

Perceived difficulty and usefulness of learning management systems: A survey on the CaLabo LMS (Bridge)*

Daisuke Nakamura

Abstract

The present paper investigated students' perceived difficulty and usefulness of learning management systems (LMSs) with relation to aggregated log frequency. Freshmen ($N = 19$) engaged in the Integrated English Writing 1 class answered the questionnaire on the difficulty and usefulness of the LMS (CaLabo LMS powered by the CHieru company) at the end of the semester. The results showed that only five of 19 students felt some difficulty but they could somehow manage to use the LMS. Two representative LMS functions that students felt difficulty in were the Virtual Private Network connection and uploading a file onto the LMS. Despite such difficulties, almost all students ($N = 18$) perceived usefulness of LMS for their learning in terms of (1) content sharing and resultant confirmation check; (2) data-based homework submission; (3) checking feedback on homework assignments and resultant communication between an instructor and students; and (4) increased PC uses. However, neither perceived difficulty nor usefulness of the LMS had any correlations with aggregated LMS log frequency.

Keywords. Learning Management Systems, perceived usefulness, perceived difficulty, log frequency

* I would like to thank Miyako Kato (the CHieru company) and Foreign Language Laboratory staff at Aoyama Gakuin University for their continuous support for using the CaLabo LMS, which resulted in decreased perceived difficulty and increased perceived usefulness of the LMS.

ISSN 0910-500X

英文學思潮

THOUGHT CURRENTS IN ENGLISH LITERATURE

VOLUME LXXXVII

2014

THE ENGLISH LITERARY SOCIETY
OF

AOYAMA GAKUIN UNIVERSITY

青山学院大学英文学会

Learning Management Systems (LMSs) or Course Management Systems (CMSs), "server-based application used to present materials and services required for blended or distance learning (such as syllabi, required reading, calendars, etc.)" (Golonka, Bowles, Frank, Richardson, & Freynik, 2014, p.72), has been widely adapted for higher education and thus their employment is ubiquitous among universities. For instance, Browne, Jenkins, and Walker (2006, cited in Lonn & Teasley, 2009) found that 95 % of universities in UK adapted LMSs. Many types of commercial and original LMSs are available and representative LMSs are Blackboard, Moodle, and WebCT (McGill & Klobus, 2009; Parker, Bianchi, & Cheah, 2008; Selim, 2007; Thang & Bidmeshki, 2010; Tsai & Tally, 2013; Yohon, Zimmerman, & Keeler, 2004; West, Waddoups, & Graham, 2007). Such widespread availability and the spreading use of LMSs have resulted in a proliferation of studies on various functions of LMSs (Malikowski, Thompson, & Theis, 2007). A spatial issue of the use of LMSs discussed in *Interactive Learning Environments* (Garcia-Penalvo & Forment, 2014) shows clear evidence for research proliferation.

One of the most used functions of LMSs is referencing or content sharing such as the uploading of PowerPoint slides (Malikowsky et al., 2007; Schoonenboom, 2014; Yohon et al., 2004). However, LMSs contain various functions such as grade books, bulletin boards, shared group workspace, quizzing, chat rooms, etc. (Koszalka & Ganesan, 2004), which aim to assist different aspects of learning and teaching. For example, one value of bulletin boards for learning was that they help learners to interact with other peers socially, and of value for teaching was traceability of discussions, according to Koszalka and Ganesan (2004).

Some studies showed that such potential values of LMSs for teaching and learning led to actual second language learning indeed. For example, Tsai and Tally (2014) taught reading strategies using Moodle and compared it with a traditional reading instruction on reading comprehension and strategy use. The results showed that those who received the Moodle-based strategy instruction developed reading comprehension better than those who received

the traditional textbook-based instruction. Furthermore, Moodle-based strategy instructions actually pushed learners to develop reading strategies, especially cognitive and metacognitive strategies. Sanprasert (2010) found that LMSs led to learner autonomy. In this study, Thai learners of English learned English through an original LMS called M@xLearn and the results of a Cotterall's (1995) questionnaire on learner autonomy and learner journals indicated that learners developed important aspects of autonomous learning such as independence and self-confidence. These facilitating effects of LMSs on learning clearly show that "language teaching, like other professions, is changing as the result of pervasive use of technology and therefore teachers need to be able to use and develop technology-based learning materials most conducive to language learning" (Heift & Chapelle, 2012, p. 565).

If LMSs have such beneficial functions for learning, it should be the case that all instructors actively adapt LMSs in their class. However, there is huge variability in the degree of utilization of LMSs among instructors (Lonn & Teasley, 2009; Schooneboom, 2014; West et al., 2007; Yohon et al., 2004). For example, only 37% of instructors adopted WebCT in their liberal arts and science classes (Yohon et al., 2004). Moreover, as described above, many instructors adapted the content sharing function of LMSs (Malikowsky et al., 2007; Schoonenboom, 2014; Yohon et al., 2004). Despite such a lower employment rate, instructors surveyed by Yohon et al. (2004) declared that WebCT reduced their time and improved their teaching. In contrast, more than 80% of instructors adapted LMSs in Lonn and Teasley's (2009) study for similar reasons: saving time, helping management of class activities, and improving communication between instructors and students. Therefore, it is important to clarify how instructors decide to employ LMSs. Two such models are identified in the literature.

West et al. (2007), based on Rogers' (2003) Innovation-Decision Model, identified five phases of instructors' decision-making processes. After (a) acquisition of knowledge of LMSs, they are (b) persuaded to adopt LMSs by their colleagues or students and (c) decide to use some functions of LMSs. Continuing to use LMSs, they (d) are faced with some technical and

integration challenges (e.g. how to adopt LMS functions with their pedagogy) and (e) decide to either continue, reduce, or quit using LMSs. Schoonenboom (2014) constructed the acceptance model in terms of *LMS usefulness*, *LMS ease of use*, and *LMS intention*. LMS usefulness was defined as how instructors perceived the usefulness of particular LMS functions for particular instructional tasks (task-technology fit) while LMS ease of use was how easily they were able to use such functions for implementation of particular instructional tasks. Both affected instructors' intentions to adopt LMSs. While Schoonenboom's (2014) model concentrates on the psychological factors underlying instructors' intentions to employ LMSs, West et al.'s (2007) model embraces the process after the initial decision. What both models have in common is that they emphasize the importance of the perceived usefulness and difficulty of LMSs and their employment.¹

If the perceived usefulness of LMS functions is one of the critical factors for employing LMSs, as West et al. and Schoonenboom's studies suggest, then it should also be the case for students. Lonn and Teasley (2009) found that students perceived usefulness in LMS functions for saving time, managing class activities, improving communication among instructors and themselves, and promoting their learning as in the case of instructors. Closer scrutiny into their log frequency revealed that the most frequently used LMS function was content sharing (e.g. of teaching materials such as PowerPoint slides). McGill and Klobus (2009) provided more detailed factor models for students' LMS adaptation; *Task-technology fit*, which included *LMS ease of use*, led to *Expected consequences of LMS use* (e.g. LMSs would promote quick accomplishments of students' learning with higher quality) and *Attitude towards LMS use* (e.g. using LMSs is pleasant), which resulted in *LMS utilization* (actual employment of LMSs). In McGill and Klobus (2009), this LMS utilization led to *Perceived impact on learning* (a similar concept to

1 In West et al.'s (2007) model, perceived usefulness of LMS is connoted in (c) as "at this stage of the process, intuitive usability is critical because the instructors have not yet committed themselves enough to the tool to spend the time to 'be trained'" (p.22). Perceived difficulty of LMS use is connoted in the decision process (d).

perceived usefulness of LMSs).

In summary, there is some evidence for facilitating effects of LMSs on learning and thus considering how both instructors and students decide to adopt LMSs is important. Research showed two crucial factors of LMS employment are perceived usefulness and difficulty of LMSs. Furthermore, it is also important to consider in what respects students perceive LMSs as effective and how they consider improving LMS use in class, since these might underlie in the perception of difficulty and usefulness of LMSs. However, Lonn and Teasley's (2009) and McGill and Klobus's (2009) studies employed only multiple-choice questions and thus open questions were also employed to clarify such positively and negatively perceived LMS functions. In addition, students' self-perceptions of PC skills are investigated with relation to perceived difficulty and usefulness of LMSs since Selim (2007) identified one factor of students' e-learning acceptance to be their own characteristics including PC skills. Therefore, the aim of this paper is to consider (a) perceived difficulty of LMSs (multiple choice), (b) perceived positive and negative aspects of LMS functions (open), and (c) perceived usefulness of LMSs for learning with relation to students' PC skills (multiple choice). Utilization of LMSs was operationalized as log frequency.

RQ 1: Which LMS functions do students feel difficulty and ease in?

This question was analyzed by frequency distribution in questions (5) and (6) of the LMS questionnaire (see Table 2 below).

RQ 2: Do students perceive the LMS useful for their learning?

This question was analyzed by frequency distribution in question (10) of the LMS questionnaire.

RQ 3: Do the perceived difficulty and usefulness of LMS lead to active utilization of LMSs?

This question was analyzed by the correlations among the answers in questions (4) and (10) of the LMS questionnaire and log frequency aggregated

on the LMS.

RQ 4: What are good points of LMSs and in what way should we improve LMS use?

This question was analyzed by students' comments in questions (8) and (9) of the LMS questionnaire.

Method

Participants

Participants in this survey were freshmen who enrolled on the Integrated English Writing 1 class. In this class, students learned writing concepts such as a topic sentence, transition words, and supporting details, and wrote three types of paragraphs (classification, comparison-contrast, and persuasive) in around 150 words. The class was taught in English and held once a week. Moreover, students wrote simple sentences in the class blog, using predetermined vocabulary once or twice a week during a semester (ten times in total). See Nakamura (2013), for details.

The class originally consisted of 23 students but four students forgot to submit one of the questionnaires to the LMS. As a consequence, the remaining five male and 14 females, aged from 18 to 20 ($M = 18.37$, $SD = .597$), served as the participants. The instructor taught how to use the CaLabo LMS and students, provided with the manual, practised using the LMS during the first couple of classes.

Materials

CaLabo LMS. LMS used in this survey was CaLabo LMS (now called CaLabo Bridge) powered by the CHleru Company and installed in PCs in Computer Assisted Language Learning rooms. Both instructors and students could access to the LMS with their IDs and passwords in university PCs. Outside the university, the LMS required an additional Virtual Private Network (VPN) connection due to university's admission policies.

In CaLabo LMS, as in other LMSs, instructors could upload PowerPoint slides, Word files, PDFs, or any other teaching materials, provide links to websites and feedback on and return of students' homework assignments, give macro (whole course) and micro (each class) pictures of the course with study goals and contents, provide questionnaires, and check students' grades for each assignment, attendances in each class, and their log frequency. Students in turn could upload homework assignments, check feedback and grades on their assignments from their instructors, and answer questionnaires.

Measurements. Three questionnaires were uploaded onto the LMS and conducted during a semester: (1) the computer use questionnaire; (2) the LMS questionnaire; and (3) the blog questionnaire. The first questionnaire was delivered at the beginning of and the latter two were at the end of the semester. Participants' log frequencies were also analysed in this survey.

The computer use questionnaire. This questionnaire (See Table 1) consisted of four multiple-choice and one open question and identified students' initial computer skills in terms of (a) the devices they possessed; (b) frequency of PC use; (c) main purposes for PC use; and (d) levels of difficulty in using PC. Students were given one point for the completion of the questionnaire.

Table. 1

A Computer Use Questionnaire

(1) Which of the devices below do you have? (multiple answers are possible)

a) desktop or laptop PC, b) tablet PC (e.g. iPad), c) smartphone, d) none

(2) How many times on average do you spend in using the computers above per day?

a) less than one hour a day, b) one hour a day, c) two hours a day, d) more than two hours a day

(3) What is the main purpose of your computer use?

a) internet surfing, b) social networking, c) doing homework, d) others (please specify below)

(4) Do you have any difficulties in using the computer?

a) yes, I strongly think so, b) I think so, c) so-so, d) no, I don't think so

(5) When do you feel such difficulties? Write your comments below (any length is OK).

The LMS questionnaire. Table 2 provides actual examples of this questionnaire. The questionnaire consisted of eight multiple choice and two open questions and specified: (a) frequency of access; (b) difficulties and ease of access; (c) good and bad points in the LMS with suggestions for improvements; and (d) usefulness of LMS for developing writing skills. Since the pilot study revealed that students felt difficulty in the VPN connection, one specific question directly addressed this (*If you could access the LMS without the VPN connection, would you access the LMS more frequently?*) was also included. Students were given five points for the completion of the questionnaire.

Table. 2
A LMS Questionnaire

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- (1) *How often have you logged on to the CaLabo LMS?*
a) not frequently, b) once a week, c) twice a week, d) more than twice a week
- (2) *How often have you checked information provided by your teacher?*
a) not frequently, b) once a week, c) twice a week, d) more than twice a week
- (3) *How often have you checked the response to your homework provided by your teacher?*
a) not frequently, b) once a week, c) twice a week, d) more than twice a week
- (4) *Did you find any difficulties in using the CaLabo LMS?*
a) difficult, b) difficult but I could use, c) so-so, d) easy
- (5) *Did you find any difficulties in using the CaLabo LMS?*
a) downloading a file, b) uploading a file, c) the VPN connection, d) answering a questionnaire, e) checking your state of homework submission, f) feedback from your teacher, g) others (write difficulties you had below), h) none
- (6) *Which part could you access with ease?*
a) downloading a file, b) uploading a file, c) the VPN connection, d) answering a questionnaire, e) checking your state of homework submission, f) feedback from your teacher, g) others (write difficulties you had below), h) none
- (7) *If you could access the LMS without the VPN connection, would you access the LMS more frequently?*
a) I think I would access the LMS more frequently, b) I don't know, c) I don't think I would access the LMS more frequently
- (8) *What are good points in the LMS? Write your opinion.*

(9) *What are bad points in the LMS? How can we improve the way to use it? Write your opinion.*

(10) *Was the LMS useful for your development of writing?*

a) Yes, I strongly think so, b) Yes, I think so, c) I don't know, d) No, I don't think so, e) No, I don't think so at all.

The blog questionnaire. The blog questionnaire consisted of two multiple choice and three open questions and investigated: (a) frequency of access; (b) useful sections of the class blog; and (c) good and bad points of the class blog with suggestions for improvements. Students were given five points for the completion of the questionnaire. See Table 3 for actual examples of this questionnaire. The results of this questionnaire were not analysed here (see Nakamura, 2013, for analyses of the survey conducted with a similar population).

Table. 3

A Blog Questionnaire

(1) *How often have you checked our blog?*

a) not often, b) once a week, c) twice a week, d) more than twice a week

(2) *What is the most useful section for your learning?*

a) none, b) homework, c) explanation

(3) *What are good points in our blog? Write your opinion in English below.*

(4) *How can we improve our blog? Write your opinion in English below.*

(5) *Are there any comments on our blog? Write them in English below.*

Log frequency. Students' log frequency of the LMS was also collected. Although the LMS questionnaire included three types of information on frequency of students' LMS use (questions (1) (2) and (3)), actual log information was necessary for operationalizing active utilization of the LMS. However, only aggregated overall log frequency was employed unlike Lonn and Teasley (2009) since the CaLaBo LMS could not aggregate frequency information from each LMS function automatically, though the LMS could aggregate such information from each class.

Results

Analyses of students' PC proficiency

Table 4 provides descriptive statistics of the answers on the computer use questionnaire. Almost all students possessed smartphones (18 out of 19) and the majority of them ($N = 16$) also had either desktop or laptop PCs. They used PCs or smartphones mainly for doing homework ($N = 15$) in around one hour a day ($N = 14$). Only seven out of 19 students felt difficulty in using PCs (e.g. fast typing, installing, using apps such as MS-Word).

Table. 4
Participants Profiles of PC Use

Devices			
Desktop or laptop	Tablet	Smartphone	None
$N = 16$ (84.2%)	$N = 2$ (10.5%)	$N = 18$ (94.7%)	$N = 0$
Frequency of use			
Less than one hour a day	One hour a day	Two hours a day	More than two hours a day
$N = 7$ (36.8%)	$N = 7$ (36.8%)	$N = 4$ (21.1%)	$N = 1$ (5.3%)
Purposes			
Internet	SNS	Homework	Others
$N = 4$ (21.1%)	$N = 4$ (21.1%)	$N = 15$ (78.9%)	$N = 2$ (10.5%)
Difficulty*			
Strongly think so	Think so	So-so	Don't think so
$N = 1$ (5.6%)	$N = 6$ (33.3%)	$N = 10$ (55.6%)	$N = 1$ (5.6%)

* One student forgot to fill in this question.

Frequency of LMS use

Table 5 shows that the majority of students looked at the LMS only *once a week* for checking information ($N = 16$) or feedback on their homework assignments ($N = 14$).

Table. 5
Participants' Frequency of LMS Access

Login frequency			
Not frequently	Once a week	Twice a week	More than twice a week
N = 1 (5.3%)	N = 9 (47.4%)	N = 7 (36.8%)	N = 2 (10.5%)
Information check frequency			
Not frequently	Once a week	Twice a week	More than twice a week
N = 0	N = 16 (84.2%)	N = 3 (15.8%)	N = 0
Feedback check frequency			
Not frequently	Once a week	Twice a week	More than twice a week
N = 1 (5.3%)	N = 14 (73.7%)	N = 4 (21.1%)	N = 0

RQ 1: Which LMS functions do students feel difficulty and ease in?

Only five of 19 students felt some difficulty but somehow they managed to use the LMS. These five were those who showed difficulty in PC use on the PC use questionnaire (Question (4)). As expected from the pilot study, the most difficult part of the LMS use was the VPN connection (N = 11) and thus 15 students argued that if they could access to the LMS without the VPN connection, they could use the system more frequently. One student's comment underlined this clearly: "*LMS often become difficult to connect in my home because of VPN connection, I think. So we should do our work with no limited to finish our homework by deadline.*"² Another difficult function seemed to be uploading a file (e.g. a homework assignment) onto the LMS. One student commented: "*I can upload soon at school, but I can't upload at home by same way. I have to save the file I want to upload before I submit on the LMS.*" Except for those students who found difficulty in uploading a file

² Any errors in students' comments remained without corrections.

onto the LMS, uploading and downloading a file onto the LMS were two of the easiest function ($N = 6$ and $N = 7$, respectively). See Table 6.

Table. 6
Participants' Profiles of Difficulty in LMS Use

<i>Did you find any difficulties in using the CaLabo LMS?</i>			
Difficult	Difficult but I could use	So-so	Easy to use
$N = 0$	$N = 5$ (26.3%)	$N = 11$ (57.9%)	$N = 3$ (15.8%)
<i>Which part did you have difficulties in?</i>			
Downloading	Uploading	VPN connection	Questionnaire
$N = 1$ (5.3%)	$N = 4$ (21.1%)	$N = 11$ (57.9%)	$N = 1$ (5.3%)
Submission states (check)	Feedback (check)	Others	None
$N = 3$ (15.8%)	$N = 2$ (10.5%)	$N = 0$	$N = 2$ (10.5%)
<i>Which part could you access with ease?</i>			
Downloading	Uploading	VPN connection	Questionnaire
$N = 7$ (36.8%)	$N = 6$ (31.6%)	$N = 3$ (15.8%)	$N = 2$ (10.5%)
Submission states (check)	Feedback (check)	Others	None
$N = 4$ (21.1%)	$N = 5$ (26.3%)	$N = 0$	$N = 2$ (10.5%)
<i>If you could access the LMS without the VPN connection, would you access the LMS more frequently?</i>			
Agree	Don't know	Disagree	
$N = 15$ (78.9%)	$N = 2$ (10.5%)	$N = 2$ (10.5%)	

RQ 2: Do students perceive the LMS useful for their learning?

Almost all of students ("strongly think so" = 3 and "think so" = 15) perceived the LMS to be useful (see Table 7). Those who chose the option "think so" included all students ($N = 7$) who showed difficulty in PC use on the computer use questionnaire. Reasons for this were provided in the analyses of RQ4.

Table. 7
Participants' Perceptions of LMS Usefulness

Was the LMS useful for your development of writing?				
Strongly agree	Agree	Don't know	Disagree	Strongly disagree
N = 3 (15.8%)	N = 15 (78.9%)	N = 1 (5.3%)	N = 0	N = 0

RQ 3: Do the perceived difficulty and usefulness of LMS lead to active utilization of the LMS?

Participants' mean log frequency was 271.84 ($SD = 79.75$). Pearson's correlation analyses showed that there were no significant correlations between perceived difficulty and active utilization, $r = -.161, p = .255$. Nor were there correlations between perceived usefulness of LMS and active utilization of the LMS though the correlations followed expected directions, $r = -.347, p = .073$. Perceived difficulty and usefulness had no relations, $r = -.039, p = .437$.

RQ 4: What are good points of LMSs and in what way should we improve LMS use?

Closer scrutiny into student's comments on question (8) revealed the following four categories of merits in LMS use: (1) content sharing and resultant confirmation check; (2) data-based homework submission; (3) checking feedback on homework assignments and resultant communication between an instructor and students; and (4) increased PC use. First, by accessing the LMS outside the university, students could check information such as deadlines for homework assignments or micro (each class) and macro (whole course) contents. ("We can know what to do in classes clearly." "I can see past homework easily." "...I can check in my homework in my house. So I can do my homework if I missed to hear about information on it.") They could check what they had learned in the course. ("To check one I learned before is

one good point. I often forget what I learned many weeks ago, so I think it's a good aspect.") Second, they could submit assignments as data onto the LMS and thus did not need to, and had no risk of forgetting to, bring them home. (*"...I can check whenever I want without bring like a paper of homework"*) Third, they could also check feedback on the assignments (*"we could check the teacher's feed at home's computer. It is easy to fix sentence on computer, because we could see two files on one computer."*), which might lead to effective communication between instructors and students. (*"LMS connect between teacher and students so we can easy to contact to check homeworks or so on."*) Fourth, continuous use of the LMS and other PC applications such as MS-Word led to increased use of PC. (*"I could use computers more than before, and I think using computers is so important for us."*)

In contrast, what students faced were all technical problems and the representative one was, as described above, the VPN connection. (*"LMS often become difficult to connect in my home because of VPN connection, I think. So we should do our work with no limited to finish our homework by deadline."*) Uploading the file outside the university was also difficult for them. (*"When I submitted the homework, I was afraid whether I could submit the homework correctly."*) These problems were felt to cause some demerits on their grades. (*"I sometimes worried when LMS didn't start because if we can't use LMS, we couldn't submit subjects."*) Some of them felt these technical problems were due to their poor PC skills. (*"I was not good at using computers, so it was sometimes difficult for me to use LMS. I often submitted different files. I think I have to improve my skills of computers."*) Others included login time. (*"It takes time and it is a little bit confusing to set up the LMS to be able to use it."*)

Discussion

The present survey (RQ1 &4) showed, as expected, that the most difficult part of the CaLabo LMS was the VPN connection. Since the majority of students ($N = 15$) claimed that they would access to the LMS more frequently

if the VPN connection were removed, one way to remove such difficulty is to respond to such a request. One student commented, "I think it's enough if we use Course Power which is easier than the LMS." For this student, Course Power, which is powered by Fujitsu and does not require the VPN connection due to the university policy, is a more viable tool for learning. As Azizah, Nor, and Nor (2005, cited in Thang & Bidmeshki, 2010) showed that usefulness of the online English learning provided by a LMS was undermined because of the limits in infrastructure, such a technical problem must be resolved. However, at the level of an instructor, it is almost impossible to change the university's admission policies which claimed that the CaLabo LMS required the VPN connection outside the university. Thus a more realistic way to mitigate the difficulties is to employ the tools of Mobile-Assisted Language Learning (MOLL). For example, Nakamura (2013) provided some homework assignments and additional explanations on the class content in a class blog. Students perceived both as useful for their writing since they could develop self-learning skills, which would lead to learner autonomy, and could make their writing skills including vocabulary knowledge more robust wherever they wanted (e.g. on a commuter train). Conde, Garcia-Penalvo, Rodriguez-Conde, Alier, Casany, and Piguillem (2014) provided evidence for supplementing the LMSs with web 2.0 tools such as *Twitter*; with Twitter, students' grades on the social and environmental information technology course increased much better than without Twitter. Therefore, if parts of the class content can be delivered on any MOLL devices which have connections to the Internet and do not require special connections like the VPN connection, then this will decrease the demerits of the LMS. Since almost all of the participants in this survey possess smartphones, this is a feasible option.

Another difficulty students faced is the uploading function. This might be because of differences in the Operating Systems in the students' home PCs. When they tried to upload a file directly onto homework assignment sections using Windows PCs (PCs in the computer assisted language learning rooms are of this type), such failures did not happen frequently. In contrast, using a Macintosh, such failures did occur. We had to upload a file onto the "My file"

section (a storage section) of the CaLabo LMS first and then attach a file from that section onto the relevant homework assignment section. Although students' failures were significantly reduced and, apart from that, two of the easiest LMS functions were uploading and downloading a file, such an additional step brings another problem, namely students' reluctance to use the CaLabo LMS, which might be a reducing factor of the perceived usefulness of LMSs.

Despite such difficulty in LMS use, all participants in this survey judged the usefulness of the LMS (RQ3) positively. *Content sharing and resultant confirmation check, data-based homework submission, checking feedback on homework assignments and resultant communication between an instructor and students, and increased PC uses* were found out in the study. First, many of these are useful for self-learning (or relearning). Students could keep a bird's-eye view on the whole course, organize their available time by checking each class's expected homework, and conduct self-review on the teaching content which they could not comprehend or forgot. These are necessary skills for successful learning in the class and also have potential to create autonomous learners: autonomous learners are those who can organize their learning by themselves, keeping the whole course of learning in their minds. Second, the pragmatic utilities of the LMS cannot be ignored. Students can receive many of the merits of the LMS use described above *whenever* and almost *wherever* they want (on their smartphones with the VPN connection). Data-based submissions of files including assignments enhance such mobility of learning. Finally, though only one student confirmed this, continuous use of the CaLabo LMS seems to increase PC use. Increased frequency of PC use is the first step toward simultaneous development of PC skills, which is an incidental merit of Computer Assisted Language Learning in general (Vallance, Vllance, & Matsui, 2009). Since basic PC skills are one of required skills for students' future jobs and the student who pointed out increased PC use was the one who felt difficulty in PC use on the computer use questionnaire, LMS use seems to have potential learning and pragmatic merits for learners.

One remaining question is the finding that neither perceived difficulty nor perceived usefulness of the LMS led to active utilization of the LMS; there were no positive correlations among them. One possibility is that perceived difficulty and usefulness of the LMS functions might have diverse effects on utilization of *each* LMS function. Aggregated log frequency of the LMS as a whole might hide meaningful correlations among them. This means that we have to collect aggregated log frequency of each LMS function as in Lonn and Teasley (2009) and then investigate correlations among perceived difficulty and perceived usefulness of each LMS function and its log frequency. The present study could not investigate log frequency of each LMS function. Although the CaLabo LMS could inform which functions students accessed on a particular day, aggregated log frequency of each LMS function could not be available automatically. This issue thus remains for further investigation.

Conclusion

As more and more universities adopt LMSs, instructors should know which LMS functions students feel difficulty in using and how they perceive the usefulness of the LMS functions. The present study showed that some students felt difficulty indeed but could use the LMS. The VPN connection and uploading a file were two most difficult LMS functions. Despite such difficulty, almost all of the students perceived the LMS useful in terms of (a) content sharing and resultant confirmation check, (b) data-based homework submission, (c) checking feedback on homework assignments and resultant communication between an instructor and students, and (d) increased PC use. Therefore, it could be claimed that active utilization of LMSs is a must, or at least beneficial for students' learning (e.g. self-review or relearning, mobility of learning outside class, and incidental development of PC skills).

However, perceived difficulty and usefulness of LMSs had no relation to active utilization of LMSs. This could be due to the fact that only log frequency of the whole LMS could be aggregated in the present study. One issue for future research is thus accumulation of log frequency for each LMS

function. Another issue for research is task-technology fit. As McGill and Klobus's (2009) factor model shows, considerations of how technology fits with particular learning tasks are important for effective technology-scaffolded learning. Moreover, Selim (2007) found that learners' characteristics such as their PC proficiency are one factor in the perception of the usefulness of LMSs (see also Robinson, 2001, for individual difference (ID) factors and their relations with different learning conditions) and papers in Suppes (2013) indeed showed that there were IDs in computer-based learning programs and thus LMS should accommodate such learners' diversities (Vivodes, Sanchez-Alonso, Mitropoulou, & Nickmans, 2007). Therefore, task-technology-learner fit is another, though comprehensive, issue for research and its consideration may shed new light on important aspects of LMS-supported learning.

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