Students' Learning Behavior, Motivation and Critical Thinking in Learning Management Systems

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Abstract

Computer mediated communication (CMC) offers new opportunities for learners to create communities of inquiry that allow for more active learning. This paper reports on the use of a Learning Management System (LMS) as a tool to facilitate students' writing and critical thinking skills. The primary data for the study came from students' online learning records and from discussion forum postings in the LMS. It was found that students' motivation to learn was at a high level. Most importantly, student motivation was positively correlated with their learning behavior. Although male and female students did not differ in their motivation and learning behavior, messages in the writing forum indicated that female students had higher critical thinking skills than male students. "Explaining" messages appeared the most often, while "interpreting" messages appeared the least. The process of text-based online discussion in the forum had the potential to enhance the students' writing skills, encourage their critical thinking, and help them write more systematically. The practical implications of these findings are discussed.

Keywords: writing, online discussion, learning management system, online learning, critical thinking

INTRODUCTION

Computer mediated communication (CMC), such as e mail, blogs, computer bulletin boards and electronic discussion boards, has been considered to be a facilitator that allows students to learn collaboratively. Since CMC has the attributes of interactive networked communications but is in written form, it is used as a platform for language students to acquire writing skills through practicing various forms of activities (Smith, 2003). To ascertain its effectiveness, researchers have investigated various issues related to CMC in the fields of second language acquisition and computer-assisted language learning (CALL), and many effects of the use of CMC on learners' language performance have been reported (Hirotani, 2009). Nowadays, the use of Learning Management Systems (LMSs) such as Moodle or Blackboard has become widely popular in tertiary education (Schroeder, Minocha, & Schneider, 2010). The term Learning Management System (LMS) refers to server-based software that controls access to and delivery of online learning resources through a standard web browser. Many teachers make use of the tools in an LMS to facilitate students' learning. When students do activities, use materials, or do tasks and quizzes online, the teacher can get feedback, and can score and track students' progress. More interestingly, communication tools in an LMS enable the learners to interact with their classmates or with their teachers. The most commonly available communication tool is an announcement used to give all learners new information about a course, including the latest news and upcoming events. Another interesting communication tool is a discussion forum where both teachers and learners can post their messages and read the comments from others.

Writing in the CMC context, in particular, has helped instructors to develop English courses which are more engaging and challenging because of the various features CMC offers. It allows students to interact with each other through written messages (considered as the

medium of communication), and the posted information can be reviewed and analyzed before it is uploaded (asynchronous learning). This text-based communication in online discussion has the potential to enhance students' writing skills and encourage their critical thinking and thus a more deliberate articulation of ideas (Stein et al., 2007). Some researchers have therefore studied the effectiveness of strategies to improve the quality of online discussion and facilitate students' cognitive presence. For example, Gilbert and Dabbagh (2005) examined the impact of facilitator guidelines, posting protocols and online discussion evaluation standards on students' meaningful discourse in asynchronous online discussion. They reported that evaluation criteria, specifically those that were timely, and even discussion contributions, had a positive influence on students' meaningful discourse. Swan, Schenker, Arnold and Kuo (2007) also found that students responded more often to others and discussed topics in greater depth after they were informed of the evaluation criteria for online behavior. Furthermore, Bai (2009) reported on using the practical inquiry model as a discourse guide for facilitating students' critical thinking in online discussion. It was found that all the postings of students who had no knowledge of the inquiry model fell into the exploration phase, except three postings in the triggering events phase and two in the integration phase.

In comparison, the postings of students who used the model as a guide included more instances of integration than the postings of those who did not know about the model. No instance in the resolution phase was found. The findings indicated that providing students with an inquiry model raised their awareness of critical thinking and helped them to engage intentionally in reflection and higher-order thinking when responding online.

Critical thinking skills are, therefore, deemed to be a critical issue for writing in the CMC context. According to Lang (2000), critical thinking is a dialogical process that produces an

increasingly sound, well-grounded, and valid understanding of a topic, and involves participants developing and examining their ideas as fully as possible, presenting them clearly and credibly to others, and examining and challenging the ideas of others. Paul and Elder (2008) describe the critical thinker as one who raises vital questions and problems, formulates them clearly and precisely, gathers and assesses relevant information, and then uses abstract ideas to interpret that information and draw well-reasoned conclusions. The critical thinker then tests those conclusions against relevant criteria, thinks open-mindedly within alternative systems of thought, recognizes assumptions as well as implications and consequences, and communicates effectively with others. Although the ability to apply critical thinking skills in new contexts can be taught and practiced, students need to be inculcated into a critical thinking attitude so that they are brave enough to risk being wrong, and wise enough to realize that much can be learned from errors and failed solution (Neslon, 2005). The instructor can provide moments of metacognitive reflection by making the students have conversations with their teammates. The team pursues consensus on a specific question, thereby making various kinds of thinking explicit and open to exploration by the members of the team (Sweet & Michaelsen, 2012).

When different strategies are employed in an online environment, what impact will they have on students' behavior and motivation? In a face-to-face classroom, it is not difficult to evaluate students' behavior and motivation. The teacher can check their attendance and notice their facial expressions (Chyung, 2007). However, these evaluation methods cannot be used with students in an online class. So an evaluation of learning behavior and motivation may derive from the students doing exercises, submitting assignments and posting messages in the LMS. Motivation has been identified as important to success in online learning (Antino, 2008) since it is the incentive or energy that drives an individual to take an action

(Reeve, 2005). Yang et al. (2006) found that motivation positively influences social presence among peers in online collaborative learning. In addition, students in online classes have a high degree of autonomous freedom and can choose their own learning preference, which might be beneficial for learners with intrinsic motivation (Ryan & Deci, 2000).

There are many studies investigating online learners' behavior in relation to their participation, but the results are inconsistent. For example, the findings of Wu and Hiltz (2004) were that students' participation in online discussions improved their perceived learning. Likewise, Xie, DeBacker, and Ferguson (2006) conducted a survey study examining students' motivation and their participation in online discussion activities. They also investigated the trends and changes in students' motivation over time. The results indicated that students' participation was related to their intrinsic motivation. Over time, students' intrinsic motivation for participating in online discussions dropped steadily. The interviews indicated that students' motivation was impacted by the instructor's involvement, interaction with peers, discussion topics, course requirements, and system functions. Another study showed that motivation had a significant relationship with online participation (Xie, Durrington, & Yen, 2011). Unlike research conducted by Chyung (2007), data from this study show that the students' online behavior was not a predictor for their motivational status, though there were gender differences in their online behavior. However, the findings in many pieces of research indicate that the quality of online discussions was heavily dependent on learners' motivational development (Xie et al., 2006; Tuckman, 2007; Cheung, Hew, & Ling-Ng, 2008). In this respect, low levels of participation contributed to a failure of the online discussion.

In the current study we intended to investigate students' motivation and learning behavior when some activities of an LMS were included in the course syllabus. It is useful to find out whether students' motivation is related to their online behavior, measured by the number of posted messages, doing exercises as well as submitting two assignments. There is still a question whether gender will be one factor affecting their motivation and behavior in online learning, since a variety of research sources found that males and females experienced the online learning environment quite differently (Anderson & Haddad, 2005; DeNeui & Dodge, 2006). For example, females were found to use computer-mediated platforms like Blackboard better than males; they also outperformed males academically (DeNeui & Dodge, 2006). To address this, the current study examined whether gender made a difference in students' online behavior and motivation when an LMS is used. In addition, it is necessary to learn more about students' critical thinking skills when they work in an LMS. It is hoped that the findings of the current study will provide valuable guidelines for supporting effective online discussion activities in EFL classes.

RESEARCH METHODOLOGY

The Participants and Setting

This study was conducted with 83 students (40 male and 43 female) who enrolled in an undergraduate English course in the first semester of the 2011 academic year. The course was a 3-credit, 14-week compulsory course. The students met the instructor in class once a week for two periods (70 minutes per period). They were also required to practice listening and speaking skills through computerized language learning in a self-study language laboratory for one period a week. Since the course was aimed at enhancing students' skills in reading and in writing logical responses to texts, through a Learning Management System, students would have more time in class to develop their speaking skills, vocabulary and everyday use

of English grammar. That is, the whole process of writing summaries and writing personal responses needed to be done online.

Online Learning Environment

Bangkok University Learning Management System (BU LMS) provides a space for creating an online course. This system helps to facilitate learning since students can download any documents related to the course contents, do a self-study, post information in the discussion forum, and submit their assignments online.

To make good use of this system, the Fundamental English I Course required students to do a self-study of how to write a good summary and a personal response, in the LMS. The PowerPoint presentation uploaded on the LMS instructed them how to summarize a story using the "Mind Mapping" technique in order to discover the main ideas and important supporting details. After that, the students did eight exercises related to skimming for main ideas, using context clues, and writing a summary. For the summary, students were required to summarize the content of a reading passage by writing a summary of about five sentences, stating what the passage was mainly about. There were two pieces of summary writing which were to be submitted, by uploading them in the LMS before the due date. In order to get full scores for the summary writing, students' work needed to conform to five rules: 1) mention the source and the author at the beginning of the summary, 2) give the right main idea, 3) provide all supporting details, 4) correctly interpret the original, and 5) use the student's own words to write a summary

Although the discussion forum is aimed to be a place for general topics, Fundamental English I Course took advantage of it as a platform for students to practice their writing skills. This activity is called the "writing forum". To allow students to know what "good input" is, they

practiced by giving their reflections by describing, explaining, expressing their likes or dislikes of what others had posted, interpreting, and showing their agreement or disagreement with other students' thoughts. Then they wrote in the forum which was organized like a platform to give them a kind of intellectual participation. With this text-based forum, students could initiate their own discussions or contribute to discussions initiated by others. There were two main objectives of CMC writing in this course which were 1) to encourage language use in writing to communicate with others through the medium of the computer and 2) to encourage critical thinking in the context of CMC writing.

All students had to participate in the forum writing activity for 8 weeks starting in week 3. The student took turns to post a topic for discussion in the LMS web-board. The topic was written in a paragraph (of at least eight sentences) to express ideas or opinions in a way that challenged other students to discuss them. Each posted topic required a response in a well thought-out paragraph from others. The response messages were supposed to show how the students could think critically. All in all, everyone had to post a topic twice and respond to another eight topics. In this activity, the instructor acted as a facilitator who often read students' writing and gave suggestions about the grammar and mechanics of writing. To make this writing forum more attractive, students would have 10 points to earn, and they were informed beforehand of the standard for assessing their writing.

Although online learning has the potential to foster a higher level of motivation for learning, students' academic integrity has become a major concern. So it is necessary to address issues of academic misconduct by reminding students before they post information or upload assignments online. By doing this, academic dishonesty is likely to decrease. In the current study, the rules were adapted from the questionnaire in Spaulding's work (2009). Students

were informed that they would immediately get zero if they carried out one of the actions below:

1. Copying sentences, phrases, or paragraphs without using quotation marks.
2. Developing their own work as a combination of two or more different sources, using rephrasing and synonymous words.
3. Copying a whole piece of work through cutting and pasting without any changes and presenting the content as their own.
4. Receiving unauthorized aid from another person.
5. Allowing another person to copy from their work.
6. Preparing work for another student to submit for posting.
7. Using another person's ideas, thoughts, or opinions by rephrasing in their own words.
8. Lending work so another student could hand it in as his or her own work.
9. Borrowing work for the purpose of handing it in as their own work.
10. Submitting the same work, or substantially similar work, in more than one course.

Instrumentation

For investigating students' online behavior, two measurements were used – the number of participations and the number of messages. Participation was defined as doing an exercise or submitting an assignment, while the number of messages was from postings. For each student, the researcher counted the number of participations and the total number of messages he or she posted during the course.

To examine students' motivation, an opinion questionnaire investigating how the students felt about learning through the LMS was distributed to them. It consisted of ten items. The Likert five-rating scale (1= strongly disagree, 2= disagree, 3 = neither agree nor disagree, 4= agree, and 5 = strongly agree) was used for a post-study survey in an experimental group. The draft

questionnaire items were checked for their content validity by three experts in the English teaching field. Items with an IOC index higher than 0.6 were acceptable. In order to test the reliability of the questionnaire, the questionnaire was piloted with 40 undergraduate students in the first semester of the 2010 academic year after they had participated in an 8-week pilot learning course, and the reliability was calculated using Cronbach's Coefficient Alpha. Internal reliability of the 10 statements was at an acceptable level: the Cronbach Alpha value was 0.86.

Data Analysis

Correlation coefficients were used to find out the relationship between students' online behavior and their motivation. Independent t-tests were adopted to analyze the differences between male and female students regarding their online behavior and their motivation in learning through the LMS. In addition, content analysis was used to examine students' critical thinking in their posted messages. Data was analyzed according to the following coding types: 1) explaining ideas, thoughts and reasons, 2) describing, 3) interpreting, 4) expressing likes or dislikes, and 5) showing agreement or disagreement. When a message contained evidence of more than one type of content, it was coded under multiple categories. Therefore, the total number of instances of all five types may be larger than the number of messages.

Research Results

Table 1 showed that students posted an average of 8.80 messages. The table also reports that the average score obtained from students' record of doing exercises and submitting assignments was 7.84, when the possible minimum and maximum scores were 5 and 10.

Table 1 Mean and Standard Deviation of online behavior of students

	Min	**Max**	**Mean**	**S.D.**
Doing exercises and submitting assignments	5	10	7.84	1.28
Messages on the discussion forum	6	10	8.80	1.11

Table 2 demonstrated the overall mean score of motivation which was at a high level ($\bar{X}$ = 4.12). The first highest mean score fell on item no. 1 (I am more motivated to learn than usual), followed by item no. 6 (I think learning through LMS doesn't give me too much burden), and item no. 10 (Supplementary sheets, PowerPoint, and exercises provided in LMS are advantageous). The lowest mean score was for item no. 7 (I can control my own learning when I study through LMS).

Table 2 Mean and Standard Deviation of motivation

Motivation to Learn through LMS	**mean**	**S.D.**	**Meaning**
1. I am more motivated to learn than usual.	4.34	.59	high
2. I feel that the process of posting in the discussion forum is interesting.	4.02	.58	high
3. I am satisfied with the quality of the assignments and postings.	4.16	.59	high
4. I think LMS is a useful tool for language learning.	4.00	.73	high
5. I think studying on my own in LMS enables me to become mature and self-disciplined.	4.02	.56	high
6. I think learning through LMS doesn't give me too much burden.	4.24	.66	high
7. I can control my own learning when I study through LMS.	3.98	.62	high

8. Posting in the discussion forum enhances my critical thinking skills.	4.07	.66	high
9. Posting in the discussion forum helps me to improve my writing skills.	4.14	.57	high
10. Supplementary sheets, PowerPoint, and exercises provided in LMS are advantageous.	4.23	.67	high
Total	**4.12**	**.29**	**high**

The primary purpose of this study was to examine the relationship between students' motivation and their learning behavior. Data about motivation was collected from the questionnaire, and participation was calculated based on the number of times the students did exercises, submitted assignments, and posted messages in the discussion forum. The Pearson Correlation coefficient was used to analyze for a relationship. The findings revealed that a student's motivation was positively correlated with how much the student participated in the LMS, $r = .246$, $p < .05$. That is, the higher their learning motivation, the more students participated in the LMS. When looking at the detail, it was found that doing exercises and submitting assignments were two activities which made the correlation stronger. That is, a positive relationship existed between motivation and the two activities, $r = .413$, $p < .001$. However, motivation was not found to relate to posting messages in the forum, $r = -.101$, $p > .05$.

Table 3 Intercorrelations between Motivation and Learning Behavior

	Motivation (n= 83)
Doing exercises + submitting assignments	.413 (.000)
Messages in the discussion forum	-.101 (.362)
Total of online learning behavior	.246 (.025)

An independent t-test analysis was employed to examine if there was a significant difference between the two groups of students in their motivation. The results revealed that there was no statistically significant difference in students' motivation between the two groups at the level of .05. That is, male and female students were not different in their motivation to learn through the LMS. So gender was found to have no effect on motivation.

Table 4 Students' motivation for learning online classified by gender

Variable	n	mean	S.D.	df	t	Sig
Male	40	4.05	.29	81	-1.91	.060
Female	43	4.17	.28	74.02		

An independent t-test analysis was employed to examine if there was a significant difference between the two groups of students in their learning behavior. The results revealed that there was no statistically significant difference in students' learning behavior in the LMS between the two groups at the level of .05. This means that male and female students had similar learning behavior, as demonstrated in Table 5.

Table 5 Students' online behavior in the LMS, classified by gender

Variable	n	mean	S.D.	df	t	Sig
Male	40	16.36	1.62	81	-1.31	.193
Female	43	16.85	1.73	77.68		

To determine the extent to which they engaged in each of the five types of reflection, a total of 730 messages posted by the students was analyzed and coded. Table 6 shows the number of instances of each type of content. For both male and female students, nearly all of the instances were of messages explaining ideas, thoughts and reasons, because it was rather easy to reveal what they perceived on a particular topic. In this type of message, students simply gave personal responses. "Describing" is something on which students focused more than expected. This is probably because many posted topics were places, fashion, food, and movies, requiring students' descriptions to clarify the concepts or pictures. Students also liked to show their agreement or disagreement before they explained their thoughts. Expressing like or dislike is mostly avoided, so there is not much expression of students' feelings. For Thai students, it is not polite to show bias on any issue when discussing it with others. Interpreting was the least common type of content the students used in their messages. In addition, it was found that the topics posted in the forum were not complicated. There were more instances of critical thinking in messages from females than in those from males. Female students' posts seemed to fall into multiple types of content more than those of male students.

Table 6 Number of instances and types of messages in relation to critical thinking, classified by gender

	explaining ideas, thoughts and reasons	describing	showing agreement or disagreement	expressing likes or dislikes	interpreting
Male (n=40)	278	204	142	12	8
Female (n=43)	350	265	198	58	16

DISCUSSION

It is interesting to see that students' motivation to learn through the LMS was high. From this it can be concluded that the students accepted computer mediated communication. This might be due to the fact that the students were excited about an online learning experience. In the past, all tasks were done in class, and with a time limit, so they hurried to complete the tasks. Online activities were done under their own control; they had more time than usual for critical thinking. One of the reasons why they were so enthusiastic was their expectation of earning points after completing the given task. They realized that taking part in the LMS activities was a part of the course requirements, and that they would earn points if they did what the scoring criteria provided. The number of posts, the names of the posters, the number of viewers, and the post dates could be seen by the instructor. These records were indicators of students' interest and participation. From the current study, it is noted that students logged on to reply to a new posting very quickly, and the large number of viewers indicated their interest in reading other messages even though they did not reply to those messages.

One important finding was that the students' motivation was correlated with their online learning behavior. The more motivation students had, the more they participated in the LMS. So, in organizing any online activities, it is necessary to inform students of what benefits they will earn, followed by a clear explanation and guidelines about doing the tasks. It can be assumed that in this study students saw the advantages of working through the LMS, so they were very active and motivated to learn. The result is also congruent with the motivation questionnaire result. The item with the highest mean score was "I am more motivated to learn than usual." This result was in accordance with the results of Xie et al. (2006), in that students' participation was related to their intrinsic motivation.

The findings showed that male and female students did not differ in their motivation and behavior when learning through the LMS. The reason for these findings could be that participating in activities online is rather new and exciting for students; they did not do it just because it was a requirement of the course, but they enjoyed this new learning experience. Contributing to different activities of the LMS empowered them to become autonomous learners. They had the power to take an active role in their own learning. Online learning tasks seem to be motivating for all students, and should be provided more in the future. However, the current result is not inconsistent with Chyung's study (2007) which found that there were gender differences in students' online behavior.

Additionally, using the discussion forum as a platform for EFL writing did not only have a positive effect on students' writing ability and motivation, but it also helped to improve their critical thinking skills. With this text-based forum, students had opportunities to respond to topics which had already started and to initiate new topics. Since students had been

instructed on how to think critically in describing, interpreting, explaining ideas and thoughts, and arguing, they could convey their ideas more systematically. It is noticeable that their postings conveyed what they thought critically. Most sentences were not complicated and were quite easy to understand. That is, the instruction helped them to become aware of the characteristics of accepted responses. Another supporting reason is probably that students were told about scoring criteria before they participated in the writing forum. This finding was consistent with Gilbert and Dabbagh's work (2005) regarding evaluation criteria which had a positive influence on students' meaningful discourse. Also, it can be supported by Swan et al.'s work (2007), revealing that students responded more often to others and discussed topics in greater depth after they were informed of the evaluation criteria for their online behavior. Moreover, although the number of messages female students posted was no different from the number of messages posted by male students, an analysis of the messages indicated higher critical thinking skills in all categories among females. So the finding was in accordance with some previous studies (Anderson & Haddad, 2005; DeNeui & Dodge, 2006) which demonstrated that females outperform males academically in online learning.

Implication for Classroom Practice

The positive result of this study implies that a Learning Management System can be used to facilitate students' learning in English courses; however, in order to enhance students' other skills such as cooperative working skills, creating deliberate learning communities by assigning group activities is another way to maximize student engagement. To do this, contributions to the writing forum could be made in groups. The teacher could ask students to form groups of 7-8 students. Each group would take it in turn to post a topic for discussion in the forum. Every week other groups would log on to write responses to the topic, in a well thought-out paragraph. Although the study's findings supported the use of CMC in the classroom for the development of the learners' critical thinking skills, it is suggested that

asynchronous CMC should be used for supplemental tasks for learners in order for there to be more time for other skills to be practiced in a face-to-face learning environment.

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