

Constraints on the Use of a Learning Management System in a Blended Learning Environment

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Abstract

This research investigated the blended learning environment constraints when academics use a learning management system (LMS). With the prevalent use of educational technologies including the LMS, a mix of traditional face-to-face and web-based technologies became an alternative mode of instructional delivery in higher education. However, despite of the reported benefits in many studies about the use of LMS, the uptake of using the system was not maximized by students and by academics. The problem this research sought to answer was: what were the constraints encountered by the academics in a blended learning environment? This investigation was conducted in a state university based in Mindanao, Philippines. Thirty-three academics from different disciplines and professorial levels participated in this study. The LMS used in this university was Moodle and records of computer logs indicated that only 30% of academics used the LMS. Two major processes were carried out in this investigation. Firstly, a qualitative approach which employed a one-hour, one-on-one in-depth interview with each participant was conducted. Data were then transcribed and coded in three stages: open, axial, and selective coding. Qualitative data were analyzed using a grounded theory approach. Secondly, a quantitative approach, using descriptive statistics was used in the analysis of the participants' computer logs which were gathered and processed using a simple data mining procedure. The findings in this study suggested that academics had been experiencing difficulties in delivering courses in a technology-enhanced learning environment particularly with the use of LMS. Difficulties in time management, curriculum level, students' access, and economic viability were found to cause the constraints.

Keywords: learning environment, constraints, learning management system, blended learning

Introduction

Web-technology has become a buzz word in the learning-teaching environment. Learning institutions utilize technological tools, such as audio and video devices to help academics and students in their lessons. As research trends have shown, “the use of the Web over the last decade has begun to dominate tertiary education” (Moore, 2007). The mix of delivering courses in a traditional classroom and the provision of electronic courseware resources has developed the notion of a blended learning environment. This environment has incorporated not only audio and video resources, but also web technology such as a learning management system (LMS). Along with the shift to learner-centered approaches to teaching and learning, this paradigm shift is challenging to both academics and students, opening opportunities for research in this field. Research and development agenda for educational technologies outcomes are geared towards all sectors in the educational context; however, several studies on blended learning environments have focused only on the learning outcomes of students. Studies on academics' readiness to use, or even actual use of technologies are scarce. Teaching in a blended learning environment needs specific skills that are aligned with technological, sociological, and pedagogical contexts.

Many studies have attested to the importance of teaching presence for a successful online learning (e.g., Garrison & Cleveland-Innes, 2005; Shea, Pickett & Pelz 2003; Swan 2004). In a different study, Shea et al. (2006) conducted an extensive investigation of teaching presence and online learning wherein 1,067 online students across 32 institutions were involved. Shea colleagues (2006) developed a survey instrument to measure students' perception of teaching presence. Using factor and regression analysis, it was found that students' recognition of effective "directed facilitation" (p. 182) and effective instructional design and organization on the part of their teacher contributed to their sense of shared purpose, trust, connectedness, and learning. Although the biggest challenge among students' adjustment relates to issues of interaction – both socially and cognitively (Angeli, Valanides & Bonk, 2003), the consensus from these studies is that teaching presence is an important factor for student satisfaction, perceived learning, and sense of community (Garrison, 2007). While social presence among students were developed through interaction, teacher presence – through its facilitation function - is vital to the success of higher-order learning in an online learning environment (Garrison, 2007).

However, the question, why do some teachers have issues when using the LMS for their classes is posed. This concern will be answered in the succeeding discussions.

Objectives

The main objective of the study was to investigate the constraints encountered by the academics in a blended learning environment. More specifically, this study sought to discover the issues and challenges encountered by academics when delivering classes in blended mode and verified claims based on computer log analysis.

Review of Related Studies

Two issues were found prevalent in a blended environment setting: personal and environmental. Acceptance of the system, motivation, skill level, and time management, among others pertained to intrinsic constraints (Giardina, 2010; Lameris et al., 2012). Personal issues were intrinsic constraints within the control of the user, such as his/her attitude towards the system, or the effect on him/her when using the system. However, intention to use can only be justified if the user had actually used the system, not only intending to use it. A major barrier to academics' adoption of information technologies was the academics' lack of knowledge and ability to integrate the technologies into their teaching practices (Thomas & Stratton, 2006). Both studies had found that a major barrier to academics' adoption of information technologies was academics' lack of knowledge and ability to integrate the technologies into their teaching practices. These had a strong impact on academics' non-confidence on the usefulness of the technologies and their reluctance to use the technologies (Anderson, 2008). In Bolliger and Wasilik's (2009) study, they examined the factors influencing faculty satisfaction. Results of their study confirmed that there were three factors affecting satisfaction of faculty in an online environment: student-related, instructor-related, and institution-related factors. The results in Bolliger and Wasilik (2009) implied that there were constraints that affect the level of satisfaction. Likewise, these constraints were found to exist in the findings of this research affecting academics' system usage: learning environment, training, and institutional level. Instructor and institution-related studies of Bolliger and Wasilik (2009) had similar effects on personal satisfaction.

Collectively, extrinsic constraints were called environmental constraints. Some studies had justified the relationship between system usages of academics to environmental issues (e.g. Lin, Singer & Ha, 2010; Macharia & Nyakwende, 2010; Peszynski, and Ocak 2011). For example, Lin et al. (2010) investigated university members' use of and resistance to an information and communication technology system (Blackboard) in a higher education organization. Lin et al. (2010) employed the technology enactment framework in their case study to examine structure enactment in university members' technology use and resistance. The case study found that maximum use, enhancing teaching, augmenting service, limited use, and resistance were enacted in organizational members' interactions with the system.

Macharia and Nyakwende (2010) investigated the factors that inhibited or accelerated the adoption and diffusion of LMSs by academic staff for teaching and learning activities. Their study used a paper-based questionnaire survey completed by 82 lecturers from a selected sample of public and private universities in Kenya. The results of analysis from that study indicated that the characteristics of the Vice Chancellors/Chief Executive Officer (CEO) were important determinants of LMS adoption and diffusion by instructors in higher education. These characteristics included: keenness on modern information and communication technologies (ICTs), influence on ICTs development, and visionary ICT leadership. Results also showed that organizational variables of subjective norm, availability of ICTs, organizational support, organizational readiness, and top management support were related to behavioural intentions of academic staff to use LMS for teaching and learning. Furthermore, results suggested that top management support was found as the dominant factor in predicting the acceptance of LMS. In Peszynski (2005), the study about power and politics in a system implementation was carried out putting executive administrators in a similar context as having a crucial role in adoption and diffusion of systems. In an exploratory qualitative case study, Ocak (2011) examined the problems and impediments that faculty members encountered in blended learning environments in a Turkish Higher Education system. Results showed that faculty members' problems with blended teaching resulted in the identification of three inductive categories: instructional processes, community concerns, and technical issues. There were eight themes that emerged from these three categories: (1) complexity of the instruction, (2) lack of planning and organization, (3) lack of effective communication, (4) need for more time, (5) lack of institutional support, (6) changing roles, (7) difficulty of adoption to new technologies, and (8) lack of electronic means. The Ocak (2011) study indicated that teaching blended courses can be highly complex and have different teaching patterns. Notably, the complexity of the teaching patterns impacted the successful implementation of the blended college courses. In Garrote and Pettersson (2007), lecturers' attitudes towards LMS were examined with particular reference to identifying obstacles to increased use. It was found that when lecturers decide individually to use tools in the LMS, the major concern is the initial amount of work compared with the expected benefits.

Relating environmental constraints to the theory of constraints (TOC) was summarized in Rahman (1998) as: (1) Every system must have at least one constraint; and (2) The existence of constraints represents opportunities for improvement. Rahman explained that contrary to conventional thinking, TOC "views constraints as positive, not negative. Because constraints determine the performance of a system, a gradual elevation of the system's constraints will improve its performance (Rahman 1998, p. 337).

The above studies have identified various external and environmental problems on system usage that impede or enhance the usage of LMSs by academics. The insights of TOC are relevant when investigating about environmental constraints with academics.

Methodology

This case study utilized a qualitative-quantitative research design. This was conducted in a state university in Mindanao, Philippines offering undergraduate and graduate degree programs in the Arts & Social Sciences; Business & Accountancy; Education; Engineering & Engineering Technology; Science & Mathematics; Nursing; and Computer Science & Information Technology.

A total of 33 participants of the study were full-time academics who either had administrative load or no administrative load. They gave consent to the researchers to access their log files. They also actively participated in the open-ended interviews.

To gather qualitative data, questions related to their three most problematic issues and challenges in using LMS were asked. They were also asked what workarounds were initiated to address the issues or challenges. Moreover, they were also asked what teaching and learning strategies were practised. Analysis was done in three steps: open, axial, and selective coding based on the grounded theory approach (Corbin & Strauss, 1990).

Quantitative data were mainly gathered from the LMS database server. The university uses the Moodle (Moodle, 2012) platform for the learning environment that was customized and called as MSU-IIT Online Learning Environment (MOLE). Each of the participants' computer log files were saved in electronic spreadsheets. Log data were analysed using descriptive statistics by getting the average and median values. Moreover, in the analysis, particularly the average and median values, the level of interactions (whether high, medium, or low) were assessed.

Validation of findings

The validation process was done in two schemes: interview transcripts confirmation by participants and presentation of findings in workshops. To increase validity of the findings the interview transcripts and a copy of the findings draft were emailed to the participants. Participants were encouraged to express their views or comments by replying to the email that was sent to them. There were ten participants whose comments were received in relation to the interview transcripts. Also, findings were presented to the participants in two instances. Firstly, the results were presented to the participants of this study who had no administrative functions. Thirteen participants attended this first workshop. Secondly, another workshop was conducted with some of the research participants from the executive management level. Some attendees who were also invited composed of the deans from all colleges, as well as graduate coordinators from each college. Twenty academics attended this second workshop.

In both workshops the theme focused on the use of LMS in a blended learning environment. The participants were asked to fill-in a form created in Google Form after the question and answer (Q & A) forum – requesting them to write their comments and/or suggestions. Consequently, most of those who participated had a more positive view of blended learning environment aided with MOLE. A question was addressed by an executive administrator to the attendees present during the Q & A forum. He asked them whether they think the blended learning mode of delivery will really work at MSU-IIT. The attendees responded affirmatively.

The validation process that this study had made was a rigorous undertaking. It was an essential component of this research such that it had served as a justification of the relevance of investigating the pros and cons of using an LMS in blended or online learning environments. Moreover, by validating the results from academics, better prospects for a paradigm shift on teaching and learning process was supported.

Results and Discussions

Based on the interview transcripts that were coded and categorized as themes, four dimensions on the issues and challenges were identified.

First dimension: Time management constraints

Time management constraints had the following themes of related issues: preparation of learning materials and tests, course implementation, contact hours, compensation, and time wasted due to connectivity problems which were referenced by 25 academics in different aspects. Expounding on these issues were outlined herein.

Material preparation for blended learning was found to be more time consuming as compared to that of the traditional classroom. Most participants revealed that writing lesson notes, looking for relevant links and assessment of learning outcomes were time consuming. They said they had to be creative and had to guide students in the use of resources, making sure that the materials were useful and not deviating from the principles and flow of their topics.

While there were some participants who recognized the benefits of multimedia enhanced classroom lectures, they disclosed that it was time consuming for video recording and uploading these to MOLE. Moreover, the necessary equipment (e.g., good quality video recorder and tripod) were not available in the classrooms.

Another issue raised by the participants was the time spent in the assessment of the learning outcomes of the students. Discussing lessons online using chat and discussion forums entailed so much time for reasons like teacher-participants could not just ignore discussions of some students whose topics were not within the particular lesson discussion thread that they had to spend some time answering them. Another and more prevalent reason that surfaced was the time between comments and responses were found to lag which was attributed to slow connectivity issues.

Likewise, participants who used a teaching strategy like journals found it time consuming to read each entry from the students in big classes. Thus, they sought time-saving techniques that would allow them to communicate efficiently using these tools. They believed that they needed training to enhance pedagogical skills for online classes.

Contact time and compensation was another issue. An academic's weekly presence requires three hours of actual contact hours, (i.e., class time). At MSU-IIT, full-time academics were required to render an equivalent of 40 hours per week that includes actual contact hours, consultation with students, lesson preparation, and related tasks. An issue arose when academics conducted a blended class using MOLE for more than double the actual contact hours online.

Second dimension: Curriculum level constraints

Curriculum level constraints were related to the subject or the course handled by a participant particularly in relation to technology and non-technology driven courses. Non-technology driven courses did not require computer laboratories often such as in the Arts & Social Sciences, Nursing, and Education. Technology-driven courses were the Engineering & Engineering Technology; Science & Mathematics; Computer Science & Information Technology; and Business & Accountancy. The need for computer facilities were explicitly stated in the course descriptions of each courses. Seventeen participants said that without a laboratory component of their subject, it was difficult for them to decide to use MOLE because of the limitations on access to computers—for themselves or for their students. Most of the comments in this area were related to availability of computer facilities.

Another issue was in relation to the department or program offering. Participants raised these issues in relation to their affiliation with a specific department, school, or college. The teaching load given to each academic related to the course description and the requirements for such courses. In MSU-IIT, a course was a single subject that an academic handles. A single course had a total equivalent of three academic units. For example, one of the courses in the School of Computer Studies was Human Computer Interaction (HCI) which was described as a socio-technical course with a two-unit lecture, and a one-unit laboratory. Highly computational and technical subjects such as Engineering courses had either computer or practical laboratory components. These reasons from the participants were issues because without computer laboratories or the necessary facilities in the classroom, academics cannot use the intended teaching strategy for the course. Some participants wanted to have their learning materials in MOLE and once uploaded, they could access it in their face-to-face classes. Also, using MOLE to conduct exams in a common laboratory was an issue for most participants because they wanted to make sure that they were present and could watch over their students answering the tests to ensure validity, reliability, and trust.

Course description as a constraint related to the type of presentation that was best for a particular course. Twelve participants from problem-related or computational courses said that their subjects were different from descriptive subjects, and that teaching strategies were much different (e.g., it was important that sample solutions to the problem needed to be discussed with the students face-to-face). Most of them suggested that descriptive subjects benefited more from MOLE. This was an issue because of the varied interaction levels that academics had to perform.

There were issues related to program level which referred to the undergraduate or graduate degree courses. Of the 27 participants, 13 implied that the issues were related to program level. Most of these participants mentioned pedagogy in one or both program levels, work responsibilities, and travel incurred when taking a graduate degree course at MSU-IIT. The general notion was to choose what course was ideal for online delivery. There needed to be specific guidelines on what type of courses will be complemented by the use of MOLE.

Third dimension: Students' access and economic viability

The students' access and economic viability were mentioned by most participants. Most of them were concerned with the equitable access of students to MOLE because a large percentage of students were economically challenged. Since most students did not have their personal computers, their non-access to technology was often considered by academics as a factor that

affected their teaching performance especially when academics suggested to their students to access materials online. Thus, economic viability hindered most participants from using MOLE. Economic viability constrained participants when deciding whether to pursue using MOLE or not. Likewise, participants were concerned about the security of their students who needed to go to Internet cafés to access their learning resources online. The danger in students going out to get access at an inappropriate time was constraining to most academics.

Fourth dimension: Students' work and validity of control

This constraint referred to the element of trust when students' assessment tasks (e.g. during quizzes) were performed outside the classroom. The major issue on students' work and validity of control was particularly related to scheduled online tests and to assignments required in the course. These were the issues mentioned by the 20 participants. Yet, participants whose courses had no computer laboratory also welcomed the idea of deploying tests online. However, the issue about no computer laboratory arose because they cannot personally supervise their students who had to take the test either in Internet cafés, their residences, or open laboratories. The participants' main issue was the validity and the veracity of their students' answers. They could not simply trust that their students genuinely answered tests by themselves. This issue conformed to the second dimension above.

In the same manner, participants were anxious about online participation of their students in the event that online learning was formally mandated as an alternative delivery of instruction. This was in relation to control mechanisms such as cross-checking who participated in online activities, which one participant said was another challenge when delivering online lessons.

In summary, four dimensions were generated as shown in Figure 1.

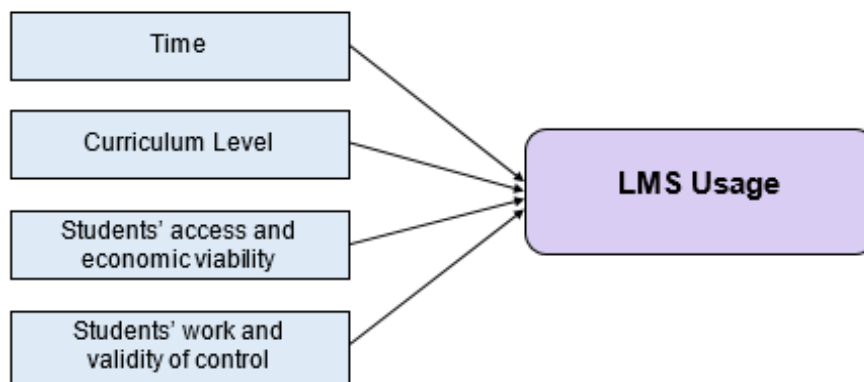


Figure 1. Learning environment constraints

Findings suggested that participants claimed that the four constraints (time management, curriculum level, students' access & economic viability, and students' work & validity of control) had influenced their satisfaction level, which then affected their decision to use MOLE. Some of the participants decided to use other alternatives instead of continuing to use MOLE because of these constraints. A few of the participants were fully aware of the benefits of MOLE, but they were not enthusiastic to use it because they claimed they lacked training and found other systems (e.g. social media such as Facebook, Instagram, or Tweeter) easier to use.

To validate the findings suggested by the results of the qualitative data, the log activities of the participants were analysed and are presented in Table 1.

As shown in Table 1, the left-most column represented the academics (as Acad. Num). Eleven of the academics from the total number of 33 participants were not users of MOLÉ, hence they were not included in this table. Consequently, only the usages of 22 academics were included for MOLÉ log usage analysis.

A more specific group of activities was presented as non-interactive and interactive as shown in the top-most row of Table 1. Under each column heading was a number in parenthesis which indicated the number of academics who used each element or activity, while the numbers shown in each cell indicated the total usage counts.

Non-interactive activities were notions that did not have interchange of ideas among the participants of the learning environment. Activities in the non-interactive group consisted of course, assignment, resource, and survey. The course column showed the logs that were recorded when users logged in and pursued some activities within the learning environment. With the exception of course logs, assignment activity was shown to have the highest transaction count (total = 13, 406), although the resource activity was shown to have the most number of academics (18) utilizing it.

Table 1: MOLE log activities

Acad. Num	Non-interactive				Total Non-interactive	Interactive					Total Interactive	Grand Total
	course	assignment	resource	survey		quiz	forum	blog	chat	journal		
	(22)	(17)	(18)	(2)		(13)	(18)	(6)	(1)	(4)		
# 26	2,970	2,935	335		6240	519	1,799			1,306	3,624	9,864
# 5	4,770	2,939	644		8,353	1,124	25	1			1,150	9,503
# 15	1,008	978	228		2,214	850	893		4	26	1,773	3,987
# 9	1,265	1,874	211	31	3,381		198	2		160	360	3,741
# 13	257	3,365	3		3,625		110				110	3,735
# 28	629				629	1,521	134				1,655	2,284
# 25	643	653	80	3	1,379	38	10	5			53	1,432
# 6	475		411		886	373					373	1,259
# 27	628	219	31		878	329	15	2			346	1,224
# 18	435	59	86		580		629				629	1,209
# 4	324	125	72		521	26	225				251	772
# 33	588	37	70		695	11	15				26	721
# 3	400	9	46		455	114	5			20	139	594
# 19	339	17	106		462		70	3			73	535
# 22	208	43	46		297	144	1				145	442
# 17	357	10	21		388	1					1	389
# 32	150	14	36		200	131					131	331
# 20	123	139	14		276							276
# 2	92				92		122	3			125	217
# 14	185	2			187		2				2	189
# 31	80		28		108		3				3	111
# 23	14				14		10				10	24
Total	15,398	13,406	2,447	34	31,860	5,180	4,264	16	4	1,512	10,979	42,839

An interactive activity occurred when students had to answer, e.g., the quiz that was deployed and activated by the teacher in a specific period. Activities in the interactive group consisted of quiz, forum, blog, chat, and journal activities. Forum was shown as the most often-used activity with 18 academics who used it. Quiz was shown to have the most interactions (total = 5,180), while chat was shown to have the least interactions. Per indication, one academic's record (#28) shows that quiz was utilized the most. Also, chat was not commonly used as shown in the table – with only one academic (#15) recorded to have used it.

Table 2 presented the high and low usage for interactive and non-interactive activities. It should be noted that out of 33 participants only 22 were using MOLE. As shown, only 19 participants with logs (PwL) had an average usage (1.91) and median (0.82) of interactive activities. Conversely, only two participants had an average and median usage (39.42) of high interactive activities which included quiz, chat, and forum. As for the non-interactive users, the table showed that there was a high average (50.79) and low average (4.3) of participants who uploaded modules, lessons, documents, and lecture notes through the MOLE platform. These results confirmed the constraints of the participants in using the MOLE.

Table 2. High and low usage for Interactive and Non-interactive activities

2- Medium	1	9.39	9.39	12.37	12.89
3- High	2	39.42	39.42	50.79	48.3
Legend: PwL - participants with logs; Ave - average; M - Median					

The interaction that occurred between interactive usage and curriculum level constraints and student's access and economic viability were deduced to have influenced. The extent of interactive usage influenced perception of curriculum level constraints. These are shown in Table 3. A big number of participants had been recorded to have had low interactive usage based on log results because of the effects of curriculum constraints.

Table 3. Interaction matrix for learning environment constraints to usage log entries.
 Legend: X - no interaction; Y - with interaction

DIMENSIONS USAGE LOG ENTRIES	Time management	Curriculum level constraints	Students' access and economic viability	Students' work and validity of control
	Interactive usage (22/22)	X	Y	Y
Non-interactive usage (22/22)	X	X	X	X
Without logs (11/33)	X	X	X	X

Curriculum constraints had been identified as issues that relate to course description and requirements. Participants had low usage of interactive features like using interaction and communication tools and feedback and assessment tools. Participants claimed that one of the major issues was the students' accessibility due to economic reasons. What had been said by participants referring to students' access problems were in their low interactive usage. The common tendency of the participants was to decide not to use MOLE because of the large percentage of students who did not own computers.

The study indicated that the program handled by academics influences the perception of curriculum level on the context of undergraduate and graduate courses. On the other hand, both academic position and academic discipline influenced the dimensions of curriculum level, students' access and economic viability, and students' work and validity of control. Among the four dimensions of learning environment constraints, these three were external influences that a participant did not have control of. Whereas, time management was internal to the participant and the use of MOLE was based on his/her own discretion. Coupled with a strong motivation, the participant controlled or managed his/her time to prepare learning resources or practice the use of MOLE. Based on the system logs, the study also showed that low usage of interactive features was strongly influenced by students' economic viability and access. The system logs justified what had been shown in the coded references as influenced also by academic discipline and academic position. The low interactive usage encompassed the use of non-interactive features which indicated that academics decided on using MOLE depending on the situation, such as for submission of assignments or for posting lesson notes, as most academics were not compelled to use MOLE for their classes. Although some of them chose to use MOLE consistently, many of the participants decided to do so if their students were amenable to its use.

Conclusions and Recommendations

Academics' usage of the LMS was influenced by the socio-technological landscape of the learning environment. More importantly, the study verified that academic disciplines had crucial influences to LMS usage. This research found that there were varied approaches for each course, and more specifically, on subject content that can best fit a blended delivery of instructions. Extending further studies in this context will benefit this area of research.

Results of the Bolliger and Wasilik (2009) study suggested that instructors were affected with difficulties on the reliability of technologies and affirmed that they needed to be more creative to teach online. The result of the Bolliger and Wasilik (2009) study was similar to this study in terms of the difficulty or challenges experienced with technology and learning resource preparation. Institution-related issues were found to be important to online faculty. Their results showed that workload, compensation, preparation, and course evaluations affect their satisfaction and motivation which were similar to the findings in this study. Interestingly, the study of Garrote and Pettersson (2007) was similar to the context of time management in this study (e.g., the amount of time to attend training, prepare materials, and interact or manage discussions online). The Garrote and Pettersson (2007) study indicated also that academics equated their time and effort to their salary received.

This study may guide academics and administrators on minimizing constraints in their own environments to possibly enhance system usage. On a larger scope, universities that have similar environmental conditions in terms of institutional policies and economic viability of students may benefit from the findings in this study. Institutional policies are mechanisms that recognize the relevance of LMS usage in organizations (e.g., on the executive management level). Moreover, network and infrastructure, as well as technology support can be facilitated by these mechanisms. This recognition extends to students getting access to reliable network system which redounds to academics' motivation to use the LMS in blended environments.

The qualitative interviews were matter-of-fact accounts of what academics felt about the LMS and their aspirations for having a useful and beneficial tool for teaching and learning with technologies. Analysis of computer logs furthered the understanding of the academics' claims about their usage of the system.

A deeper analysis of log files of usage by academics can be done using a longitudinal study or an action research approach. Analyzing log files can help visualize the interaction patterns of academics with their students. It would be worthy to examine the extent to which students interact and collaborate with each other and with their teacher through the LMS, and the extent to which this has accelerated the quality of teaching and learning. Also, a more rigid study can be made by considering an evaluative research for academics' usage within department or subject area; or in a wider scope, a comparison of usage across subject disciplines in various colleges of the university.

Many of the complaints were in relation to access of their students because of economic reasons. Most students did not have their own computers. If they did have their own computers, most did not have Internet connection at home. Even some academics had the same problem. The problem of student access was a challenge that most academics face. Enforcing the use of MOLE for their courses made it more difficult for others. This constraint is a university-wide problem related to policies which academics cannot solve by themselves.

Overall, participants implied that a reduced teaching load may be necessary to enable them to develop better learning resources and be motivated to use MOLE. The study found that some participants were not motivated to use the system because of time constraints. They claimed that creating modules for blended learning was doable, but the time to develop the learning resources was lacking. Some participants proposed a reduced teaching load so that they could allocate more time to developing the modules.

The prominent issue in the learning environment perspective relates to the subject discipline – descriptive subjects are better delivered online compared to problem-solving or computational subjects. Findings of this research suggested that the cliché ‘one-size fits all’ cannot be adhered to. This notion of what subject discipline can be appropriately delivered in a blended learning environment has to be solved on the department or college level.

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