THE SUCCESS OF LEARNING MANAGEMENT SYSTEM AMONG DISTANCE LEARNERS IN MALAYSIAN UNIVERSITIES

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ABSTRACT

Continuing formal education is essential for distance learners to improve their learning skills and knowledge to meet the challenge career in modern competitive world. This study examines the success factors that influence learners' use of the Learning Management System (LMS) and tests the applicability of the propose model, in the context of distance learning practices in higher education. A survey was conducted to higher education learners who involved in distance learning instruction. This study used a set of questionnaire which was adapted from the literatures to examine three groups of dimensions, system design (system quality, service quality, information quality, usefulness and ease of use), system usage (system use, behavioural intention to use and user satisfaction) and System Outcome (net benefit). Using data from a survey to distance learning students (N=425), a path analysis revealed that system design has a significant influence on user satisfaction and intention to use of the LMS which directly affect the use of the system. Consequently user satisfaction and system used show strong impact to the net benefit.

Keywords: *Information System Success, Technology Acceptance Model, Educational Technology Model, System Design. System Usage, System Impact.*

1. INTRODUCTION

The rapid growth of the internet use has not only generated a transformed interest in the role of new information and communication technologies (ICT) in higher education and learning (Dutton & Loader, 2002), but it has also affected the ways people teach and learn (DeLacey & Leonard, 2002; Radcliffe, 2002). At the same time, there has been growing concern over the possible decline of traditional teaching and learning practices and learning institutions, as distance education and virtual universities become practicable alternative platforms for higher education. Students, instructors, and administrators have continued to employ the internet for their practices, and e-learning have become a key item in educational agendas.

Online Distance Education (ODE) is still young in Malaysia and needs better requirements understanding and more system enhancement. For instance, distance education strategies and delivery modes were perceived by the distance learning as not adapted to meet the needs of the larger intake of learners, and the learners' diversity. This causes the issue of learning support in distance learning that should be looked into (Dzakaria, 2003).

According to Wahlstedt and Honkaranta (2007), the learning management systems (LMS) consist pedagogical devices, human interactions, learning contents and assessment supporting and advancing traditional learning in school or in higher education. LMS must satisfy the needs of the users: the students and the instructors. LMS was largely used as a useful content distribution system. Instructors can use the LMS for

distributing courses and interact with students in distance. There seems to be a gap between the reality and the many advanced teaching tools that are provided in LMS, such as multimedia materials, which were considered as possible means for enhancing teaching, but not utilized. To bridge this gap LMS system should be build to be more adaptive and customizable. This is to support teachers or instructors with different computer level skills. According to Ramayah (2005) many colleges are using LMS for e-learning courses and instruction, but many instructors restrict themselves to uploading course materials (such as syllabus, reading materials and lecture slide) to the course web site and never use the interactive features (chat, discussion forum, email, messages). Some instructors may use the discussion board to generate class discussion among students and themselves but the lack of immediate feedback with the discussion board in LMS has discouraged users to utilise them. Although many interactive features are available in the LMS, its capacity for use may still be limited because of its demand on the commitments from both instructor and students during a specific time frame. An effective implementation of an LMS needs to determine the critical features of the system and their implementation (Ravi and Pamela, 2004).

The aim of this research is to develop an effective LMS for distance learning instruction that is usable and fully utilized by students, instructors and administrators. Developing a good LMS is not worthwhile if the acceptance of the technology is still low and the success factors are still unclear. In priory, the acceptance and success factors of the LMS usage among stakeholders are studied and led to the construction of educational technology model (ETM). Therefore, the focus of this paper is to develop and verify the goodness of an ETM that can be used as a guideline to develop or evaluate a LMS.

2. TECHNOLOGY ACCEPTANCE MODEL (TAM)

Understanding why people accept or reject new information system (IS) was one of the biggest challenges in the research of new technologies. This study used Technology Acceptance Model (TAM) that identifies computer technology usage behaviour by applying perceived usefulness (PU) and perceived ease of use (PEU) as key determinants that lead to the actual usage of an information system (Davis, 1989; Wahlstedt and Honkaranta, 2007). In this study, perceived usefulness is defined as the degree to which an individual believes that using a LMS would enhance his or her learning performance, while perceived ease of use is defined as the degree an individual believes that using LMS would be less effort to learn how to use the system. Between the two, perceived ease of use has a direct effect on both perceived usefulness and behavioural intention to use, which ultimately influence the actual system use.

A number of studies have adapted TAM model and acceptance items to study student acceptance of new technologies (Pearson and Young, 2002; Selim, 2003; Ong et al., 2004; and Drennan et al., 2005). In a study of student acceptance of course websites, Selim (2003) found that perceived usefulness and perceived usability proved to be important factors for the acceptance and use of websites, as these two constructs accounted for 83% of the variance in the acceptance and use. Ong et al. (2004) stated that computer self-efficacy appeared to be a significant determinant of perceived usefulness, perceived ease of use and perceived credibility in using e-learning system in high-technology companies. In their study, high computer self-efficacy showed more positive usefulness and ease of use beliefs.

Pearson and Young (2002), in their research summarizes the study of using the applicability of TAM in Malaysia and the conclusion of their research indicates that all those researches have supported the model in predicting and explaining the use or the intention to use of a particular technology. There is a general consensus that perceived usefulness has significantly related to technology use. A person who finds a particular technology useful will use more of the technology as compared to another person who finds it not useful. On the other hand, many researches find perceived ease of use is useful in predicting perceived usefulness and not significantly relate to usage or intention to use. Researchers have explored various external variables that can act as previous circumstances (for example attitude towards computer) to these perceived usefulness and perceived ease of use in attempts to improve the predictive power of the expanded TAM. Some of the results shown to be significant and thus it can be concluded that particularly in the

Malaysian environment, perceived usefulness is the driver to any technology acceptance and this has to be tackled to enhance usage among individuals (Pearson and Young, 2002). Those empirical studies using these models, concluded that TAM (Figure 1) is the most influential model in predicting the acceptance of technology.

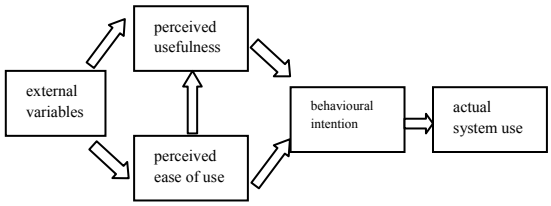

Figure 1: The Technology Acceptance Model

The TAM recommends that information system (IS) usage is determined by behavioural intention to used (BI), which is viewed as being mutually determined by the user's attitude toward using, perceived ease of use (PEU) and perceived usefulness (PU) of the system (Davis et al., 1989).

3. DELONE & MCLEAN IS SUCCESS MODEL

The most popular IS success model was proposed by DeLone and McLean (DL&ML) in 1990 by highlighting six intercorrelated dimensions. The dimensions are System Quality, Information Quality, Use, User Satisfaction, Individual Impact and Organizational Impact. This model were further modified as IS become more complicated by including Service Quality as a new function. Individual Impact dimension was removed and Intention to Use dimension which was related to Use was added. In addition, Organizational Impact was replaced by Net Benefit (Delone & McLean, 1992; Delone & McLean, 2003). The modified model is shown in Figure 2. Since then many empirical studies have been conducted by researchers to validate the model by applying it in different IS before it's dimension could serve as appropriate measure (Wu and Wang, 2006; Wang et al., 2007 and Lee-Post and Holsapple, 2009).

Based on DL&ML modified model, Wu and Wang (2006) reconstructed and validated the model to measure knowledge management system (KMS). Using path analysis, they confirmed the KMS success model with five dimensions namely, system quality, knowledge/information quality, perceived KMS benefit, user satisfaction and System Use. Wang (2007) had employed the DL&ML success model in assessing the success of web-based learning system from the organizational approach.

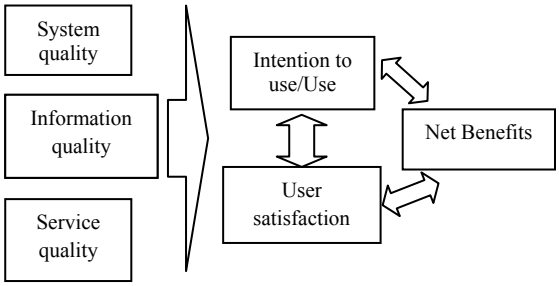

Figure 2: DL&ML IS Success Model

Lee-Post (2009) defined the success of e-learning as a multi-faceted construct that can be assessed along six dimensions which take place in three stages. The first stage is to manage system design success by maximizing the three quality dimensions which are system, information and service quality. The second stage is to accomplish system delivery success by optimizing the intention to use dimension. The final stage is to obtain system outcome success by maximizing net benefits and user satisfaction dimensions (Lee-Post 2009). Many other researchers have adapted the success dimensions by DL&MS in several types of IS (Wang and Liao, 2007; Yen and Lu, 2008; Lee and Chung, 2009)

In conclusion, the DL&MS success dimensions have played important role in assess many IS success. Each success dimension is quantified as a single numeric measure by combining the ratings of its set of attributed factors through an instrument. The overall success of IS can then be evaluated for every dimension. Any success dimension with lower score signifies a lack in that area and efforts can be committed accordingly to fix the insufficiency.

4. CONSTRUCTION OF EDUCATIONAL TECHNOLOGY MODEL (ETM)

The research model was constructed as a result of a comparison between the TAM model and the DL&ML IS success model. The TAM model emphasizes on measuring the user behaviour using the perceived usefulness and ease of use as the main variables in the usage dimension and that would measure the actual use of a system. Based on the literature review, TAM does not measure the overall system quality even its have strong effect in the user behaviour. According to Dishaw & Strong (1998), TAM has a weakness of not incorporating the technology and task characteristics in measuring acceptance. On the other hand the DL&ML success model have significant relation with user satisfaction, system use, intention to use and net benefit but the IS success model did not mention the importance of capacity of use even this variable is very important to determine the direction upon which the success of the IS. It does not give a clear interest in ease of use and the usefulness even the previous studies find significant effect on user satisfaction and the acceptance of new technology (Lynn, 1999; Alhelalat et al. 2008; Mäntymäki, 2009; Li 2009; Ong et al., 2009). According to Urbach et.al. (2009), some researchers have found that the DL&ML model is incomplete and have suggested that extra dimensions should be included in the model. Some of them have constructed alternative models of success (Seddon & Kiew; Seddon 1997, 1994). Despite of all comments and weaknesses, DL&ML model still become a dominant model for measuring the success. Other researchers have applied the model in their researches and some have focused on the validation of the model (Rai, Lang and Welker 2002).

This study demonstrates the value of assessing DL&MS success from an information systems perspective in general, and specifically from the educational Technology perspectives. Educational technology model (ETM) is constructed based on the development and continual improvement in designing, developing and delivering the needed service to the distance learning stakeholders. If we want to evaluate the success of any program or system used by the people, we must evaluate the system in all phase of designing process until it is used by users. In other words the overall success of a distance learning technology initiative is depending on the success at each of the three phases of LMS development, namely, system or technology design, usage and system impact. The following are brief descriptions of each dimension and element of the Educational Technology Model (ETM) which is shown in Figure 3.

1. The success of system design stage is depending on the success of five dimensions: system quality; information quality; service quality; perceived ease of use; and perceived usefulness.
2. The success of the usage stage is affected by system design stage and is depending on the success of the system use, behavioral intention to use and user satisfaction factors.
3. The success of the system outcome stage is depending on the attainment of success of the usage stage and net benefit.

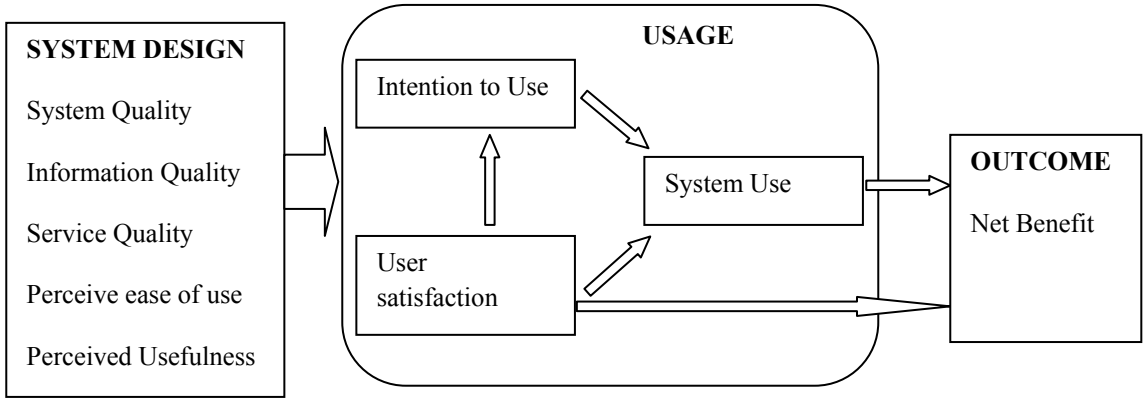

Figure 3: Proposed Educational Technology Success Model

The following are descriptions of the sub-characteristic of the ETM measures:

- System quality (SyQ) can be defined as the stability, reliability and suitability of the hardware and software that provides the information that is required. It is a broad concept that has been measured in different ways. The studies on System Quality are often associated with system performance. System quality in a LMS, measures the intrinsic features of the technology including system performance and user interface. Examples of system quality measures in LMS are response time, usability, availability, reliability, completeness, system flexibility, and security.
- Information Quality (InQ) are concerned with information system including students records, reports, learning content and other information regarding learning activities. Most information quality measures are subjective, as they are derived from the user perspectives. Criteria that can be used for LMS in distance learning quality are information completeness, accuracy, legibility, timeliness, availability, relevancy, consistency and reliability (DeLone and McLean, 2003 Lee-Post, 2009).
- Service Quality (SvQ) is concerned with the overall support delivered by the service provider of distance learning or technology, regardless of whether the service is delivered by the internal department of distance learning organization or outsource to external providers. Service quality can be measured through access to technical support, quick responsiveness, assurance, empathy and follow up services (DeLone and McLean, 2003 Lee-Post, 2009).
- Perceived Ease of Use (PEU) refers to the degree to which the user expects the target system is free of effort (Davis et al., 1989). TAM hypothesizes that PEU has a significant positive impact on the behavioral intention to use. In using LMS this factor suggests that the easier the system is to interact with, the greater the user's ability will be to carry out the sequences of behavior needed to use the system. If the LMS is considered to be easy to use, it is more likely to be accepted by the students.
- Perceived Usefulness (PU) comes from the definition of the word useful which is "capable of being used advantageously." Therefore, a system that scores high in perceived usefulness will have a positive user performance impact. (Davis et al., 1989) defines usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance". In using LMS, students would intend to use the system if they feel that the system might make their learning activities easier and smooth with less effort.
- Behavioral Intention to Use (BI) in TAM hypothesizes that the behavioral intention to use is the single best predictor of actual system usage and well supported by past TAM research (Davis & Venkatesh, 1996; Morris & Dillon, 1997). In the LMS usage, this factor implies that students develop this behavior if the system design is adequate and their satisfaction increase.
- User satisfaction (SAT) is frequently used to measure a system success. It is defined as the overall evaluation of user's experience in using a system and the potential impact of the system. User satisfaction is related to user perception and attitudes towards the use of the system which are influenced by user's characteristics and experiences.
- The actual system use is a measure of IS success. It refers to voluntary instead of mandatory use and also relates to the person who uses it, their levels of use, training, knowledge, belief, expectation and acceptance or resistance (DeLone and McLean, 2003, Park et al., 2007). In using the LMS, this factor measures the frequency and breadth of distance learning technology inquiries and functions. It measures the use of instructional features, interactive features, administrative features, visual features, support features and technology features to assess the success of LMS.
- System impact or net benefit (NB) implies how the system can benefit a single user, a group of users, an organization or an entire industry. It is associated with users' job performance, as well as change in work activity and improved productivity. Thus, individual Net Benefits can be assessed using job effects, efficiency, effectiveness, decision quality, and error reduction (DeLone and McLean, 200, Lee-Post, 2009). In assessing LMS, net benefits capture the balance of positive and negative impacts on the behavior of users, which includes system developers, administrator, instructor and student, or the entire distance learning stakeholders.

5. RESEARCH METHODOLOGY

The purpose of this study is to validate the proposed success ETM by determining the success level of Malaysian students toward LMS usage. A survey is carried out on a sample of about 425

students from four Malaysian universities that offered distance learning program and use LMS platform (Open University Malaysia (OUM), Universiti Tun Abdul Razak (UNITAR), University Utara Malaysia (UUM), Universiti Sains Malaysia (USM) and Universiti Putra Malaysia (UPM)). The researchers have used survey method, and questionnaires are distributed to all students registered in distance learning department from those four Malaysian universities. The questionnaire is developed based on issues raised by past researchers and studies, as well as concerns mentioned in the literature related to ETM dimensions. In order to see if the result of this research is consistent with past literatures, the researcher tried to match specific items with LMS issues. Items are measure using 5 point-Likert-scales ranging from strongly disagree to strongly agree. The respondents took approximately 15 minutes to complete the questionnaire. Respondents were assured that their individual responses would be kept confidential. The researchers use Statistical Package for the Social Sciences (SPSS) 17.0 to analyze the data and use AMOS 18 for hypotheses testing and to determine the model fit through Structural Equation Model (SEM).

The validity of this instrument was assessed through content validity, pre-testing and revision of questionnaire. The content and construction of the questionnaire were also evaluated by two judges. The judges are lecturers in the field of Instructional Technology, in the Faculty of Information Technology and Science at University Kebangsaan Malaysia. The researchers then conduct reliability test for each construct to assess the goodness and reliability of the measures. Table 1 shows high reliability of each construct as mentioned by Sekaran (2003).

Table 1 : Cronbach's Alpha

Item	Reliability
System quality	0.944
Information quality	0.919
Service quality	0.890
Perceived usefulness	0.914
Perceived ease of use	0.892
User satisfaction	0.845
System use	0.954
Intention to use	0.822
Net benefit	0.803

According to Sekaran (2003), a reliability coefficient, alpha of 0.80 to 0.90 indicates that a scale is well-constructed and a coefficient in the 0.50 to 0.60 indicates that a scale is less well-constructed. When executing a reliability test for internal item consistency, the researcher first ran the test for all the items except those asking for participants' demographic information. A coefficient alpha value of 0.963 is obtained, indicating a high reliability for 94 items.

6. DEMOGRAPHIC INFORMATION

Table 2 presents summary of the background informations. It can be seen that 49.4% of the respondents are female whereas 50.6% of them are male. Majority of the respondents aged between 20 to 40 years old. Most of the respondents have used computer for more than 1 year and 23.3% have used computer for more than 10 years. All of them have experience using LMS for more than one year.

Table 2 . Demographic Information

Gender	**Frequency**	**Percent**
Male	215	50.6
Female	210	49.4
Age	**Frequency**	**Percent**
Less than 20	45	10.6
20 - 24	120	28.2
25 - 29	121	28.5
30 -40	113	28.6
41 - 50	14	3.3
over 50	12	2.8
Computer Usage	**Frequency**	**Percent**
less than 1 year	10	2.4
1 - 3 years	94	22.1
3 - 7 years	158	37.2
7 - 10 years	64	15.1
more than 10 years	99	23.3
LMS Usage	**Frequency**	**Percent**
less than 1 year	114	26.8
1 - 3 years	148	34.8
3 - 7 years	128	30.1
7 - 10 years	19	4.5
more than 10 years	16	3.8
Total	**425**	**100**

7. MEASURE OF FIT

The proposed research model incorporates aspects of technology acceptance model and IS success model. The model presents five observed or exogenous variables (PU, SYQ, INQ, SVQ, PEU)

and four endogenous variables (SAT, USE, NB, BI). Endogenous variables (or dependent variables), depend on other variables, and have single-headed arrows pointing to them. Exogenous variables (or independent variables), do not depend on other variables, and do not have single headed arrows pointing to them (Arbuckle, 2005). The model after testing and modification is called the Educational Technology Model (ETM) throughout the rest of this research.

Before analysing the structural model, it is necessary to understand how to evaluate the models. Fit measures are grouped into various types and each type has its specific capability in model evaluation, such as measures of parsimony, minimum sample discrepancy function, measures based on the population discrepancy, comparison to a baseline model, and a goodness of fit index (GFI) and other related measures (Sahari et al.,2009; Arbuckle 1999, 2005; Byrne 2001, 2006; Holmes-Smith 2000; MacCallum 1990; Steiger 1990). Nevertheless, Arbuckle (2005) mentions that model evaluations is one of the most difficult and unsettle issues related to structural equation modelling. In this research the model is validated using confirmatory factor analysis (CFA).

The CFA is carried out using SEM software AMOS 18. The objective of the CFA is to construct a structural model which aligns the tested measures to the specific constructs, by constraining the variance of each measure to the specific latent construct it should represent. In addition to assess the degree to which each measure contributes to its latent construct, the CFA also tests the separation between constructs by evaluating the fit in the overall model. There are four groups of fit measures. The fit measures within each group give the same rank of ordering of models (Arbuckle 2005). The first group is RMSEA and TLI, the second groups is CFI, the third group is CMIN and NFI, and the fourth group is GFI, and AGFI. Among the many measures of fit, five popular measures are: Chi-square, normed chi-square ($\chi 2$ /df), goodness of fit index (GFI), Tucker-Lewis Index (TLI) and Root Mean-Square Error of Approximation (RMSEA) (Holmes-Smith 2000). Table 3 shows the measures of fit. The overall fit for the model is very good with Chi-sq/df is 2.80, at 11 df and is significant and P value 0.001.

Table3 Summary of the Fit Measures Used in this study

Fit Measures	Standards Fit	Model Fit
CMIN/Df	A value close to 1 and not exceeding 3 indicates a good fit.	**2.800**
P Value	A p value greater than 0.05 indicates an acceptable fit.	**0.022**
RMSEA	A value should not greater than 0.1	**0.490**
TLI	a value close to 1 indicates a very good fit.	**0.986**
CFI	a value close to 1 indicates a very good fit.	**0.996**
GFI	A value always less than or equal to 1 indicates a perfect fit.	**0.989**
AGFI	A value always less than or equal to1 indicates a perfect fit.	**0.953**
RMR	RMR of less than .05 indicates a perfect fit.	**0.016**
IFI	IFI values close to 1 indicate a very good fit.	**0.996**
RFI	RFI values close to 1 indicate a very good fit	**0.973**
NFI	TLI values close to 1 indicate a very good fit.	**0.992**

8. HYPOTHESES TESTING

Structural equation modelling is well suited to test a group of hypotheses simultaneously in the form of a

model with significant level 0.05. Nevertheless, it helps to reveal these hypotheses and to consider each one individually.

Table4 : Educational Technology Model (ETM) Hypotheses

No	Hypotheses			Reference	Effect	β	Sig
1.	PU	→	SAT	Matti,2009; Alhelalat et al. 2008	Supported	0.254	***
2.	SvQ	→	SAT	DeLone & McLean, 2003	Supported	0.242	***
3.	InQ	→	SAT	DeLone & McLean, 2003	Supported	0.211	***
4.	SyQ	→	SAT	DeLone & McLean, 2003	Supported	0.236	***
5.	PEU	→	SAT	Matti,2009; Alhelalat et al. 2008	Supported	0.084	.036
6.	PEU	→	BI	Davis, 1989;	Supported	0.102	.019
7.	PU	→	BI	Davis, 1989;	Supported	0.382	***
8.	SvQ	→	BI	DeLone & McLean, 2003	Supported	0.126	.009
9.	InQ	→	BI	DeLone & McLean, 2003	Not Supported	-0.169	***
10.	SyQ	→	BI	DeLone & McLean, 2003	Supported	0.149	***
11.	SAT	→	BI	DeLone & McLean, 2003	Supported	0.339	***
12.	BI	→	USE	Davis, 1989; DeLone & McLean, 2003	Supported	0.145	.045
13.	SAT	→	USE	DeLone & McLean, 2003	Supported	0.150	.038
14.	SAT	→	NB	DeLone & McLean, 2003	Supported	0.479	***
15.	USE	→	NB	DeLone & McLean, 2003	Supported	0.135	.002

From Table 4, the hypotheses that describe the relationship between independent variables (SyQ, InQ, SvQ, PU, PEU) and the dependent variable (SAT, BI) are significant except the relationship between InQ and BI. It shows that PU, SyQ, SvQ, InQ, PEU have significantly influence SAT, and PU, SyQ, SvQ, PEU have significantly influence BI. It also shows that SAT has significant relation with BI, USE and NB. Nevertheless, BI has significant relation with USE, and USE significantly influences NB. There are enough evidence associated with causal relationship between independent variables and dependent variables in the model which facilitates the effort to understand the dynamics between the constructs. The analyses showed that PU and PEU are correlated as predicted in theoretical work. The reason for such correlation in the relationships is likely due to the advanced stage of adoption and ongoing use of technology. Thus, the Modification Indices of AMOS 18 suggests the independent variable to be correlated, Table 5 below shows the correlation result of the independent variables.

This study found that there is a good significant correlation between the DL&ML quality dimensions (system, information and service quality) and TAM independent variables (Perceived ease of use and perceived usefulness). This finding confirm further research recommended by Ultan et al. (2006) which suggested to further explore the interdependency of the factors of quality and success and the correlations between factors. A correlation analysis in Table 5 shows positive correlation between independent variables in ETM (i.e. system quality, information quality, service quality, perceived usefulness and perceived ease of used). Each construct shares greater variance with its own set of indicators than with the

other constructs representing a different set of indicators.

Table 5: Correlations between Independent Variables

	Estimate
SvQ <--> SyQ	0.703
PU <--> SvQ	0.632
InQ <--> PEU	0.470
SyQ <--> PEU	0.491
PU <--> InQ	0.598
SvQ <--> PEU	0.558
SvQ <--> InQ	0.755
PU <--> PEU	0.791
PU <--> SyQ	0.559
InQ <--> SyQ	0.621

9. DISCUSSION

This study have constructed and verified an educational technology success model. Using LMS as a theoretical framework, we construct five measures in system design quality, three measures in system usage and net benefit in system outcome as educational technology success dimensions. The empirical results provide appropriate support for model. Almost all hypothesized relationships were found to be significant.

The current LMS analysis considers the success dimensions as system, service and information quality, usefulness and ease of use, behavioural intention to use, user satisfaction and system use to influence the net benefit. Thus, the developed ETM considers the interrelationships and causal effects amongst the main parts of the measures: system design (system quality, information quality, service quality, ease of use and usefulness); usage (system use, user satisfaction and behavioural intention to use) and system outcome (net benefits). The empirical results of the study indicate that system quality, information quality, service quality, perceived usefulness and perceived ease of use have significantly positive influence to user satisfaction. Except for information quality, all other factors in system design have directly influence the behavioural intention to use. In addition, behavioural intention to use and user satisfaction have direct effect on system use. Nevertheless, the system use and user satisfaction have positive influence on the net benefit. This result is in line with study by Sharkey et. al (2006) that suggested the need of more research to explore the correlations between the independent variables of user satisfaction and intention to use.

In the LMS context, we encounter that the attitude of using the system is affected by beliefs about system design which then affected the net benefit. Users' belief that good or bad system design form their attitude or interest to use the system, which eventually give positive or negative impact on the behaviour. Users also belief that the behavioural intention to use is developed by the system design and consequently, to affect user which also shaped by the system design.

10. CONCLUSION

The evaluation of learning management system (LMS) is crucial to ensure their effective implementation and positive impact on distance learning delivery. Many institutions find it quite easy to start with a commercial LMS, but they encounter many problems such as, pricing, linguistic, assessment tools, and suitability to target users. A review of LMS evaluation studies was carried out which indicated that the improvement of current system is required. In order to satisfy this requirement, a new framework is introduced for the evaluation of Information Systems (IS) in educational settings. The proposed Educational Technology Model (ETM) framework with three characteristics (System design, usage behaviour and system outcome) was developed after having critically appraised the existing findings of IS success and acceptance studies. ETM is constructed based on previous models of IS evaluation, in particular, the IS Success Model and the Technology acceptance model (TAM). The researchers incorporates the concept of fit between technology design quality (perceived usefulness, perceived ease of use, system quality, information quality and service quality); Usage (behavioural intention to use, user satisfaction and system use) and system outcome (net benefit).

The paper outlines the methodology of survey approach using data from 425 distance learners (N=425), and by Structural Equation Modelling (SEM) analysis. The main findings of the research

are the identification of the factors that determine the use and success of educational technology system. Based on these factors we formulate a measurement model to verify the relationships among TAM and IS success dimensions.

The empirical research is carried out in order to evaluate the reliability, validity, and consistency of the developed measurement instrument. The theoretical model is developed and tested so as to highlight the variables that play an important role in determining the success of educational technology system. The study of the theoretical model suggests some managerial implications. In particular, the success of LMS depends on the quality of system design (system quality, information quality, service quality, perceived ease of use and perceived usefulness). The usage dimension (behavioural intention to use, user satisfaction and system use) depends on the system design and affect the system net benefit. The resultant model demonstrates the interrelationships amongst the main conceptual parts, including the specific LMS features. It is proposed that all of these factors affect the benefits and impact users and organisations.

Validation of measures requires the assessment of measurement properties over a variety of samples in similar contexts. Furthermore sample from different background should be gathered to confirm, evaluate, or refine the model. This also can be done probably by investigating this model to different systems.

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REFERENCE

[1]. Ajzen I, 1985, From Intentions to Actions: a Theory of Planned Behavior, (in J. Kuhl and J. Beckmann (Eds.), Action Control: From Cognition to Behavior), Springer Verlag, New York, 11-39

[2]. Ajzen I, 1988, Attitudes, personality, and behavior, Addison-Wesley Pub, Reading, Mass.

[3]. Ajzen I, 1991, The theory of planned behavior, Organizational Behavior and Human Decision Processes, 50(2), 179-211

[4]. Ajzen I, Fishbein M, 1970, The prediction of behavior from attitudinal and normative beliefs, Journal of Personality and Social Psychology, 6, 466-487

[5]. Alhelalat, J. Ineson, E. Jung, T. 2008. The Evaluation of Hotel Website Quality, Usability and Benefits: Developing a Testing Model. Proceedings of Euro-HCRIE Conference, Dubai, UAE, October 2008.

[6]. Byrne, BM 2001, Structural Equation Modelling with AMOS: Basic Concepts, Applications, and Programming, Lawrence Erlbaum Associates, Inc., Mahwah, New Jersey, USA.

[7]. Byrne, BM, 2006, Structural Equation Modelling with EQS: Basic concepts, applications, and programming, 2 edn, Lawrence Erlbaum Associates, Inc., Mahwah, New Jersey, USA.

[8]. Cao, M. Zhang, Q. & Seydel, J. (2005). B2C e-commerce web site quality: an empirical Industrial Management Data Systems.Volume: 105, Issue: 5, Pages: 645-661

[9]. Li, C. 2009. Extending the technology acceptance model to investigate the factors affecting the user satisfaction in internet banking. *Business and Information* . July 06-08

[10]. Davis, F. D. 1989. "Perceived usefulness, perceived ease of use, and user acceptance of information technology". MIS Quaterly, 13, 1989: 319-40.

[11]. DeLone, W.H., and McLean, E.R. 2003. "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update," Journal of Management Information Systems (19:4), Spring, pp 9-30.

[12]. Dishaw, M., & Strong, D. "Extending the TAM with Task-Technology Fit Constructs", Information &n Management, (36:1), July 1998, pp. 9-21.

[13]. Dutton, W. H., & Loader, B. D. (2002). Digital Academe: New Media and Institutions in Higher Education and Learning. London: Taylor and Francis/Routledge.

[14]. Dzakira H and Idrus R. (2003) "Teacher-Learner Interactions in Distance Education: A Case of Two Malaysian Universities".Turkish Online Journal of Distance Education-TOJDE July 2003 ISSN 1302-6488 Volume:4 Number:3 http://tojde.anadolu.edu.tr/tojde11/articles/idrus.htm.

[15]. Holmes-Smith 2000, 'Introduction to Structural Equation Modelling using AMOS 4.0, 5th International and 8th National Research Conference on Quality and Innovation Management, The Euro- Australian Cooperation Centre(EACC), Victoria.

[16]. Hu, P. J.-H. (2003). Evaluating Telemedicine Systems Success: A Revised Model, Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS 03), January 6-9, Big Island, Hawaii.

[17]. James L. Arbuckle ,(2007), AMOS 16 user guide. Amos Development Corporation SPSS, Inc, http://amosdevelopment.com

[18]. Lee-Post, A.and Holsapple, C. W. (2006). "Defining, assessing, and promoting e-learning success: An information systems perspective", Decision Sciences Journal of Innovative Education 4(1), pp 67-85.

[19]. Lynn bouchard ,(1999)developing and evaluating methods for user satisfaction measurement in practice. journal of information technology Management, Volume X Numbers 3-4, 1999

[20]. MacCallum, RC 1990, 'The need for alternative measures of fit in covariance structure modelling', Multivariate Behavioural Research, vol. 25, pp. 157-62.

[21]. Mäntymäki, M 2009. Customer Loyalty in Social Virtual Worlds. 22nd Bled eConference Enablement: Facilitating an Open, Effective and Representative eSociety ,14 – 17 June 2009; Bled, Slovenia Turku Centre for Computer Science (TUCS) Turku School of Economics, Finland

[22]. Urbach, N, Smolnik, S. & Riempp, G. 2009. Development and validation of a model for assessing the success of employee portals ,17th European Conference on Information Systems, 2009

[23]. Ong, C, S, Day. M, Hsu. L 2009.The measurement of user satisfaction with question answering systems, Information & Management 46 (2009) 397–403.www.elsevier.com/locate/im

[24]. park, N., Lee, K. M., & Cheong, P. H. (2007). University instructors' acceptance of electronic courseware: An application of the technology acceptance model. Journal of Computer-Mediated Communication, 13(1), article 9. http://jcmc.indiana.edu/vol13/issue1/park.html

[25]. Petter, S., DeLone, W., and McLean, E. (2008) "Measuring information systems success: models, dimensions, measures, and interrelationships", European Journal of Information Systems 17, pp 236-263.

[26]. Radcliffe, D. (2002). Technological and pedagogical convergence between work-based and campus-based learning. Educational Technology & Society, 5 (2). Retrieved May 12, 2005 fromhttp://ifets.ieee.org/periodical/vol_2_2002/radcliffe.html

[27]. Rai, A., Lang, S. S. and Welker, R. B. (2002). Assessing the Validity of IS Success Models: An Empirical Test and Theoretical Analysis, Information Systems Research, 13 (1), 50-69.

[28]. Sahari, N,. A.A.A. Ghani, H. Selamat and A.S.M. Yunus. 2009. Development and validation of mathematics courseware usefulness evaluation instrument for teachers. J.Applied Sci. 9: 535-541.

[29]. Seddon, P. B. (1997). A Respecification and Extension of the DeLone and McLean Model of IS Success, Information Systems Research, 8 (3), 240-253.

[30]. Seddon, P. B. and Kiew, M.-Y. (1994). A Partial Test and Development of the DeLone and McLean Model of IS Success, Proceedings of the 15th International Conference on Information Systems (ICIS 94), December 14-17, Vancouver, Canada.

[31]. Sekaran, U, 2003, Research methods for business: a skill-building approach, 4 th edn, John Wiley & Sons, Inc

[32]. Sharkey, U., Scott, M. and Acton, T (2006) The influence of quality on the success of e–commerce systems., European Conference on Information Systems (Ed, Ljungberg J, A. M.), Goteborg, Sweden, pp. 1711-1722.

[33]. Steiger, JH 1990, 'Structural model evaluation and modification: an interval estimation approach', Multivariate Behavioural Research, vol. 25, pp. 173-80.

[34]. Wahlstedt A., and Honkaranta A. (2007), Bridging the Gap between Advanced Distributed Teaching and the Use of Learning Management Systems in the University Context, Seventh IEEE International Conference on Advanced Learning Technologies (ICALT 2007).

[35]. Wang, Y.-S., Wang, H.-Y. & Shee, D. Y. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. Computers in Human Behavior, Vol 23, Issue 4, 1792-1808.

[36]. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35* (8), 982-1003.

[37]. Drennan, J. Kennedy, J. & Pisarki, A. 2005. Factors affecting student attitudes toward flexible online learning in management

education. The *Journal of Educational Research*. v98 i6. 331-340.

[38]. Wang, Y.S. and Liao, Y.W. 2007. Assessing eGovernment systems success: a validation of the DeLone and Mclean model of information system success. *Government Information Quarterly.* 25. 717-733.

[39]. Yen, C. and Lu, H. 2008. Effect of e-service quality on loyalty intention: an empirical study in online auction. *Managing Service Quality*. 18(2). 127-146.

[40]. Lee, K.C. and Chung, N. 2009. Understanding factor affecting trust and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective. *Interacting with Computers.* 21. 385-392.

[41]. Lee-Post, A. 2009. E-Learning success model: an information system perspective. Electronic Journal of eLearning. 7(10). 61-70.