EXPLORING THE FREQUENT USE OF THE LEARNING MANAGEMENT SYSTEMS (LMS) FEATURES AND LEARNERS' INTERACTIONS IN HIGHER EDUCATION[i]

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Abstract:

The purpose of this study is to explore how the frequent use of Learning Management Systems (LMS) features improve learners' interactions. In this structural equation, modelling was applied to examine how the regular use of LMS features improve learners' interactions. The study was a survey that made use of the questionnaire for data collection. A total of 362 students responded to the questionnaires used in the study. The results indicated that the frequent use of LMS features help learners to interact with content as well as the instructor but not with their peers during the learning process. It is hoped that the outcomes of this study can be used in shaping Innovative practices in Higher Education and beyond.

Keywords: learning management systems, learner-instructor interaction, learner-content interaction, learner-learner interaction, higher education

Résumé :

Le but de cette étude est d'explorer comment l'utilisation fréquente des systèmes de gestion de l'apprentissage (SGA) améliore les interactions des apprenants. Dans cette équation structurelle, une modélisation a été appliquée pour examiner comment l'utilisation régulière des SGA améliore les interactions des apprenants. L'étude a porté une enquête à l'aide du questionnaire pour la collecte de données. Au total, 362 étudiants ont répondu été interrogés. Les résultats indiquent que l'utilisation régulière des SGA aide les apprenants à interagir avec le contenu ainsi qu'avec l'enseignant, mais pas avec leurs pairs pendant le processus d'apprentissage. L'on espère que les résultats de cette

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recherche pourront être utilisés pour améliorer des pratiques innovantes d'enseignement dans l'enseignement supérieur et au-delà.

Mots clés: systèmes de gestion de l'apprentissage, interaction apprenant-enseignant, interaction apprenant-contenu, interaction apprenant-apprenant, enseignement supérieu

1. Introduction

The development and growth of the technology in higher has led to the worldwide spread of information and provided drastic changes to global communication and learners' interaction. Instructional methods that were difficult to be implemented due to the inability to give the much-needed attention to students have now become more comfortable to be carried out with the current advances in technology. The introduction and expansion of various technology-enhanced learning tools (emails, electronic journals, discussion boards, websites, search engines, online office hours via chat or web-conferencing, electronic submission of assignments, school portal, and learning management systems) are causing numerous transformations in educational delivery and support processes in higher education institutions. Learning management systems (LMS) has become increasingly important in higher education institutions (Walker, Voce & Jenkins, 2016; Walker et al., 2014).

Learning management systems are providing new modes of teaching and learning that modelled a significant challenge to the dominance of instructor-centred approach in higher education because of its limited scope in today's information age with too much information. Today's knowledge has a half-life that gets shorter all the time. As a result, teaching should focus on collaboration, interactivity, and promotion of learner-centred learning activities that promote the achievement of better learning outcomes and make the learner feel more satisfied with their learning. Learning management systems and school portal allow teachers and learners to make class announcements, submit assignments, share instructional materials, and communicate with each other. LMS is application software that has played a significant role in education. It can be designed to supplement and facilitate instructional activities such as course registration, analysing and reporting skill gaps, tracking learners' progress, delivery of courses content supports the learning process and enables communication among learners and between learners and the instructor (Gilhooly, 2001; Umek, Aristovnik, Tomaževič & Keržič, 2015).

LMS also can provide educational resources that are available online as a support for the individual learning process; connect educational resources to what is happening in class, both before and after interaction with learners. It can also provide learning materials and facilities for collaborative discussions and peer support, and finally, enable both face-to-face sessions and online learning activities. Previous research in LMS has focused on how these systems deliver and manage instructional content with little concern for how these tools help students' interactions.

Interactions (learner-instructor interaction, learner-learner interaction, learner-content interaction) are essential components in education; however, learners in Higher Educational institutions tend to have fewer opportunities to interact with their instructors and peers in traditional face-to-face instruction (Eom, Wen, & Ashill, 2006). Given that interaction among learners, instructors and content occur in all types and level of education, regardless of delivery method. Studies show that interactions may influence learners' satisfaction and perceived learning outcomes in Higher education (Eom, 2009; Eom, Wen, & Ashill, 2006; Swan, 2001).

Interaction among the students and between students and the instructors as well as between students and content can be made possible through the application of LMS features like discussion boards, email, and chat, among others. These LMS features can also facilitate the social construction of knowledge (Hsu, 2007, Shaibou, 2018).

2. Purpose of the Study and Research Questions

The purpose of this study is to explore how the frequent use of Learning Management Systems (LMS) features improve learners' interactions. Based on the above-stated purpose of the study, the following research questions were formulated to guide the study.

2.1 Research Questions and Hypotheses
Q1: To what extent does the frequent use of LMS features improve learner-learner interaction, learner-instructor interaction, learner-content interaction?

H1: The frequent use of the LMS feature will lead to a higher level of perceived interaction between the learner and the contents.

H2: The frequent use of the LMS feature will lead to a higher level of perceived interaction between the instructor and the learner.

H3: The frequent use of the LMS feature will lead to a higher level of perceived interaction among the learners.

3. Literature Review

3.1 Learning Management System (LMS)
Learning Management Systems (LMS) is a comprehensive, integrated software that supports the development, delivery, administration, monitor, and assessment of courses in traditional face-to-face, blended, or online learning environments (Clayton et al., 2014). It is also referred to as a set of software tools for the administration, documentation, tracking, and reporting of learning, classroom and online course programs, and course content (Clayton et al., 2014). LMS are branded by various names like learning content management system (LCMS), course management system (CMS), virtual learning environment (VLE), learning portal, or e-learning platform (Clayton et al., 2014). Each

name might have a slightly different connotation, depending on interpretation. However, in this dissertation, we will use the term LMS.

LMS enables instructors to plan, design and deliver educational materials to their students (Halverson, 2009). Also, they offer a range of activities such as chat rooms, online discussion forums, and email communications, among others (Jochems, Merrienboer, & Koper, 2004). This kind of learning environment encourages the student-centred approach, which caters to individual differences (Lajoie & Azevedo, 2006). It can also be useful in an organisational setting where students can share knowledge with each other in their daily learning (Wang, Ran, Liao, & Yang, 2010).

Institutions use LMS software to plan, implement, monitor, facilitate, and assess student learning (Clayton et al., 2014). The software integrates course preparation; educational content and resources; the delivery and tracking of student activities, for instance, discussion and collaboration; the administration of assessment activities; and the accumulation and presentation of marks and grades (Clayton et al., 2014). Also, the LMS helps institutions maintain the integrity of their educational programs and enables faculty to develop courses effectively and efficiently, deliver instruction, foster collaboration, facilitate communication, and assess students (Clayton et al., 2014). The LMS can also be used to enhance traditional face-to-face instruction, as well as blended and online educational environments.

There are different types of LMSs with varying capabilities in creating consistent technology-enhanced learning environments that may be used to enhance traditional face-to-face learning or delivering blended learning. The LMSs have the potential to support collaboration, interaction and student-centred learning conditions (Clayton et al., 2014). They also provide the instructors with the opportunity to evaluate students and their learning as well as monitor their progress (Clayton et al., 2014). Interaction among the instructors and students is made possible through the application of discussion boards, email, chat, and the use of wikis and podcasts, among others.

LeRouge, Blanton, and Kittner (2002) researched to examine the effectiveness of collaborative team projects using collaborative group features provided by LMS. They found the LMS collaborative group tools like email and the discussion board can enhance student learning outcomes and facilitate successful student collaborative group projects.

Table 1: Features and Benefits of LMS

Features	Benefits
Managing Users and Courses	Uploading courses, recommending courses and generating various reports.
Making Students Course Calendar	It is a feature that enables LMS users to view the available programs or courses at a glance.
Messaging and Notifications	Is used to send reminders and notifications to students on upcoming lessons or deadlines.
Formative and Summative Assessments	Assessments can be uploaded to follow up classroom course programs. It can also have diagnostic assessments to assess the level of knowledge of students and assign a suitable level to them.

Grading and Scoring	In one location, can access students' scores and transcripts and maintain an ongoing record of the performance of the individual.
Tracking and Reporting Learners Progress	It provides a range of standard and general summaries and detailed reports, that learner can view his average test scores, final test scores.
Administration	It helps to facilitate the ways and means of getting enrolment approval, individual and batch registration, verifying prerequisites.

3.2 Interactions in Technology-Enhanced Learning Environment

Interaction among the students and between students and the instructors as well as between students and content can be made possible through the application of LMS features like discussion boards, email, and chat, among others.

Interaction in an educational setting, through communication and collaboration, is the most central mechanism instructors use to encourage active learning among students. Interaction is vital in all forms of education, regardless of whether technology is involved or not (Moore & Kearsley, 1996). Interaction has been identified as a critical constituent of the educational process (Anderson, 2003a). Interaction is an essential part of the learning process, whereby instructors, students, and the learning content share a common learning environment. The interaction also plays a significant role in defining the effectiveness and quality of education and allows individuals to share information, to receive feedback and to more readily evaluate progress (Piccoli, Ahmad, & Ives, 2001). Moore (1989) identified three major interaction types in the learning process: learner-to-learner, learner-to-content, and learner-to-instructor. The interactions within these learning activities indicate to what extent, the learners could acquire the knowledge.

Northrup, Lee, and Burgess (2002) classified interaction within the online learning environment into four types: content interaction, collaboration interaction, meta-cognitive skills, and need for support from the instructor. Anderson (2003), focuses on the social, pedagogical, and economic impact, extended this definition by proposing six types of interactions: instructor-instructor, instructor-content, content-content, learner-learner, learner-instructor and learner-content interactions. Despite the different kinds of interaction that are continuously addressed by researchers from different perspectives, Moore's interaction model still, dominates interaction in the learning environments (Bray et al., 2008; Northrup et al., 2002). Hence, for this study, we will adopt Moore's three types of interaction.

Moore (1989) stated that the foundation of teaching is deeply rooted in interaction and stressed that an increase in interaction between students and instructors, students and students, and students and course content could encourage student motivation and help them take pleasure in learning. Therefore, interaction again proves to be an invaluable component of the learning process. In the traditional classroom, the principal mode of communication is a face-to-face interaction between teacher and student (Anderson, 2003b). The interaction that results in knowledge transfer is the interactions between teacher and student, student and student, and student and content (Moore, 1989). In the modern classroom, the primary mode of interaction is student-to-instructor interaction, student-to-student interaction, and student-to-content interaction.

Many theories of learning specify the importance of interaction between students and content, arguing that this is the most natural, effective and efficient way to learn (Gunawardena, 1995; Leidner & Jarvenpaa, 1995). For example, when using LMS asynchronous communication tools such as discussion threads, student responses allow individual learners to post comments, review comments made since they previously posted, and respond to these comments. As time goes time, this interaction should lead to more in-depth and broader information processing, more knowledge transfer, and more in-depth learning more than if learning were done in isolation (Johnson, Hornik, & Salas, 2008). On the other hand, the use of synchronous communication tools such as chat, learners can gain immediate feedback and evaluate their learning with ease (Johnson, Hornik, & Salas, 2008). As individuals' interactions increase, they should also have a more positive perception of the learning environment (Moore, 2002). Timely feedback and interaction with the instructor can help learners feel that they are valued as well as providing needed information more quickly. Appropriate interaction with peers can increase the information shared in the class which should also lead to a more positive view of the learning environment, as well as helping learners see more significant value in the course (Johnson, Hornik, & Salas, 2008).

Interactions of all kinds can enhance the learning process and can be appropriate, effective and efficient in all educational settings (Anderson, 2003a, 2003b; Murray, Pérez, Geist, & Hedrick, 2013). Research indicates that once the three types of interaction (learner-instructor, learner-content, and learner-learner) reach an optimal level, increasing another kind of interaction would yield diminishing returns (Anderson, 2003a; Bernard et al., 2009; Murray, Pérez, Geist, & Hedrick, 2001). In a meta-analysis conducted by Bernard et al. (2009), they discovered empirical support for Anderson's theorem related to different modes of interaction, specifically in distance education. They examined 74 reports that fit their criteria and categorised them according to student-student, student-teacher, or student-content interaction treatments. Bernard et al. (2009) found that there was an average effect size of +0.38, showing that the interaction treatments was associated with a moderate, positive effect on achievement. With the most significant effects size found to be related to learner-learner interactions (+0.49) and learner-content interactions (+0.46), which were not significantly different from each other. The smallest effect size was for learner-teacher (+0.32) interactions. Their findings supported Anderson equivalence theorem, suggesting that when the strength of a particular interaction increased, the average effect size also increased, signifying that higher-quality interactions lead to better achievement.

Stravredes (2002, 2011) emphasised the importance of interaction by affirming that student achievement and positive attitudes increased as the level of interaction increased. One important note, though, was that the quality of interaction was more significantly related to student interaction than the amount of interaction was in general. Feedback for students was one significant example; students would instead receive quality, constructive feedback concerning their work rather than a simple "good job" or "great," comments that offered no suggestions for improvement. Students needed more detailed

feedback from the instructor regarding their grades in the class, which areas they excelled in, and which areas they needed to improve.

Studies have also supported the notion that one form of interaction can be used more heavily without degrading the students' learning (Anderson, 2003a). The implications are that courses can be designed to heavily emphasise one type of interaction with minimal loss in educational effectiveness. Further, as higher education institutions continue to expand the use of LMS, more focus will be placed on student/content interaction. According to Anderson (2003a), there is a need to transform student/student and student/instructor interactions into the enhanced form of student/content interaction.

3.3 Learner-Instructor Interaction

Learner-instructor interaction is a reciprocal communication between the course instructor and the learners (Moore & Kearsley, 1996). This type of interaction is considered as very valuable by both the students and the instructors. Learner-instructor interaction can take on many forms. Some of these interactions are direct while others are indirect, such as evaluation conducted by instructors for formative assessment, and individual assistance, such as guidance-support, and encouragement from the instructors. The Instructors are usually valuable when students are at the point of knowledge application (Moore, 1989).

An import form of learner-instructor interaction is feedback. Feedback enables the students and the instructors to ensure students comprehension of course materials and receives information on their performance in delivering course content. Feedback from instructors is vital to students' achievement in the courses (Anderson, 2003). Students favour timely feedback from instructors. In the other hand, a lack of immediate feedback brings about feelings of isolation and dissatisfaction (Yukselturk & Yildirim, 2008). Northrup et al. (2002) confirmed the importance of instructor feedback to students and found it useful when provided two times per week. Students who can communicate with their instructors are often more satisfied with the learning compared to those who do not communicate (Bray et al., 2008).

Learners in technology-enhanced learning environments reported more course satisfaction when they received support from their instructors matches their expectations of communicating with their instructors (Shaibou, 2018). Supporting the frequency of contact between the students and the instructors, having a regular presence in-class discussion, and making expectations clear to learners are three practices suggested for instructors to adopt in enhancing learner-instructor interaction during learning (Dennen, Darabi, & Smith, 2007; Shaibou, 2018).

When there are learner-instructor interactions, the learners feel the social and instructor presence in the learning environment, which enhances students' cognitive abilities. The instructor presence in technology-enhanced learning environments is likely to engage and enhance students to attain deeper learning (Yuen, Fox, Sun, & Deng, 2009). The instructor presence is a critical aspect in the promotion of learner-learner interaction,

which creates a cognitive presence, that lead to higher-level learning (Garrison, 2007; Yuen et al., 2009).

Moore and Kearsley (2005); Madland and Griff Richards (2016) note that instructors often interact with students to stimulate interest and motivation, and help students, apply their learning. According to Anderson (2003a), student-teacher interaction is costly, and the cost increases with a growing number of students, making it the least scalable mode of interaction.

3.4 Learner-Content Interaction

Learner-content interaction is a one-way process of expanding and reflecting on the subject matter or the course content (Moore, 1989). This type of interaction is the primary reason for the existence of formal educational systems (Moore, 1989). The interaction of learners with content initiates an internal educational conversation, which happens when students talk or think by themselves about the information, knowledge, or ideas gained as part of course experience (Shaibou, 2018). Through an internal conversation student cognitively elaborate, organise, and reflect on the new insights they have obtained by integrating previous knowledge (Moore, 1989; Moore & Kearsley, 1996). According to Moore and Kearsley (2005), content is merely the subject matter that is to be learned. Content can either external (for instance, a student learning the principle of instructional design) or internal to the student (for example, a student examining his or her assumptions about a subject matter).

Learner-content interaction is the outcome of the instructor-content interaction, where students encounter different learning resources (Shaibou, 2018). The students use different ways of learning these resources to achieve their learning needs. This interaction allows students to engage in learning to construct a new learning experience (Navarro & Shoemaker, 2000). The availability of different types of teaching materials such as text, simulations, audio/visual content, and video contents are likely to motivate students in their learning.

Mason and Kaye (1989) also showed the critical role that learner-content interaction plays, and that for active learning to take place, the learners should consciously interact with or operate on the learning materials or resources. Learner-content interaction is a significant aspect of student's knowledge construction and also act an essential aspect in all forms of interaction. Well-designed instructional materials help to improve the interactions between the instructor and students, and among students.

Nowadays, the use of Learning Management Systems (LMS) has made it easy to incorporate and disseminate a vast collection of educational resources. Murray, Pérez, Geist, and Hedrick (2012) found that students with the highest access rates to instructional materials are also the highest achievers. Their findings are also in line with Crampton, Ragusa, and Cavanagh (2012) findings that students with greater access to course content regarding diversity and percentage of available materials achieved a higher grade. However, researchers like Stewart, Stott, and Nuttall (2011) found that

students accessed stored learning materials to help them with assignments, not on a weekly basis to supplement lectures. A similar study, by Murray et al. (2012), also found that students tend to access only materials that are directly linked to only earning a grade.

3.5 Learner-learner Interaction

Learner-learner interaction is two-way mutual communication between or among learners, with or without the presence of an instructor (Moore & Kearsley, 1996). It can take many forms, such as guidance, support, evaluation, and encouragement (Moore, 1989). By interacting with fellow students, students can exchange ideas and get feedback from each other (Anderson, 2003; Moore, 1989). Student interest and motivation can be enhanced through peer interaction using asynchronous or synchronous tools (Moore, 1989). Engaging in peer interaction propels students to construct ideas genuinely and increases achievement (Anderson, 2003).

Learners' interactivity is mainly aligned with communications between two or more students within a course, and outside the course (Woods & Baker, 2004). learner-learner interaction creates social learning, which causes students in small or more significant groups to share knowledge and experience (Navarro & Shoemaker, 2000; Woods & Baker, 2004). Instructions in technology-enhanced learning should focus on promoting social interactivity and collaboration among members of the community of learning. In other words, the instructional materials presented to the students need to provide opportunities for students to construct knowledge collaboratively, which could lead to unprompted interaction between each other (Garcia & Sophia, 2008). When students interact with each other, there are significant possibilities for them to attain a deeper understanding of new experiences. Hence, an essential aspect of achieving such learning experiences depends on the professors use the technology-enhanced learning environment.

The lack of adequate interaction among students in Higher Education institutions has been pointed out as a significant problem afflicting university education. The students feel isolated when they get fewer chances to work with each other on assignments (Belanger & Jordan, 2000). The use of technology, like learning management systems will enable interaction that could decrease student isolation and increase communication with each other. Also, interaction among students could enhance student engagement in learning and encourage a sense of a learning community in which the students actively participate in their learning and share ideas among themselves (Battalio, 2007).

4. Methodology

4.1 Design

The study was an exploratory survey of a cross-sectional nature as it collected information from a sample of undergraduate students at one point in time on the frequent use of learning management systems (LMS) features and learners' in higher education. A

cross-sectional survey gathers information from a sample population that has been drawn from a pre-determined population at one point in time (Fraenkel & Wallen, 2000).

4.2 Participants and Sampling Procedure

The target population for the study consisted of undergraduate students in a South Korea University who stood at 27, 739 as of Spring 2017/2018 academic year. The question of how big the sample should be inevitably arising whenever one designs a research study. There is no restriction on the number of participants to be included in a research project. Nevertheless, a sample of 400 students was for this study.

Of the 400 questionnaires that were distributed to undergraduate students at Korea University, 300 were online and 100 face-to-face. Out of the 300-online questionnaire distributed, 284 were returned given a returned rate of 94.7% and out of the 100-handed questionnaire 78 (78%). Overall, a total of 362 questionnaires were returned out of 400, given a return rate of 90.5%. Hence, the participants of this study consisted of 362 undergraduates' students who volunteered while taking the courses during the fall of 2017. The participants were freshmen, sophomores, juniors, and seniors with various majors in the Colleges of Arts and Design, Business, Education, Engineering, Liberal Arts, Life Sciences and Biotechnology, Health Sciences, Media & Communication, Political Science & Economics, and Sciences.

A total of 362 respondents were involved in this study, and out of this number, 194 or 53.6 % are males while the remaining are 168 females (44.4%). With regards to experience in Higher Education Institute, 137 (37.8%) are Second-year students, 126 (34.8%) are first-year students, 58 (16.0%) are third-year students and the remaining 11.3% are fourth-year students. As for the college of the respondent 14.9% are from the College of Liberal Arts, 13.0% from the College of Engineering, 12.7% from the College of Education, 11.6% from the College of Science, and 10.5% from the College of Political Science & Economics.

4.3 Data Collection

Data in the Study were collected using a questionnaire administered to undergraduate students.

4.4 The Questionnaire and Development of Instrument

The questionnaire was developed in four steps. In the first step, the original version of the questionnaire was adapted from past studies with similar objectives and constructs as the present study. The second step was the evaluation stage, which involved the review of the questionnaire by the researcher's adviser. The third step was the presentation of the questionnaire to an Educational Technologist with expertise in e-learning and integration of LMS in the University curriculum and instruction. The survey items ware revised at each step to fit the present context of this study and until the completed questionnaire was developed. The final questionnaire was translated into the

Korean language. The Korean vision of the questionnaire was shortened, focusing on precise and straightforward questions, to increase the rate of responses by the students.

The questionnaire was divided into three sections. The first part consisted of the introduction, which gave the subjects an idea of the purpose of the study and students' demographic information. The second part consisted of a series of 19 Likert scale items representing the frequent Use features of LMS (items 1-19). The third part of the questionnaire consisted of a series of 23 Likert scale items representing Learner-Instructor Interaction (items 01-07); Learner-Content interaction (items 08-15) Learner-Learner Interaction (items 16-23). The instrument was adapted from the literature features of LMS (Lonn and Teasley, 2008); Learner-Instructor Interaction was measured using seven items, adapted from Johnson et al. (2000); Marks, Sibley, & Arbaugh (2005) with the reliability of 0.85. Learner-Content interaction with an alpha coefficient of 0.86 (Watts-Taffe et al. 2003); Learner-Learner Interaction with an alpha coefficient of 0.84 (Johnson et al. 2000; Marks, Sibley, & Arbaugh, 2005).

4.5 Analysis of Data

The data regarding students' frequent use of the learning management systems features and students' interactions were gathered using a questionnaire. The questionnaire results were analysed using SPSS 23.0 for Windows.

Descriptive statistics were used to analyse the demographic variables, gender, college year, and college classification. Factor analysis was used to examine the validity of the research instrument. The factor analysis method was used for removing redundancy or duplication from a set of correlated variables, reduce many variables to a smaller amount based on the correlations between the variables. After running the factor analysis, some unrelated questions were removed because they were found to be vague and non-informative. The Univariate General Linear Model Procedure and Linear Regression Procedure in SPSS were used to perform a multiple regression analysis to determine the relationship between the variables.

4.6 Data Screening

The data was screened for univariate outliers. Of the returned questionnaire, there were neither outlier no missing values. Hence, the minimum amount of data for factor analysis was satisfied, with a final sample size of 362. However, out of the 19 items used to determine the frequent use of LMS features, identified in the literature, only nine are used according to the survey results. Hence the analysis of the study will be based on a total of 28 items ten less than the original number of items.

5. Findings

Descriptive statistics of learner-content interaction (M=3.57, SD=.76), learner-instructor interaction (M=2.27, SD=.80), and learner-learner interaction (M=2.91, SD=.73). Among three types of interaction, learner-content interaction (M=3.57, SD=.76) had the highest

mean score, followed, by the learner-learner interaction (M=2.91, SD=.73) and learner-instructor interaction (M=2.27, SD=.80) had the lowest mean score. Learner-learner interaction scale and learner-instructor interaction scale had a mean slightly lower than the midpoint score of 3.

Table 2: Summary Statistics, Correlations and Results from the Regression
Analysis of Learner Interactions as Predictors Learner Satisfaction (N = 362)

Variable	LCI	LII	LLI
LLI			
LII			.393**
LCI		.229**	.501**
Mean	3.57	2.29	2.91
SD	.755	.800	.732

**p < .01

5.1 Test of the Structural Model

A test of the structural model showed a good model fit ($\chi2$=58.90, p < 0.00; $\chi2$/df=2.43; GFI=0.88; CFI=0.96; RMSEA=0.05; SRMR=0.05). Table 3 gives the results of the hypothesis test and path coefficients of the proposed research model. The result showed that the data supported two out of three hypotheses. Hypotheses dealing with learner-content interactions and learner-instructor interactions ware significant. However, hypothesis dealing with learner-learner interactions was not significant.

Hence, high-frequent use of the LMS features will lead to a high level of perceived interaction between the learner and content as well as learner and instructor. Inconsistent with the third hypothesis, high-frequent use of the LMS features has no impact on learner-learner interactions.

Table 3: Hypothesis Testing Results

Hypotheses	Path			Path coefficient	P	Result
H1c	FULMS	--- >	LCI	.329	***	Supported
H2c:	FULMS	--- >	LII	.077	.040	Supported
H3c	FULMS	--- >	LLI	.063	.170	Not supported

6. Conclusion

The frequent use of the LMS features was found to be the most reliable predictor of both the learner-content interaction and the learner-instructor interaction. This was possible because, according to some researchers, a variety of media or technology tools expand opportunities for learner-content interaction (Anderson, 2003). The prominence of learner-content interaction was also consistent with both Chejlyk (2006) and Keeler (2006). This result supported the ideas of Moore (1989) and Moore and Kearsley (1996), both of whom highlighted the importance of learner-content interaction in a technology-

rich learning environment. In this study, the frequent use of the LMS features did not show an effect on learner-learner interactions. Hence, interaction among the instructors and students is made possible through the application of LMS features like discussion boards, email, and chat, among others. These items can facilitate the social construction of knowledge (Hsu, 2007). The relevance and impact of learner-content interaction and learner-instructor interaction likely depend on the intensity and frequency with which the students use the different features of the LMS.

References

Anderson, T. (2003a). Getting the mix right again: An updated and theoretical rationale for interaction. *International Review of Research in Open and Distance Learning, 4.*

Anderson, T. (2003b). Modes of interaction in distance education: Recent developments and research questions. In M. G. Moore & W. G. Anderson (Eds.), *Handbook of distance education.* Mahwah, NJ: L. Erlbaum Associates.

Battalio, J. (2007). Interaction online: A re-evaluation. Quarterly Review of Distance Education, 8(4), 339–352.

Berge, Z. L. (1999). Interaction in post-secondary web-based learning. *Educational Technology, 39(1), 5–11.*

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research, 79, 1243-1289.*

Belanger, F., & Jordan, D. H. (2004). *Evaluation and implementation of distance learning: Technologies, tools and techniques.* Hershey, PA: Idea Group Publishing.

Burnett, K. B., Bonnici, L. J., Miksa, S. D., & Kim, J. (2007). Frequency, intensity, and topicality in online learning: An exploration of the Interaction dimensions that contribute to student satisfaction in online learning for Library and Information Science, 48(1),21–35.

Bray, E., Aoki, K., & Dlugosh, L. (2008). Predictors of learning satisfaction in Japanese online distance. *International Review of Research in Open & Distance Learning, 9(3), 1–24.*

Chejlyk, S. (2006). The effects of online course format and three components of student perceived interactions on overall course satisfaction. (Doctoral dissertation).

Clayton R. Wright, Valerie Lopes, T. Craig Montgomerie, Sunday A. Reju and Seb Schmoller (2014). Selecting a Learning Management System: Advice from an Academic Perspective. *EDUCAUSE Review Online article.*

Crampton, A., Ragusa, A. T., & Cavanagh, H. (2012). Cross-discipline investigation of the relationship between academic performance and online resource access by distance education students. *Research in Learning Technology, 20(0).*

Dennen, V. P., Darabi, A. A., & Smith, L. J. (2007). Instructor-learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education, 28, 65-79.*

Eom, S. (2009). Effects of interaction on students' perceived learning satisfaction in online university education: An empirical investigation. *International Journal of Global Management Studies, 1(2), 60–74.*

Eom, S. B., Wen, H. J., & Ashill, N. (2006). The determinants of students' perceived learning outcomes and satisfaction in online university education: an empirical investigation. *Decision Sciences Journal of Innovative Education, 4(2), 215–235.*

Fraenkel, R. J., & Wallen, E. N. (2000). *How to design and evaluate research in education* (4th ed.). San Francisco: McGraw-Hill.

Garcia, K., & Sophia, R. S. (2008). The Blended Learning Classroom: An Online Instructor Training Program. In M. D. Lytras, D. Gasevic, P. O. de-Pablos & W. Huang (Eds.), *Technology Enhanced Learning: Best Practices* (pp. 05-256).:. (pp. 57-80). Hershey: IGI Publishing.

Garrison, D. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks, 11(1), 61-72.*

Gilhooly, K. (2001). Making e-learning effective. Computer World, Vol. 35, No. 29, pp. 52–53,

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications 1 (2/3), 147–166.*

Halverson, T. (2009). *Distance education and new learning environments: Combining traditional teaching methods and emerging technologies.* New York: Cambria Press.

Hsu, J. (2007). Innovative technologies for education and learning: Education and knowledge-oriented applications of blogs, wikis, podcasts, and More. *International Journal of Information and Communication Technology Education, 3(3), 70-89.*

Jochems, W., Merrienboer, J. V., & Koper, R. (Eds.). (2004). *An introduction to integrated e-learning.* London: Routledge Falmer Tylor & Francis Group Company.

Johnson, S. D., Aragon, S. R., Shaik, N. & Palma-Rivas, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research, 11(1), 29-49.*

Johnson, R. D., Hornik, S. & Salas, E. (2008). An empirical examination of factors contributing to the creation of successful e-learning environments. *International Journal of Human-Computer Studies, 66, 356–369.*

Lajoie, S. P., and Azevedo, R. (2006). Teaching and learning in technology-rich environments. *Handbook of educational psychology (2ed., pp. 803–821).* Mahwah, NJ.: Lawrence Erlbaum Associates.

Leidner, D. E., Jarvenpaa, S. L., 1995. The use of information technology to enhance management school education: a theoretical view. *MIS Quarterly* 19 (3), 265–29.

LeRouge C., Blanton, E., & Kittner, M. (2002). The other semi virtual team: Using collaborative technologies to facilitate student team projects. *In Proceedings of the*

international academy for information management (IAIM) 17th annual conference: International conference on informatics education research, Barcelona, Spain.

Lonn, S. & Teasley, S. D. (2008). Investigating Perceptions and Uses of Learning Management Systems: Saving Time or Innovating Practice? Paper presented at the *Annual Meeting of the American Educational Research Association*. New York.

Madland, C. and Richards, G. (2016). Enhancing Student-Student Online Interaction: Exploring the Study Buddy Peer Review Activity. *International Review of Research in Open and Distributed Learning,17 (3)*

Marks, R. B., Sibley, S., & Arbaugh, J. B. (2005). A structural equation model of predictors of effective online learning. *Journal of Management Education, 29(4), 531–563.*

Mason, R. & Kay, A. (Eds.). (1989). *Mindweave: Communication, computers and distance education*. New York: Pergamon.

Moore, M. (1989). Editorial: Three types of interaction. *American Journal of Distance Education, 3(2), 1-7*

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing Company.

Morss, D. A. (1999). A study of student perspectives on web-based learning: Web CT in the classroom. Internet Research: *Electronic Networking Applications and Policy, 9(5), 393–408.*

Murray, M., Pérez, J., Geist, D., & Hedrick, A. (2013). Student interaction with content in online and hybrid courses: Leading horses to the proverbial water. *In Proceedings of the Informing Science and Information Technology Education Conference (Vol. 2013, No. 1, pp. 99-115).*

Murray, M., Perez, J., Geist, D., & Hedrick, A. (2012). Student interaction with online course content: Build it, and they might come. *Journal of Information Technology Education: Research, 11, 126-140.*

Navarro, P., & Shoemaker, J. (2000). Performance and perceptions of distance learners in cyberspace. *American Journal of Distance Education, 14(2), 15-35.*

Northrup, P., Lee, R., & Burgess, V. (2002). Learner perceptions of online interaction. Paper presented at *ED-MEDIA 2002 world conference on educational multimedia hypermedia & telecommunications*, Denver, CO.

Piccoli, G., Ahmad, R., Ives, B. (2001). Web-based virtual learning environments: a research framework and a preliminary assessment of effectiveness in basic its skills training. *MIS Quarterly 25 (4), 401–426.*

Shaibou, A., H. (2018). Exploring the frequent Use of the Learning Management Systems (LMS) features as a mediator between Learners' Interactions, Learners' Learning Outcomes and Satisfaction in Higher Education. Published PhD thesis, Korea University.

Stavredes, T. (2011). Effective Online Teaching: Foundations and Strategies for Student Success. Available at: http://learn.education.illinois.edu/file.php/1647/LearningTheoryJossey-Bass.pdf

Surowiecki, J. (2004). *The wisdom of crowds*. New York, NJ: Random House.

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Journal of Distance Education, 22(2), 306–331.*

Umek, L., Aristovnik, A., Tomaževič, N., Keržič, D. (2015). Analysis of Selected Aspects of Students' Performance and Satisfaction in a Moodle-based E Learning System Environment. *Eurasia Journal of Mathematics, Science & Technology.*

Walker, R., Voce, J., Nicholls, J., Swift, E., Ahmed, J., Horrigan, S., & Vincent P. (2014). *2014 Survey of Technology Enhanced Learning for higher education in the UK.* Universities and Colleges Information Systems Association, Oxford, UK.

Walker, R., Voce, J., Swift, E., Ahmed, J., Jenkins, M., & Vincent, P. (2016). *2016 Survey of Technology Enhanced Learning for higher education in the UK.* Universities and Colleges Information Systems Association, Oxford, UK.

Wang, M., Ran, W., Liao, J., & Yang, S. J. H. (2010). A Performance-Oriented Approach to E-Learning in the Workplace. *Educational Technology & Society, 13 (4), 167–179.*

Watts-Taffe, S., Gwinn, C. B. and Horn, M. L., 2003. Preparing preservice teachers to integrate technology with the elementary literacy program. *The Reading Teacher, vol. 57, pp.130138.*

Woods, R., & Baker, J. (2004). Interaction and immediacy in online learning. *The International Review of Research in Open and Distance Learning, 5(2).*

Yuen, H. K., Fox, R., Sun, A., & Deng, L. (2009). Course management systems in higher education: Understanding student experiences. *Journal of Education, 6(3), 189-20.*