

CHAPTER I

INTRODUCTION



Rationale

The virtual classroom is a teaching and learning environment located within a computer-mediated communication system. The objectives of a virtual classroom are to improve access to advanced educational experiences by allowing students and instructors to participate in remote learning communities using personal computers at home or at work, and to improve the quality and effectiveness of education by using the computer to support a collaborative learning process. Collaborative learning is an educational process that emphasizes group or cooperative efforts among instructors and students, and also active participation by and interaction between students and instructors. The active dialog and sharing of ideas and information allows new knowledge to emerge. (Bouton and Garth, 1983; Whipple, 1987)

Since technology has been implemented in the virtual classroom environment, it improves efficiency and learning outcomes. Also, several new technologies most notably 3D technologies, are being incorporated into the regular school curriculums to assist both teaching and learning.

In the absence of conclusive data with respect to wise technology choices and successful teaching/learning models, institutions must carefully prepare today for what is anticipated as a widespread integration of information into teaching, learning, and research (Chickering and Ehrmann, 1999; Tham & Werner, 2002). Followings are seven recommendations for beginning this process of integration:

- 1) Create a venue where key stakeholders can analyze major technology issues and purchases,
- 2) Assert the value of technology-based learning from a variety of research perspectives,
- 3) Establish quality standards for certificate and degree programs,
- 4) Avoid pitting traditionalists against technology enthusiasts,
- 5) Make collaboration and cooperation, not reengineering and restructuring, the new institutional buzzword,
- 6) Retain a strong commitment to adequate library staffing

and funding, and, 7) Prepare for success by creating the necessary support structures (Tham & Werner, 2002).

The education system in Thailand emphasizes learner-centered learning. Different learning processes are needed to change from “the more traditional classroom-based, discipline-focused, learning-by-listening approaches” that are linked to everyday situations (Dede, 1993). The skills and the abilities that new workers need are rationality, creativity, decision making, and problem solving. They must also be able to select appropriate technologies and know how to apply them for specific purposes and be able to direct their own personal and professional growth through lifelong learning. According to Skolnikoff (1994), educational institutions need to provide programs in which learners learn to think and become participants in the larger world.

From the reason above, it indicated a need to change learning expectation to prepare learners for rapidly changing roles and responsibilities in their jobs, families, and communities for the 21st century. Project-based learning was identified as a pedagogy that prepares learners for these new expectations by perceiving, developing, and implementing projects relevant to the learners’ needs. This active learning process enhances critical thinking, problem solving, teamwork, negotiating skill, consensus reaching, and technology use, and prepares learners to take responsibility for their own learning (Wolff, 2002).

Project-based learning facilitates many of the above skills through the active process of designing, developing, and producing products. This learning process occurs by grouping learners into various sized groups, depending upon what learning activity is taking place. Direct and guided instructions are often presented to larger groups of learners by instructors or a teaching team. Project-based work happens more often in teams and includes community members as resources and advisors for the projects. The Ministry of Education in Thailand (2002) recommends project-based learning be implemented in classroom activities, especially Grade 4 to Grade 6, to prepare young learners both for further years in school and lifelong learning. Researchers in Thailand have shown that project-based learning improves learner’s skills and abilities. They studied the web-based instruction models with project-based learning in team building and found that subjects learned well. Team learning yielded

higher post-test learning achievement. The study also found that team performance and cooperative teamwork had improved over pre-test scores. (Varaporn Tragoolsrid, 2002).

Project-based learning is a learner-centered approach, and it supports learning by practice, particularly in higher education. Project-based learning provides an environment to enliven and enrich the learning process. Introducing interactive partners into an educational system creates more realistic social contexts, thereby increasing the effectiveness of the system. Such an environment helps sustain the students' interests and would provide a more natural learning habitat (Wolff, 2002 ; Sands, 2005).

Project-based learning plays a major role in constructive cognitive development (Piaget, 1928, cited in Kumer, 1996). Piaget's theory emphasizes the importance of collaboration. He stated that interaction between peers is equally shared. This contrasts adult-child or instructor-learner interactions, in which the former is usually in control, thus not following his/her own natural learning process.

Project-based learning presents an environment in which a student interacts with one or more collaborating peers to solve a given problem. The interactions among the students are monitored and controlled by the project-based learning system. There are numbers of experimental studies and implemented systems available in the literature to emphasize the effectiveness of collaboration. An experiment on constructive interaction by Naomi Miyuki (1986) showed that about 80% of self-critiquing took place during collaborative learning compared to 20% that took place when students were learning alone. This experiment showed that the learners might have missed the opportunity for better understanding if they had not collaborated.

Moreover, Wolff (2002) determined the design features of the physical learning environment that support and enhance collaborative, project-based learning. The study included the initial identification of 44 design features of the physical learning environment that support and enhance collaborative, project-based learning at the community college level and the determination of the rationale for the selection of these features. Analysis and synthesis of the features resulted in 32 design features that were placed in the following six categories: 1) learning group

size, 2) functional spaces for learning activities, 3) adjacencies, 4) furnishings, 5) psychological and physiological support of the learners, and 6) structural aspects. The essence of designing physical environment that support and encourage collaborative, project-based learning is the interrelationship between these categories and the features within the categories.

The differences between learning in the traditional and virtual modes are the type and extent of interaction. In traditional classrooms, the potential for learner-instructor and learner-learner interaction is very high, but instructors continue to employ the lecture mode as the predominant method of instruction. In the virtual classroom, on the other hand, technology supports collaborative learning, heterogeneous groupings, problem-solving and higher order thinking skills educational processes that a lecture format cannot facilitate.

The feature of learning environment is important part to support learning activities, not only the physical learning environment but also the online learning environment. Since the mid 1990s, online learning has continued to expand as a tool for increasing student access to higher education and providing opportunities for active learning and interactive communication among participants (Cravener, 1999; Cohan, 2007).

A large amount of research has been investigated factors affecting learning outcome in an online learning environment (Brown & Kiriakidis, 2007; Chisamore & Thompson, 2007; Kikuchi, 2007; Liaw, Huang & Chen, 2006; Cohan & Ellis, (n.d.); Levy (n.d). For example, Levy (n.d.) identified six factors to be considered when planning and developing an online distance learning program. These six factors are vision and plans, curriculum, staff training and support, student services, student training and support, and copyright and intellectual property. Similarly, Cohan (2007) investigated factors that related to positive outcome in a web-based introductory nutrition course. He identified nine factors that were believed to be important toward predicting student success in the course. The factors were age, gender, pretest knowledge, prior attitudes toward nutrition and technology, time and effort spent in the course, satisfaction with the instructor, and satisfaction with the participant-participant interaction. The study of Cohan & Ellis (n.d.) found four factors (instructor accessibility, class organization, feel of the class, and peer impact)

appeared to match well with student expectations and seemed to accurately reflect the student perspective of the constituents of quality in a course delivered via an online modality. Liaw, Huang & Chen (2006) investigated learner's attitude factors toward e-learning systems. The learners' attitude can be grouped in four different factors; e-learning as a learner autonomy environment, e-learning as a problem-solving environment, e-learning as a multimedia learning environment, and teachers as assisted tutors in e-learning. Chisamore & Thompson (2006) identified six factors affecting group dynamics in an online learning environment, which included 1) team experience level, 2) strengths of the team members, 3) task clarity, 4) task leadership, 5) use of technology, and 6) interaction of the team. Latest, Brown & Kiriakidis (2007) identified five factors that may assure student success in online program were 1) the online learning environment, 2) the role of the instructor, 3) learning communities, 4) computer-mediated communication technologies, and 5) policy and practice.

Furthermore, Yukselturk & Inan (n.d.) examined four factors affecting student dropouts in online program. Four factors found were 1) arrangement of time, 2) personal problem, 3) expenses, and 4) motivation. Similarly, Tyan (2003) investigated diffusion barriers to e-learning in corporate in Taiwan. The results yielded four factors – the maturity of e-learning, corporate readiness, the cost of ownership, and government support. Muilenburg & Berge (2005) determined the underlying constructs that comprise student barriers to online learning. Eight factors found were 1) administrative issues, 2) social interaction, 3) academic skills, 4) technical skill, 5) learner motivation, 6) time and support for studies, 7) cost and access to the internet, and 8) technical problems.

From the literature, the factors affecting in chances of success are varied. However, factors affecting a design of virtual classroom environments for project-based learning are needed to investigate in order to determine how they support and enhance learning outcome and team learning.

Based on previous studies, the factors that were believed to be important toward predicting student success in virtual classroom environment can be classified into four main groups: learner factor, pedagogy and instructional factor, Environment

of learner factor, group dynamic and peer impact factor. The details of each factor were as follows:

1) Learner factors: self-directed learning, cognitive style, learning style, internet ability, intrinsic control, online experience, previous knowledge, psychosocial traits, and gender, ethnicity, and racial group.

2) Pedagogy and instructional design factors: interaction design, interface design, content design, usability design, accessibility and responsiveness, feedback quality, instructor experience, and assessment.

3) Environment and community of learners factors : community tools, online student support, learning resource, availability of instructors, quality technology, orientation to course, accessibility to hardware and software, clearly defined written instructions, flexible synchronous/asynchronous communication, positive interaction between instructor and learner, maintain online website/resource, format and informal social activities and interaction, and social aspects labeled as scaffolding.

4) Group dynamic and peer impact factors: team interaction, task clarity, team leadership, strengths of the team members, and size of group..

In conclusion, the virtual classroom is the new instructional technology that allows computer and internet technology to take a major role in assisting instructors and learners in their learning activities, usually via a website. The virtual classroom acts as the invisible physical classroom, and it has a direct impact on learners' behavior, play and learning. Just as the good quality of the physical classroom environment, such as convenience and comfort, tend to lead toward increasing student achievement. The well-designed virtual learning environment may also have these effects; however, in-depth study of it is essential. Little is known about how specific factors affecting the design of the virtual classroom environment for higher education will support and enhance learners' outcomes. The results of this study will lead to better understanding of the ideal features of virtual classroom design and lead toward developing the most appropriate learning environment for the virtual classroom.

Objectives of the study

The objectives of this study are:

Main objective 1: To analyze factors affecting the design of virtual classroom environments for project-based learning in higher education

Main objective 2: To design a virtual classroom environment for project-based learning in higher education

For supporting two main objectives, the sub objectives need to identify. The sub objectives are follows:

1.1 To identify factors affecting the design of virtual classroom environments for project-based learning in higher education ; and

1.2 To analyze factors affecting the design of virtual classroom environments for project-based learning in higher education.

2.1 To design a virtual classroom environment for project-based learning in higher education; and

2.2 To propose a virtual classroom environment model for project-based learning in higher education.

Research questions

For objective 1, the research question is: What are the factors that will affect the design of virtual classroom environments in higher education?

For objective 2, the research question is: Which are the factors affecting the design of virtual classroom environment for project-based learning in higher education?

Scope of the study

1. The subjects in this study were students enrolled in the Information Literacy class, Faculty of Humanities and Social Sciences, Khon Kaen University, in the second semester of academic year 2007.

2. There are myriad factors affecting the design of virtual classroom environments, but this study will limit itself to those in four main categories (For references refer to 2.4 page 38). These are as follow:

2.1 Learner factors: self-directed; cognitive style; learning style; internet ability; intrinsic control; online experience; previous knowledge; psychosocial traits; and gender, ethnicity, and racial group.

2.2 Pedagogy and instructional design factors: interaction design, interface design, content design, usability design, accessibility and responsiveness, feedback quality, instructor experience, and assessment.

2.3 Environment and community of learners factors: community tools, online student support, learning resources, availability of instructors, quality of technology, orientation to course, accessibility to hardware and software, clearly defined written instructions, flexible synchronous/asynchronous communication, positive interaction between instructor and learner, maintain online website/resource, format and informal social activities and interaction, and scaffolding.

2.4 Group dynamic and peer impact factors: team interaction, task clarity, team leadership, strengths of team members, and group size.

Limitation of the study

Technology continues to progress rapidly. This study, by necessity, is limited to virtual classroom technology that exists at present at Khon Kaen University. Newer and more advanced technology may not be applicable to this design.

Conceptual Framework

This research study has been based on upon the several theories and researches as foundations of this study. The conceptual frameworks in this study are as follows:

1. Online learning environment

Online learning environments can be an extremely effective way of delivering course content to students and supporting them in their studies. Online learning environment combine hypertext-based course materials with asynchronous communication facilities, supportive multimedia, and other interactive features to aid understanding (Hill, 2000). This provides a single point of access, facilitating 'one stop shop' learning, with the obvious advantage over traditional environments that

learners can study when and for as long as they want, using whatever resources they require at any particular moment. However, there are many studies showing that students do not always use online environments in the ways designers and tutors expect or desire. A large of study has been investigated the successful factors or barrier factors to supports and enhances learners' outcome (For references refers to table 3, page 38). The factors are as follows:

1.1 Learner factors: self-directed, cognitive style, learning style, internet ability, intrinsic control, online experience, previous knowledge, psychosocial traits, and gender, ethnicity, and racial group.

1.2 Pedagogy and instructional design factors: interaction design, interface design, content design, usability design, accessibility and responsiveness, feedback quality, instructor experience, and assessment.

1.3 Environment and community of learners factors : community tools, online student support, learning resource, availability of instructors, quality technology, orientation to course, accessibility to hardware and software, clearly defined written instructions, flexible synchronous / asynchronous communication, positive interaction between instructor and learner, maintain online website/resource, format and informal social activities and interaction, and scaffolding..

1.4 Group dynamic and peer impact factors: team interaction, task clarity, team leadership, strengths of the team members, and size of group.

2. Project-based learning

Project-based learning is a model for classroom activity that shifts away from the classroom practice of short, isolated, teacher-centered lessons. Instead it emphasizes learning activities that are long-term, interdisciplinary, and student-centered (Whitehorse, 2004).

There are seven components to project-based learning models. According to Grant (2002), the seven project-based learning elements are as follows.

1) Introduction. Many projects use an introduction "to set the stage" for or anchor the project. This often contributes to motivating learners. Occupational skills, such as graphic arts or Webpage design, typically use the domain as the anchor, since the skills are authentic to the profession.

2) Task. The guiding question or driving question explains what will be accomplished in the task and embeds the content to be studied. The tasks should be engaging, challenging and doable.

3) Resources. Resources provide the data to be used by learners and can include computers, hypertext links, scientific probes, compasses, CD-ROMs, eyewitnesses, etc.

4) Process. The process is the steps necessary for learners to complete the task or answer the guiding or driving question. The process should include activities that require higher-level and critical thinking skills such as analysis, synthesis and evaluation of information.

5) Guidance and scaffolding. When learners need help, guidance and scaffolding must be provided. These can include student-teacher interactions, practice worksheets, peer counseling, guiding questions, job aides, project templates, etc.

6) Cooperative/Collaborative learning. Many projects include groups or teams, especially when learning resources are limited, but, cooperative learning may also employ rounds of peer review or group brainstorming sessions.

7) Reflection. The best examples of project-based learning offer an opportunity for closure, debriefing, or reflection. These may include relevant in-class discussions, journal entries or follow-up questionnaires about what students have learned.

3. Team learning

Team learning was the process of aligning and developing the capacities of a team to create the results its members truly desire (Senge, 1990). It builds on personal mastery and shared vision. People need to be able to act together. Senge (1990) suggested that team learning can not only can there be good results for the organization; members will grow more rapidly than could have occurred otherwise.

Mills (1967 refer in Adam & Kolb, n.d.) described five stage of team development as follows:

Stage 1. Immediate gratification. In this stage, members of the group seek to fulfill individual need. They come together to meet some immediate individual need, such as attending a concert to enjoy music. There is no sustained effort at gratification.

Stage 2. Sustained conditions for gratification. In this stage, individuals come together for gratification but develop ways to sustain the gratification. One example is a group that decides to attend concerts regularly or follow a musical group to various venues to recreate the experience. The effort to sustain gratification requires individual learning because it involves developing informal strategies and implementing mechanisms to maintain the gratification over time.

Stage 3. Pursuit of a collective goal. This stage focuses on developing a collective goal. In this stage, a group becomes a team. This stage requires development of more formal strategies and structures to meet the group purpose. Here the members of the group must transform individual learning to group learning, develop methods of coordination, develop adaptation mechanisms, and respond to changing external demands. For example, an informal group may decide to create its own musical group and perform at various venues.

Stage 4. Self-determination. In this stage, the group no longer simply adapts to changes in the environment but makes self-directed changes directed by its stated desires. While external constraints are not completely eliminated, the group develops the freedom to set and pursue its own goals. An example is a musical group that sets its own progressive agenda and makes music that is seen as ground-breaking.

Stage 5. Growth. A group working at this stage can follow multiple goals, create high levels of innovation, manage diverse and conflicting types of innovation, and influence a number of different domains. For example, a well-established musical group may influence several types of music, as the musical group the Beatles were able to do, by creating rock, easy-listening, classical, and popular music. In addition, members have been able to advance various causes contribute to the development of new groups and engage in other artistic endeavors such as painting and drawing.

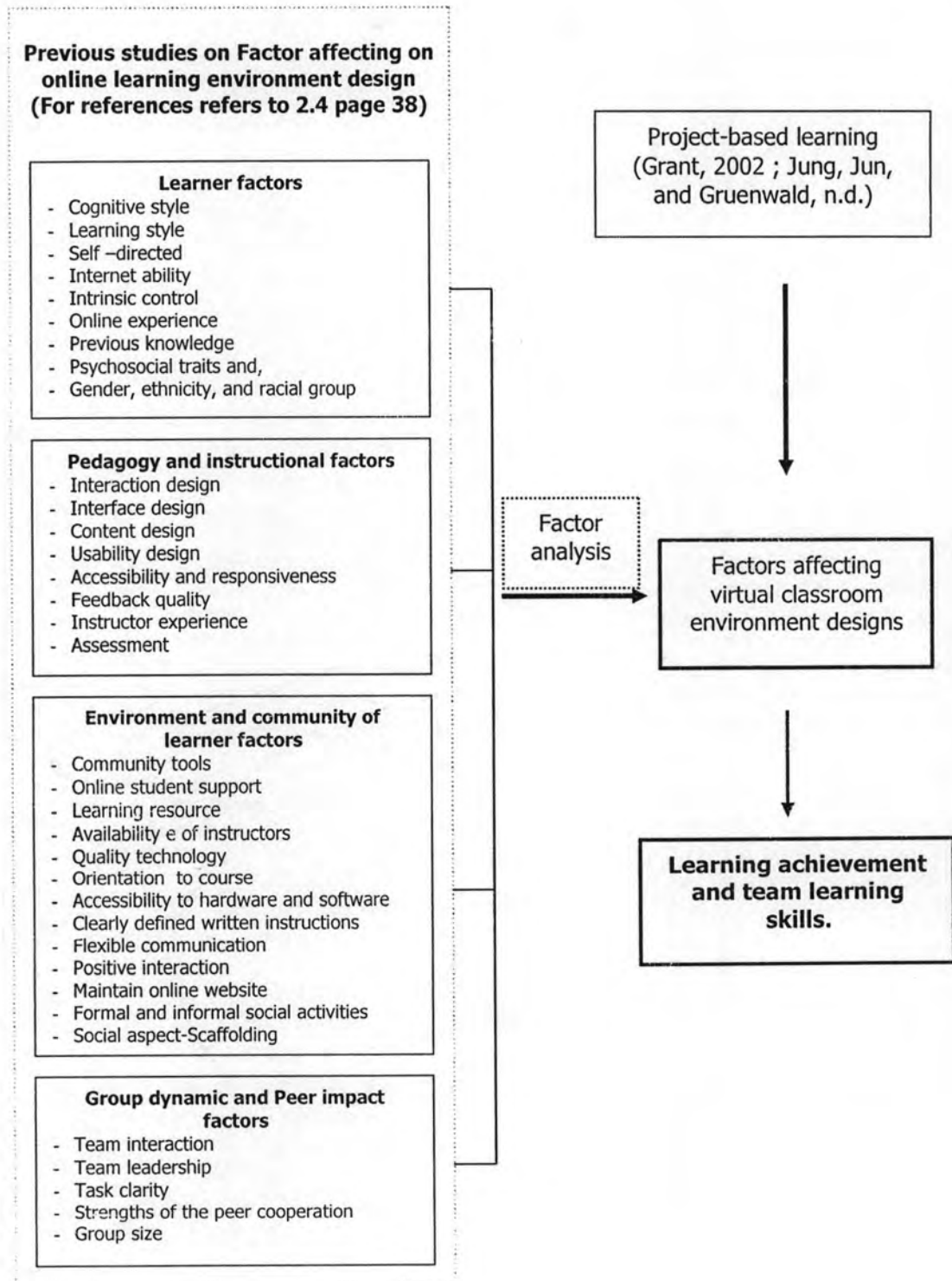


Figure 1 The research conceptual frameworks.

Definition of Terms

Virtual classroom is a software system designed to help teachers by facilitating the management of educational courses for their students, especially by helping teachers and learners with course administration. The system can often track the learners' progress, which can be monitored by both teachers and learners.

Virtual classroom environment is a teaching and learning environment developed by information technology and communications to improve learning activities by allowing learners and instructors to participate in remote learning communities using personal computer and internet at home or at work.

Online Learning environment is a web-based environment that are relatively open system, allowing interactions and knowledge sharing with other learner and instructors and providing access to a wide range of resource.

Project-based learning is a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Online group work is a group of people with complementary competencies executing simultaneous, collaborative work processes through electronic media without regard to geographic location

Team learning is a process of aligning and developing the capacities of a team to think, learn and create the results. The results build on personal mastery, shared vision and coordinated action.

Expected benefits from the study

The expected benefits from this study are:

1. A guideline to design online environment study for project-based learning in higher education.
2. Awareness on online learning environment design stimulus