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Developing a Virtual Classroom System to Promote the Course Code on CS. 213 (Operating System) for Undergraduate Students of Faculty of Science and Technology at Kasem Bundit University

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Abstract

The purposes of this study were as follows: 1) to develop and test the efficiency of a virtual classroom system to promote the course code on CS. 213 (Operating System) for undergraduate students of faculty of science and technology at Kasem Bundit University; 2) to compare the students' learning achievement before and after by using the virtual classroom system; and 3) to investigate the students' opinion toward the virtual classroom system which was developed by the researchers. The population was consisted of 23 undergraduate students which were studying in the second year in computer science. They were enrolled in course code on CS.213 (Operating System) of the first semester in 2015. The sample was selected using simple random sampling method by drew lots and separated into two sections were: section no. 011 and section no. 010. Real time streaming video were conducted between two campuses were: 1) the section no. 011 was conducted using streaming video at Romklao campus; and 2) the section no. 010 was conducted using live streaming video at Pattanakarn campus. It allowed full student interaction and use of multimedia in the lecture and also attends lectures either at the scheduled time or on request view lecture at a later time. The instruments used for this experiment were: 1) the content of four lessons in Operating System, such as Deadlock, Memory Management, Virtual Memory, and File System Interface which developed by the researcher; 2) self-administered questionnaires were used before and after of each lesson to survey the students' opinions toward the effectiveness of the constructed materials; and 3) data were analyzed using statistical tools by percentage, means, standard deviation and t-test (T-dependent) with SPSS for Windows. The duration of the experiment was 4 class sessions, 180 minutes each, four-week period.

The results of these analyses showed that (1) the students' achievement on the section no. 011 were 75.53 percent on the using streaming video, while the other section (section no. 010) were 76.23 percent on the using live streaming video. This means that the efficiency of the materials was higher than the 75/75 criterion; (2) the students' achievement on learning after using virtual classroom system was significantly higher than after using the materials at the 0.05 level; and (3) the students' opinions toward the constructed materials were highly positive.

Keywords: Virtual Classroom, Distance Learning, Effects of Virtual Reality Classroom, Live Streaming Video

1. Introduction

At present, increasing globalization means that rapid communication, market forces and lower import restrictions can help make a new technology available anywhere that it might be useful. Technology can be a powerful tool for transforming learning. It can help affirm and advance relationships between teachers and students, reinvents our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of all learners. Many countries were in the stage of conducting pilot studies to gain a better understanding of the potentials of this new technology for education and the reactions teachers and students displayed toward it. Technology also changes the way teachers teach, offering educators effective ways to reach different types of learners and assess student understanding through multiple means. These things help students who may have

difficulties learning in a traditional environment get the equivalent education their peers would by shaping the learning environment to the students need. A virtual classroom is a combined set of tools for conducting classroom-like sessions live over the Internet. It allows the teachers and students to participate in real time lessons and discussions. Students can ask questions, draw on the whiteboard, and participate in breakout sessions. Everything that can be done in a real classroom, can be done in a virtual classroom. Moreover, the whole classroom session can be recorded and made available for review afterwards. Interaction between teachers and students like a regular class room with an added advantage of recording and sharing data, information and entire e-learning sessions. Educators should set a vision for creating learning experiences that provide the right tools and supports for all learners to thrive.

Kasem Bundit University maintains two campuses: the Pattanakarn Campus is situated on Pattanakarn Rd, in the inner part of Bangkok and the Romklao Campus is situated on Romklao Rd, in the outskirt of Bangkok. Several problems involve a wide range of planning, interactions, strategies, organizational arrangement and material resources that take place in the teaching-learning process. Therefore, analysis of problems and difficulties encountered by teachers and students among campuses were: 1) highly costs for traveling among campuses, the university provides bus transport among two campuses; 2) traffic congestion, as the number of car increase and poor road management the chance of congestion also increase; 3) it may be occurred risk factors for road traffic injuries; and 4) problems of providing a service to teachers' basic instructional needs by allocating resources and materials.

Dealing with troublesome situations that threaten the university as the four major problems, researchers examined the problems and found a solution. We're supposed to be finding a virtual classroom solution. It refers to instruction in a learning environment where teacher and students are separated by time or location. The teacher provides course content through the Internet, course management applications, multimedia resources, and video conferencing. Students receive the content and communicate synchronously with the teacher via the same technologies.

The purpose of this study is to conduct a pilot study of a virtual classroom in order to determine the effectiveness of a learning and teaching that are used technology. The sample was selected using simple random sampling method by drew lots and separated into two sections were: section no. 011 and section no. 010. Real time streaming video were conducted between two campuses were: 1) section no. 011 was conducted using streaming video at Romklao campus; and 2) section no. 010 was conducted using live streaming video at Pattanakarn campus.

2. Purpose of Research

A virtual classroom must support four key components of learning: active engagement, participation in groups, frequent interaction and feedback, and connection to a real-world. Furthermore, the purposes of this study were as follows: 1) to develop and test the efficiency of a virtual classroom system to promote the course code on CS. 213 (Operating System) for undergraduate students of faculty of science and technology at Kasem Bundit University; 2) to compare the students' learning achievement before and after by using the virtual classroom system; and 3) to investigate the students' opinion toward the virtual classroom system which was developed by the researchers. This trial was to find out if the virtual classroom would be a suitable alternative for face-to-face meetings and if so what would be the best way and the best didactical approach to set up a virtual classroom. Finally, some suggestions regarding expectations of this study were also provided for instructors who wish to utilize virtual classroom in their teaching.

3. Hypothesis

A research hypothesis is the statement created by our speculation upon the outcome of this study are as follow: 1) the efficiency of a virtual classroom system to promote the course code on CS. 213 (Operating System) for undergraduate students of faculty of science and technology was upon the 75/75 criterion; 2) the students' achievement on learning after using virtual classroom system was significantly at the 0.05 level; and 3) the students' opinions toward the constructed a virtual classroom were highly positive.

4. Methodology

4.1 Research design

The type of research that will be used in this study is a development and experimental. The virtual classroom system was developed by the researchers. We present the findings of the pilots, the selection process of the virtual classroom product and we give recommendations on using the virtual classroom in distance teaching. How it affects our pedagogical model and how we can get more students and teachers to use it.

4.2 Population

The population was consisted of 23 undergraduate students which were studying in the second year in computer science. They were enrolled in course code on CS.213 (Operating System) of the first semester in 2015 which are separated into two groups.

4.3 Sampling method

The research sampling method that will be used in this study is random sampling to obtain a more scientific result that could be used to represent the entirety of the population. The sample was selected using simple random sampling method by drew lots and separated into two sections were: section no. 011 and section no. 010. Real time streaming video were conducted between two campuses were: 1) the section no. 011 was conducted using streaming video at Romklao campus; and 2) the section no. 010 was conducted using live streaming video at Pattanakarn campus.

4.4 Research instrument

The instruments used for this experiment were: 1) web application offers a live virtual classroom environment for distance learning which consisted of system administrator (instructor) and user members (students). Web based collaboration at a distance connects students from different locations to enhance the teaching and learning; 2) the content of four lessons in Operating System which developed by the researcher; 3) self-administered questionnaires were used before and after of each lesson to survey the students' opinions toward the effectiveness of the constructed materials; and 4) data were analysed using statistical tools by percentage, means, standard deviation and t-test (T-dependent) with SPSS for Windows. Anyway, the web application development used models and techniques are followed for software development that used is named as Software Development Life Cycle (SDLC). It comprises mainly were as follows: 1) problem definition, this level involves determining the project goal and running a feasibility study amongst the students and web development services, taking into consideration various factors like project cost, equipment cost, content, and practicality; 2) system requirement analysis, refinement of project goals into defined functions and operations of the proposed web application through intensive discussion between web development services and the student are achieved. We are captured functional requirements with UML (Unified Modeling Language) use case diagram as shown in Figure 1, the other; model the structure of system by modelling its classes, their attributes and operations in a UML class diagram as shown in Figure 2; 3) system design, used of various details like operations, functions, layouts, process diagram and other documentation are done; 4) implementation, this is where the expertise of web development services are needed the most when actual back end coding is done. The researcher used PHP language for coding and Adobe Dreamweaver CS6 are included; 5) testing, the web application is put through various testing environments and tools designed and used by web development services to ensure harmonious execution; 6) acceptance and deployment, finally the web development services deploy and install the system after getting formally approved by the 20 testers; and 7) maintenance, the web development services are responsible for subsequent maintenance and upgrading if and when needed.

In case of the experimental, the section no. 010 was conducted using live streaming video at Pattanakarn campus as a regular class (needed the instructor) by using Wirecast Streaming-Recording. Wirecast is a live video streaming production tool for live streaming to multiple sources including capture any of multiple webcams, monitor displays, images, videos and media files. It allows instructor to create live or on-demand broadcasts for the web application via computer network between two campuses. The other section, the section no. 011 was conducted using streaming video at Romklao campus by using VLC Media Player for supports streaming media over computer network and transcodes multimedia files from the section no. 010. It supports many audio and video compression methods and file formats, including streaming protocols and a large number of free decoding and encoding libraries. Therefore, the students of section no. 011 will be received live streaming as the real time, including the content and communicate synchronously with the instructor via the Internet (computer network). All of events will be recorded into database of the web application. Thus, the system allows students to select and watch any videos and contents, rather than having to watch at a specific broadcast time, which was the prevalent approach with over broadcasting during much of the class as shown in the Figure 3 and Figure 4.

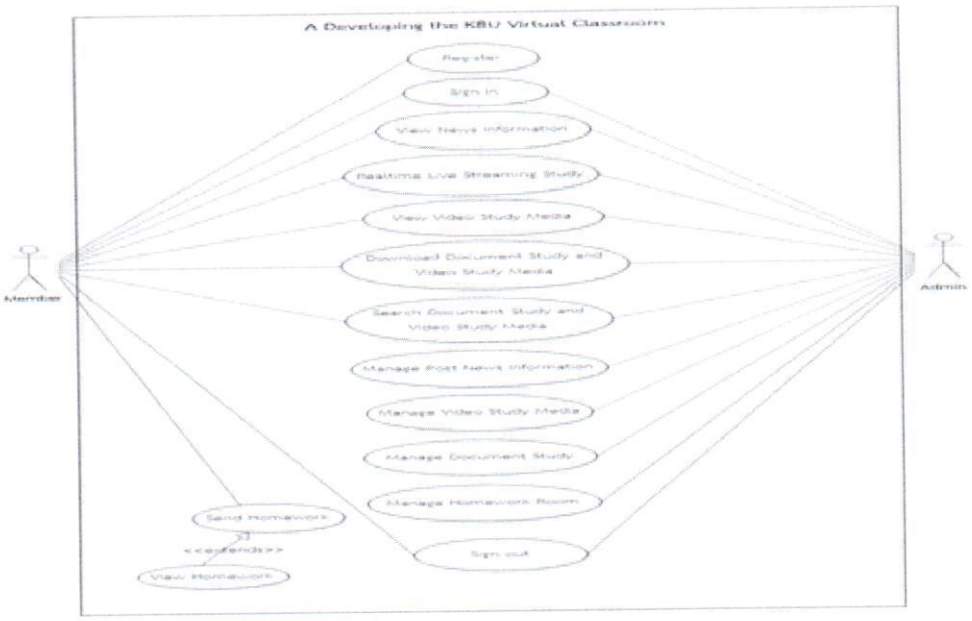

Figure 1 shown use case diagram of a virtual classroom.

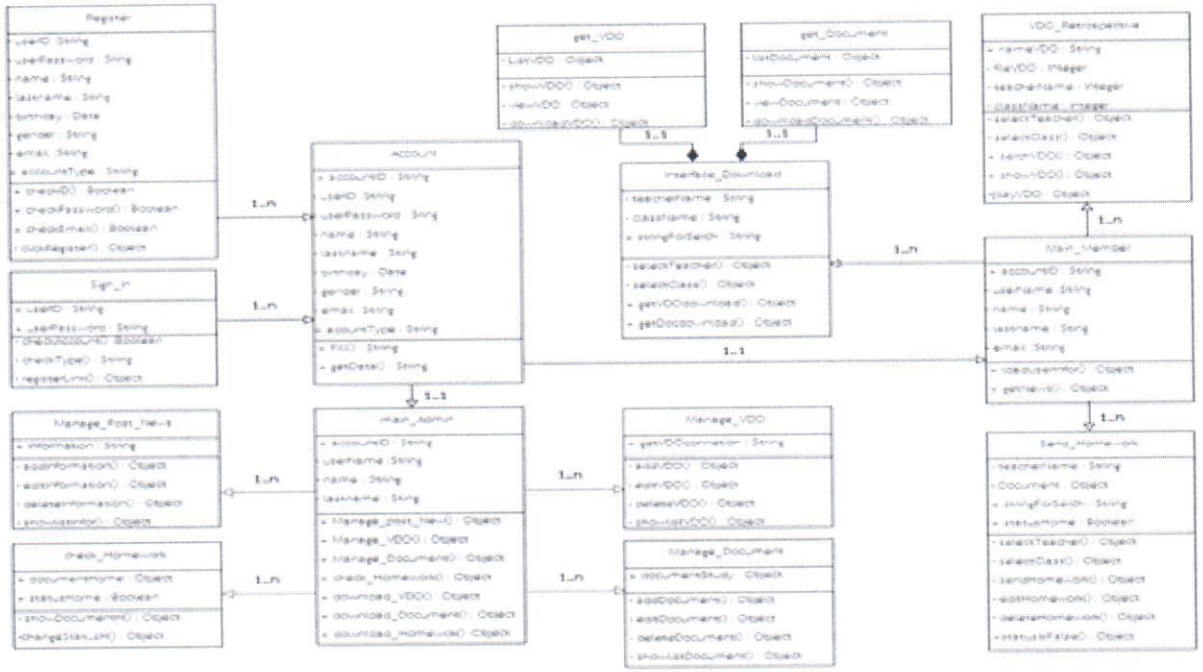

Figure 2 shown class diagram of a virtual classroom.

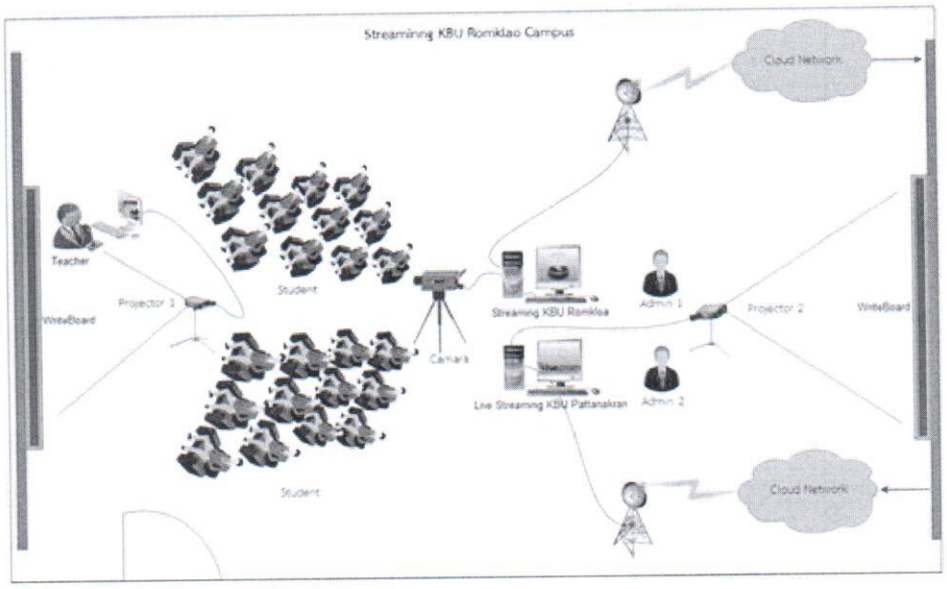

Figure 3 shown model of virtual classroom (Streaming), class section no. 011 at Romklao Campus.

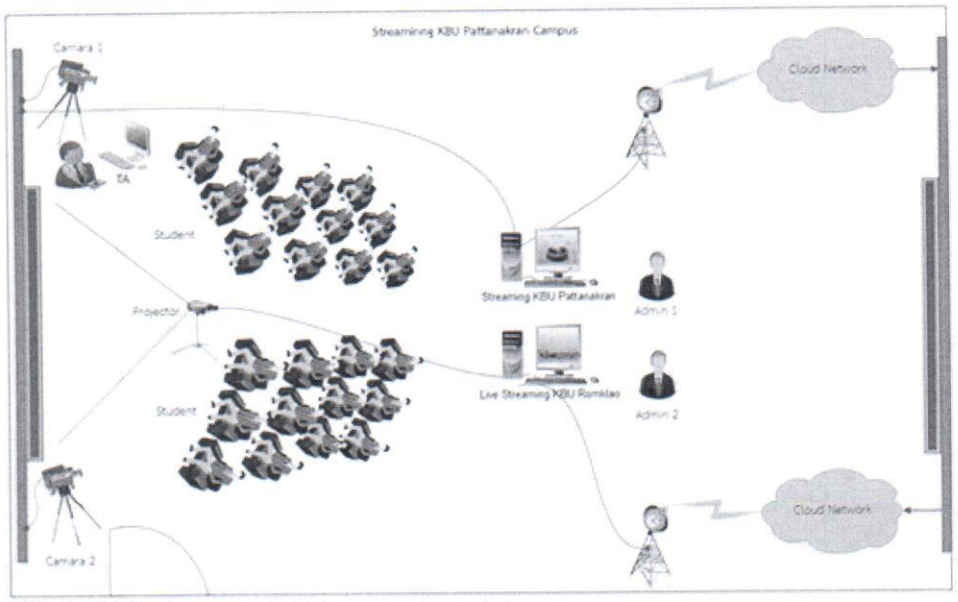

Figure 4 shown model of virtual classroom (Live Streaming), class section no. 010 at Pattanakarn Campus.

5. Results and major findings

The study revealed that (1) the efficiency of a virtual classroom system to compare the students' learning achievement before and after for the students' achievement on the class section no. 011 were 70.57/74.57 on the using streaming video (Romklao Campus), and the other class section (no. 011) were 75.53/76.23 on the using live streaming video (Pattanakarn Campus) as shown in Table 1; 2) the standard deviation and t-test to investigate the students' opinion toward the virtual classroom system used to measure confidence in statistical conclusion that would be computed from population as shown in Table 2; 3) the result of comparing for the students' scores after using the virtual classroom that classified by separated section as shown in Table 3; and 4) the result of student satisfaction survey toward the effectiveness of using a virtual classroom as shown in Table 4.

Table 1 The efficiency of comparing the students' learning achievement before and after using virtual classroom system was significantly higher than after using the materials at the 0.05 level.

Classroom	Number of Student (N)	Pretest		Posttest		t-test
		$\bar{x}$	S.D.	$\bar{x}$	S.D.	
Class section no. 011 (Streaming, Romklao Campus)	30	14.66	3.89	34.77	4.47	.000
Class section no. 010 (Live Streaming, Pattanakarn Campus)	30	14.86	4.04	32.13	6.18	.000

Table 2 The analysis by using statistical tools by percentage, means, standard deviation and t-test the standard deviation and t-test to investigate the students' opinion were revealed that the posttest scores are higher than at the 0.05 level of all lessons.

Lesson	Pretest Scores		Posttest Scores		t-test
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	
6	44.93	7.14	76.33	5.67	40.825*
7	44.77	8.08	76.27	7.63	39.121*
8	43.97	6.07	74.33	6.47	37.905*
9	41.53	8.38	75.23	6.49	37.650*

*P<.05t(.05, df29)=1.699

Table 3 The result of comparing the posttest scores that classified by the section was significantly higher than after using the materials at the 0.05 level.

Sources of Variance	Sum of Squares	df	Mean Squares	F	Sig
Between Groups	190.566	28	6.806	46.677	.115
Within Group	1.46	1	.146		.000
Total	**190.702**	**19**			W

Table 4 The result of student satisfaction survey toward the effectiveness of using a virtual classroom was revealed that the students are strongly agreed.

Item	Evaluation Criteria	mean ($\bar{x}$)	Standard Deviation (S.D.)	Result Discussion
1	A virtual classroom environments	3.93	0.73	Strongly Agree
2	The affective on using a virtual classroom	3.90	0.72	Strongly Agree
Total		**3.92**	**0.73**	**Strongly Agree**

6. Conclusion

This study was corresponded to the hypothesis by our speculation upon the outcome of this study are as follow: 1) the students' achievement on the section no. 011 were 75.53 percent on the using streaming video, while the other section (section no. 010) were 76.23 percent on the using live streaming video. This means that the efficiency of the materials was higher than the 75/75 criterion; 2) the students' achievement on learning after using virtual classroom system by percentage, means, standard deviation and t-test the standard deviation and t-test to investigate the students' opinion were revealed that the posttest scores are higher than at the 0.05 level of all lessons; 3) the result of comparing the posttest scores that classified by the section was significantly higher than after using the materials at the 0.05 level; and 4) the result of student satisfaction survey toward the effectiveness of using a virtual classroom was revealed that the students are strongly agreed.

The virtual classroom system to promote the course code on CS. 213 (Operating System) is supported both of instructor and students that are communicated using voice, video, chat and whiteboard tools which are allowed the instructor and students to participate in real time lessons and discussions. Therefore, this study was corresponded to several researches that are perceived usefulness of the course and instructor efforts to create an interactive environment were the characteristics most strongly associated with student satisfaction. Both of sections, the instructor used an online class to a group of students using a live stream site that brought students online session with live, multi-way audio streaming and real-time video streaming which are efficient in functional equivalence to the other virtual classroom environment that are used high end streaming system [1] [2]. Furthermore, (on the live streaming site) this will make the instructor and his students feel that they are familiar with the session and well aware of how they are doing in their learning and teaching process. Live streaming can help to focus instructor's observations of students' performance

and influence instructor's perspectives of the effectiveness of his methodologies when dealing with various aspects of learning and teaching in the classroom, which can result in instructor's reflection that will lead to the improvement of his teaching and providing support to his students in self-learning and the integration of cognitive abilities with motivation and attitude toward learning which enabled his students to achieve the goals in a high quality learning. The students' level of satisfaction with their own learning process increased [3] [4].

The learning outcomes of the section no. 011 were 75.53 percent on the using streaming video, while the other section (section no. 010) were 76.23 percent on the using live streaming video. This means that the efficiency of the materials was higher than after using the materials at the 0.05 level which according to several studies. Virtual classroom show some deficiencies in a two-way interaction with audio and video. In order to support better use of e-learning in teaching interaction that focus on choice of communication protocol, defining of system server, and requirements of hardware and bandwidth in the process of system development [5]. The use of collaborative learning and role playing in trainees to use virtual classroom had developed trainees' individual skill performance and also in making full use of them. There is a significant relationship between staff members' skill and cooperation in work groups that more skilled teachers were more cooperative in the work groups, while collective performance of work groups was affected by the mean of the skills of the participating teachers, and there was also a significant relationship between the means of the skills of work groups and the final performance of the group [6]. Learning and teaching in case of using virtual classroom in higher education is a term describing virtual courses are used of the Internet that to improve access to advanced educational experiences by allowing instructors and students to participate in remote learning communities and to improve the quality and effectiveness of education by using the computer to support a collaborative learning process [7]. Virtual classroom facilitated increased authentic interaction and encouraged learners to become more autonomous [8]. There is a research has successfully produced a customized web-based virtual classroom system model that provided a viable alternative to the traditional teaching/learning system that improved access to quality education [9] [10].

Recommendations

Based on the major findings, it was recommended as follows: (1) according to this pilot study, we are recommended the system can be used for any courses in university but have to improve access to advanced educational experiences by allowing instructors and students to participate in remote learning communities using personal computer, and to improve the quality and effectiveness of course material and environment; (2) must be added some features into the web application such as, the students can be submitted their homework assignments electronically with an attachment on the web application and including the examination online.

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