Examining The Effect Of Learning Management System: Performance And Effort Expectancy On Student's Satisfaction

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Abstract:
Learning management systems (LMS) have been implemented in many Higher Educational Institutes (HEI) around the world to facilitate connections between students and teachers beyond the traditional classroom setting. Recent advancements in information and communication technology have transformed the educational environment into a smart learning space. This study proposes a theoretical framework based on a validated technology acceptance model (TAM) to assess HEI students' perceptions of LMS adoption, focusing on two key constructs: Performance Expectancy (PE) and Effort Expectancy (EE), each of which is described by six items. HEI students' behavioural intentions (BI) to use the LMS served as the dependent variable. The populations of the study are the students randomly selected from the private universities in West Bengal. Structured questionnaire designed to analyze the conceptual framework developed based on the Technology Acceptance model. All identified items related to Performance Expectancy (PE) and Effort Expectancy (EE) were utilized to assess their impact on the Behavioural Intention (BI) to use the LMS, which served as the dependent variable in a regression analysis. This study examines the potential acceptance of LMS as perceived by the students' within the higher education landscape of West Bengal and the expected results will provide valuable information for the management staff of the private universities in managing E-learning strategically along with traditional learning system.
Keywords*: Learning Management Systems (LMS); TAM; PE; EE; BI; HEI; West Bengal*

I. Introduction:

In recent years, the use of new information and communication technology among students has become increasingly popular. A notable development in this area is the learning management system (LMS), also known as content management system (CMS). An LMS is an online platform that provides a virtual learning environment (VLE) which allows smooth interaction between teachers and students and makes it easy to upload and download classroom teaching materials. LMS serves as an effective tool for communication outside of the traditional classroom with the more widespread availability of internet connectivity especially in tier 1 and tier 2 cities where most universities are located in West Bengal. LMS platforms have become an essential part of modern education. To measure the perception of HEI students of West Bengal about LMS, researchers developed a research model from validated TAM model (Davis, 1989) where the constructs like Performance Expectancy (PE), Effort Expectancy (EE) playing vital role. Performance Expectancy (PE) refers to an individual's perception of the usefulness of technology in accomplishing various tasks (Venkatesh et al., 2003; Ain et al., 2016). It is a key construct that determines information systems adoption and eventual use, a fact stated by many researchers in their research studies. Performance expectancy is the extent to which an individual perceives that using a system will help him or her to gain certain job performance. Effort Expectancy is also a construct as the degree of ease associated with the use of an information system. Early-stage assessments of technology adoption reveal a direct impact of Effort Expectancy on Behavioral Intention (BI) (Gupta et al., 2008; Venkatesh et al., 2003). Effort expectancy (EE) is based on the idea that there are relationships between the effort put forth at work and the performance achieved from that effort with the rewards received from the effort. Effort Expectancy has a direct link to the use of LMS by the students. In order to empirically test this, the study investigated the impact of two independent constructs, Performance Expectancy (PE) and Effort Expectancy (EE) on the dependent construct Behavioural Intension (BI) and the use of LMS by the students of different Private Universities of West Bengal.

II.   Literature Review

Buzzetto-More, N. (2015) in their paper highlighted that YouTube videos increase the engagement, better understanding and overall satisfaction of the students. Similarly, researchers Findik-Coşkunçay, et al. (2018) in their paper depicted on recent advancement of information technologies and how learning management system (LMS) playing a vital role in supporting educational resources. One researcher Ellahi, A. (2018) in his paper said that the social networking sites can induce learning effectiveness and the amount of conversion of the learners into social networking sites which can be used as supplementary elements for existing pedagogy methods prevailing in a developing country. Some social scientists Barrio-García, et al. (2015) in their paper pointed out the facts that there will be always a scope to enhance students' involvement in higher education if the students use web 2.0 tools extensively for social purposes. Another researcher, Baran, E. (2014) pointed out the fact of attractiveness of mobile devices which are become essential factor for online education. On the other hand, researchers like Emelyanova, N., et al. (2014) explained the fact of getting success and efficient utility of LMS is dependent on stakeholder's adaptability and perception about LMS. For this reason many research is impelled by the importance of understanding two major group of stakeholders namely teachers and students perceptions of LMS. Few management scientists Goh, et al. (2014) explored the area that LMS was popular for its easy accessibility and interactive nature. Some researchers Dias, SB., et al.(2015) in their research article portrayed on the LMS under blended learning method which could effectively support online teaching learning practices at higher educational institutions. Two social scientists Bousbahi, F., Alrazgan, MS. (2015) in their article highlighted the picture of Middle East and they enlightened the fact that for enhancement of teaching learning in higher education many Universities and Colleges opted LMS in their teaching learning pedagogy. Bervell, B., et al. (2014) mentioned that a decade had delayed since the LMS permeated the way into higher education in Sub-Saharan Africa and the SSA offered new paradigms of both blended and online mode of e-learning delivery. Similarly few Indian researchers Das, J., et al. (2020) in their article focused on Gujarat, India where numbers of esteemed higher educational institute were exists and those were inclined towards using LMS platform. Ally, M. (2004), Claar, C., et al. (2014) and DePietro, P. (2013) in their respective articles highlighted the importance of LMS perception and adaptability among the stakeholders.

III.   Exploration Of Research Gap

A review of the literature reveals several important gaps which has the following details:

➢ Most research on the perceived benefits of Learning Management Systems (LMS) has been conducted internationally, with limited studies specifically focused on India, particularly in West Bengal.

➢ The concept of LMS is relatively new in West Bengal. While online teaching and learning methods have existed, there is a noticeable scarcity of literature addressing the widespread adoption of LMS platforms for these purposes.

IV.   Research Objectives

An attempt has been in the present study to pursue the use and implementation of Learning Management System in the higher educational institutes of West Bengal. The objectives of the study are summarized as follows:

➢ To construct a theoretical framework based on the variables that influence students' actual use of e-learning systems in the higher educational institutes of West Bengal using an adapted TAM model

➢ To identify the items of explaining the Performance Expectancy (PE) and Effort Expectancy (EE) ,which would be used as independent variables and also, the items of Behavioural Intensions, used as dependent variable

➢ To measure the level of influence of all the items considered in Performance Expectancy(PE) and Effort Expectancy(EE) on Behavioural Intension to explore the strategy of Learning Management System

V.   Theoretical Framework Of The Study

Conceptual framework is based on validated model known as Technology Acceptance Model (TAM) developed by Fred Davis in 1989. It is an information systems theory that describes how users come to accept and use a technology. In this model two important constructs are namely perceived ease of use (PEOU) and perceived usefulness (PU). As per Davis definition, perceived ease of use (PEOU) is "the degree to which a person believes that using a particular system would be free from effort". Similarly, perceived usefulness (PU) is "the degree to which a person believes that using a particular system would enhance his or her job performance". To describe the conceptual framework, a simple flow chart has been developed which explains the relationships between six research constructs that constitute the key determinants of student's perception to practice online learning through LMS platform.
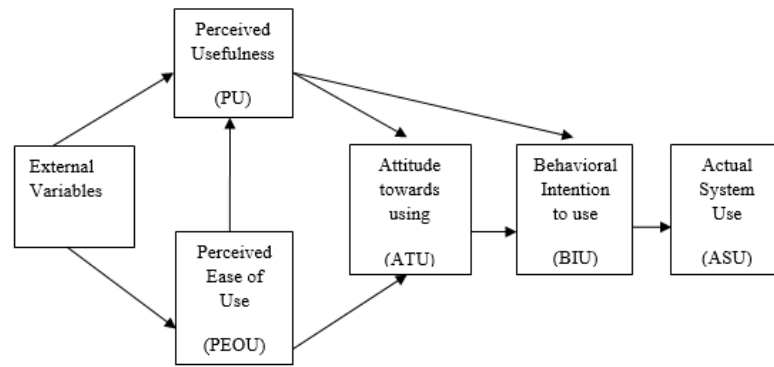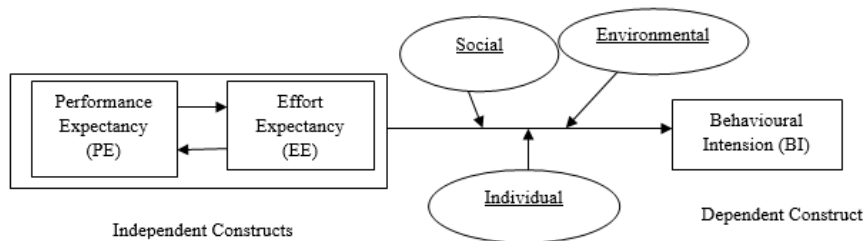
Fig. 1: TAM Model (Davis, 1989)

Fig. 2: Proposed Research Framework

VI.   Methodology

Survey Instrument Development: For the survey instrument development (structured questionnaire) three constructs with their respective parameters and sources were identified which illustrated in the tabular form mentioned below:

CONSTRUCTS & PARAMETERS SOURCES			
SL NO	CONSTRUCTS	PARAMETERS	REFERENCES
1	Performance Expectancy (PE) (Input)	PE1:Usefulness PE2:Achievement PE3:Quickness	Al-Fraihat et al., 2020; Mehta et al., 2019; Šumak & Šorgo, 2016; Venkatesh et al., 2003, 2012
2	Effort Expectancy (EE) (Input)	EE1: Easiness EE2: Interactivity EE3: Comparability	Ali, 2019; Hoi, 2020; Mehta et al., 2019; Šumak & Šorgo, 2016; Venkatesh et al., 2003, 2012
3	Behavioural Intention (BI) of LMS (Output)	BI$_1$:Intention of use BI$_2$:Frequency of use	Ali, 2019; Chopra et al., 2019; García Botero et al., 2018; Hoi, 2020; Mehta et al., 2019; Šumak & Šorgo, 2016; Venkatesh et al., 2003, 2012; Zhang et al., 2020

Table 1: Description of constructs & parameters

From Table1, Performance Expectancy (PE) and Effort Expectancy (EE) include six parameters and acted as independent constructs where as Behavioural Intension (BI) includes two parameters acted as dependent construct.

Data Collection: This study involved 417 of the undergraduate and postgraduate students of different Private Universities of West Bengal to capture the perceptions of all the identified items in the theoretical framework using the structured questionnaire.To collect the data at the first stage convenience sampling used as purposively those educational institutes of West Bengal were selected where LMS had been already implemented and the learning institutes used the LMS into their teaching learning pedagogy. At the second stage of sampling process, students of HEI were selected randomly for further analysis.

Pilot Survey and Final Survey: To testify the survey instrument (designed questionnaire) at the initial stage a pilot survey had been conducted having 120 sample size and the result of the reliability measurement Cronbach's Alpha was 0.911 was the strong evidence of reliability of the designed questionnaire and at the final stage of survey having 417 sample size where Cronbach's Alpha was 0.930.

Method: For the first stage an Exploratory Factor Analysis (EFA) had been performed based on 17 items where emerged factors were 5 as an outcome of the factor analysis. The 5 emerged factors were namely "Performance Expectancy driven by Social Influence" as Factor1, "Facilitating Environmental Condition" as Factor2, "Individual Perceived Usefulness" as Factor3, "Effort Expectancy" as Factor4 and "Assessment Perceived Risk" as Factor5. For the second stage, regression analysis had been performed in two separated models. For the Model 1, regression analysis treats (X: all occurring factors) as the independent variables and behavioral intention (Y: BI_1) as the dependent variable, where Y represents "Preference of Traditional learning over Online learning". For the Model 2, regression analysis was conducted with the emerged factors treated as independent variables (X: All emerged factors) and Behavioral Intention as the dependent variable (Y: BI_2), where Y represents the "Sustained Growth of the LMS System."

VII. Analysis And Findings

To measure the influence of Performance Expectancy (PE) and Effort Expectancy (EE) on Behavioural Intension (BI) and to establish the proposed research model (explained in Fig.2) multivariate regression analysis was conducted. In the study Performance Expectancy (PE) and Effort Expectancy (EE) acted as independent constructs further subdivided into six components namely, PE1, PE2, PE3, EE1, EE2, EE3 & the dependent construct Behavioural Intension which influenced by the 2 independent constructs PE & EE further subdivided into two components namely, BI_1 and BI_2 where it has been designed in such a way that signifies and presented in tabular form illustrated below-

Variable Name	Item Code	Item Description
Performance Expectancy (PE)	PE1	I find LMS useful in my daily life for study
	PE2	My important task are achieving easily through LMS
	PE3	LMS helps me to complete my task more quickly
Effort Expectancy (EE)	EE1	Learning how to use LMS is easy for me
	EE2	My interaction with LMS is clear and understandable
	EE3	Using LMS is as easy as using any other systems I have previously used
Behavioural Intension (BI)	BI_1 BI_2	I prefer to use traditional learning in compare to online learning. I plan to continue to use LMS frequently.

Table 2: Latent Variable Coding & Item Description

Model 1

Regression analysis treats (X: all occurring factors) as the independent variables and behavioral intention (Y: BI_1) as the dependent variable, where Y represents "Preference of Traditional learning over Online learning". The results of the regression analysis are presented below.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.342[a]	.117	.106	1.1360

Table 3: Regression Model Summary

ANOVA						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	70.263	5	14.053	10.889	.000[b]
	Residual	530.428	411	1.291		
	Total	600.691	416			

Table 4: Regression ANOVA Details

Dependent Variable: Preference of Traditional Learning over Online Learning		
Independent Variables: All the emerged factors with the respective standardized co-efficient at thesignificance level		
Factor Name	Standardized Co-efficient	Significance Level
Facilitating Environmental Condition(Factor2)	0.179	0.000
Assessment Perceived Risk (Factor 5)	0.170	0.000
Individual Perceived Usefulness (Factor 3)	0.149	0.001
Effort Expectancy (Factor4)	0.131	0.005
Performance Expectancy driven by SocialInfluence (Factor1)	0.129	0.006

Table 5: Summary of Findings: Regression Analysis (Model 1)

The goal in the initial regression analysis for Model 1 was not only to identify the relationship between (Y: BI_1) Behavioral Intention and X (the emerging factors), but also to show that X had a significant impact on Y and how do these influence student preferences? From the Table 5 (Summary of Findings: Regression

Analysis (Model 1)), it was found that all five contingency factors were significant. However, the most notable factor was "Facilitating Environmental Condition" highlighting how the supportive conditions of traditional learning and the infrastructure provided by higher educational institutions strengthen the preference for traditional learning alongside online learning. Similarly, the next significant factor from the Table 5 was "Assessment Perceived Risk" indicating that students perceive more risk associated with online learning via LMS platforms compared to traditional learning methods. Another significant factor identified was "Individual Perceived Usefulness" underscoring students' enjoyment, satisfaction, and trust in traditional learning over online alternatives. Given that Model 1 of the regression analysis emphasized a "Preference for Traditional Learning over Online Learning" and the results indicated a limited influence of online learning among students, it underscores the robustness of traditional learning alongside online methods in the teaching-learning paradigm of West Bengal's higher education sector.

Model 2
The regression analysis was conducted with the emerged factors treated as independent variables (X: All emerged factors) and Behavioral Intention as the dependent variable (Y: BI_2), where Y represents the "Sustained Growth of the LMS System." The findings of the regression analysis are presented below:

Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.810[a]	.657	.653	.6445

Table 6: Regression Model Summary

ANOVA

	Model	Sum of Squares	df	Mean Square	F	Sig.
	Regression	326.784	5	65.357	157.333	.000[b]
1	Residual	170.731	411	.415		
	Total	497.516	416			

Table 7: Regression ANOVA Details

Dependent Variable: Sustain growth of LMS system		
Independent Variables: All the emerged factors with the respective standardized co-efficient at the significance level		
Factor Name	Standardized Co-efficient	Significance Level
Individual Perceived Usefulness (Factor 3)	0.531	0.000
Performance Expectancy driven by Social Influence (Factor1)	0.433	0.000
Facilitating Environmental Condition (Factor 2)	0.360	0.000
Effort Expectancy (Factor4)	0.237	0.000

Table 8: Summary of Findings: Regression Analysis (Model 2)

According to the Table 8(Summary of Findings: Regression Analysis (Model 2)), all items of the five emerged factors were significant at the 1% level. The most significant factor was "Individual Perceived Usefulness," which reflected students' increased enjoyment, satisfaction, and trust in the LMS system. The next significant factor was "Performance Expectancy Driven by Social Influence," which highlighted how students' expectations regarding LMS performance were influenced by social factors and the potential for social isolation while using the system. The third significant factor was "Facilitating Environmental Condition," which referred to the supporting conditions of the LMS system, such as the infrastructure provided by higher education institutions, that enhanced students' comfort and engagement with the system. The fourth significant factor was "Effort Expectancy," which focused on the ease of use students experienced when interacting with the LMS system interestingly, the factor "Assessment Perceived Risk" was found to be insignificant. This suggests that as more students use the LMS system, the perceived risks associated with it diminish over time. Since Model 2 emphasized the "Sustained Growth of the LMS System" the regression analysis results indicate a strong influence of the LMS system on HEI students. This underscores the potential for rapid growth and broader adoption of the LMS system in the teaching-learning practices of higher education institutions in West Bengal.

VIII. Discussion
This research focuses on three key constructs: Performance Expectancy (PE), Effort Expectancy (EE), and Behavioral Intentions (BI), as shown in Figure 2 of the research model. The main objective was to examine the relationship between these constructs, specifically PE, and EE how affects BI. This relationship was confirmed by regression analysis. In addition, three moderating constructs namely social, environmental, and

individual measure the strength and direction of the relationship between Performance Expectancy (PE), Effort Expectancy (EE) and Behavioural Intension (BI) in this particular study. An exploratory factor analysis (EFA) was conducted on 17 items, resulting in 5 emerged factors. Regression analysis was then utilized to measure the influence of these factors on Behavioural Intension. In the first regression analysis test for Model 1 this research study not try to prove the level of association in between Y and X rather the study willing to prove X has significantly robust impact on Y that means students have an intension to use LMS along with traditional learning system. Similarly, in regression Model 2, the analysis underscored the substantial influence of LMS among students, advocating for the sustained growth of LMS systems in the teaching-learning pedagogy of higher education in West Bengal.

IX. Conclusion

In conclusion, this research explored the use of Learning Management Systems (LMS) alongside traditional learning methods among higher education students (HEIs) in West Bengal. Through thorough analysis and empirical investigation, several key findings have emerged, highlighting the effectiveness and implications of integrating LMS into educational practices. The study clearly shows that LMS provide significant benefits, including enhanced accessibility, flexibility, and scalability. Importantly, the research emphasizes the complementary relationship between LMS and traditional learning systems. While LMS offer valuable advantages in terms of accessibility and interactivity, traditional learning methods continue to play a crucial role in certain educational contexts. Face-to-face interactions, hands-on experiences, and peer collaboration are essential elements of the learning process that should not be overlooked. By adopting a blended learning approach that combines the strengths of both LMS and traditional teaching methods, educators can create a dynamic and inclusive learning environment that caters to the diverse needs and aspirations of students in the digital age.

X. Future Scope Of Study

➢ The analysis of the study builds on primary source of data and that were collected from undergraduate and postgraduate students of different Private Universities of West Bengal where Govt. Colleges or Universities did not consider which can be a future scope of study.
➢ The study did not also consider the other major stakeholder of education system like: Teachers and their perception and adoptability rate of LMS into the teaching learning pedagogy which can be a vibrant future scope of the study.

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