as much about the time learners are off-line as the time they're online – delegating more rote concepts to online instruction so that teachers can better use class time for small-group discussion, one-on-one check-ins, group projects, or targeted tutoring if students are struggling [6]. All these benefits will never happen without the use of networking technologies.

2 NETWORKING TECHNOLOGIES

Networked technologies have been incorporated in e-learning design to enhance learners' collaborative problem solving skills at the same time provide social interactions and activity. Social learning is an important way to help students gain experience and develop skills such as critical thinking, problem solving and construction of knowledge. Figure 2.1 contains four components necessary for socially oriented network blended learning and collaborative

environment; namely, social media (support active learning), virtual tutor (learning by doing and online help), file sharing mechanism (on-time sharing and multiple-access to learning objects) and e-moderation (control).

Firstly, the rapid diffusion of social media such as Facebook, Yahoo Messenger, Windows Live Messenger, Skype and other have enabled users to connect with people more than ever before. In addition, students are using social media at school for various purposes such as communicating, sharing personal experiences, and exchanging information with others [7]. While educators are concerned with how they should treat such media in order to prevent classroom disruption, social media provides affordable resources that can build social learning environment and collaboration [8]. The use of social media allows learners to participate, and do peer to peer to support “active learning” and “learning by doing”. Recent research shows that the educational use of social media has significant potential learning management system [9],[10],[11].

Secondly, virtual tutoring allow teachers and learners to communicate though separated by time and space, it provide support, necessary for the learning process. Tutoring can be done either directly through the virtual learning environment of a tutoring service or via a link in a learning management system[12]. Tutoring may take the form of a group of learners simultaneously logged in and received instruction from a single tutor, known as many-to-one tutoring. Another form of tutoring, called peer tutoring, involves peers within a course, helping and tutoring each other via online conferencing interface [13],[14]. Online tutoring involves a shared interface, such that both the tutor and the learner (or a group of learners) are online at the same time.

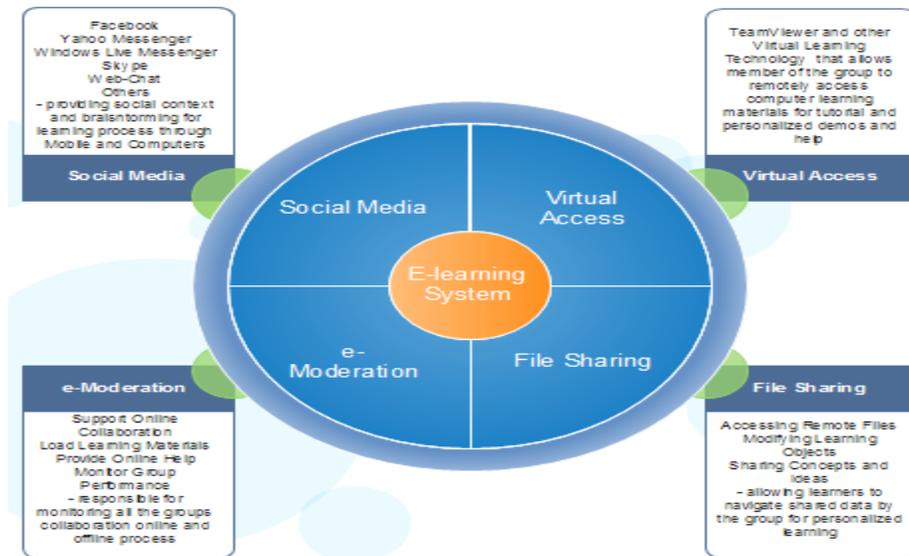


Figure 2.1 Four Component for Socially Oriented Networked Blended Learning and Online Collaborative Problem Solving Environment

Thirdly, file sharing is the public or private sharing of data or space in a network with various levels of access privilege. File sharing allows a number of people to use the same file or file by some combination of being able to read or view it, write to or modify it, copy it, or print it. Typically, a file sharing system has one or more administrators. With the advent of the Internet, a file transfer system (FTP) has become widely-used. FTP can be used to access (read and possibly write to) files shared among a particular set of users. Most Web site developers use FTP to upload new or revised Web files to a Web server, and indeed the WWW itself can be thought of as large-scale file sharing in which requested pages or files are constantly being downloaded or copied down to the user. File sharing implies a system in which users write to as well as read files or in which users are allotted some amount of space for personal files on a common server, giving access to other users as they see fit. This kind of file sharing is common in schools and universities [15].

Lastly, e-moderation refers to the act of managing, facilitating and engendering group based computer-mediated communication. It is an integral part of any educational context and is often carried out by tutors as well as students themselves [16]. Participants involved in the discussion are active (logged online) at different times, and maybe separated from one another by physical distances. Users can post messages to new or current issues in their own time where these messages are stored for others to view, comment on, and review later. In online learning, the teacher plays at the background by monitoring students performance and give feedback whenever seen and seem necessary. The e-moderator will need to control over who can access the e-learning materials and what level of access is allowed to participants. A useful way of conceptualizing skills for managing and facilitating has been developed such as forming, functioning, formulating skills and fermenting [17].

The four components discussed above once implemented effectively in e-learning system will lead into increasing the cognizance of

students and developing their problem solving skills. This will provide a socially oriented network blended learning and collaborative problem solving environment.

3 METHODOLOGY

Collaboration in small groups has been particularly recognised as both advantageous and appreciative by students [18][19]. It has been shown that small groups enable students to identify and correct misconceptions easily and quickly to improve understanding of the topics being studied and provide students with a better learning experience and ultimately greater academic achievement [19]. For this, the student were grouped into seven and the study was organized in the concept of algorithm analysis and programming. Each group freely choose public social media as a tool for collaboration such as YM,WLM, FB, Skype. Each group has a de facto leader and serve as moderator or facilitator within the group while the instructor closely monitoring their group efforts.

At the start of the session, minimal requirements regarding the project has been discussed regarding certain level of participation: student group is expected to have a minimum of five collaborative sessions to solve 10 collaborative assignments including discussion of thread messages, file sharing, remote access and tutorial logs. At the end of each problem, each group was asked to submit a software in C++ that implement and solve the algorithmic problem including documentation and algorithm pseudo code. Group was allowed to use other group work with the condition that they had to clearly acknowledge the sources, allowing software reuse. Part of the documentation, students are required to include/submit their learning experiences and their perceptions in participating in the group as

well as towards the learning environment using social media and other network technologies.

Figure 3.1 illustrates the sequence of the collaborative problem solving activities using network technologies.

1. Instructor posted problems in the social media group and solve the collaborative assignments.
2. Student discuss and collaboratively solve the algorithmic problem. The following instances will likely happen within the group:
 - a. The de facto leader initiated the collaboration and gradually faded as a group leader. This scenario is important to give way the collaboration equal opportunities and positive group dynamics.
 - b. Instructor roles is work mostly at the background but can interject messages or pressed “like” button to express approval of the group efforts. It can also answers questions if a question is directed towards him for clarifications purposes only.
 - c. In the event that a leader is not emerged in the group, instructor might give a push when a group was so “quiet”.
 - d. Established solution to the problem.
3. Students are allowed to access member’s computer remotely as if they were sitting right in front of them for the purpose of:
 - a. Provide tutorial and run simulations and other technical support;
 - b. Decode, debug and modify programs in programming;
 - c. And accessing other learning objects.

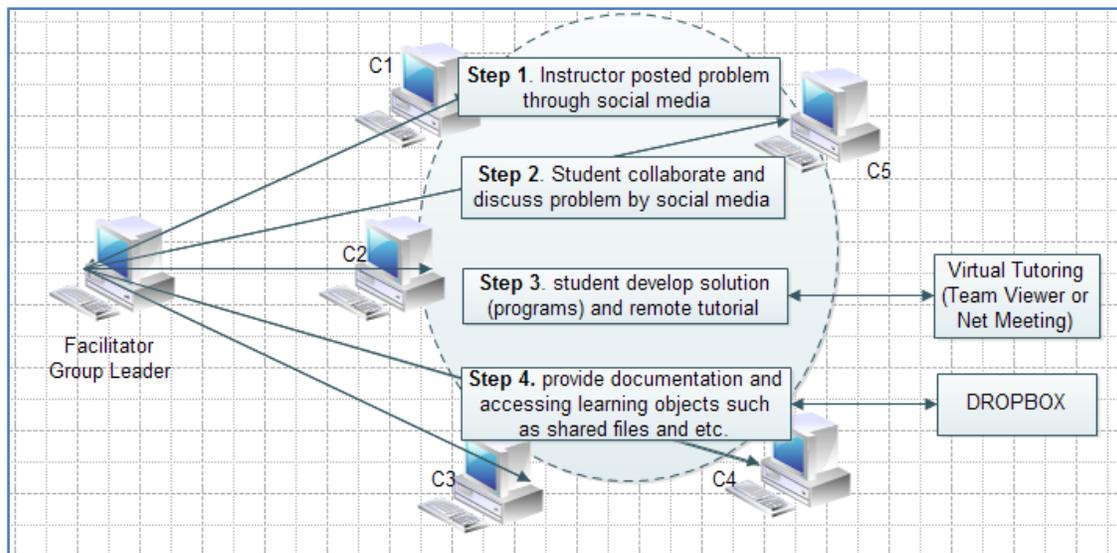


Figure 3.1 Networked Learning Environment Architecture that Support Blended Learning and Collaborative Problem Solving

TeamViewer and NetMeeting perform this mechanism as proprietary software package for remote control, desktop sharing, online meetings and web conferencing. It can also provide learners with support via Iphone, Ipad and android for windows, allowing participation anytime, anywhere.

4. Students are required to submit final documentation including program code, program output and testing data, individual perceptions and experiences and shared data that were in and out files in the folder and other learning objects were all bundled into one reports. During collaboration, students were able to share pdf, pictures, videos and other file formats, coding samples, individual contributions and other performance indicators were needed for the report.

In other words, FTP servers and size limits on attachment in emails are already a thing in the past. Existing services suffered problems with internet

latency, large files, bugs and “just made to think too much”. Student needs to collaborate on timely manners and can add, edit, modify and access learning materials wherever possible. DropBox technology provides such benefits where to date it has 300 million users and always have their stuff at hand, share with co-learners and work on team projects. DropBox allows users to create a special folder on each of their computers the synchronizes so that it appears to be the same folder regardless of which computer is used to view it. Files placed in this folder are also accessible through a website and mobile applications.

Combining different network technologies can be effective and worthwhile if implemented properly. In our e-learning design, such mechanism is implemented as post activities of each lesson provided in e-learning prototype; replacing activities during blended learning (physical and traditional classroom setting) into network blended learning where post activities can be done in network collaborative

environment. These activities lessened the direct participation of the instructor but closely monitored the learning process.

In a collaboration learning environment, knowledge is shared or transmitted among learners as they work towards common learning goals, for example, a shared understanding of the subject at hand or a solution to the problem. Learners are active in their process of knowledge acquisition as they participate in discussions, search for information, and exchange opinions with their peers. Knowledge is co-created and shared among peers, not owned by a particular learner. The learning process creates a bond between and among learners as their knowledge construction depends on each other's contribution to the discussion. Hence, collaborative learning processes assist students to develop higher thinking skills and achieve richer knowledge through shared goals, shared exploration, and socialization.

4 CONCLUSION

The paper was successfully initiated and offered an engaging opportunity that enhanced collaborative problem solving through the use of social media. By incorporating the public social media such as FB, YM, WML and Skype, it created a highly sociable learning environment, characterized participation and interactivity. By the use of TeamViewer and NetMeeting, students were able to help other students by remotely accessing members' computers and perform actual programming, provide actual supports thereby allowing "learning-by-doing". While other team members are collaboratively solving problems using the social media, other members are actively documenting their group efforts using DropBox. All students directly access the reports, modify, suggest and edit simultaneously by group members. Although, the facilitator's role is still a pivotal factor toward collaborative learning (gradually

eliminating his participation and just observing), it helps to reduce group difficulty by verifying/clarifying learning misconceptions and giving immediate feedback and suggestions during problem solving.

The second phase of the research to be published is the impact of this new environment in the learning process of students for both individual and group performance. Their perceptions and positive attitudes about the project will be discussed. Deeper study on the threaded messages will be likewise considered for analysis that show construction of knowledge, improved problem solving skill and cognitive skill were developed during network blended learning and collaboration as shown in their final output and individual assessment.

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