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Antecedents of instructors' self-efficacy and satisfaction while using LMS in new normal

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Abstract

The shift from face-to-face to a flexible learning environment following the disruptions due to the COVID-19 pandemic led the universities to fully utilise the learning management system (LMS) as part of the new normal in teaching. Educators in higher educational institutions (HEIs) are in survival mode, especially in developing economies and those with limited LMS experience. This paper has proposed and validated a model to describe the antecedent factors associated with LMS usage to the instructor's self-efficacy and satisfaction. The structural equation model specifies that 7 out of 10 hypothesised paths provide acceptable fit measures. We successfully modelled the difference along with the prior LMS knowledge. The paper has several implications for the theory and practice in higher education, especially in a developing economy where most HEIs were caught off-guard by the transition caused by the pandemic. We provide theoretical and practical insights derived from this work.

Keywords: Self-efficacy, flexible learning, job satisfaction, computer anxiety, SEM.

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1. Introduction

The global education system has significantly transformed due to the COVID-19 pandemic. School closures during this time have spotlighted issues, challenges and operationalised pandemic pedagogy amidst resource disparities (Putra et al., 2020; Ramij & Sultana, 2020). Due to insufficient resources, the teachers and learners in developing economies, like the Philippines, greatly suffer. To favourably respond to this situation, the Philippine government, through its commission on higher education (CHEd), implemented a flexible learning system (FLS) for higher education institutions (HEIs). As highlighted in the CHEd Memorandum Order No. 04 series of 2020, such policy emphasises exploring other learning modalities to effectively transition from traditional face-to-face to flexible learning and different distance learning options. Flexible learning is a method in which the learners are given self-determination in learning and utilising a technology-enhanced medium at any time and place (Becerra-Alonso et al., 2020; Huang et al., 2020). The medium became the new normal in teaching, and giving insights into the post-COVID-19 new normal is essential, especially in explaining behavioural structures and providing policy directions or curricular innovations (Gonzales, 2022). Along with these insights, using a learning management system (LMS) highlights emerging discussions during the pandemic, especially among non-LMS users.

LMS is an educational platform that employs information technology systems to deliver online classes effectively. The system allows instructors to manage and send learning content, assess class activities and collect student feedback without needing physical appearance while attending classes. Aside from being a tool for teaching and learning, LMS also allows the HEIs to implement local policies within a school system (Ghazal et al., 2018). There are various LMSs utilised worldwide, like Google Classroom, Moodle, Blackboard, WebCT and Schoology (Raza et al., 2021; Waheed et al., 2016). Some are institution-based and designed to cater to the institution's unique needs. In the context of LMS usage in the FLS environment, studies revealed different exchanges of views. For example, Cahapay (2021) emphasised a necessary range of delivering learning in the new normal with unlimited usage of LMS and blended learning modality. Higher education has been paradigm-shifting since the advent of the LMS (Hassanzadeh et al., 2012). Its discussions are becoming more crucial during the pandemic (Raza et al., 2021), with a more distinct effect among developing countries.

The problem of developing economies is that some HEIs, whether state-owned or small-scale private colleges and universities are not ready for the abrupt transition (Kundu & Bej, 2021). The experiences specifically in using LMS lead to some inherent structures along with behavioural factors that affect those who are not used to the LMS. Therefore, delineating the latent factors affected by the change, especially in teaching online using LMS, reflect some inherent complexity and validation. In the absence of behavioural data to model some latent structures involving its usage, it is reasonable to start with self-efficacy and satisfaction with the system. Low self-efficacy among the implementers tends to limit the system's technological application, leading to low job satisfaction. For instance, to ensure effective outcomes and satisfaction from faculty, educational leaders must support the faculty in technical and self-efficacy areas (Zheng et al., 2018). Another interesting construct to explain efficacy and satisfaction is the anxiety in using the system, the educational managers, and the government's facilitating conditions. Batucan et al. (2022) reported that facilitating conditions, such as the availability of online resources and specialised interactivity on LMS, can motivate the users to enrich learning and pedagogical competencies.

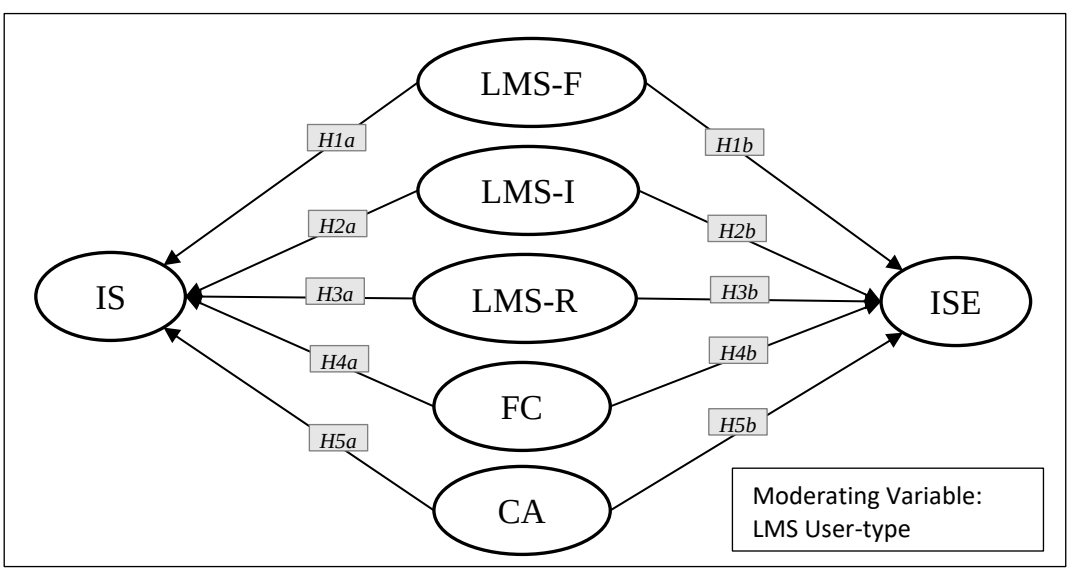
Topics on measuring factors influencing students' and instructors' satisfaction and acceptance of the LMS technology have sprouted in the literature. The majority of research studies (68%) reported on the general usage of LMS, while only a few (39%) measured latent variables on LMS satisfaction (Dahlstrom

et al., 2014). Although studies examine LMS acceptance with various theoretical models, some have noted several barriers reported by less experienced users (Simonson et al., 2019). These barriers include internal contingency factors (Lin & Wang, 2012), prior knowledge and motivation (Hamilton & Tee, 2013), LMS characteristics as to the quality of the system (Al-Busaidi & Al-Shihi, 2012), government support, other facilitating conditions and computer anxiety (Bervell & Arkorful, 2020). The authors would like to model that the most critical factor is prior knowledge about LMS. A considerable thought is that not all students from developing countries are ready for the drastic transition from face-to-face to online classes (Kundu & Bej, 2021), affecting in some way the self-efficacy and job satisfaction of the instructors. It is empirical to look at the emerging structures and uncover variations among these behavioural constructs and how it affects the self-efficacy and job satisfaction of the educators in HEIs.

This study investigates the antecedences of instructors' self-efficacy (ISE) and instructors' satisfaction (IS) while using the LMS in a flexible learning environment during the COVID-19 pandemic. The LMS characteristics in terms of functionality, interactivity and response have been identified through the literature review. On the other hand, the behavioural constructs affecting LMS use must differ from those with no LMS experience. Other factors that facilitate the condition to use the system include government and technology support, computer anxiety and the moderating effects of previous LMS users and those who are first-timers. The paper is organised by validating the measurement model through confirmatory factor analysis (CFA) and the path analysis using the covariance-based structural equation modelling. The main goal is to confirm and test an alternative proposed measurement model, as shown in Figure 1. The final model carried out the test of moderating effects with LMS user-type as the control variable.

1.1 Theoretical Framework

The theoretical underpinning of the proposed model is based on emerging literature explaining LMS characteristics' associations with ISE and IS. The proposed model shown in Figure 2 is a product of building arguments around the LMS topic using various models to provide new insights.



Legend: LMS-F/I/R Learning management system-functionality, interactivity, & response; FC-Facilitating conditions; CA-Computer anxiety; ISE-Instructor's self-efficacy; IS-Instructor's satisfaction

Figure 1. The proposed model

Figure 1 shows the proposed model on the identified antecedences of ISE and IS while using LMS in a flexible learning environment amidst the COVID-19 pandemic. The proposed measurement model comprised various sets of predictive factors. These include the theoretical models of Al-Busaidi and Al-Shihi (2012), Hamilton and Tee (2013), and Lin and Wang (2012). We develop hypotheses to support the proposed framework from these pieces of literature. The building blocks of our arguments are well-crafted with related literature in the section below.

1.2 Related Research and Hypotheses Development

1.2.1 LMS Characteristics

System characteristics in information systems usage have been posited to directly affect the end users' perceptions (Pituch & Lee, 2006). These users' beliefs have been explored in several studies, which led to the critical development of LMS and e-learning systems. For example, LMS characteristics regarding the system's quality, information and service have been identified as critical factors to user satisfaction and acceptance of the technology (DeLone & McLean, 1992). This study classified the LMS characteristics as functionality, interactivity and response.

LMS functionality (LMS-F) is defined as the perceived ability of the LMS to offer flexible access to educational and assessment media (Pituch & Lee, 2006). The teaching and learning processes in the flexible learning environment depend on the LMS's cloud functionality, a clean and intuitive user interface with drag and drop user capability; easy integration of social media platforms; and a comprehensive assessment and grading system (Duin & Tham, 2020). The second LMS characteristic investigated in this study was the system's interactivity. LMS interactivity (LMS-I) refers to the perceived interactivity of the learning process among students, the interactions among instructors and learners, and collaborative learning resulting from these interactions (Pituch & Lee, 2006). The critical aspect of the learning process is the interactions between instructors and students. Finally, regarding the efficiency of functionality and interactivity in terms of integrating various file types or media, the LMS will not be perceived as useful if the system response is unsatisfactory. LMS response (LMS-R) refers to the degree to which learners believe that LMS response is fast, consistent and appropriate. LMS-R is the third LMS characteristic infused in this study, especially since the infrastructure in terms of Internet connection in the Philippines is still developing. Kerka (1999) specified that the probable causes of poor LMS-R include thin bandwidth (the capability of the communication lines) and slow modem, hampering the delivery of sound, video and graphics. These days, this phenomenon is still prevalent in developing countries.

Consequently, this study categorises the instructor's self-efficacy and satisfaction with using the LMS in a flexible learning environment, while the world is still facing the challenges of learning and teaching during the COVID-19 pandemic. Pieces of literature have explored these relationships in general (Al-Busaidi & Al-Shihi, 2012; Dahlstrom et al., 2014). For example, Al-Busaidi and Al-Shihi (2012) found that when implementing the LMS in a blended learning environment, information quality, system quality, management support, incentives policy and training are essential elements of IS. Triangulated data sources about LMS practices and experiences revealed that teachers' user satisfaction and efficacy are improved when skills in using LMS are enhanced (Dahlstrom et al., 2014). Nguyen (2021) said that system characteristics positively affect users' satisfaction. Thus, the following hypotheses are proposed:

H1a LMS-F is positively associated with IS.

H1b LMS-F is positively associated with ISE.

H2a LMS-I is positively associated with IS.

H2b LMS-I is positively associated with ISE.

H3a LMS-R is positively associated with IS.

H3B LMS-R is positively associated with ISE.

1.2.2 Facilitating Conditions (FC)

FC is a person's belief that the organisation's technical infrastructure supports the system's use (Venkatesh et al., 2003). In other words, the respondents believe that the school supports them regarding infrastructure to support the LMS. FC impacts instructors' motivation to use LMS in a flexible learning environment. This construct is derived from the unified theory of acceptance and use of technology (UTAUT). The researchers who developed the UTAUT model found that FC fundamental determinants influence the use of information systems (Wong et al., 2013). Several recent studies have confirmed these findings (e. g., Bervell & Arkorful, 2020; Holzmann et al., 2020; Šumak et al., 2017). For example, Bervell and Arkorful (2020) found associations between facilitating conditions; the voluntariness of the users; and LMS-aided blended learning user behaviour. Furthermore, the paper reported that facilitating conditions predicted voluntariness of use and actual use behaviour. Voluntariness of use determined actual LMS use behaviour for blended learning in distance education. Cardullo et al. (2021) revealed that facilitating conditions such as support for online teaching positively affect teachers' self-efficacy while conducting online classes. Due to this fact, the following hypotheses were proposed.

H4a FC is positively associated with IS.

H4b FC is positively associated with ISE.

1.2.3 Computer Anxiety (CA)

CA is defined as 'the anxiety or apprehension people had when using computers or when considering the possibility of using computers' (Simonson et al., 1987). It is considered that there are inverse effects of computer anxiety towards the utilisation of LMS, and this is more evident among non-millennial instructors in developing countries like the Philippines. For example, previous studies revealed that the acceptance and attitudes towards using the LMS are negatively affected by CA (Al-Busaidi & Al-Shihi, 2012; Piccoli et al., 2001). Other emerging literature still reveals this construct to have affected older people's performance and job satisfaction (Fernández-Batanero et al., 2021; Henderson & Corry, 2021). This means that the distress of technology use may restrict the efficacy and satisfaction of teachers' adoption of LMS. In line with these arguments, the following hypotheses were proposed:

H5a CA is negatively associated with IS.

H4b CA is negatively associated with ISE.

1.2.4 Instructors' Self-Efficacy (ISE)

In this study, ISE is defined as the instructors' perception of their abilities or how certain they can execute specific actions (Bong & Skaalvik, 2002). In contemporary educational research, ISE is founded on social cognitive theory (Bandura, 1977, 1989). Bandura's self-efficacy theory refers to a belief in a person's ability to perform an assigned task. According to Bandura (1989), individuals are driven to take action if they believe in their ability and are confident that the measure would produce a better outcome. Emerging literature demonstrates a causal link from ISE to IS (Federici, 2013; Skaalvik & Skaalvik, 2017). According to Skaalvik, and Skaalvik (2017), people are more satisfied with their jobs

when they consider mastering the introduced system's activities. School administrators' increased self-efficacy is correlated with their subordinates' job satisfaction (Federici, 2013). Hill et al. (1986) revealed that self-efficacy beliefs affect the intention to use various technologically advanced tools and products. Therefore, a person with the skill of Internet technology is more inclined to adopt online bank transactions. The practical reason behind these findings is that the users are comfortable with the innovations' characteristics.

1.2.5 Instructors' Satisfaction (IS)

IS is commonly defined as commitment and fulfilment (Culver, 1990). It is developed from instructors' affective responses to their teaching roles in the educational context (Han et al., 2020; Skaalvik & Skaalvik, 2017). In this study, IS refers to the primary elements influencing LMS satisfaction in a flexible learning environment. Al-Busaidi and Al-Shihi (2012) revealed that IS affects the continuous intention to use LMS for distance education and blended learning.

1.3 Purpose of the Study

The main objective of the study is to develop and validate a hypothetical structural model of ISE and IS through the lens of the LMS characteristics and other intervening variables, such as FC and CA. Additionally, the model testing also provides significant differences in part and overall variations of the paths along the final model using the data of LMS users before and during the transition of classes from face-to-face to flexible learning environment due to the COVID-19 pandemic.

2. Methods

2.1 Participants

We collected data from instructors and professors of selected universities in Central Visayas Regions, the Philippines. The gathering was via email, messenger or any electronic domain. The participating schools' faculty received an invitation to participate in the questionnaire and a link to the questionnaire's website. The primary inclusion criterion is to have responses from those who have experience using any LMS platform (i.e., institutional-based LMS, Google Classroom, Moodle etc.) during the implementation of the flexible learning environment amidst the COVID-19 pandemic as mandated by the CHEd in Philippine HEIs. We invited 500 faculty members of the selected universities, retrieving 385 participants with a 77% retrieval rate. The demographic characteristics of LMS users under the survey are presented in Table 1.

Table 1. Demographic characteristics of the LMS users

	Total *N* = 385		LMS User Type			
			First-time users (*n*=334)		Not first-time users (*n*=51)	
Category	*N*	%	*n*	%	*n*	%
Gender						
Male	194	50.39	167	43.38	27	7.01
Female	191	49.61	167	43.38	24	6.23
Age						
30 years old and below	124	32.21	106	27.53	18	4.68
31 to 45 years	120	31.17	111	28.83	9	2.34
46 years old and above	86	22.34	67	17.40	19	4.94
Employment Status						

Permanent (tenured)	245	63.64	214	55.58	31	8.05
Fulltime (not tenured)	18	4.68	14	3.64	4	1.04
Part-timer (not tenured)	122	31.69	106	27.53	16	4.16

2.2 Data Collection Tools

The survey form includes demographic information (gender, age, specialisation, LMS experience, teaching experience, school location, employment status and academic rank) and the indicators of the study's constructs. The measurement tool for each indicator is a 5-point Likert scale phrased according to '(1) strongly disagree' to '(5) strongly agree'. All self-report measures were adapted or minimally revised from well-cited works of literature. The revision was set to fit the locale of the study. Table 2 presents the items in the survey questionnaire with the item code according to constructs, references and the reliability indices using Cronbach's alpha.

Table 2. List of Items by constructs, reliability indices, and sources

Statement	**Alpha**	**Source**
LMS Functionality (LMS-F)		
'LMS allows learners to take control of their learning.'	0.839	Pituch & Lee (2006)
'LMS provides flexible access in learning as to time and place.'		
'LMS provides multimedia course content (audio, video, and text).'		
'LMS allows students to take tests and submit assignments.'		
'LMS can display course material in a well-organized and easy-to-read format.'		
'LMS-can present course content clearly.'		
LMS Interactivity (LMS-I)		
'The LMS allows interactive communication among instructors and students.'	0.849	Pituch & Lee (2006)
'The LMS allows interactive communication between students.'		
'The LMS's communication tools are efficient (email, chat room, etc.).'		
The LMS allows the submission of requirements in different file formats.		Authors
The LMS allows giving comments on the uploaded requirement.		
LMS Response (LMS-R)		
'In general, the LMS application response is fast.'	0.850	Au et al. (2008) and Nelson et al., (2005)
'The LMS's response time is consistent in most cases.'		
'The LMS's response time is reasonable in most cases.'		
'It takes too long for the system to respond to my requests (reverse coded).'		
'The system makes information very accessible.'		
'The quality of response time is good.'		
Facilitating Conditions		
'I am equipped with the resources required to use the LMS.'	-	Tan et al., (2000)
'I am equipped with the knowledge required to use the LMS.'		
'The government endorses using LMS in a flexible learning environment.'		
'The government is active in setting up the facilities to enable LMS for education.'		
'Internet connection in the Philippines makes the use of LMS in education more feasible.'		
Computer Anxiety		
'I find it very difficult to work on a computer.'	0.914	Gardner et al., (1993)
'I find uncomfortable in using the computer.'		
'When I try to use a computer, I get a sinking sensation.'		

Self-efficacy		
'I feel confident of my abilities in utilizing the LMS even if no one is available to guide me.'	0.873	Pituch & Lee (2006)
'I feel confident of my abilities in utilizing the LMS even though I only have the online instructions for reference.'		
'I feel confident of my abilities in utilizing the LMS despite never using a system like this before.'		
'I feel confident of my abilities in utilizing the LMS as long as I have observed someone else using it before attempting it myself.'		
'I feel confident of my abilities in utilizing the LMS as long as I have plenty of time to finish the task for which the software is intended.'		
'I feel confident of my abilities in utilizing the LMS as long as someone demonstrates how to do it.'		
Instructor's Satisfaction		
'The LMS's performance has met my expectations.'	0.936	Al-Busaidi et al. (2012)
'The LMS usage experience has been good for me.'		
'Using the LMS was a wise decision.'		
'I feel delighted with the LMS.'		Au et al. (2008)
'Overall, I am very contented with the LMS.'		

2.3 Data analysis

The paper examined the hypothesised model using covariance-based structural equation modelling (CB-SEM). Before the main data analysis procedures, we computed Cronbach's alpha coefficient to establish the internal consistency and the reliability coefficient in each group of the constructs' indicators. Following was the checking of multicollinearity through a zero-order correlation. We carried out the CFA to validate the specified model. Lastly, we tested the theoretical model utilising path analysis in SEM. In the reported fit measures, we used established fit indices such as the Tucker–Lewis index (TLI), comparative fit index (CFI), the root mean square error of approximation (RMSEA) and standardised root mean squared residual (SRMR). Hu and Bentler (1999) specified that TLI and CFI values above 0.90 are acceptable; RMSEA must be less than 0.06; while a reasonable range for SRMR is between 0 and 0.08.

3. Results

The first preliminary analysis found each construct's internal reliability indices using Cronbach's alpha of the original survey items. The Cronbach's alpha (see Table 2) ranging from 0.839 to 0.936 indicates a good to an excellent evaluation of the reliability of items in each construct of the proposed model. The multicollinearity and discriminant validity review using the zero-order correlations are presented in Table 3.

3.1 Correlations and descriptive statistics

Table 3. The correlations and descriptive measures of the study variables

Study Variables	1	2	3	4	5	6	7
1. LMS-F	1						
2. LMS-I	.698**	1					
3. LMS-R	.646**	.678**	1				
4. FC	.461**	.504**	.559**	1			
5. CA	-.274**	-.192**	-.247**	-.158**	1		
6. ISE	.509**	.512**	.527**	.579**	-.275**	1	
7. IS	.631**	.633**	.765**	.703**	-.210**	.692**	1
Mean ($\underline{x}$)	1.81	2.02	2.33	2.45	3.67	2.09	2.15
Standard Deviation (s)	0.525	0.63	0.619	0.648	0.978	0.654	0.733

$^{**}p \leq 0.01$

Correlations between the study variables and descriptive statistics (i.e., means and sample standard deviations) are in Table 3. The correlation coefficients among the constructs ranged from −0.274 to 0.698. Acceptable discriminant validity among the study variables was established with correlation indices less than 0.90 (Hair, Black, Babin, & Anderson, 2014; Lischetzke, 2014). The data revealed that the correlation coefficients are significant at 0.01 (**) alpha levels. The strongest correlation was found between LMS-F and LMS-I (0.698), while the strongest correlation with a negative coefficient reflects in CA and LMS-F (−0.274). CA varies negatively as to all other constructs in the model.

3.2 Testing the Model by CFA

All responses (N=385) were loaded to CFA structure in AMOS 27. The model strength was determined using the following fit indices: (1) the chi-squared test (χ^2); (2) the RMSEA; and (3) the SRMR. The study uses the CFI as a normed fit index and the Tucker–Lewis index TLI for the non-normed fit. The cut-off scores to attain a good model are the following: RMSEA must be ≤0.050, SRMR should be ≤0.080, TLI must be ≥0.900 and CFI must be ≥0.900 (Hu & Bentler, 1999). Table 4 reports the standardised factor loadings, the construct validity represented by the composite reliability (CR), Cronbach's alpha and the average variance extracted (AVE) of the identified path model. The Cronbach's alpha ranges from 0.789 to 0.939, indicating the instrument's reliability in the final model.

The CFA results (Table 4) indicated permissible values of the specified fit measures. Issues on the modification indices were fixed, specifically on the need to covariate correlated errors of the same factors. The factor loadings of the final model (see Figure 2) confirm the correct identification of factors based on the path analysis. We ensured no issues with the CR by checking that indices are greater than 0.7 (Hair, 2009). Generally, the measurement model is satisfactory with acceptable fit measures of the RMSEA (0.047), SRMR (0.042), TLI (0.957) and CFI (0.962).

Table 4. CFA Results of Final Measurement Model

Construct	Item	Standardized loadings	(CR)	(AVE)	α
LMS-F	LMS_F6	0.746	0.835	0.460	0.846
	LMS_F5	0.731			
	LMS_F4	0.718			
	LMS_F3	0.633			
	LMS_F2	0.649			
	LMS_F1	0.575			
LMS-I	LMS_I5	0.771	0.846	0.525	0.863
	LMS_I4	0.699			
	LMS_I3	0.766			
	LMS_I2	0.709			
	LMS_I1	0.673			
LMS-R	LMS_R6	0.826	0.920	0.698	0.920
	LMS_R5	0.694			
	LMS_R3	0.867			
	LMS_R2	0.893			
	LMS_R1	0.881			
FC	FC3	0.549	0.787	0.560	0.774
	FC2	0.837			
	FC1	0.823			
CA	CA_3	0.918	0.935	0.829	0.931
	CA_2	0.975			
	CA_1	0.832			
ISE	ISE_5	0.709	0.892	0.627	0.892
	ISE_4	0.669			
	ISE_3	0.776			
	ISE_2	0.917			
	ISE_1	0.861			
IS	IS_5	0.885	0.939	0.755	0.943
	IS_4	0.887			
	IS_3	0.82			
	IS_2	0.861			
	IS_1	0.889			

3.3 Path Analysis

We established relationships in the hypothesised model using path analysis and reported beta-coefficients with p-values in Table 5. Non-significant paths were excluded from the reporting. Results showed that all of the model fit indices are acceptable ($\chi 2$ [360.446, N=446], p<0.001, $\chi 2/df$=1.646, TLI = 0.970 and CFI = 0.974). The RMSEA = 0.045 indicates an excellent fit of the proposed model with the observed data (Hu & Bentler, 1999).

Table 5. SEM results

Hypothesis	Path	β	SE.	CR	p	Label
H1b	LMS-F→ISE	-0.093	0.117	-0.792	<0.005	No
H2a	LMS-I→IS	0.131	0.085	1.5547	<0.005	No
H2b	LMS-I→ISE	0.264	0.113	2.333	<.005	Yes
H3a	LMS-R→IS	0.446	0.080	5.553	<.001	Yes
H4a	FC→IS	0.940	0.112	8.408	<.001	Yes
H4b	FC→ISE	0.843	0.110	7.684	<.001	Yes
H5b	CA→ISE	-0.040	0.230	-1.700	<.005	No

Table 6 reveals that the hypothesised relationships between LMS-I→ISE, LMS-R→IS, FC→IS and FC→ISE are significant. Two paths in the proposed model, LMS-F→IS and LMS-R→ISE, were removed due to a substantial non-significant fit. LMS-I is an endogenous variable that directly explains both IS and ISE in the final model. FC directly explains IS and ISE, while LMS-R directly affects IS. A very high positive significant effect is observed in H4a and H4b. A moderate positive impact is established in H2b, while H1b, H2a and H5b possess weak non-significant correlations in the path analysis. We established a likelihood of a high-quality model fit with all modification indices less than 4; standardised residuals less than 0.05; and CRs greater than 0.75.

3.4 Analysis of Moderating Effects

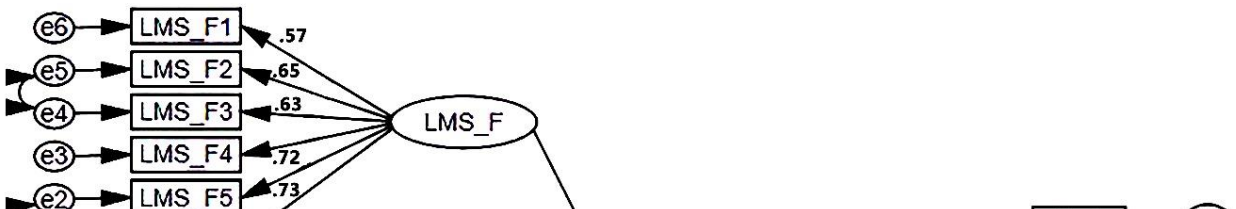
The moderating effects of LMS user type were analysed using multigroup analysis to provide identification of possible restrictions between first-time users of the LMS when flexible learning was implemented during the pandemic and non-first-time users. The comparison of the moderator group was split into first-time users (n = 334) and not first-time users (n = 51).

Table 6. Effects of Moderating Variable

Paths	*LMS user type*		*z-scores*
	First-time users	*Not first-time users*	
	Estimates		
LMS_I → ISE	0.205***	0.071	-1.111
LMS_R → IS	0.510***	0.610***	0.758
FC → IS	0.900***	1.200**	0.692
FC → ISE	0.746***	1.346**	1.235

***ρ < 0.001, **ρ < 0.01, *ρ < 0.05

Table 6 revealed that none of the z-scores are significant, indicating that all paths are not different between LMS user types.



4. Discussions

The proposed structural model on LMS characteristics (i.e., functionality, interactivity, and response) along with the facilitating conditions and computer anxiety as antecedent factors of self-efficacy and users' satisfaction while using LMS is theoretically supported. The final results achieved a well-fitting relationship among predictors of instructors' self-efficacy and satisfaction. These findings generate discussions on the need to improve human resources and infrastructure to support LMS in developing economies. Emerging literature identified human resources (e.g., college instructors and professors) and infrastructure (e.g., internet connectivity) as barriers to implementing technology-driven higher education and LMS usage (Costan et al., 2021, Batucan et al., 2022). Another prominent finding revealed significant variations in LMS user type, which can be attributed to the age of LMS users. Thus, policy directions may consider improving teachers' motivation, especially for older instructors, and pouring investments into facilities such as internet connectivity, software development, and others.

CB-SEM results described variation supporting facilitating conditions to the latent constructs of satisfaction and self-efficacy. In a flexible learning environment, computer anxiety is not seen as a factor

affecting self-efficacy. However, a separate investigation may be conducted on instructors who have used LMS only during the pandemic. It is necessary to uncover the lived experiences while coping with the demand of technological applications and the need to get out of their comfort zones. Furthermore, the study found that interactivity and response of the LMS are the most important characteristics in explaining self-efficacy and satisfaction among users. The findings confirm with Al-Busaidi and Al-Shihi (2012) that LMS characteristics impact instructor satisfaction in a blended learning environment. Although the LMS characteristics are attributed mainly to the system, there is inherent reason to believe that infrastructure leading to Internet connection affects the interactivity and response of LMS, consequently affecting the self-efficacy beliefs and satisfaction of instructors.

Other supported paths in the model revealed that FC affects ISE and IS. The government and school managers' support is vital in improving a sound LMS-related environment for educators. For instance, aligning technological knowledge with teachers' pedagogical knowledge is critical in schools' technology (Gonzales & Gonzales, 2021). In the context of this study, necessary resources in implementing the LMS are important aspects of improving teachers' burnout as they implement the system. A possible interpretation of the direct variation of FC efficacy and satisfaction could be attributed to workload, as Skaalvik and Skaalvik (2020) discussed.

5. Conclusion

This work proposed and validated an empirical model that examines college instructors' self-efficacy and job satisfaction in relation to the usage of LMS. The paper illustrates paths using LMS characteristics, facilitating conditions, and computer anxiety as antecedent variables. In the final model, four hypothesised relationships are supported and confirmed in the CB-SEM analysis of cross-sectional data of 417 college instructor participants. Furthermore, we investigate the LMS user type as the moderating variable because LMS usage highly depends on whether the instructor has previous technology experience.

There are three major contributions of this study: (1) LMS characteristics (i.e., system interactivity and response) along with facilitating conditions are important antecedent variables of instructors' self-efficacy and satisfaction towards LMS usage; (2) facilitating conditions through social and government support provide a high impact on the self-efficacy LMS users; and (3) facilitating conditions significantly and positively impact the satisfaction of LMS users. Drawing from the notion of LMS use in the COVID-19 new normal, this paper contributes to the emerging literature by introducing internal and external factors in explaining the system's adoption in a technology-driven higher education.

6. Recommendations

The results lead to practical and theoretical suggestions. Theoretically, the verified paths could serve as a springboard for governance in higher education and feedback to school leadership. This indicates that self-efficacy beliefs and job satisfaction are well explained by the instructors' LMS characteristics, support and technology background. In a practical sense, the paper firmly established the need to improve infrastructure to support LMS implementation in developing economies.

Further research is suggested, especially on uncovering lived experiences of those technologically challenged educators in developing economies. Concerning the non-significant paths on CA, it is recommended that the social anxiety (Eryilmaz & Cigdemoglu, 2019) and computer self-efficacy (Schlebusch, 2018) be extended to elucidate and explore a more comprehensive model that might have better variations with CA.

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8. References

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