INFLUENCE OF LEARNING MANAGEMENT SYSTEMS SELF-EFFICACY ON ELEARNING PERFORMANCE

By

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ABSTRACT

Recent advancements in technology have changed the way educators teach and students learn (Wells, Fieger & Lange, 2005). In the last decade, educational trends have progressed towards online and blended instruction. One key in this revolution is the development of the Learning Management System (LMS); software that enables the management and delivery of learning content and resources to students providing students the flexibility for "anytime" and "anywhere" learning.

Research indicates learner self-efficacy with LMS may be a critical factor in e-learner satisfaction (Lee and Hwang, 2007) and performance. The goal of this study was to develop and validate an instrument that measures students' confidence with LMS, and explore the relationship between LMS self-efficacy and course performance for e-learners. This study was conducted with 68 students enrolled in an instructional technology course.

Student confidence for accessing the course content, tests and grades, asynchronous communication, synchronous communication and using advanced tools were measured. Factor and post-hoc analysis were used to examine instrument dimensionality. The complete paper will discuss the full results of the study and designs for further validation, particularly with regard to implications for measuring student self-efficacy with LMS technologies. Patterns of confidence and performance will also be reported and discussed.

Keywords: Learning Management Systems, Elearning Performance, Self-efficacy, Blackboard

INTRODUCTION

Recent advancements in technology have changed the way educators teach and students learn (Wells, Fieger & Lange, 2005). In the last decade, educational trends have progressed rapidly in a movement towards web-based instruction and blended instruction. The breakthrough of the Internet and other new technologies has demanded changes on traditional campuses. The conventional ways in which teachers teach and students learn have been altered (Wells, Fieger, & de Lange, 2005). Online courses have proliferated across schools worldwide. Students have the flexibility to take classes in the luxury of their own home and at their convenience. A Sloan consortium survey reported that 3.5 million students took at least one online course during the fall 2006 term and there was a 9.7 percent growth rate for online enrollments that far exceeds the 1.5 percent growth of the overall higher education student population (Allen & Seaman, 2007).

The breakthroughs in technology and increase in online enrollment have led to the development of the Learning Management System (LMS), Course Management System (CMS), and Virtual Learning Environment (VLE) that facilitate teaching and learning outside the physical classroom. Many universities use a LMS or a CMS to deliver their courses. These learning environments can be used to totally replace face-to-face teaching in a physical classroom, partially replace face-to-face teaching, or supplement existing face-to-face teaching (Arbaugh & Duray, 2002). The LMS can facilitate learning through efficient access to learning materials, providing immediate feedback to students through online assessments (Breen, Cohen, and Chang, 2003) and improved communication between students and

instructors through discussion forums and e-mail (Beard and Harper, 2002).

Learning Management Systems

The North American Council for Online Learning (NACOL) who are now known as INACOL (International Association for K-12 online learning) define the course management system (CMS) as, "the technology platform used to deliver online learning" (p. 10). With some debate, the terms CMS and LMS are used interchangeably by online educators. A typcial LMS is software for the creation and editing of course content, communication tools, assessment tools, and other features designed to enhance access and ease of use.

An LMS enables the management and delivery of learning content and resources to students. It provides an opportunity to maintain interaction between the instructor and students, and to evaluate the students by providing immediate feedback on online assessments. Most LMS software is Web-based to facilitate "anytime, anywhere" access to learning content and administration.

Common LMS software used in higher education fall under two broad categories:

- commercial systems (e.g., Blackboard, WebCT, eCollege, Desire2Learn) and
- open-source products (e.g., Moodle, Sakai, Segue, Coursework).

These systems share several essential characteristics including

- High availability - Accessible to diverse users (instructors, students & administrators)
- Scalability - Expandable and Up gradeable to meet demand
- Security - Selectively limit and control access
- Usability - Convenient and practicable for use
- Interoperability - Able to work with parts of other systems and
- Stability - Reliable and able to endure load changes (Hall, 2003)

The use of LMS has increased dramatically over the last decade. Many colleges and higher education institutions have adopted the use of learning management systems. In the recent years, K-12 institutions, corporate training groups have also adopted the use of LMS. More and more faculty members are using learning management systems to teach their courses. They are able to distribute course material easily, make students discuss online asynchronously, collect assignments online and post grades online. Faculty use learning management systems for online teaching, and also supplement it with their face to face instruction in their blended courses. From a university administrator's perspective, a real advantage of online instruction is the ability to enroll more students without having to build more classrooms (Bonk & Dennen, 2003).

Blackboard

Blackboard is one of the leading commercial LMS (or CMS) products used in North America and Europe (Munoz and Van Duzer, 2005). Blackboard has powerful capabilities in three key areas: instruction, communication, and assessment. It is the most widely adopted learning management system among United States post secondary institutions. Blackboard provides for a password-protected community where students access their courses in an online environment. It has the necessary admin iterative tools to make teaching online easier (Lowe, 2003).

Researchers have compared LMS software based on their functionality, user-friendliness, and cost. Some of the key features that are evaluated in a LMS are its usability,

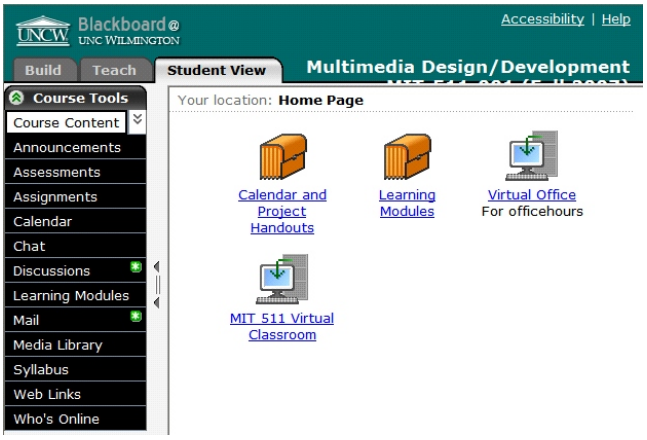

Figure 1. Blackboard student homepage

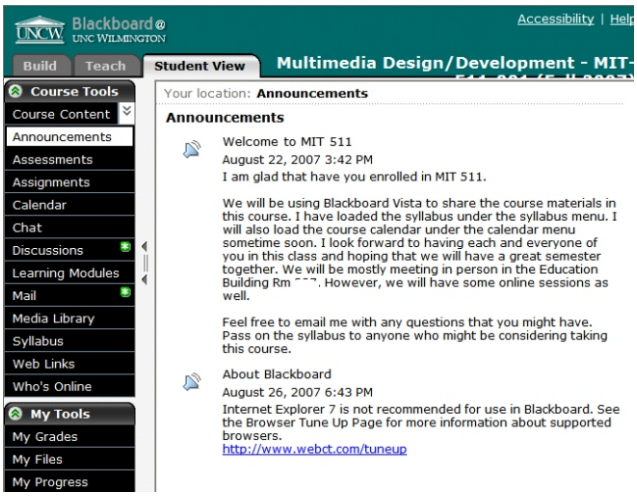

Figure 2. Blackboard Announcement Page

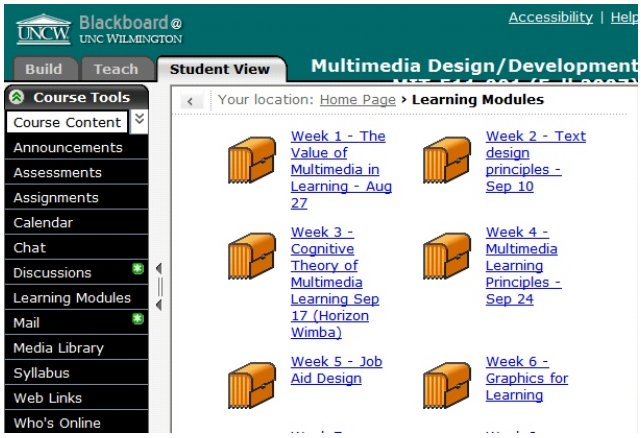

Figure 3. Blackboard Course Content

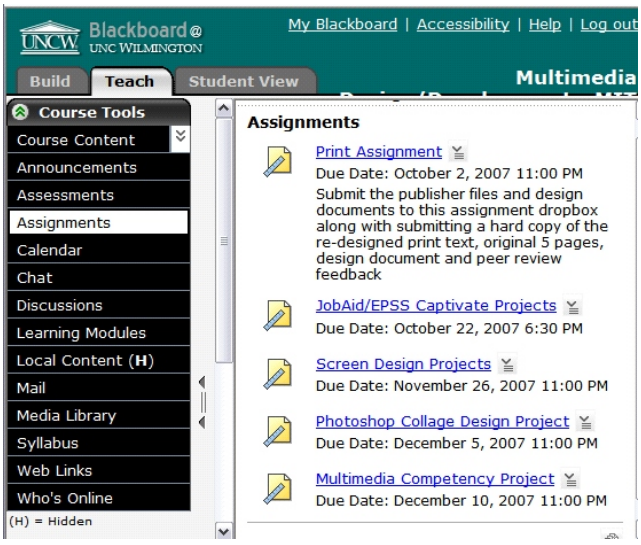

Figure 4. Blackboard Assignments Page

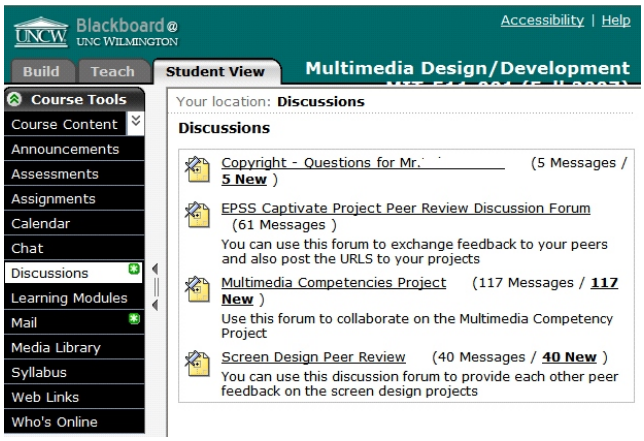

Figure 5. Blackboard Discussion Board

availability, security, stability, interoperability, and scalability (Hall, 2003). Blackboard was the learning management system used in this study.

Figures 1-5 provide a look at the common Blackboard student interface and features used in the courses examined in this study.

Asynchronous and synchronous components

These new technologies allow for a powerful combination of highly interactive instructional material with two-way asynchronous and synchronous communication between teachers and students. The "asynchronous and synchronous" terminology has been borrowed from digital communications. Asynchronous means a process of transmitting data where each character is transmitted separately with no time synchronization between sending and receiving devices; synchronous means a type of transmission in which the transmission and reception of all data is synchronized by a common clock.

In the online course setting, "Asynchronous" literally means "not at the same time." An asynchronous course is one in which the instruction is delivered at one time and the work can be done at a different time. The advantages of asynchronous courses are that it makes it possible for "anytime" and "anywhere" learning. Some of the key components of asynchronous courses are discussion boards, using a learning management system for course delivery and transfer of files, and online quizzes,

Synchronous means "events which occur at the same time." Synchronous courses are those in which the faculty

and students can interact with one another in real time. The advantage of synchronous meetings is that the instructor can provide instant feedback on a student's performance, and allows the teaching to adapt to the students' needs immediately even though they are at different locations.

A course could be entirely asynchronous or could include both asynchronous and synchronous components. While discussion boards, emails, recorded lectures are asynchronous, virtual classrooms and online chats form the synchronous part of the course. Online courses and learning management systems have received a great deal of attention in the last few years. In this study, the authors examined both asynchronous and synchronous components of a learning management system and the self-efficacy of instructional technology students in using these different tools.

Online, Hybrid, and Blended Learning

Within the online learning community the terms hybrid and blended learning are used with little or no difference in meaning among educators (Watson, 2009). In general, hybrid or blended learning combines online and face-to-face delivery of educational content. Allen and Seaman (2008) on behalf of the Sloan consortium define online courses as, "those in which at least 80 percent of the course content is delivered online" (p. 4). The definitions of hybrid learning span a continuum from a qualitative socializing pedagogy (Dziuban, Hartman & Moskal, 2004) to quantitative. Dyjur (2008) defined hybrid learning as:

The integration of face-to-face and online learning to help enhance the classroom experience and extend learning through the innovative use of information and communications technology. Blended strategies enhance student engagement and learning through online activities to the course curriculum, and improve effectiveness and efficiencies by reducing lecture time (para 4).

The Sloan Consortium defines a hybrid course as having between 30 percent and 80 percent of the course content delivered online. In this study the quantitative definition of hybrid or blended learning is used (Allen & Seaman, 2008).

Many scholars have compared online and hybrid learning. A recent meta-analysis by Means, Toyoma, Murphy, Bakia, & Jones (2009), examining three studies on different courses further reinforced the No Significant Difference Phenomenon (Russell, 2001). They found no significant difference in student performance between online and hybrid courses. Exceptions do exist (Keefe, 2003; Porier & Feldman, 2004; Campbell, et al., 2008). Poirier and Feldman (2004) and Campbell et al. (2008) found a significant effect favoring online students when comparing an online course with a hybrid course. Keefe (2003) found a significant effect favoring performance for students in a hybrid course over those in an online course. Findings such as these lead hybrid course performance and us to examine commonalities and factors that may contribute to online.

Self-Efficacy

Self-efficacy is students' judgment of their own capabilities for a specific learning outcome. Bandura (1997) in his self-efficacy theory, defined self-efficacy as beliefs in one's abilities to carry out a desired course of action. According to Bandura, there are four sources of self-efficacy: the self-beliefs of students are formed from mastery experience (performance on previous similar tasks); vicarious experience (modeling, or the observation of others' performance on similar tasks); verbal persuasion (feedback from significant others); and physiological and emotional reactions (e.g., anxiety) to specific tasks. Although the informal term *confidence* is sometimes used as a synonym for self-efficacy, it fails to capture the specificity and theoretical base of the construct of self-efficacy (Bandura, 1997).

Furthermore, Bandura suggests the formation of self-efficacy beliefs is based primarily on reflection and interpretation of past performance (also referred to as *enactive mastery experiences).* Previous experiences in which a particular performance was enacted by an individual and was perceived by that individual as successful will tend to raise self-efficacy beliefs related to this performance; those experiences perceived as

unsuccessful will tend to lower self-efficacy beliefs. With the technological advancement in this decade, it is important that students are successful in achieving learning and performance outcomes, which results in an increase in their self-efficacy beliefs.

Self-efficacy for technology use may be an important factor for student participation and performance. With courses being taught fully online and in hybrid settings (face-to-face and online), it has become important for students to be confident in their technology skills. According to Eachus and Cassidy (2002), self-efficacy is an important factor in understanding the frequency and success with which individuals use computers. Compeau, Higgins, and Huff (1999) tested the influence of computer self-efficacy beliefs, outcome expectations, effect, and anxiety on computer use and found that computer self-efficacy beliefs had a significant positive influence on computer use.

Self-efficacy is often measured by self-reported surveys. Saadé and Kira (2009) developed a survey instrument to capture student perceived computer anxiety and self-efficacy of using an LMS. The survey contains 18 Likert-type questions measuring student perceptions on three constructs. The findings indicated that computer self-efficacy has a significant impact on computer anxiety and perceived ease of computer use.

Purpose

LMS self-efficacy, defined as self-assessment regarding one's skills using a LMS, may be a critical factor in e-learner satisfaction (Lee and Hwang, 2007). The goal of this study was to develop and validate an instrument that measures students' confidence with LMS, and explore the relationship between LMS self-efficacy and course performance for e-learners.

Method

LMSES

The Learning Management Self-Efficacy Survey (LMSES) was initially designed with five LMS-related categories (Accessing the course content, Tests and Grades, Asynchronous Communication, Synchronous Communication and Advanced Tools). Participants were asked to rate the items on the survey on a four-point Likert scale ranging from (1) Not Confident at to (4) Very Confident.

Participants

This study was conducted with 68 students enrolled in one of two sections of an instructional technology course. Thirty-three students were enrolled in an online course where a LMS was used for course delivery, and 35 students were enrolled in a hybrid environment in which the LMS was used as a supplement to face-to-face instruction. The study participants were predominantly female (64%) below the age of 24 (50%).

Results

Five-category grouping before differential analysis

Student confidence for accessing the course content was (M=2.69), tests and grades (M=2.73), asynchronous communication (M=2.02), synchronous communication (M=1.84), and advanced tools (M=1.91). The reliability of this administration was .96.

Three different analyses were conducted to test for differences between the online and hybrid learners. A multivariate analysis of variance (MANOVA) conducted on the overall data indicated students enrolled in the online course reported significantly greater self-efficacy than students enrolled in the hybrid course, $F(1, 68) = 14.194$, $p < .01$. Follow-up univariate analyses for the five categories revealed significant differences at the $p<.01$ level for four of the five categories, all indicating greater self-efficacy for students in the online course. Tukey post hoc analyses reveled significant differences on 31 of the 48 items again, all favoring students in the online course. No significant differences were found for items in the Tests and Grades category (Table 1).

Four-category grouping after differential analysis

Following the first administration of the LMSES, differential item function analysis lead to the reduction of the LMSES from 48 to 24 items (Table 2). From this analysis four factors emerged: i) Accessing information, ii) Posting information, iii) File management, and iv) Advanced features. These four factors combined to account for 91% of the item variance.

LMSES Functionality before differential analysis,		Online,	Hybrid,	Overall Mean
Part I Accessing the Course Content I would feel confident to ….				
1. Log in to my course in the LMS		2.88	2.75	2.81
2. Read the text-based announcements posted by my instructor		2.94	2.72	2.83*
3. Listen to the voice-based announcements posted by my instructor		2.79	2.08	2.42*
4. View my instructor's information, such as name, office hours, and office location		2.97	2.78	2.87*
5. View the course documents online		2.97	2.78	2.87*
6. Download the course documents to my computer		2.91 ,	2.75 ,	2.83
7. Access the links to the Web resources		2.94 ,	2.83 ,	2.88
8. Access the course calendar and tasks assigned		2.88	2.83	2.85
9. Create a homepage with personal information		2.73	1.36	2.01*
10. View profiles of other participants in the course		2.76	2.22	2.48*
	Mean	**2.88**	**2.51**	**2.69***
Part II Tests and Grades I would feel confident to ….				
11. Take a test/quiz online		2.67	2.47	2.57
12. View the feedback for the online test/quiz		2.79	2.75	2.77
13. Complete a survey online		2.94	2.89	2.91
14. Submit assignments online using a drop box		2.64	2.44	2.54
15. View my grades in the grade book		2.88	2.86	2.87
	Mean	**2.78**	**2.68**	**2.73**
Part III Asynchronous Communication I would feel confident to ….				
16. Send text-based e-mail to my instructor		3.00	2.80	2.90*
17. Send text-based e-mail to one or more students in my class		2.88	2.66	2.76*
18. Send voice e-mail to my instructor		1.64	0.89	1.25*
19. Send voice e-mail to one or more students		1.61	0.86	1.22*
20. Post text messages in the discussion group		2.97	2.63	2.79*
21. Reply to the text messages in the discussion group		2.88	2.56	2.71*
22. Create a new thread in the discussion group		2.82	2.14	2.46*
23. Download attachments from the messages in the discussion group		2.88	2.53	2.70*
24. Attach files to my messages in the discussion group		2.85	2.50	2.67*
25. Post voice messages to the voice board		1.61	0.83	1.20*
26. Reply to the voice board messages		1.67	1.03	1.33*
27. Import and export voice messages		1.55	0.83	1.17*
28. Create an audio Podcast		1.09	0.67	0.87*
29. Exchange files with my group members		2.58	2.17	2.36*
	Mean	**2.29**	**1.79**	**2.02***
Part IV Synchronous Communication I would feel confident to ….				
30. Join a text-based chat session		2.58	2.31	2.43*
31. Read messages from one or more members in a synchronous text-based chat system		2.55	2.17	2.35*
32. Post or reply to a message in a synchronous text-based chat system (one-to-many interaction)		2.55	2.14	2.33*
33. Interact privately with one member of the synchronous text-based chat system (one-to-one interaction)		2.55	2.14	2.33*
34. View archived text-based chat sessions		2.27	2.00	2.13
35. Join a virtual class session, such as Horizon Wimba or Blackboard Virtual Classroom		2.15	1.56	1.84*
36. Use the Whiteboard tools in a virtual class session		1.61	1.25	1.42
36. Use the Whiteboard tools in a virtual class session		1.61	1.25	1.42
37. Join a breakout room in a virtual class session		1.64	1.08	1.35*
38. Display a Web browser from within a virtual class session		1.67	1.33	1.49
39. Ask questions to the moderator of the virtual class session		2.00	1.47	1.72*
40. Direct message with the other participants in the virtual class session		1.88	1.42	1.64*
41. Post my responses by selecting different options (e.g., polling, hand raising) in the virtual class session		1.73	1.36	1.54
42. Moderate a virtual class session (e.g., load presentations, archive settings, grant user permissions)		1.33	1.22	1.28
	Mean	**2.04**	**1.65**	**1.84***

Table 1. Mean scores for LMSES before differential analysis (48 items). (Cont..)

Part V Advanced Tools I would feel confident to ….			
43. Post my reflection to a journal	2.18	2.14	2.16
44. Post my reflection to a blog	2.15	1.94	2.04
45. Comment on a blog posting	2.18	2.11	2.14
46. Collaborate on web pages to add, expand, and change the content (Wiki)	2.00	1.42	*1.70**
47. Read news publications using RSS feeds	1.85	1.34	*1.59**
48. Get context-sensitive help	2.12	1.58	*1.84**
Mean	**2.08**	**1.76**	**1.91***

Table 1. Mean scores for LMSES before Differential Analysis (48 items).

LMSES Functionality after differential analysis,	Online	Hybrid	Overall Mean
Part I Accessing Information I would feel confident to ….			
1. Log in to my course in the LMS	2.88	2.75	2.81
2. Read the text-based announcements posted by my instructor	2.94	2.72	2.83*
3. View my instructor's information, such as name, office hours, and office location		2.78	2.87*
4. View the course documents online	2.97	2.78	2.87*
5. Access the links to the Web resources	2.94	2.83	2.88
6. View the feedback for the online test/quiz	2.79	2.75	2.77
7. Access the course calendar and tasks assigned	2.88	2.83	2.85
8. View my grades in the grade book	2.88	2.86	2.87
Mean	**2.91**	**2.79**	**2.84**
Part II Posting Information			
9. Take a test/quiz online	2.67	2.47	2.57
10. Send text-based e-mail to my instructor	3.00	2.80	2.90*
11. Post text messages in the discussion group	2.97	2.63	2.79*
12. Create a new thread in the discussion group	2.82	2.14	2.46*
Mean	**2.87**	**2.51**	**2.57***
Part III File Management			
13. Submit assignments online using a drop box	2.64	2.44	2.54
14. Download attachments from the messages in the discussion group	2.88	2.53	2.70*
15. Exchange files with my group members	2.58	2.17	2.36*
Mean	**2.70**	**2.38**	**2.54 ***
Part IV Advanced Features			
16. Join a virtual class session, such as Horizon Wimba or Blackboard Virtual Classroom	2.15	1.56	1.84*
17. Use the Whiteboard tools in a virtual class session	1.61	1.25	1.42
18. Join a breakout room in a virtual class session	1.64	1.08	1.35*
19. Display a Web browser from within a virtual class session	1.67	1.33	1.49
20. Direct message with the other participants in the virtual class session	1.88	1.42	1.64*
21. Post my responses by selecting different options (e.g., Polling, hand raising) in the virtual class session	1.73	1.36	1.54
22. Moderate a virtual class session (e.g., load presentations, archive settings, grant user permissions)	1.33	1.22	1.28
23. Post my reflection to a blog	2.15	1.94	2.04
24. Collaborate on web pages to add, expand, and change the content (Wiki)	2.00	1.42	*1.70**
Mean	**1.80**	**1.40**	**1.55***

Table 2. Mean scores for LMSES after Differential Analysis (24 items).

Student confidence for accessing the course content was (M=2.84), posting information (M=2.57), file management (M=2.54), and advanced features (M=1.55). The reliability of this administration was .92. Factor and post-hoc analysis were used to examine our a priori hypothesis that the scale contained four dimensions.

Follow-up univariate analyses for the four categories revealed significant differences at the $p<.01$ level for three of the four categories, all indicating greater self-efficacy for students in the online course. Tukey post hoc analyses revealed significant differences on 12 of the 24 items again, all favoring students in the online course.

LMS Self-Efficacy and Course Performance

Regression analysis was conducted to predict the effect of learner LMS self-efficacy on course performance. In this study, LMS self-efficacy of the hybrid learners accounted for a significant contribution to their course performance $R2 = .09$, $F(1, 35) = 3.26$, $p<.05$, indicating students with higher LMS self-efficacy tended to have better course performance. Whereas, LMS self-efficacy of the online learners did not account for a significant contribution their course performance $R2=.04$, $F(1, 32) = 1.16.$, $p>.05$.

Discussion

Perhaps the most interesting finding is the significant positive correlation of self-efficacy with course performance for the students in the hybrid course, despite reporting significantly lower self-efficacy than the students in the online course in three of the four categories measured. Neither group reported a relatively high level of self-efficacy. The highest reported self-efficacy value for either group, "Send text-based e-mail to my instructor," had a mean of 3.0 (Somewhat Confident) for online learners. This could mean there is a baseline competence with LMS use required for success, but once that level is perceived, greater self-efficacy with the system is not required.

Furthermore, it is perplexing that the significant positive correlation occurred for the hybrid learners. It would seem that the use of the LMS as a supplement to face-to-face instruction would require less confidence with the system than in a course in which all content is delivered though the LMS. Other factors that may have influenced this finding could be discrepancies in the use of various tools between the courses or other differences in the learners. Hybrid learners had the option to enroll in the fully online version of the course, but self-selected into the hybrid version. This may be due in part to their perceived lower self-efficacy with the delivery system. Clearly, more investigation is required.

Finally, the only LMSES category that did not yield a significant difference was Tests and Grades when grouped into five categories (M=2.73) and it was Accessing Information (M=2.84) when grouped into four categories. The authors suggest this finding is an indication of the predominant use of a LMS throughout each student's experience. As suggested by Bandura (1997), the formation of self-efficacy beliefs is based primarily on reflection and interpretation of past performance. If this is the case, it is unfortunate that the vast array of learning support features of a contemporary LMS is not utilized.

Conclusion

Although LMS has been widely used in higher education, this study indicated that many LMC features are not fully utilized and a large portion of students are still lack of confidence with the system. Future studies should focus on identifying factor that influence the level of technology self-efficacy and help students gain more confidence. More studies could be designed to investigate the human-computer interaction of LMS. Studies are also needed to examine other factors influencing course format selection.

References

[1]. Allen, I. & Seamen, J. (2008). Staying the Course. Online Education in the United States, 2008. The Sloan Consortium. Sloan-C. Needham, MA.

[2]. Arbaugh, J.B., & Duray, R. (2002). Technological and structural characteristics, student learning and satisfaction with web-based courses: An exploratory study of two MBA programs, *Management Learning*, 33, 331-347

[3]. Bandura, A. (1997). *Self-efficacy: The exercise of*

control. New York: Freeman.

[4]. Beard, L. A., & Harper, C. (2002). Student Perceptions of Online Versus On Campus Instruction. *Education, 122*, 4, 658-663.

[5]. Breen, L., Cohen, L., & Chang, P. (2003). *Teaching and learning online for the first time: Student and coordinator perspectives.* Paper presented at the Partners in Learning: 12th Annual Teaching Learning Forum, Edith Cowan University, Perth.

[6]. Bonk, C. J., & Dennen, V. (2003). Frameworks for research, design, benchmarks, training, and pedagogy in Web-based distance education. In M. G. Moore & B. Anderson (Ed.), Handbook of distance education (pp. 331-348). Mahwah, NJ: Lawrence Erlbaum Associates.

[7]. Campbell, M., Gibson, W., Hall, A., Richards, D., & Callery. P. (2008). Online vs. face-to-face discussion in a Web-based research methods course for postgraduate nursing students: A quasi-experimental study. International Journal of Nursing Studies, 45(5), 75059.

[8]. Compeau, D., Higgins, C. A., & Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. *MIS Quarterly,23,* 145-158.

[9]. Dyjur, T. (2008). University of Calgary, Teaching and Learning Centre. Retrieved online from: http:// commons. ucalgary.ca/teaching/programs/itbl/. February 26, 2010.

[10]. Dziuban, C., Hartman, J., Moskal, P., (2004). Blended learning. EDUCAUSE Review, 7(2004).

[11]. Eachus, P, & Cassidy, S. (2002). *Developing the computer self-efficacy (CSE) scale: Investigating the relationship between CSE, gender and experience with computers.* Journal of Educational Computing Research, 26, 2, 133-153

[12]. Hall, J. (2003). Assessing Learning Management Systems. Retrieved online from: http://www. Clomedia. com /content/templates/clo_feature.asp? articleid =91 &zoneid=29. August 26, 2009.

[13]. Keefe, T. J. (2003). Using technology to enhance a course: The importance of interaction. EDUCAUSE Quarterly, 1, 2434.

[14]. Lee, J.K. and Hwang, C.Y. (2007). The effects of computer self-efficacy and learning management system quality on e-Learner's satisfaction. In Cameron, L., Voerman, A. and Dalziel,J. (Eds), *Proceedings of the 2007 European LAMS Conference: Designing the future of learning* (pp73-79). 5 July, 2007, Greenwich: LAMS Foundation.

[15]. Means, B., Toyoma, Y., Murphy, R., Bakia, M., & Jones, J. (2009). Evidence of evaluation based practices in online learning: A meta analysis and review of online learning studies. Retrieved online from http://www. Ed. gov /rschstat/eval/tech/evidence-based-practices/final report.pdf November 12, 2009

[16]. Poirier, C. R., & Feldman, R. S. (2004). Teaching in cyberspace: Online versus traditional instruction using a waiting-list experimental design. *Teaching of Psychology*, 31(1):59-62.

[17]. Russell, Thomas L. (2001) The No Significant Difference Phenomenon: A Comparative Research Annotated Bibliography on Technology for Distance Education. IDECC, Montgomery, AL.

[18]. Saadé, R. G. & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of Information Technology Education*, 8, 177-191.

[19]. Watson, J. (2009). Blended learning: The convergence of online and face-to-face education. North American Council for Online Learning. Retrieved online from: http://www.inacol.org/research/docs/ NACOL_PP-BlendedLearning-lr.pdf. February 26, 2010.

[20]. Wells P., Fieger, P., & de Lange, P. (2005). Integrating a virtual learning environment into a second year accounting course: Determinants of overall student perception. *Proceedings of the AAA Annual Meeting,* San Francisco.

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