

A Proposed Collaborative Computer Network-Based Learning Model for Undergraduate Students with Different Learning Styles

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Introduction

Nowadays, computer network-based learning is widely use all over the world because of its potential and flexibility. All educational institutions over the world use computer network-based learning for expanding learning opportunities and facilitating learning activities to students separated by time and distance as well as. It can be effective for delivering content to students and for instructors interacting with each other in a face-to-face classroom by using communication tool such as email, bulletin boards, conferencing system, whiteboards, chat rooms and videoconferencing and it can delivery contents in multimedia format like a video on demand, audio clips, animations, simulations and movies. Also, computer network-based learning can support for all educational levels and can use for formal and non-formal education. While computer network-based learning is the integration between computers, network computer and communication tools, technology alone can not makes an effective learning process and ensure learning quality. So learning activities are the important factor that all educators must integrate with technology and Collaborative Learning is the one method that's appropriate and supports computer network-based learning activity with effective learning.

Collaborative learning is an approach to teaching and learning in which students are required to work together in the learning process, and to reach a consensus through negotiation to accomplish group tasks, McAlpine (2000). Some important attributes include learner center, constructivist, and problems-solving activities that the students explore in order to create their own knowledge, meaning and solutions. The importance of collaborative learning as an instructional method has led to its application in situations in which computer network based is required by using computer network technologies for effective communication in learning activities, Hannafin and Land (1997).

However, differences in student learning styles are one of the major problems that affect all students since not everyone prefers to use the same style of activity for effective learning. With that in mind, the best method is to use specific activities designed for each student learning styles but this is difficult to do because there are a wide variety of student characteristics in virtual classroom. So, the best solution for this problem is to design a learning model which supports the learning methods of all students so that all students can learn satisfactorily, happily, and get high achievement. Collaborative computer network-based learning model for undergraduate students with different learning styles was developed for solve this problem.

Literature Review

Collaborative Learning

Collaborative learning, cooperative learning and small group learning are terms that are often used interchangeably in the literature. However, it is important to differentiate collaborative learning from the other two. Collaborative learning differs from cooperative learning in that its emphasis lies in mutual engagement of learners in the learning process rather than on the sole division of labor to reach a common group goal, Bernard, Rubalcava and St-Pierre(2000). In cooperative learning, the result may simply add up to collection or incorporation of each individual's work into the final products based on

collaboration should represent a synthesis of the whole. Some of the main advantages of collaborative learning that are often cited are that it encourages active and constructive learning and encourages deep processing of information, as well as evoking critical thinking, reasoning and goal-based learning, Brown and Parlinscar (1989). In addition, collaborative learning requires less teacher role than cooperative learning and includes sharing the learning task, combining expertise, building or consolidating a learning community, Slavin (1995).

In collaborative learning setting, the emphasis is placed on the interactions as common understandings are negotiated and developed across differences of knowledge, skills and attitudes. Indeed, collaborative learning should thrive on these differences. Motivation to participate and confidence, together, play an equally important role if benefits are to emerge from the experience. Moreover, participants need to assume a variety of functional roles as interchanges progress and involve question answering and explanations that are open to challenges and justifications, Bernard, Rubalcava and St-Pierre (2000). So collaborative learning is the appropriated learning pattern for learning activity in modern age that needs students enhance knowledge, experiences and potentials for conducting their real life.

Collaborative Computer Network-Based Learning

Collaborative Computer Network-Based Learning is the computer-based variant of the classroom version and is coming to be regarded as one of the promising pedagogical approaches for distance education and its an integral component of higher education in the new millennium, Harasim (1996), Riel (1990). In addition, it will better prepare students for the requirements of today's global industries where workers and consultants, and the effective use of collaborative computer network-based learning, will aid in acquisition of complex and higher-level concept and skills that has been claimed as a weakness of distance education, Abrami and Bure (1996).

In order for Collaborative Computer Network-Based Learning to take place successfully, it is crucial that the learner feels part of a learning community where his/her contributions add to a common knowledge pool and where a community spirit is fostered through social interactions, Palloff and Pratt (1999). There are two methods for using collaborative network based learning, first one is group project method that supports students to do a project together by using group opinion in selecting topic and working with teamwork for learning goal. The second one is a debate or discussion method that supports students sharing and exchanging of individual ideas with group members for eventually concluding the group's final opinion for problem solving or justification.

The activities of collaborative computer network-based learning use abilities and potentials of computer and network for communicating among students and facilitators for learning activities. The communication of computer networks can support student-to-student and students-to-facilitator by using communication tools such as e-mail, chat rooms, web boards, instant messaging, and desktop conferencing. When its integrated with the appropriate activities of collaborative learning, the result is a highly effective learning activity on computer network.

Learning Styles

Learning styles are important factors in designing instruction and it is a variable that can affect learners' achievement. So the instructional designers should know learning styles principles and theories for designing the appropriate web's environments for all students in a virtual classroom. The nature of the web tends toward graphical and textual, thus catering particularly to those with visual learning preferences. Those with either auditory

or kinesthetic learning preferences frequently find themselves at a great disadvantage in the web-based learning environment. This is particularly true for the hundreds of courses that exist today containing only lecture notes and little interaction or mentoring, Lynch (2002).

Kolb's (1986) popular learning style inventory, which is often used in distance learning research, measured student preferences in two bi-polar dimensions. Kolb suggested that over time learners develop either a preference for concrete experiences or preference for engaging in abstract analyses when acquiring skills and knowledge. Students also may emphasize interest in turning theory into practice by active experimentation, or they may prefer to think about their experiences by reflective observation. Dille and Mezack (1991) used Kolb's inventory to identify student success in Web-based learning. They found that students who preferred abstract analyses did much better than those with higher scores in concrete experience. Terrell and Dringus (1999-2000) found that Kolb's convergence and assimilator categories were predictive of greater success in their graduate degree program.

In this research, Kolb's learning style inventory is used for grouping learners because Kolb's learning style categorizes type of learners based upon learning experiences; number of group is not variety and there are no group effects with collaborative learning activities.

Methodology

Methodology

There were three stages for conducting this research: 1) study the patterns of collaborative computer network-based learning; 2) development of collaborative computer network-based learning model and implementation; 3) evaluate and adjust model. This particular document presents only the first and some part of the second stage because this project is being conducted.

The first stage has two parts in collecting data. The first one is sorting interview data from the experts into three groups: 1) Networking administrator or related; 2) Facilitator or related; and, 3) Instructor who has experiences in computer network-based learning. The second one is to study collaborative computer network-based learning model from research and collaborative learning website and integrate data from the two parts for developing a new appropriate model.

Participants

The population are networking administrators, facilitators and teaching expertise who has experiences in computer network-based learning from government and private universities in Thailand's universities those have computer network-base learning system and being develop and were selected to sample with purposive random sampling by selecting from people who has experiences in computer network-based learning at least one yea. In Thailand, there are 43 universities. 20 universities have computer network-based learning systems. Six universities have complete computer network-based learning system. 14 universities are developing computer network-based learning systems. From these there are six facilitators, 20 networking administrators, and two teaching expertise who has experiences in computer network-based learning. The sample was interviewed by face-to-face and telephone interviews with a structure interviewing form containing seven issues: 1) Content, 2) Learning Management System, 3) Facilitators, 4) Learners, 5) Mode of communications, 6) Assessment, and 7) Infrastructure. The scope of questions is the opinions about all components that should be set up for computer network-based learning in a Thai context.

Results Discussion

Result from interviewing

Data from the interviewing form were analyzed with content analysis and then grouped by the categories of interviewing issues. Summarization of major themes from all the data is shown in table 1.

Table 1 Interviewing Data

Components	Facilitators	Networking Admin.	Teaching Expertise
Content	Computer network-based learning support all content. Design learning activities according with content.	Computer network-based learning support all content. Design learning activities according with content.	Computer network-based learning support all content. Design learning activities according with content.
Learning Management System	Develop or buy appropriate LMS for own environment.	Develop appropriate LMS for own environment.	Develop appropriate LMS for own environment.
Mode of Communications	Use together but use it appropriate with content and activities. Asynchronous can support all situations.	Use together but Asynchronous can support all situations.	Use together but use it appropriate with content and activities. Asynchronous can support all situations.
Assessment	Use traditional assessment.	Use traditional assessment, if use online assessment must approve by institute policy.	Use online or traditional assessment by according between content and assessment.
Facilitators	Responsibility in course building. Teaching technique and computer skills are required.	Responsibility in course building. Teaching technique and computer skills are required.	Responsibility in course building guiding and coaching. Computer literacy and assessment technique and constructivism are required.
Learners	Computer network-based learning concept, how to learn and computer skills are required.	Computer network-based learning concept and how to learn are required. Computer skills are developed by learning by doing.	Computer network-based learning concept, how to learn and computer skills are required.
Infrastructure	Provide more internet connecting point, bandwidth. Wireless campus.	Provide more internet connecting point, bandwidth. Wireless campus. Communication reserved system.	Provide more internet connecting point, bandwidth. Wireless campus.

Table 1 shows interviewing data that was analyzed for integrating into the prototype model sorted into seven issues: 1) Content, 2) Learning Management System, 3) Facilitator, 4) Learner, 5) Mode of communication, 6) Assessment, and 7) Infrastructure. The opinions of facilitators, networking administrators, and teaching experts are shown according to the main idea and have little difference in each details. The facilitators and teaching experts are always focused on pedagogy and networking administrators are always focused on physical environment and technology. The differences of data show the dimensions and perspectives in each component that can apply information for synthesis an effective prototype model.

Result from collaborative network-based pattern study

This study of collaborative network-based patterns examined information from documents, research and collaborative learning websites in order to collect data about web patterns and methods, components, environments, and strategies in collaborative learning settings in order to analyze all factors and synthesize a new model. From the data analysis were found appropriate factors used to synthesize a prototype model. A collaborative web-based patterns were developed from Price (1996), Collis (1996), Lightspan (2000); collaborative learning process were developed from Puntambekar (1999) and Bernard, Rubalcava and St-Pierre (2000); and, collaborative learning strategies were developed from Soller, Goodman, Linton and Gaimani (1994). The last component is Kolb's learning styles for supporting activities which was developed from Anderson and Adams (1992). From all related factors, we can group the necessary component for developing collaborative computer network-based learning model within four main components. They are: facilitator, learner, content, and activities for supporting collaborative learning.

Model synthesis is integrated data from an interview as a part of model for an appropriate collaborative computer network-based learning model for Thai learners in higher education with the four main components (see Table 2).

Table2 Component of prototype model

Facilitator	Facilitator	Content	Activities supporting collaborative learning
Preparing for facilitator 1. Give knowledge in collaborative learning and computer network-based learning. 2. Give knowledge, skill and management of collaborative learning. 3. Give knowledge and skill in computer, software and network application related with learning activities. 4. Build a confidence for conducting	Preparing for learner 1. Give collaborative learning skills. -Interpersonal skills, such as request, inform, motivate, maintenance, acknowledge, argue. -Group building/ Management skills. -Inquiry skills. -Conflict solving skills. -Presentation skills. 2. Give knowledge and skill in computer, software and network application related	Appropriation of content 1. Content should be variety. 2. Content should not deep. 3. Content relates with learner's life or real situation. 4. Content is a part of learner's experiences.	Step of collaborative learning 1. Personal learning 2. Collaborative learning. Collaborative learning strategies 1. Encouraging participant 2. Maintaining social grounding 3. Evaluating student performance 4. Promote group processing 5. Supporting collaborative learning conversation skill practice 6. Applying appropriate technology

learning activities.	with learning activities.		Kolb's learning style supporting activities 1. Reflective and active learning activities. 2. Concrete and abstract learning activities.
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The collaborative computer network-based learning model was developed from two types of data sources. The first one is data from interviews that shows data relating all components of computer network-based learning in a Thai context; and the second one is data from documents, research and collaborative learning website. The result is a collaborative network-based learning model comprised of four main components.

The first of the four components is Facilitators. In collaborative learning, instructor roles were changed to facilitator roles that had different missions. So there is a necessity to prepare concepts, knowledge, and skills used in collaborative learning and computer applications for facilitators to build a confidence in learning activity operations. The success of collaborative learning depends on facilitators. Hence, facilitator preparation is the main component in this model and a short-course of training is an appropriate method for facilitator preparation.

The second component is Learners. This component is very important because learners are the human resources that we want to develop. The environment of collaborative network-based learning is different from traditional classroom, so preparation in the knowledge and skills of collaborative learning activities is necessary mission that must be considered. The major factors for learners are: how to learn, computer application about hardware and software, Internet applications, and collaborative learning skills. The university has responsibility for preparing learners for all these factors. However, while some learners may have computer literacy skills, these skill vary widely so a training course for learners should be used to address the variety of skills according to learners' needs.

The third component is Content. Although all content can delivered with computer network-based learning, collaborative learning has a specific characteristic because the learning activities is group process and use communication to share, exchange, discuss, argue, solve problem and build knowledge based upon learners' experiences. So appropriate content should provide variety, not complexity, related with their life. The more learner experiences are integrated, the more benefit, better learning, and effective learning will result.

The fourth component is Activities for Supporting Collaborative Learning. This component has three parts. The first one is the step of collaborative learning. This is composed of personal learning and collaborative learning. It is necessary to use two types of learning together. Personal learning helps learners to reflect upon knowledge and experiences of their own before joining in groups for collaborative learning. If learners do not have enough knowledge and experience, the facilitator must equalize knowledge at the same level for all learners, so that all learners can do effective learning activities in group or collaborative learning settings. The second one is collaborative learning strategies that are composed of encouraging participants, maintaining social grounding, evaluating students' performances, promoting group processing, supporting collaborative learning conversation skill practice, and applying appropriate technologies. All strategies can support, promote, and motivate learners to participate in group activities, which is the main factor of collaborative learning. The last one is Kolb's learning style supporting

activities. These are composed of two parts of learning activities. They are: 1) reflective and active learning activities, and 2) concrete and abstract learning activities. These two parts of learning activities can support four learning styles learners because each type of learning style has co-characteristics or appropriate learning method such as Diverger, which is composed of concrete and reflection; Assimilator, which is composed of reflection and abstraction; Converger, which is composed of abstract and active; and, Accommodator, which is composed of active and concrete. The co-characteristics of Kolb's learning style are the key factors to set appropriate learning activities for all Table 4).

Table 3. Activity 1: Reflection and Active

Reflection	Active
Diverger (Concrete) *(Reflection)	Converger (Abstract) *(Active)
Assimilator *(Reflection) (Abstract)	Assimilator *(Reflection) (Abstract)

Table 4. Activity 2: Abstract and Concrete

Abstract	Concrete
Converger *(Abstract) (Active)	Diverger *(Concrete) (Reflection)
Assimilator (Reflection) *(Abstract)	Accommodator (Active) *(Concrete)

(* Co – characteristic)

Conclusion

The collaborative computer network-based learning model that is described in this paper is in the first and some part of the second stage of research and development for presentation of an appropriate collaborative network-based learning model for different learning style learners. This model was developed by considering on learners, facilitators, content and design activities for supporting collaborative learning in a Thai context and integrated with web-based development by adapting from Price (1996), Collis (1996), Lightspan (2000) for pattern, collaborative learning processes from Puntambekar (1999) and Bernard, Rubalcava and St-Pierre(2000), for collaborative learning strategies from Soller, Goodman, Linton and Gaimani (1994). The last component is Kolb's learning style supporting activities from Anderson and Adams (1992).

The components that were selected for use in this prototype model were approved and recommended by researchers and developers to ensure effective components and appropriate items for learning activity, especially for collaborative learning and computer network-based learning activities. This prototype model will be tested with undergraduate students and evaluate in October,2003 at Kasetsart University. The prototype model is believed to be suitable and well matched for Thai learners in higher education institutions.

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