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The Effect of LMS Characteristics on Students' LMS Adoption

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Abstract

There has been great growing in adopting Learning Management System (LMS) as a mode to connect with students. Almost every university have started developing their own LMS to train and teach students. The objective of this study is to analyze the effect of LMS Characteristics on students' LMS adoption. A survey is conducted among 75 undergraduate students who use LMS extensively at the Department of Industrial Management, University of Kelaniya in order to fulfill the objective. The conduct of this study involves quantitative approach. The result of the study indicates LMS Characteristics including of system quality, information quality and service quality play a significant role in determining students' LMS adoption.

Keywords: Learning Management System, System Quality, Information Quality and Service Quality

Introduction

With the swift development of ICT infrastructures every educational institution has the chance to make use of the internet as a communication medium with the students. The role of e-learning and information technologies in higher education continues to expand in scope and complexity. Further, the increasing usage of internet motivates many researchers to develop internet technologies and web based applications. As a consequence, assessing the e-learning systems is the only way to ensure that higher education programs delivered via technology are of high quality. Increasing effectiveness of the e-learning system has become one of the most practically and theoretically important research areas.

Among the e-learning tools on the market, LMSs are viewed as the most basic and reliable e-learning tool in blended learning environments, and they are often the starting point of any Web-based learning program (Kakasevski et al., 2008). Examples of LMS are Blackboard, WebCT, e College, Moodle, Desire2Learn, and ANGEL etc. An LMS not only provides academic institutions with efficient means to train and teach individuals, but also enables them to efficiently codify and share their academic knowledge (Al Busaidi, 2012).

The usage of the LMS has become a requirement at Universities. Most of the Universities have developed their own LMS portal for the use of their own lecturers and students. Since integration of LMS in teaching and learning has been a priority in almost all universities in Sri Lanka, evaluating the technology factors or LMS characteristics is

the only way to ensure that lecturers and students use these technologies an effective way. This study investigates the effect of LMS characteristics on students' LMS adoption.

Review of Literature

LMS will help the lecturers to provide their learning materials and also interactivity features such as thread discussions, shared files and forums. LMSs also support management task such as delivery and tracking, examination, planning, virtual live classes and several statistical analyses. This may save lecturers a lot of time and effort without making any substantial change in teaching process.

In spite of this potential to improve learning by means of using an LMS for the delivery of e-learning, the features and functionalities that have been built into these systems are often underutilized (Vovides et al., 2007). Students' utilization of LMS is still minimal (Ayub et al., 2010). Malikowski et al., (2006) found that LMSs are primarily used to transmit information to students. The challenge is not to promote uptake but to encourage, enable and facilitate effective implementation that is likely to have significant impact on student learning (Sharpe et al. 2006). So, universities need to investigate LMS characteristics that influence the students' and instructors' adoption of LMS.

E-learning system is a special type of IS (Wang, Wang and Shee, 2007). In 1992, DeLone and McLean presented an IS success model as a framework and model for measuring the complex dependent variable in IS research. This model consists of six dimensions of success that are proposed to be interrelated and interdependent. These dimensions are 'System Quality', 'Information Quality', 'Use', 'User Satisfaction', 'Individual Impact' and 'Organizational Impact'.

Ten years after the publication of their first model and based on the evaluation of the many contributions to it, DeLone and McLean proposed an updated IS success model (DeLone & McLean 2002, 2003). The updated model consists of six interrelated dimensions of IS success: information quality, system quality and service quality, (intention to) use, user satisfaction, and net benefits. Thus a system can be evaluated in terms of information, system, and service quality; these characteristics affect the subsequent use or intention to use and user satisfaction.

Holsapple and Lee-Post (2006) proposed the e-learning success model which makes the process approach explicit to measure and assess success is adapted from DeLone and McLean's (2003) updated IS success model. Their model includes success metrics developed specifically for the e-learning context being investigated. They use the process approach to posit that the overall success of e-learning initiatives depends on the attainment of success at each of the three stages of e-learning systems development: design, delivery, and outcome analysis. Success of the design stage is evaluated along three success factor dimensions: system quality, information quality, and service quality. Success of the delivery stage is evaluated along two success factor dimensions: use and user satisfaction. Finally, success of the outcome stage is evaluated along the net benefits dimension.

According to Roca et al., (2006) LMS quality is critical to the users' (lecturers and students) adoption of LMS. From the learners' perspective, found that perceived system quality factors (system quality, information quality and service quality) affect directly e-learning users' satisfaction and intention to use, and indirectly on perceived usefulness.

This research examines LMS characteristics in terms of system quality, information quality and service quality (see Figure 1).

Research Framework

The framework was conceptualized based on the work of Al- Busaidi (2012), Al- Busaidi (2009), Cheng, (2011), Wang and Chiu (2011), DeLone and McLean(1992,2003), Holsapple and Anita Lee-Post (2006), Liaw (2008), Ozkan et al., (2008), Wan et al., (2007), Roca et al., (2006).

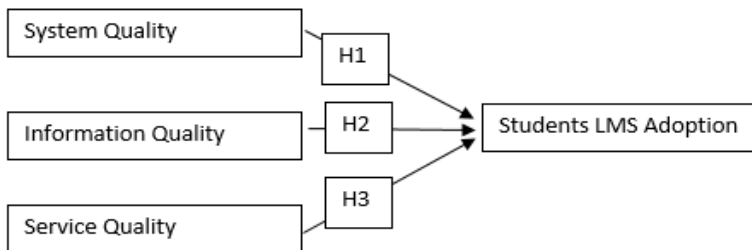


Figure 1. Research Framework

System Quality

System quality is related to the characteristics of a system (Al- Busaidi, 2012). System quality plays a major role in the success of LMS. Researchers such as Bailey and Pearson (1983), DeLone and McLean (1992, 2003), Seddon (1997) W. Holsapple and Anita Lee-Post (2006) and Ozkan et al., (2009) have introduced several ways to measure system quality. In the e-learning success model Holsapple and Anita Lee Post (2006) measured the system quality by indicators related to easy to use, user friendly, stable, secure, fast and responsive. The common measures of system quality are ease of use, response time, reliability, flexibility, user friendly and accessibility. In the context of e-learning, system characteristics were found to be significant for e-learning success (acceptance and use). Some of these system characteristics are reliability (Wan et al., 2007; Webster and Hackley, 1997); accessibility (Wan et al., 2007); and system's functionality, interactivity, and response (Pituch and Lee, 2006; Cheng, 2011).

Information Quality

Information quality refers to the perceived output produced by the system (Al- Busaidi (2012). In the e-learning success model Holsapple and Anita Lee Post (2006) measured the information quality by indicators related to well organized, effectively presented, of the right length, clearly written, useful and up-to-date. The common characteristics of information quality include accuracy, relevance, timeliness, sufficiency, completeness, understandability, format, and accessibility (Bailey and Pearson, 1983; Seddon, 1997). Generally, information quality plays a significant role in the use of an information system and user satisfaction (DeLone and McLean, 1992).

Service Quality

Service quality can be defined as the quality of support services provided to the system's end users. In the e-learning success model Holsapple and Anita Lee Post (2006) measured the service quality by indicators related to prompt, responsive, fair, knowledge-able, and available. Common measurements of service quality are tangibles, reliability, responsiveness, assurance and empathy (Kettinger and Lee, 1994; Parasuraman et al., 1988). In the e-learning context, Roca et al., (2006) measured service quality by

measurements related to responsiveness, reliability, and empathy, and they confirmed its direct impact on satisfaction and indirect impact on perceived usefulness.

Based on the preceding discussion, the following hypotheses were formulated.

H1: System quality is significantly related to students' LMS adoption

H2: Information quality is significantly related to students' LMS adoption

H3: Service quality is significantly related to students' LMS adoption

Research Methodology

The conduct of this study is using quantitative approach. Department of Industrial Management, University of Kelaniya is involved in the study. Findings of the study are then used to test the formulated hypotheses. In order to test hypotheses, self-administered questionnaire is disseminated to the LMS adopters. A stratified sampling technique is adopted in order to assure that respondents are well responded. A total of 75 questionnaires are distributed and all of them are returned and usable. Table 1 summarizes the demographic profile and descriptive statistics of the respondents.

A questionnaire is developed in order to specify the technology (LMS) factors within each category. The system quality constructs are adopted from the work of Ozkan et al., (2008). To capture the information quality measures are adopted from the work of Al-Busaidi (2012). Service quality constructs are adopted from the work of Al-Busaidi (2012) and Ozkan et al., (2008). All items used a five-point Likert-type scale of potential responses: strongly agree, agree, neutral, disagree, and strongly disagree. Statistical software package SPSS version 16.0 is used to analyze the data.

The study used correlation and regression analysis. According to Alreck and Settle (1995), when the objective of the study is to test the degree and significance between two continuous variables from interval or ratio scales, the appropriate techniques is either correlation or regression analysis. According to Bryman and Cramer, (2001) Correlation entails the provision of a yardstick whereby the intensity of strengths of a relationship can be measured. However correlation analysis gauges only the degree to which two variables are related or move together but there is no assumption that one is causing or affecting the other (Alreck and Settle, 1995). Therefore, to measure the degree and direction of influence the independent variable on the dependent variable, the regression analysis is also applied in this study.

Table 1. Demographic profile and descriptive statistics of surveyed students

Item	Frequency	Percentage
Gender		
Male	30	40
Female	45	60
Age or Level		
20-22 (Level 2)	46	61
23-25 (Level 3)	39	39
PC ownership		
Yes	64	85
No	11	15
Laptop ownership		
Yes	65	87

No	10	13
Often of LMS use		
Regular	26	35
Just-to download	49	65

Findings and Discussion

The LMS characteristics of this study comprised three variables namely system quality, information quality, and service quality. Reliability analysis as conducted on the aforesaid variables using multi- item measures. As displayed at Table 2 the Cronbach's alpha for the three mentioned variables suggest that the instruments are highly reliable.

Correlation analysis between LMS characteristics (system quality, information quality, and service quality) and Students LMS adoption produced significant positive correlation (see Table 3).

Finally regression analysis (see Table 4) using the enter method is also executed separately between LMS characteristics and students' LMS adoption. System quality has significant positive relationship with students' LMS adoption ($r=0.433$, $p=0.002 < \alpha = 0.05$). This indicates that, system quality positively affect students' adoption of LMS.

Table 2. Reliability of Instruments Measures

Variables	No. of Items	Cronbach's Alpha
System Quality	8	0.811
Information Quality	3	0.829
Service Quality	3	0.787

Table 3. Correlation matrix between LMS characteristics and students' LMS adoption.

LMS Characteristics	Correlation	P Value
System Quality	0.433**	0.002
Information Quality	0.652**	0.000
Service Quality	0.457**	0.000

Further, based on the regression analysis (see Table 4), it is discovered that system quality explains 18.8% variation of students' LMS adoption i.e. $R^2 = 0.188$, with $F = 11.089$, and $p = 0.002$. Hence, H1 is supported i.e. system quality is significantly associated with students' adoption of LMS. Nevertheless, the finding has further strengthened findings by DeLone and McLean(1992), Roca et al., (2006), Liaw (2008), Ozkan et al., (2008), Al-Busaidi (2009) and Wang and Chiu (2011).

Table 4. Regression analysis between LMS characteristics and students' LMS adoption.

LMS Characteristics	B	R^2	Adjusted R^2	F	P
System Quality	0.499	0.188	0.171	11.089	0.002
Information Quality	0.491	0.425	0.413	35.436	0.000
Service Quality	0.395	0.229	0.230	14.714	0.000

As shown in Table 3, a result of the correlation analysis between information quality and students' LMS adoption indicates strong positive relationship. The value of Pearson's $r = 0.652$.

Based on the results of the regression analysis as displayed in Table 4, information quality explains 42.5% variations in LMS adoption with $F = 35.436$ and $p = 0.000$. This finding entails that H2 substantially supported and thus consistent with those of DeLone and McLean, (1992), Roca et al.,(2006) and Cheng (2011).

As displayed at Table 3 correlation analysis between service quality and students' LMS adoption that yields Pearson's $r = 0.457$, and hence it can be confirmed that positive significant relationship exists between the aforesaid two variables.

Results of regression analysis indicate that the service quality explains 23% variation in LMS adoption with $F = 14.714$ and $p = 0.000$. Nevertheless, the finding has further strengthened finding Roca et al.,(2006) and Wang and Chiu (2011).

Conclusion

In an LMS adopting environment, especially in the context of Department of Industrial Management, university of Kelaniya, empirical report on LMS characteristics were unknown. In this respect, three aspects of qualities namely, system quality, information quality and service quality of LMS were investigated in this study.

The extant literature on IS has consistently emphasized the importance of system quality, information quality and service quality. A system can be evaluated in terms of system, information, and service quality; these characteristics affect the subsequent use or intention to use and user satisfaction (DeLone & McLean, 2003).

System quality focuses on the outcome of the interaction between the user and the system. Attribute of system quality include perceived ease of use, help option available, fast, user friendly, security and responsive. This study discovered that system quality explains 18.8% variation of Students' LMS adoption. Because the students believe that their system quality features such as perceived ease of use, help option available, fast, user friendly, security and responsive were well versed with their LMS and this motivate them to adopt it. Hence, respondents had indicated that the LMS they adopt fulfilled the system quality that they expect, and thus has a significant influence on their adoption of LMS.

Information quality enhances learners' perceived ease of use of LMS. If the information provided by LMS is of good quality, easy to understand, accurate, and complete, learners may believe LMS is easy overall. Respondents of this study have agreed that the information quality is gladdening, and positively inclined towards creating an environment for LMS adoption. Among the three LMS characteristics, this information quality scores the highest rating from respondents. Thus information quality explains 42.5% variations on students' LMS adoption.

Service quality refers to the quality of support services provided to the system's end users. Service quality plays a significant role in determining students' LMS adoption. Online service quality is a critical factor for learners' acceptance, use, and satisfaction with LMS in blended learning. Good service quality enables learners to understand the LMS, be able to use it, and perceive its usefulness. Service quality explains 23% variation on students' LMS adoption at department of Industrial Management.

LMS developers must frequently improve the quality of LMS and ensure its richness, easiness, fastness, responsiveness, flexibility, reliability, and interactivity, user friendly, and security for its adopters. Additionally, LMS adopting universities must highlight the importance of LMS on curriculum, guarantee the quality of the utilized system, ensure that

lecturers are entirely on board regarding the adoption of LMS and provide good enough service for effective LMS adoption.

This study confirms some findings of previous studies of Al- Busaidi (2012), Al-Busaidi (2009), DeLone and McLean (1992), Roca et al., (2006), Liaw (2008), Ozkan et al., (2008), Wang and Chiu (2011), and Cheng (2011).

The above mentioned studies had been done in foreign countries thus in the Middle East, and in Malaysia and Oman and such knowledge is lacking in Sri Lankan context. Hence, this study has provided valuable insights for developers of LMS to evaluate their LMS quality.

Limitations and Future Research

This study has limitations. First, the sample is collected from the Department of Industrial Management, university of Kelaniya, more researches can be conducted at several department, and in different universities to evaluate the findings that would be appropriate to generalize the findings. Second future research might also examine the other critical factors (i.e. lecturers' performance, students' perspectives, and university support) influencing the success of universities' LMS adoption in detail. Also, the study assesses LMS adoption from students' perspective and further research may evaluate it from lecturers' perspective.

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