Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2010 Proceedings

Americas Conference on Information Systems (AMCIS)

8-2010

MIS2.0: Designing the Next Generation MIS Course Using Social Networking Technology

Peter Ractham
Faculty of Commerce and Accountancy Thammasat University, peter.ractham@gmail.com

Laddawan Kaewkitipong
Faculty of Commerce and Accountancy Thammasat University, lad_k@hotmail.com

Daniel Firpo
School of Information Systems and Technology Claremont Graduate University, Daniel.Firpo@cgu.edu

Follow this and additional works at: http://aisel.aisnet.org/amcis2010

MIS2.0: Designing the Next Generation MIS Course Using Social Networking Technology

Peter Ractham
Faculty of Commerce and Accountancy
Thammasat University
peter.ractham@gmail.com

Laddawan Kaewkitipong
Faculty of Commerce and Accountancy
Thammasat University
lad_k@hotmail.com

Daniel Firpo
School of Information Systems and Technology
Claremont Graduate University
Daniel.Firpo@cgu.edu

ABSTRACT

The major objective of this paper is to explore, via a design science research methodology, the implementation of a social constructivist learning framework for an introductory MIS course. Facebook was used as a learning artifact to build and foster a learning environment, and a series of features and activities using this artifact were conducted to utilize the social interactions amongst the system's users to foster constructivist learning. Various pedagogic strategies were used to integrate activities occurring both inside and outside of the classroom setting to achieve social learning. All features utilized were evaluated based upon activities and interactions amongst all users. The research findings show great potential for the implemented features, as well as the activities conducted to take advantage of these features, suggest possible features for use in similar future studies based on feedback from this study's sample group.

Keywords

Design Science, Innovative Teaching, Social Networking Technology

INTRODUCTION

Background

The rise in popularity of social networking services has garnered much attention from both educators and practitioners worldwide. Such services have been used to help students network, collaborate and share resources with one another for educational purposes (Evans, Kairam and Pirolli, 2009). For example, instructors can use video clips from Youtube to supplement their lectures, record and broadcast their classes through online repositories such as iTunes U, use Wiki technology to facilitate collaborative writing for class projects, and use Facebook to connect and better communicate with their students (Ajjan and Hartshorne, 2008; Chen, Lambert and Guidry, 2009; Albors, Ramos and Hervas 2008).

Although social networking services adoption for educational purposes is a growing trend, many early adopters have not been able to fully maximize its potential. For instance, while instructors may use Facebook as a means to befriend and leisurely communicate with their students to provide their students with additional channels for communication, they may gain very little or no intellectual feedback from them. Hence, this study attempts to design and implement social networking services, such as Facebook within an educational setting. Our primary goal is to build a successful learning artifact that will enable its users to improve their ability to network, communicate and collaborate among relevant parties. In addition, our secondary goal is to gain better understandings for the design and implementation of social networking services within an educational setting. Ultimately, the learning artifact should enhance traditional educational pedagogies in new and exciting ways (Freitas and Neumaan, 2009 and Ebner, Lienhardt, Rohs and Meyer, 2010).

The paper is outlined as follows: first, we explore the concept of Social Constructivism, which provides the theoretical framework for our study. Then, we discuss the purpose for our research, as well as our research question. Then, we give an overview of the Design Science Research Methodology (DSRM), our guiding methodology for carrying out our study. Next,

we examine our results, and then finally, we will thoroughly discuss our findings, research contributions, and suggestions for future works.

Social Constructivist Learning

The design of the learning artifact was based on a Social Constructivism framework. This framework suggests that learning usually occurs as a result of social interactions. Social Constructivism has been described as a student-centered learning paradigm (Vygotsky, 1978; Bruner, 1996). The Constructivist learning theory considers an active learner as an individual node who socially interacts with others and subsequently learns through series of collaborative interactions (Sumontas and Olfman, 2009). Furthermore, Harasim (1990) described the constructivist learning environment as one in which students are engaged and participating with one another to create the learning atmosphere. Hence, it is important for instructors to create such environments by employing different teaching strategies to promote social interaction as well as nurturing some degree of personal relationship with their students. The success factors are strongly determined if the learners feel more involved with the group (Wegerif, 1998).

To ensure a higher possibility of creating a successful constructivist learning environment, we proposed using a popular social networking service, Facebook, as the learning artifact for our classes. We utilized various Facebook features to help our students to network and participate in various class activities beyond the classroom setting. We also offered multimodal communication channels where students can communicate both synchronously (i.e. live picture and video upload) and asynchronously (i.e. discussions and wall posts), to provide them with greater learning potential (Jarvis, Smith, Hallam and Knight, 2007). Our study not only focused on using these services to enhance communication between instructors and the students, but also on creating a social environment where learning can happen interchangeably from both inside and outside of the classroom setting. We also investigated different protocols to create a participatory-based learning environment, where each student shares and discusses their personal experiences with their classmates. Our learning protocols provide a direct linkage from the in-class activities and extend them to communications that take place outside of the classroom setting. We also encouraged our students to take central roles in contributing and participating with one another, while the instructors simply take a supporting role in facilitating and guiding the overall learning process. In doing so, we were able to create a student-learning-centered learning paradigm through the lens of the Social Constructivism framework.

PURPOSE OF STUDY AND RESEARCH QUESTION

The main purpose of this study is to explore the implementation of a social constructivist learning framework for an introductory MIS course at Thammasat University, Thailand. We assumed that the first year students posses very limited knowledge of relevance to the field of MIS, hence our attempts to remedy such a troublesome trend is to design the learning artifact and its mechanisms to enable its users to better collaborate, discuss, and share experiences with one another. Also, although many instructors from our university have shown interest in using popular services such as Facebook for their classes, most still lack an understanding of how to implement them into their class pedagogy. Some only use Facebook to leisurely communicate with their students, while others only use more traditional online communication mediums such as discussion boards. Existing courses that used Facebook in one form or another failed to integrate all features. Instead, most only used the Facebook Wall to communicate with one another, thus limiting our students' learning opportunities. Therefore, our focus is to use Facebook as a learning artifact to solve this problematic situation by designing mechanisms that can ultimately produce an innovative learning paradigm for our current and future courses. Thus, our research question is:

> *How can we design mechanisms to achieve social constructivist learning via a social networking artifact?*

To answer this question, we use our experiences from our IS201 course – Principles of MIS – during the Fall 2009 semester We also employ the Design Science Research Methodology (DSRM) as our research guideline.

METHODOLOGY

Design Science Research Methodology (DSRM)

Design Science provides IS researchers with the guidelines to create and evaluate the effectiveness of IT artifacts in solving identified organizational problems. Additionally, IS researchers can also use Design Science to "create innovations that define ideas, practices technical capabilities and products." (Hevner, March, Park, and Ram, 2004). Thus, DSRM is deemed appropriate in allowing us to create and foster innovative learning environment by using Facebook as our artifact to solve the aforementioned problematic situation. In this study, we follow the six steps of DSRM, proposed by Peffers, Tuunanen, Rothenberger, and Chatterjee (2007). These steps are 1) Problem Identification and Motivation, 2) Design Objective of the Solution, 3) Design and Development, 4) Demonstration, 5) Evaluation and 6) Communication. This gives us strong

guidelines to identify problematic issues; develop a conceptual model; propose possible outcomes; design, develop, test, and evaluate the desired artifact; and make a contribution with our findings.

FINDINGS

In this section, we present and discuss our research and findings through the six-step guideline of DSRM discussed above.

Problem identification and Motivation

Our study, The Facebook Social Learning project, was initiated at an annual MIS department meeting in October 2009. All faculty members from the MIS department discussed various possibilities on how to improve our courses. One of the major concerns raised during the two day session were the recent declines in enrollment in our undergraduate MIS program. The main author proposed the solution of implementing a learning artifact for our introductory MIS courses. The main purpose in following this strategy was to improve our teaching pedagogy as well as to build and nurture long lasting relationships with prospective incoming students. Another faculty member also suggested that the use of the artifact should only be on a voluntary basis. Hence, the consensus was to introduce the learning artifact into the introductory MIS course, IS201 (Principle of Management Information System). The course objectives are to provide students with basic overviews of MIS concepts and allow the instructors to take on the role of knowledge facilitators rather than lecturer. Their main role was to guide the students' learning process instead of simply lecturing the class, which may result in improving learning experiences for our students.

Design Objective of the Solution

Initially, the two main authors discussed the possibility of integrating various tools for our courses. First, we decided that in order for our introductory course to be meaningful with our first year students, we would employ a learning artifact that adheres to a Social Constructivism framework. We wanted the learning process to occur as a result of interrelated social activities which students are actively involved in, and for students to help each other through socialization processes. Hence, we defined our objectives as follows:

1) To successfully implement Facebook for the IS201 course and set up a social learning environment for our students.

2) Utilizing social networking service and employ various innovative techniques to build and maintain relationships with our students.

Design and Development

After series of brainstorming sessions, we selected Facebook for our three courses. The three courses were comprised of 76 first year students. The primary reason we chose Facebook as our learning artifact was because of its popularity amongst our students. This in turn, provided them with a familiar, easy-to-use, and fun technology for learning purposes. We expected that Facebook would require little-to-no learning curve for our students. Once the design criteria were agreed upon, we created a new Facebook subgroup, "IS201," and sent email invitations to all registered students. This subgroup was designed as a closed group, where all members must be authorized to join by the two authors, who also served as administrators for the subgroup.

Demonstration

The two main authors introduced *The Facebook Social Learning project* for all participants during our first class meeting. We explained the project overview and its objectives to all registered students. We also gave a demonstration on how to use different features for class assignments as well as other relevance features. Technical tutorials such uploading pictures and videos, wall posting, and group discussion were demonstrated. In total, there were 88 members for the subgroup, each played important interrelated roles in helping the project to meet its two objectives. In addition, various roles are together reinforcing each other in facilitating the implementation of social learning environment/process. In fact, these different roles are part of the mechanism we have designed in attempt to answer our research question, which is how we can design mechanisms to achieve social constructivist learning via a social networking artifact. All parties involves were expected to be involved in a semester long learning environment by using the artifacts as assigned by the researchers. The 5 assigned roles for each user group are described below (See Figure 1):
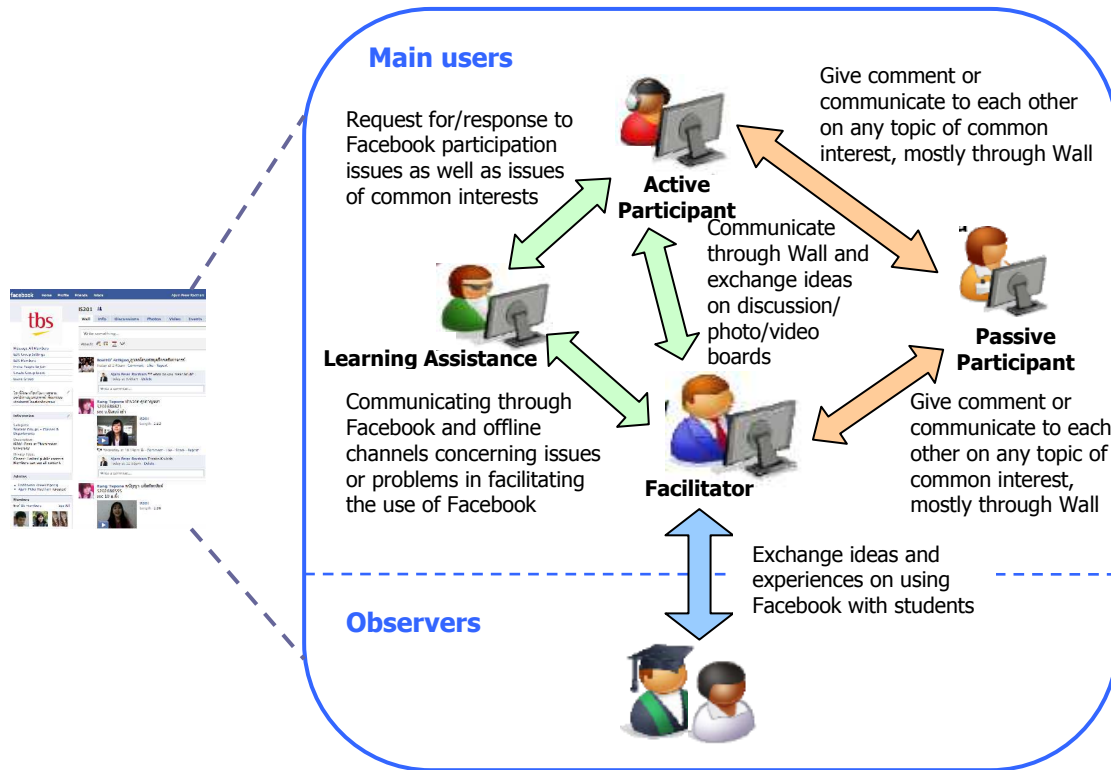
Figure 1: Five roles and interactions in the Facebook group project

1) <u>Learning Facilitators</u> – The two main authors played the role of the learning facilitators. Their main roles were to mediate class participation, lead discussions, and encourage participation and the learning process. Such processes were mediated by the facilitators' attempts to post information, news updates, weekly assignments, teaching thoughts, and class materials.

2) <u>Learning assistant</u> – A fourth year student was assigned the role of Learning Assistant. This student's main role was to assist all participants on any technical and non-technical issues.

3) <u>Active participants</u> –76 students joined the subgroup within the first week. Their main roles were to participate in social interaction, contribute to class discussion, and share learning resources with their classmate. Also, active participants were encouraged to be involved in various in class activities such as taking photos and video of the class discussions and share them with the rest of the group.

4) <u>Passive participants</u> – 6 students from previous semesters also requested to join the subgroup. They played the part of the passive participants where they had no mandatory role. Their main interests were to browse, participate in group discussions, and make informal comments to their friends.

5) <u>Observers</u> – 3 faculty members from MIS and Finance Departments who were interested in using Facebook for their future classes joined our subgroup. They usually remained inactive but frequently gave the two authors perceptive comments and suggestions off-line. This was considered helpful because the three observers also used Facebook to communicate with their students; however their usages were mainly to communicate with their students and were not learning related.

Facebook Social Learning Project Features

To create an innovative learning artifact for our students, we placed strong emphasize on integrating all existing Facebook features to align with our teaching strategies. We believe that by allowing our students to achieve their learning process through a series of interrelated social activities, it'll enable them to achieve their full learning potential for our class. The four features are: Wall, Discussion, Photo, and Video. Each plays important roles to create continuous and lively interactions between group members. The detailed discussions of each feature are as follows: (See Figure 2).

Figure 2: the four features of the Facebook group

1.   Social Playground (Facebook Wall) – The Social Playground utilized Facebook Wall as a centralized space where all subgroup members publicly posted different messages such as class announcements, inquiries, or IT news. The playground also allowed all members to interactively communicate with each other through the comment section. All members were granted permission to make wall posts, comments, and upload pictures and videos on the playground. The Social Playground was designed as a common space where all members can 'meet, greet, and retreat' and have a lively conversation.

2.   Social Discussion (Facebook Discussion) – The Social Discussion feature utilized the Facebook discussion board for all members to converse on various IT related topics. The Social Discussion feature was mainly used as a weekly 'round table' where instructors and students discuss various issues that stem from earlier in-class conversations. Most of the questions posted in this section focused on allowing each member to share their experiences and ideas with others, while linking their ideas to what they learned from prior classes. For example, one of the most popular threads, in terms of number of responses, was: "From our class discussion today, please

share your idea with others on what type of E-commerce business would you want to start in the future and why?"

3.   <u>Social Roll Call</u> (Facebook Photos) – The Social Roll Call utilized the Facebook Photo section. The instructors attempted to create an informal, friendly environment in the classroom setting by taking photographs of various classroom activities, such student presentations and class discussions. Students were also encouraged to use their mobile phones to take their classmates' pictures during class activities. The Social Roll Call was used for the students to share IT related news: students were required to search for up-to-date IT news and share them through the Social Roll Call section. In addition, some students also took photos of the whiteboard written inside the classroom and uploaded them to share with classmates who couldn't make it to class. In addition, the uploaded photos can be tagged, and hence used to identify any students that appear in the photos.

4.   <u>Social Tube</u> (Facebook Videos) – Similar to Social Roll Call, students were encouraged to use their mobile phones to record and upload videos of classmates. The videos were usually of an in-class activity, such as class presentations or group discussions. Also, we asked the students to create a 3 minute evaluation video for our Facebook project in order to help us to better evaluate the artifact.

Project Evaluation

The amount of activity during the 5 months period (October 2009 – February 2010) shows that system performance was satisfactory. There were strong indications of constant interactions amongst all members across the period. In addition, the level of ongoing activity showed positive trends as members conversed on various subjects and topics. Although a portion of online activity was the result of mandatory class assignments, others – such as Wall post comments and photo tagging – were done completely on a voluntary basis. The most popular activities occurred in the Social Playground comments, which saw 380 comments from users. Users actively participated in building dialogue and making comments on each other's posts. Many enjoyed making comments on their friends' photo postings. Also, photo tagging in Social Roll Call was another popular feature where student tagged themselves and their friends in the photos (for a total of 96 tagged photos). This was unexpected, but appeared to be helpful in creating a friendly social environment. The total amount of activity is summarized in Table 1.

Facebook Features	Number of activities	Number of Comments	Number of Taggings
Social Playground	163	380	N/A
Social Discussion	27	651	N/A
Social Roll Call	194	223	96
Social Tube	78	99	8

Table 1: Summary of activities and comments in each Facebook feature

To gain a better understanding of users' experiences, we also asked the 75 active participants to submit 3 minutes evaluation video. The evaluation was based on users' experiences, interactions with other group members, and overall learning impressions. The responses were mostly positive, where most users felt that using Facebook for their class was very helpful in helping them learn in our class. Many were satisfied with Facebook because they were familiar with the technology and welcomed its use as a learning artifact. A student said:

"I like using Facebook in IS201; it gives me the chance to interact with my classmates and the teachers outside of classroom. Since I already use Facebook on the daily basis so it's nice for me to just browse on Facebook and then visit the IS201 group to see what others are up to."

Another student also added:

"Using Facebook for our class was fun, and it's not that difficult to use."

Another student liked the integrative features that allowed multimodal communication among members, which lead to a

strong perceived sense of community.

> "Facebook provides a good tool that integrates existing web technology such as Discussion board, chat, blog and YouTube. The tool provides more of the 'community-based' feeling where I feel comfortable sharing knowledge with the people I network with from my class."

A detailed evaluation of each of the features is discussed below (See figure 3).

Figure 3: Summary of the four social activities in the Facebook group
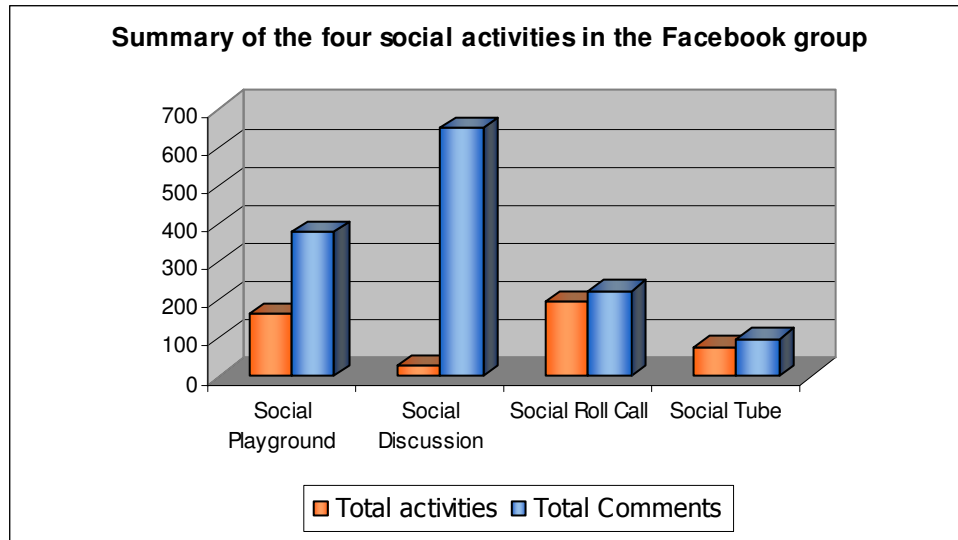
a) Social Playground Evaluation – There were total of 163 wall posts and 380 comments in the Social Playground section. The high amount of activity indicated its popularity, which demonstrates the need for a centralized communication channel where members can interact and communicate with each other. Table 2 captures the total amount of activity in detail by roles and by months. From the table, it can be seen that with little intervention from the instructor and the learning assistant in the first place, the students initiated and sustained a lively dialogue and conversed with one another similar to when people meet in a real-life setting.

Social Playground	October	November	December	January	February
Total posts	41	46	33	33	10
Active Participant comments	70	97	63	26	11
Facilitator comments	3	50	24	17	16
Learning Assistant comments	-	2	1	-	-

Table 2: Total number of posts and comments by Roles and by Months

From the evaluation responses, the majority of students therefore had positive feedback while participating in the Social Playground. Many liked such features due to its intuitiveness and ease of use. In addition, the ability to communicate and get answers from the instructors and/or their classmates was deemed as important to students. A student commented:

> "I like the ability to ask questions on the Facebook Wall where I can some answers from both my classmates and our instructors"

The Social Playground also provides users with a common space where all members could participate in lively conversation via the commenting system. A student stated:

" I like most of the IT news that the instructors posted and many of us also made comments on them, thus helping me to understand various examples that that the instructors often mentioned in our class"

b) Social Discussion – there were a total of 27 Discussions and 651 comments in the Social Discussion section. Total number of topics and comments by roles and by months are detailed in Table 3. The high number of comments from the active participants shows that this feature was actively accessed and utilized.

Social Discussion	October	November	December	January	February
Total topics	3	12	3	6	3
Active Participant comments	17	304	82	142	45
Facilitator comments	4	31	3	13	9
Learning assistant comments	-	1	-	-	-

Table 3: Total number of topics and comments by roles and by months

The discussion topics were extended from various in-class discussions. The intentions were to allow all members to have the ability to participate, carefully constructed their thought, and share with other members their real world experience. This approach proved to be very popular amongst all members. Many students enjoyed sharing knowledge using on Social Discussion where they exchanged and contributed real life experiences with other members. A student said:

"I really like to share knowledge with others on the discussion board. Often times I would be able to clarify what the professor said during his lecture by looking at others' posts. Also I can read my classmates' input on difficult topics I did not understand."

Another student commented on a particular discussion she participated in. She emphasized the ability to tap into her classmate's tacit knowledge, which would have been difficult without an aid of an effective tool:

"One particular topic I really like was for us to discuss our tacit knowledge and share with the rest of the class, that discussion help me to know my classmates' skills or hobbies."

c) Social Roll Call – There were a total of 194 photos with 97 identified tags, and 232 comments in this section (See Table 4). One of the most popular activities on the Social Roll Call was the IT news discussion. Once a member scanned and posted news that was of interest to other users, they started to have lengthy conversations with one another by commenting on each others responses. This led to many lively conversations among the group members. In addition, there were significant tagging of active participants' names to identify each student in photos. Many users enjoyed tagging each other in photos and then making personal comments to each other in the photo's comments section. Photo tagging also provided serendipitous discovery where the two instructors were able to identify all of the 80 students whose photos were tagged by themselves or their friends, hence mimicking the roll call for class attendance.

Social Roll Call	October	November	December	January	February
Total Posts	12	76	64	30	12
Active Participant comments	16	91	28	30	7
Facilitator comments	1	24	1	9	10
Learning Assistant comments	-	-	-	5	-
Taggings	21	75	1	-	-

Table 4: Total number of photos and comments by Roles and by Months

In fact photos tagging was an unexpected discovery to system usage. Some absent students were able to identify their friends

who attended the lecture and then borrowed their notes or class materials.

> "I like the pictures we took from our lectures. It very fun to see our friends in class and sometimes when I missed the lectures, I can see my friends in those pictures or videos, so I can borrow their class notes."

Besides, from Table 4, it can be seen that the number of taggings are relative to the number of comments. Interestingly, this implies that tagging plays an important role in stimulating the social responses.

d) Social Tube – There were a total of 78 videos and 99 comments in this section (See Table 5). For this feature, it can be seen from the numbers that the number of videos, as well as the number of comments are relatively small in comparison to the activity seen with the other features.

Social Tube	October	November	December	January
Total videos	1	9	1	67
Active Participant comments	2	2	-	49
Facilitator comments	1	-	-	45
Taggings	-	-	-	9

Table 5: Total number of videos and comments by Roles and by Months

Nevertheless, from table 5 it can be seen that the number of videos shared in January was much higher than in other months due to the intervention of the Facilitator. The students were assigned to record a video and share their views regarding their experiences in using Facebook to facilitate social learning in the class. It appears that without an intervention from the Facilitators, video sharing seemed to be the least-considered alternative for sharing and learning among the students. The relative complexity with video recording in comparison with the other three activities can account for its low level of use. A student said:

> "Recording video and uploading them to Facebook take too much time and effort. Although I like it when the professor do record and upload our class discussion video on Facebook."

Research Contribution and Propose Recommendations

The study results made two significant contributions. First, we were able to design and implement a learning artifact guided by the social constructivism framework. The learning environment was designed to enhance activities from within classroom setting, and also extend them to the external environment. This led to a successful social constructivist learning environment where learning occurred through a series of social activities (Woo and reeves, 2007). In addition, we were able to engage our students with continuous and interactive learning environments while building and nurturing relationships with them. Our students expressed satisfaction with the different social activities they participated in during the course. They succeeded in sharing knowledge with others as well as achieving social learning through a series of meaningful and relevant activities utilizing the artifact. The different Facebook features also provided users with an easy-to-use, nonthreatening, and collaborative technology, which encouraged continuous social interactions. Furthermore, the majority of our students felt comfortable participating in different knowledge collaboration activities within the social context (Clarke and Cooper, 2000) Although a truly social learning is still difficult to achieve, there might be some room for improvement in the future using more entertaining features such as a social game and or quiz. Many students proposed the idea of incorporating different types of social gaming for our future projects. A student stated:

> "I like all of the features available on our Facebook subgroup, but I wish the instructors would create the Facebook Quiz and Game for our class. I think it'll be more fun and interesting to be able to play the game or take some fun quiz that me and my friends can play together."

CONCLUSION

In our study, the usage of popular social networking services such as Facebook as a learning artifact yields various positive results. Facebook can be used to build and nurture personal relationships between the instructors and their students. Such technology provided our students with a familiar and easy-to-use technology, which can be easily adapted from their personal

use of the technology. The smooth transition from using Facebook at their leisure to in a classroom setting provided great incentives for all parties to embrace the adaptation process and subsequently provide a lively and meaningful discussion, which regularly led to a social learning environment. All parties were able to exchange idea and learn from each others. However, instructors must design and implement such systems in parallel with social constructivist strategies, which rely heavily on synchronized interactions and participation from all members. Both active and passive participants must be given equal importance to ensure learning continuity throughout the system life cycle. Carefully crafted and constant participation from both instructors and students are crucial to maintain interest in the system. Both technological features and classroom strategies must also synchronize with one another, while extending the learning process beyond the classroom setting. In hindsight, the instructors must embrace the role of learning facilitators and utilize the learning artifact to harness the network effects and push users to generated content. Student experiences and other relevant real world activities should be embedded within the lesson plans, thus enabling the students to maintain their interests and subsequently gain a better understanding of the subject matter. This study contains limitation where the researchers were directly involved with the subjects, which might resulted in creating biases by the users (our students). Another limitation is an inability to accurately measure the learning effectiveness. For example, students may have the wrong perceptions of giving the system positive feedbacks to increase their grade. Hence, future research should also include different measurement techniques such as survey and in-depth interview with different users from the group.

It can be concluded that social networking services such as Facebook has great potential for future educators and practitioners. Also, future research is needed to learn how its use can be improved. One could consider smart phone usages to further enhance learning ubiquity amongst all users. This could also extend the ubiquitous learning processes for a new generation of learners. Furthermore, social games and quizzes may be used to generate more interests amongst younger users.

REFERENCES

1. Albors, J., Ramos, J. C. and Hervas, J. L. (2008) New Learning Network Paradigms: Communities of Objectives, Crowdsourcing, Wikis and Open Source, *International Journal of Information Management*, 28, 194-202.

2. Arjan, H. and Harshrne, R. (2008) Investigating Faculty Decisions to Adopt Web 2.0 Technology; Theory and Empirical Tests, *Internet and Higher Education*, 11, 71-80.

3. Bruner, J. S. (1996) *The culture of education*, Cambridge: Harvard University Press.

4. Ebner, M., Lienhardt, C., Rohs, M. and Meyer, I. (2010) Microblogs in Higher Education – A Chance to facilitate Informal and Process-Oriented Learning? Computers & Education, doi:10.1016/j.compedu.2009.12.006

5. Evans, B. M., Kairam, S. and Pirolloi, P. (2009) Do Your Friends Make You Smarter?: An Analysis of Social Strategies in Online Information Seeking, *Information Processing and Management*.

6. Freitas, S. D. and Neumaan, T. (2009) The use of 'exploratory learning' for supporting immersive learning in virtual environments, *Computer & Education*, 52,2, 343-352.

7. Harasim, L. (1990) *On-Line education: Perspectives on a new medium*, New York: Praeger/Greenwood.

8. Hevner, A. R., March, S. T., Park, J. and Ram, S. (2004) Design Research in Information Systems Research, *MIS Quarterly*, 28, 1, 75-105.

9. Kasemvilas, S. and Olfman, L. (2009) Design alternatives for a MediaWiki to support collaborative writing, *Journal of Information, Information Technolog*y, *and Organizations*, 4, 87-106.

10. Peffers, K., Tuunanen, T., Rothenberger M. and Chatterjee S. (2008) A Design Science Research Methodology for Information Systems Research, *Journal of Management Information Systems*, 24, 3, 45-77.

11. Woo, Y. and Reeves, T.C. (2007) Meaningful Interaction in Web-based Learning: A Social Constructivist Interpretation. *Internet and Higher Education*, 10, 15-25.

12. Wegerif, R. (1998) The social dimension of asynchronous learning networks, *Journal of Asynchronous Learning Networks*, 2(1), 34-49.

13. Vygotsky, L. S. (1978) *Mind in society. Cambridge*, Harvard University Press.