



Extending Technology Acceptance Model in Learning-Management-Systems in TVET Institutions: The Impact of Vocational Educators' Gender, Experience and Perception

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DOI: <https://doi.org/10.30880/jtet.2021.13.03.009>

Received 13th October 2020; Accepted 20th November 2020; Available online 30 September 2021

Abstract: The study considered extending the technology acceptance model in learning-management-systems in Technical and Vocational Education and Training (TVET): The impact of vocational educators' gender, experience and perception. A mixed research design was adopted for this study with 1314 TVET educators as the population. A sample of 386 respondents comprising of 234 and 152 vocational educators from federal and state institutions were selected based on Taro Yamene's formula afterwards, proportionate sampling technique was used to determine the number of the vocational educators for each institution. The instrument for data collection was a structured questionnaire titled: "TVET Educators Experience and Perception of LMS Questionnaire" (TEEPLMSQ). The reliability of the instrument was determined using Cronbach's Alpha which yielded reliability indices of ($\alpha = .961$); ($\alpha = .816$), ($\alpha = .832$) with a high grand coefficient of .80 for vocational educators' perception, LMS skills possessed and barriers militating against LMS use respectively. Data collected were analyzed using bivariate correlation, regression, and also path analysis through 5000 re-samples bias-corrected (BC) bootstrapping method, as well as confirmatory factor analysis. The result of the study revealed that vocational educators in Enugu and Anambra States of Nigeria perceived LMS as a credible ICT tool that supports the teaching of TVET courses and enhances the transfer of TVET skills to TVET students. The path analytical results revealed that lecturers' characteristic (experience and gender) has full mediation effects between the LMS skills possessed and level of LMS usage. Based on the findings of the study, it was recommended among others that The TVET educators should adopt LMS in teaching and learning of TVET courses in Nigerian tertiary institutions.

Keywords: Learning-Management-Systems, TVET, technology acceptance model, perception, gender

1. Introduction

The rapid change in technology and increased complexity of the 21st-century world of work has placed a demand on the educational institutions and educators to drive for the best theoretical and pedagogical approach to prepare students for work (Moate & Cox, 2015). In line with this, the Nigerian Government has demonstrated her commitments to ensure that Information and Communications Technology (ICT) receives the right attention so that students can be prepared with the skills required to meet-up with the demands of today's competitive world of work. The Federal Ministry of Education (2007) noted that the government shall continue to provide infrastructure and ICT facilities to promote the effective acquisition of ICT skills in tertiary institutions. This effort is in line with the objective of the New Partnership for Africa's Development (NEPAD) which is to help nations achieve sustainable development by standardizing their educational systems and the quality of the students learning.

Several scholars agree that in an attempt to improve the standard of tertiary education and to encourage ICT skills acquisition, the Nigeria government has enactment different ICT Acts covering different educational levels (FGN, 2013). Some of the ICT Acts include Wireless Telegraphy Act of 1961, the National Broadcasting Commission Act of 1992, the National Information Technology Development Agency Act of 2001 and the Nigerian Communications Act of 2003 among others (Obutte, 2014). This shows that the integration of ICT into instructional delivery in Nigeria educational system is a timely and welcomed development. One of the aspects of the ICT that can promote knowledge and skill acquisition is the learning management systems (LMS) (Belias, & Koustelios, 2013).

According to Nair and Patil (2012), a learning management system is a virtual learning environment that is developed for the effective administration of online courses, dissemination and sharing of course contents and which promotes teacher-student interaction as well as student-student collaboration. Although LMS has been used for training, for corporate organizational information management, for instructional delivery in education and for data-base management, yet its usability and benefits has not yet been established in Vocational and Technical Education and Training (TVET) (Drent & Meelissen, 2008). Therefore, this study determined the perception of the vocational educators about the LMS, how their teaching experience influences their usage of the LMS and whether gender affects the acceptability and usage of LMS for instructional delivery of TVET courses.

1.1 Learning Management System

One of the tools which support inclusive teaching and promotes skill acquisition is the LMS. Turnbull, Chugh, and Luck (2019) defined a learning management system as an internet-based software application that supports the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content. It is a blend of software tools and Web-based technologies that enhance planning, delivery, and tracking of the training process, which supports a specific learning outcome (Sabharwal, Hossain, Chugh & Wells (2018). Cavus, Mohammed, Yakubu (2021) found that many educational institutions use LMS to run online courses, while some employ it as a blended learning technology for the sustainable educational system. The LMS has features that make it an indispensable tool for the effective learning process. Some of the features include forums, wikis, glossary, threaded discussions, hyperlinks, video conferencing, chat, database, quiz/assignment, announcement, grades, feedback, emailing among others (Kant, Prasad & Anjali, 2021). All these features make LMS encompassing and accommodative for all kinds of instructional delivery. Again, the LMS gives students the opportunity to watch lecture supplemental videos, attempt assignments, quiz and carry out group projects online. It also supports synchronous and asynchronous interaction between lecturers and students, improves students' learning skills and promotes their academic performance (Correa-Baena et al., 2018; Esa et al., 2017; Yoloye, 2015).

Although great learning has been experienced using LMS in different disciplines, its impact has not been felt in the teaching and learning of TVET courses (Ugwoke, Edeh, & Ezemma, 2019). This may be attributed to the fact that most vocational educators feel reluctant in using this interactive instructional facility (Ugwoke, Edeh, & Ezemma, 2019; Ololube, 2011, Chang, Hajiyev, & Su, 2017). It has also been argued that the failure of the vocational educators in using LMS for instructional delivery is because of the educators' poor ICT skills, insufficient ICT orientation, insufficient training on how to use the LMS and perceived ICT phobia (Cavus, Mohammed, Yakubu, 2021). These generally have affected ICT integration and its usage in the teaching and learning of TVET courses in most federal and state tertiary institutions in Nigeria.

Eventhough LMS has been found to be an effective tool for instructional delivery, literature has shown that gender can influence its acceptability and usability in instructional delivery. For instance, Olaitan (2014) in a study found that there are gender differences between male and female TVET educators in relation to ICT acceptance and usability. Similarly, Ugwoke, Edeh and Ezemma, (2018); Al-Gahtani, Hubona, and Wang (2007) postulated that gender has the propensity of showing substantial moderation effect on the relationship between perceived usefulness of an ICT tool and users' attitude, and again between subjective norms and intention to use ICT tools provided by an institution. However, the authors observed that the moderating effect on ICT tool usage is experienced more with male workers than with their female counterparts.

Similarly, Baki, Birgoren, and Aktepe (2018) revealed that the moderating effects such as worker's attitudes toward ICT tools and their intention to use the technology provided in the work environment were not statistically significant.

Some empirical researches also revealed that perceived usefulness of ICT tools is more obvious on male than the female workers (Turnbull, Chugh, & Luck 2019; Dias, Hadjileontiadou, Diniz, & Hadjileontiadis, 2017). Cavus, Mohammed, Yakubu (2021) attributed the gender variation in relation to attitude toward ICT tools usage and intention to the social roles of the males and females in some cultures. Although gender has been revealed to have a positive or negative effect on ICT tool usage by teaching staff, research showed that lecturers’ teaching experience can also influence their acceptance of ICT tool for instructional delivery (Ologunde, Asaolu & Elumilade, 2015). Ologunde, et al. (2015) argued that the younger lecturers may accept to use ICT than the older ones, and lecturers who have undergone ICT trainings during their first or second degree may easily use ICT tools better than their counterparts who never had any ICT training.

Again, Ologunde, et al. (2015) maintained that those who use ICT often in instructional delivery are prone to accept such tools than those who seldom use them. The essence of diagnosing the effects of gender and working experience is to envisage how these factors affect the effective integration of ICT tools (LMS) into the teaching and learning process of TVET courses and to envisage strategies TVET institutions and educators can adopt to encourage the LMS acceptability and usage in instructional delivery.

1.2 Technology Acceptance Model

The technology acceptance model was first propounded by Davis in the year 1985. According to Davis, the success of the ICT system is influenced by the user acceptance of the system (see figure 1 below). The user's acceptance of the system is measured by three major factors: perceived usefulness, perceived ease of use and attitudes towards usage of the system (Baki, Birgoren, & Aktepe, 2018; Bordbar, 2010; Buabeng-Andoh, 2012).

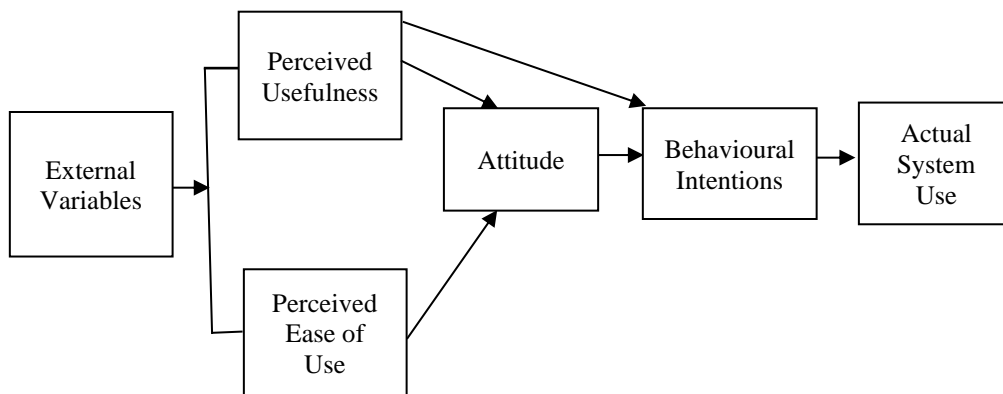


Fig. 1 - Technology Acceptance Model (adopted from Davis, 1989)

However, Davis and Venkatesh in 1996 modified the model and removed attitude variable because they found through empirical studies that attitude plays a minor role in ICT system usage behaviour. This gave rise to the Unified Theory of Acceptance and Use of Technology (UTAUT) (see Figure 2). First, the UTAUT model has four major determinants of intention and usage. They are performance expectancy, effort expectancy, social influence and facilitating conditions. Secondly, it has also four moderators of key relationships, thus: gender, age, experience and voluntariness. Davis and Venkatesh (1996) maintained that the core determinants are the major factors, which affect directly the user’s behavioural intention to adopt new technologies, while the moderators are factors that control the effect of the key factors.

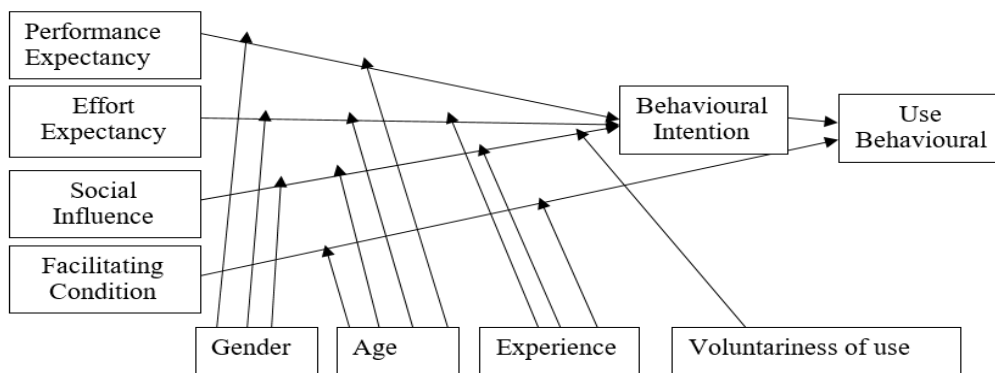


Fig. 2 - UTAUT Model Source: Davis & Venkatesh (1996)

1.3 Statement of the Problem

Despite the increase in globalization and continuous demand for modern skills for employment in the 21st-century world of work, the teaching of TVET courses is still majorly through the conventional method. The Nigerian government has been conscious of the need for the tertiary institutions to integrate ICT into the teaching and learning process to improve the students' knowledge and skills have enacted several laws supporting the implementation of ICT-driven pedagogy. The government had also provided several ICT facilities to tertiary institutions and had played her commitments to continue to support the implementation of ICT curriculum across disciplines. Despite the efforts of the government, literature still revealed that little efforts have been made by TVET institutions and educators to integrate ICT tools like LMS into the instructional delivery of TVET courses. The LMS has been considered a veritable ICT tool that can promote students' learning skills, help the educators to distribute course materials to the students, give assignments and get feedback as well as help improve the students' academic performance (Cavus, Mohammed & Yakubu, 2021). Authors agree that several corporate organizations use LMS for the training of their staff, and many tertiary institutions adopt it for online teaching, yet its application in the teaching of TVET courses has been lagging. Authors argue that factors such as educators lack of ICT skills, poor motivation by institutional administrators and management, ICT phobia, paucity of internet connectivity, educators' teaching experience, gender and gross lack of interest are contending challenges facing the effective implementation of LMS in instructional delivery of TVET courses (Khan, Hasan & Clement, 2012). Hence, this study determined the effect of the Technology Acceptance Model in Learning-Management-Systems in TVET Institutions: The Impact of Vocational Educators' Gender, Experience and Perception on the usage of the LMS. This study has added to the literature on TAM and the UTAUT Model by extending its coverage to the lecturers' perception, and also syncing institutional culture and information use into the study model (see figure 3). To the best of the knowledge of the researchers, this is the first study that addresses the impacts of TAM on LMS on TVET educators using the above parameters and variables. Therefore, in line with the literature reviewed, the following hypotheses were formulated to guide the study.

1.4 Hypothesis

In line with the above literature, the following hypotheses were formulated:

- Ho1:** There is a significant difference in the mean responses of vocational Educators in federal and state tertiary institutions, on the LMS skills possessed by them for effective use of LMS in instructional delivery of TVET courses.
- Ho2:** There is a significant difference in the mean responses of vocational Educators in federal and state tertiary institutions on their perception of LMS usage in instructional delivery of TVET courses.
- Ho3:** Lecturers' experience is a significant positive predictor of level of LMS skills possessed for instructional delivery of TVET courses.
- Ho4:** Lecturer's gender is a significant positive predictor of level of LMS usage for instructional delivery of TVET courses.
- Ho5:** Perceived ease of use is a significant positive predictor of the level of LMS usage for instructional delivery of TVET courses.
- Ho6:** Perceived usefulness is a significant positive predictor of institutional the culture required for instructional delivery of TVET courses.
- Ho7:** Information use is a significant positive predictor of the level of LMS usage for instructional delivery of TVET courses.
- Ho8:** Perceived usefulness is a significant positive predictor of institutional culture required for instructional delivery of TVET courses.
- Ho9:** Institutional culture is a significant positive predictor of LMS level of usage for instructional delivery of TVET courses.
- Ho10:** Institutional culture is a significant positive predictor of the level of LMS skills for instructional delivery of TVET courses.

2. Methodology

2.1 The Research Model

The study adopted Mixed Research Design. The research model presented in Figure 1 was developed in line with the hypotheses of this study. The study adopted Venkatesh, Morris, Davis, and Davis (2003) four-item expectancy scale on LMS perceived ease of use and four-item performance expectancy scale for the perceived usefulness of LMS. IBM Special Package for Social Sciences (SPSS) version 22.0 was used to analyze the exploratory factor analysis (EFA) for all the data using Maximum Likelihood estimation with oblique rotation. The study also used Kaiser-Meyer-Olkin (K+MO) to measure sampling adequacy and MSA = .714 was realized for vocational educators' perception of LMS; .773 for the LMS skills possessed by the vocational educators; and .719 for the barriers militating against the vocational educators' usage of the LMS for effective instructional delivery of TVET courses.

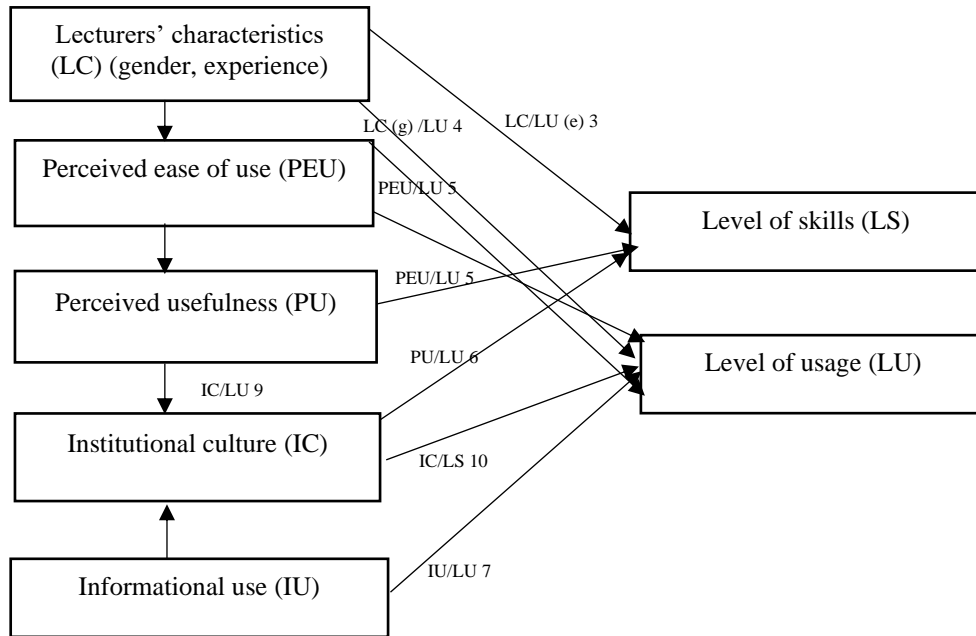


Fig. 3 - Conceptual Model: seven (7) items Model for effect of lecturers' characteristics

The model described the relationship between the constructs tested in hypotheses 3 to 10. They include determining if there is any linear relationship between the lecturers' characteristics (gender and experience) and the educators' level of use of LMS, perception and level of skills possessed by the educators for effective use of LMS in instructional delivery of TVET courses. Also, the relationship between the information use and the educators' level of usage of LMS. Relationship between their perceived usefulness of LMS and institutional culture, institutional culture and LMS level of usage. Finally, the relationship between institutional culture and LMS level of skills possessed by the educators.

2.2 Population

The population for the study is 1314 TVET educators consisting of 783 educators from six federal institutions (University of Nigeria, Nsukka; Nnamdi Azikiwe University, Awka, Anambra State; Federal College of Education Eha-Amufu; Enugu State; Federal College of Education (Technical), Umunze, Anambra State; and Nwafor Orizu Federal College of Education (Technical), Nsugbe, Anambra State) and 531 from three state-owned institutions (Enugu State University of Technology, Enugu State; Enugu State College Education Technical; and Odimegwu Ojukwu University Igboariam, Anambra State) (Data from Office of the Registrar of various institutions, 2018). The choice of these institutions is because they offer TVET programmes and they all have institutional-based learning management systems, computer laboratory, internet connectivity and other ICT facilities that facilitate virtual learning.

2.3 Sample and Sampling Technique

The sample size of the study was 386 respondents comprising of 234 Vocational Educators in Federal Institutions (VEFI) and 152 Vocational Educators in State Institutions (VESI) from federal and state tertiary institutions respectively purposefully selected based on individual's abilities to meet the enrolment criteria designed for the study. Yamene's formula in Uzoagulu (2011) was used to determine the sample size of the respondents while a proportionate sampling technique was used to determine the number of vocational educators for each of the institutions studied. The formula is presented below:

Taro Yamene's Formula

$$n = \frac{N}{1+N(e)^2} \text{ where:}$$

- n = the sample size
- N = infinite number
- e = level of significance
- 1 = unity

Table 1 - Demographic characteristics of vocational educators showing baseline equivalence

<i>Characteristic</i>	<i>Dimension</i>	<i>VEFI Group n (%)</i>	<i>VESI Group n (%)</i>	<i>X²</i>	<i>Sig.</i>
N	Sample	N 234 (61%)	N=152 (39%)		
Gender	Male	139 (36%)	88 (23%)	.458	.498
	Female	95 (25%)	64 (16%)		
Teaching Experience	0 – 10	93 (24%)	62 (16%)	4.782	.092
	11 – 20	88 (23%)	55 (14%)		
	21 and above	53 (14%)	35 (9%)		
Age	M ± SD	39.56±9.65	38.88±6.78	5.586	.061
	Range	25-65	25-65		
Availability of LMS Platform in tertiary institutions	Yes	234 (61%)	152 (39%)		
	No	0	0		

Key: *N* = Sample size, *M* = Mean, *SD* = Standard deviation, *VEFI* = Vocational Educators in Federal Institutions, *VESI* = Vocational Educators in State Institutions, *x²* = Chi-square.

The VEFI consists of 139 (36%) males and 95 (25%) females with different years of teaching experience ranging from 0-10 (93, 24%), 11-20 (88, 23%), and 21 and above (53, 14%), and age range of 25-65 years. On the other hand, the VESI comprises of 88 (23%) males and 64 (16%) females with teaching experiences ranging from 0-10 (62, 16%), 11-20 (55, 14%), and 21 and above (35, 9%) with age range of 25-65. Both groups indicated that their institutions have learning management systems available for instructional delivery. In addition, Table 1 also revealed that there were no significant difference in the participants (VEFI and VESI) demographic characteristics with regard to gender, teaching experience and age. This is evidenced from the values obtained from the Chi-square (X^2) and probability values (Sig) across the groups (see Table 1).

2.4 Participants Selection Procedures

The participants were selected using the eligibility criteria benchmark which includes: availability and willingness to participate in the study; fully employed as a teaching staff; attended LMS training and must have taught TVET course(s) for a least one semester. Other information elicited from the participants includes gender, specific number of years of teaching experience on LMS.

2.5 Instrument

The instrument for data collection was a structured questionnaire titled: “TVET Educators Experience and Perception of LMS Questionnaire” (TEEPLMSQ). The instrument with five sections (A-E) was developed by the researchers from literature (Wood et al. 2008). Section A was used to elicit demographic information of the respondents and also to indicate LMS availability in their various institutions. For the LMS availability, 2 options Available (A) = 1 and Not Available (NA) = 0 were used. Section B consists of a 16-item statement that elicited information on the vocational educators’ perception of LMS as an effective tool for teaching and learning of TVET courses. For this Section, 2 response options were also used, namely: Agree (A) 1 and Disagree (0). Section C contained 13-item statements that sought the opinion of respondents on their LMS skills possessed. This section has 4-response options as follows: Highly Possessed (HP) = 4, Possessed (P) = 3, Seldomly Possessed (SP) = 2, Not Possessed (NP) = 1. Section D consisted of 12 item statements that sought respondents’ opinions on the barriers militating against the use of LMS for effective teaching and learning of TVET courses in tertiary institutions. The Section used 4-response options, thus: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD). Finally, Section E with 14-item statements elicited respondents’ views on the impact of vocational educators’ characteristics like gender and teaching experience on educators’ perception of barriers to LMS usage in TVET courses. Hence, the following Cronbach alpha index were obtained: Vocational educators’ perception of LMS ($\alpha = .961$, $n = 386$); LMS skills possessed ($\alpha = .816$, $n = 386$), barriers militating against LMS use ($\alpha = .832$, $n = 386$). And finally, vocational educators’ characteristics (gender and teaching experience) and their perception of the LMS barriers (.764, $n = 386$). The Cronbach Alpha yielded a high grand coefficient of 0.79.

2.6 Data Analysis

Data collected were analyzed using IBM SPSS 22.0 version, PROCESS for SPSS, LISREL 9.30 and AMOS 22.0. We used mean, standard deviation to answer the research questions, Cronbach’s alpha was used to check the scale’s internal consistency (Abanyam & Onimawo; 2020) and to determine the degree to which the variables that make up the scale hang together and if they measured the same underlying construct which they were meant to measure (Pallant, 2005). Again, correlation and regression analysis were used as statistical tools to explore the interrelationship among tested variables. We also used Structural Equation Model (SEM) by employing path analysis and also applied the 5000 re-sample Bias-Corrected (BC) bootstrapping method and Confirmatory Factor Analysis (CFA). We used the SPSS

software to analyze for the mean, standard deviation, Cronbach's Alpha, correlation and regression. AMOS 22.0 was employed to ascertain the path analysis. To complement for insufficient data that may impair the generalization of research findings, we employed 5000 re-samples BC bootstrapping method (Preacher & Hayes, 2008). We employed a PROCESS for SPSS to substantiate the multiple mediation analysis that supported estimating specific indirect effects. This is congruent with Hayes (2013) who postulated that limitation that occurs from the use of AMOS can be eliminated by using PROCESS for SPSS. Finally, LISREL was employed for Confirmatory Factor Analysis (CFA).

3. Results and Analysis

The result of the study is presented in line with the hypotheses formulated. First, Table 1 presented the demographic characteristics of the 386 participants made up of the 234 Vocational Educators in Federal Institutions (VEFI) and 152 Vocational Educators in State Institutions (VESI). Again, Table 1 also showed the gender of the participants according to groups 139 (36%) males and 95 (25%) females for the VEFI group and 88 (23%) males and 64 (16%) females for VESI. The mean age of the VEFI and the VESI groups were 39.56 ± 9.65 and 38.88 ± 6.78 years respectively. Finally, Table 1 showed Chi-Square values - $X^2 = .458, 4.782, \text{ and } 5.586$ and P-values = .498, .092 and .061 for gender, teaching experience and age respectively. Indicating that there was no significant difference in the participants' demographic characteristics stated above.

Table 2 - ANOVA results of skills possessed by vocational educators for effective use of LMS for teaching and learning of TVET Courses

		Sum of Squares	Df	Mean Square	F	Sig.
Cluster mean	Between Groups	.067	2	.034	.166	.860
	Within Groups	9.895	384	.026		
	Total	9.962	386			

Table 2 showed the ANOVA results of skills possessed by the Vocational educators for effective use of LMS in teaching and learning of TVET courses in tertiary institutions in Enugu and Anambra States. We determined whether there is a significant difference in the mean responses of vocational educators in Universities, Polytechnics, and Colleges of Education on the skills possessed by the educators for effective use of LMS in teaching and learning of TVET courses in tertiary institutions. The one-way ANOVA presented in Table 2 revealed sum of square values of .067 and 9.895 for between groups and within groups respectively with a total of 9.962 and mean square of .34 and .026 for between and within groups respectively. However, F-ratio of the cluster showed no significant difference at 0.05 level of significance: $F(2, 384) = .166; p > 0.05$. The F-ratio of .166 with a p-value of .860 calculated at 0.05 level of significance. Therefore, the hypothesis was not rejected.

Table 3- ANOVA results on the barriers militating against effective usage of LMS in teaching and learning of TVET courses in tertiary institutions

		Sum of Squares	Df	Mean Square	F	Sig.
Cluster mean	Between Groups	.053	2	.0265	2.12	0.36
	Within Groups	8.542	384	.0222		
	Total	9.072	386			

Table 3 showed the ANOVA results on the barriers militating against effective usage of LMS in teaching and learning of TVET courses in tertiary institutions in Enugu and Anambra States. We determined whether there is a significant difference in the mean responses of vocational educators in tertiary institutions on the barriers for effective use of LMS. The result showed the sum of square values of .053 and 8.542 for between groups and within groups respectively with a total of 9.072 and mean square of .0263 and .0222 for between and within groups respectively. However, F-ratio of the cluster showed no significant difference at 0.05 level of significance: $F(2, 384) = 2.12; p > 0.05$. The F-ratio of 2.12 with a p-value of 0.36 was calculated at a 0.05 level of significance. Therefore, the hypothesis was not rejected.

Hypothesis 3 to 10

Table 4 - Mean and standard deviation ratings, cronbach’s alpha (α) and correlations of all the variables

Variables	Mean	SD	A	1	2	3	4	5	6	7
1 Lecturers’ Characteristic (experience)	3.76	.154	.952	1						
2 Perceived Ease of Use	3.88	.133	.874	.453**	1					
3 Perceived Usefulness	3.65	.177	.910	.584**	.483**	1				
4 Level of Skills	3.72	.163	.847	.264**	.310**	.351**	1			
5 Information Use	3.56	.185	.963	.627**	.518**	.541**	.518*	1		
6 Level of Usage	3.69	.189	.806	.456**	.398**	.577**	.468*	.536**	1	
7 Institutional culture/social influence	3.80	.142	.895	.548**	.478**	.642**	.537*	.614**	.588**	1

* p < .05, ** p < .01.

Table 4 presented the results of Cronbach’s alpha values for the variables studied. The values are as follows: .952, .874, .910, .847, .963, .806, .895 for lecturers’ characteristics (experience), perceived ease of use, perceived usefulness, level of skills possessed, information use, level of usage, and institutional culture/social influence respectively which indicates a high measure of internal consistency (Pallant, 2005). Again, the table showed a correlation matrix between all the variables. The values suggested an adequate validity of measurements across the measured constructs.

3.1 Unmediated Pathways of the Tested Construct

We used simple linear regression analysis to determine the unmediated pathways between the variables of the study. This is always to enable us to substantiate the need to conduct mediation analysis and to perform path analysis in order to test the mediated pathways observed in the study. Hence, we used 5000 re-samples BC bootstrapping approach (Preacher & Hayes, 2008). Table 5 presented the linear regression analysis result for the unmediated pathways.

Table 5 - Linear Regression Analysis of the lecturers’ characteristics, level of use, perception and level of skills possessed for effective use of LMS in teaching and learning of TVET courses in tertiary institutions in Enugu and Anambra States

Variables	R ²	t-value	B	Remarks
LC(e) → LS	0.254	2.672	0.472	Accept
LC(g) → LU	0.287	0.732	0.541	Accept
PEU → LU	0.130	0.016	0.023	Reject
PU → LU	0.278	3.281	0.565	Accept
IU → LU	0.283	4.453	0.658	Accept
PU → IC	0.226	1.574	0.358	Accept
IC → LU	0.242	2.683	0.478	Accept
IC → LS	0.109	0.007	0.013	Reject

Note: LC(e) = lecturers ‘characteristics (experience), LC(g) = lecturers ‘characteristics (gender) PEU = perceived ease of use, PU = perceived usefulness, LS = level of skills possessed, LP = LMS perception, LU = level of usage, and IU = information use, IC = Institutional culture, R2: adjusted R-square; df = degrees of freedom regression coefficient. *** p < .001

Table 5 presents the result of simple linear regression analysis for testing hypotheses 3 to 10. The result showed that lecturers’ characteristics (experience) positively predicts level of LMS skill possessed β= 0.472, F(384) = 2.672, p < .001. The adjusted R² = 0.254 implies that 25.4% of the variance in the level of LMS skill possessed by the lecturers is explained by the lecturers’ experience in the use of LMS. This shows a large effect. Furthermore, the result revealed that lecturers’ characteristics (gender) positively predicted level of usage, β= 0.541, F(384) = 0.732, p < .001. The adjusted R² = 0.287 implies that 15.7% of the variance found in the level of usage is explained by lecturers’ characteristics (gender). In addition, our result showed that perceived ease of use does not predict level of usage, β = 0.023, F(384) = 0.016, p < .001.

The adjusted $R^2 = 0.130$ shows that 13.0% of the variance in the level of usage is explained by perceived ease of use indicating low effect.

Again, our finding showed that perceived usefulness positively predicted level of use, $\beta = 0.565$, $F(384) = 3.281$, $p < .001$. The adjusted $R^2 = 0.278$ depicts that 27.8% of the variance in the level of use is explained by perceived usefulness. The values above indicate that there is a large effect. More so, we found that information use positively predicted level of use, $\beta = 0.658$, $F(384) = 4.453$, $p < .001$. The adjusted $R^2 = 0.283$ showed that 28.3% variance in the level of use is explained by information use. We found that perceived usefulness positively predicted institutional culture, $\beta = 0.358$, $F(384) = 1.574$, $p < .001$. The adjusted $R^2 = 0.226$ indicates that 22.6% of the variance in institutional culture is explained by perceived usefulness. There is a large effect on the above data. We also looked at institutional culture and level of usage and found a positive prediction, $\beta = 0.478$, $F(384) = 2.683$, $p < .001$. In the same vein, the adjusted $R^2 = 0.242$ revealed that 24.2% of the variance in the level of usage is explained by institutional culture. The data also showed a large effect. Finally, our result on institutional culture and level of LMS skills possessed showed negative prediction, $\beta = 0.013$, $F(384) = 0.007$, $p < .001$. The adjusted $R^2 = 0.109$ implied that 10.9% variance in the level of LMS skills possessed is explained by institutional culture. This effect is low.

Since our predictions were statistically significant (see Table 5), it was therefore expedient that we carry out mediation analysis by conducting path analysis using 5000 re-sample BC bootstrapping method (Preacher & Hayes, 2008) (see Table 6). The result presented in Table 5 showed a significant difference which implied that the seven paths multiple mediation analysis is credible for this study.

3.2 Mediated Pathways of the Tested Construct

From our result, we noted statistically significant mediated indirect pathways of the study model. Therefore, we carried out analysis by employing BC bootstrapping method using a larger re-sample approach to eliminate any possible limitations that could have risen as a result of using a small sample. The analysis authenticated the result of the regression analysis on mediated and unmediated pathways (see Table 6).

Table 6 - Summary of BC bootstrapping mediation on LMS skills possessed and level of usage

Hypothesis	Direct Effect			Indirect Effect			Remark
	95% CI			95% CI			
	Est.	LL	UL	Est.	LL	UL	
LC(e) → LS → LU → IC → IU	.069 (ns)	-.089	.363	.345***	.328	.432	Full Mediation
PU → LS → LU → IC	.057(ns)	-.065	.501	.081***	.027	.157	Full Mediation
PEU → LS → LU → IU	.219*	.036	.323	.076**	.034	.187	Partial Mediation
IC → LS → LU → PU	.061(ns)	-.053	.243	.078***	.037	.319	Full Mediation
LC(e) → LS → LU	.048(ns)	-.064	.756	.046**	.022	.546	Full Mediation
LS → LU → IU	.562**	.043	.481	.037**	.075	.602	Partial Mediation
LC(g) → LS → LU	.345**	.546	.549	.044**	.041	.548	Partial Mediation

Note: LC(e) = lecturers ‘characteristics (experience), LC(g) = lecturers ‘characteristics (gender) PEU = perceived ease of use, PU = perceived usefulness, LS = level of skills, LP = LMS perception, LU = level of usage, and IU = information use, IC = Institutional culture, Est = estimate; CI = confidence interval; LL= lower limit; UL= upper limit; ns: non-significant

* $p < .05$, ** $p < .01$, *** $p < .001$.

The result of the multiple mediation model for the path analysis conducted on the BC bootstrapping revealed standardized direct and indirect effects (see Table 6). The 95% confidence interval (CI) of the direct and indirect effects were determined using 2000 bootstrapping resamples. The result showed that the direct effect was statistically non-significant (CI = -.089 to .363, $p > .05$) with regard to the mediating effects of level of LMS skills possessed (LS) and level of LMS usage (LU) on the relationship among lecturers’ characteristic (experience), institutional culture and information use. On the other hand, the indirect effect was statistically significant (CI = .328 to .432, $p < .001$). From the outcome of the direct and indirect effects, we inferred that the lecturers’ characteristics (experience), institutional culture and information usefully mediated the level of LMS skills possessed and level of usage. Again, the result showed fully

mediation on the effects of level of LMS skills possessed (LS) and level of LMS usage (LU) on the relationship between perceived usefulness (PU) and institutional culture. The direct effect showed statistically non-significant (CI = -.065 to .501, $p > .05$), while the indirect effect revealed statistically significant (CI = .027 to .157, $p > .05$). Also, 2000 bootstrapping resamples showed a fully mediating effect on the level of LMS skills possessed (LS) and level of LMS usage (LU) in relation to institutional culture and perceived usefulness. The direct effect result was statistically insignificant (CI = -.053 to .243, $p > .05$), while the indirect effect was statistically significant (CI = .037 to .319, $p > .05$). In the same vein, the analysis showed fully mediation effects of level of LMS skills possessed (LS) and level of LMS usage (LU) on the relationship with lecturers' characteristics (experience). The direct effect result was statistically insignificant (CI = -.064 to .756, $p > .05$), while the indirect effect showed statistically significant (CI = .022 to .546, $p > .05$). From the above result, we inferred that the lecturers' characteristics (experience) fully mediated the level of LMS skills possessed and level of usage.

Conversely, we found that the mediating effect of level of LMS skills possessed and level of usage was statistically significant for perceived ease of use and informational use. The direct effect results are (CI = .036 to .323, $p > .05$), while the indirect effect results are (CI = .034 to .187, $p > .05$). From this result, we, therefore, inferred that perceived ease of use and informational use have partial mediation on the level of LMS skills possessed and level LMS usage for instructional delivery (see Table 7).

Table 7 -Total & direct effects of institutional culture on information use; and lecturers' characteristics (gender & experience) on information use

	Effects	Estimate	SE	t	95% CI	
					Lower	Upper
Institutional culture	Total	.450***	.058	5.981	.362	.659
	Direct	.054(ns)	.082	0.879	-.064	.253
Lecturers' Characteristics (g & e)	Total	.538***	.046	4.684	.397	.583
	Direct	.049(ns)	.077	0.788	.043	.185

Key: SE = standard error; CI = confidence interval; ns = not significant.
*** $p < .001$.

Table 8 - Mediation and specific indirect effects on lms skills possessed and level of usage

Specific Indirect Effects	Bootstrapping						
	Bias-Corrected				Percentile		
	Estimate	SE	95% CI		SE	95% CI	
			Lower	Upper		Lower	Upper
Ind 1: LS → PEU → LU	.098	.035	.021	.172	.044	.026	.172
Ind 2: LS → LC(e) → IC → LU	.043	.031	.018	.163	.022	.013	.106
Ind 3: LS → LC (g) → LU	.188	.062	.113	.362	.049	.098	.279
Ind 4: LS → PU → LU	.086	.059	.024	.284	.065	.028	.332
Total	.436	.085	.236	.481	.073	.226	.536
Contrast							
C1: Ind 1 minus Ind 2	.055	.044	-.043	.161	.057	-.047	.162
C1: Ind 1 minus Ind 3	-.092	.072	-.235	.047	.068	-.262	.049
C1: Ind 1 minus Ind 4	.010	.065	-.266	-.062	.049	-.264	.132
C1: Ind 2 minus Ind 3	-.145	.057	-.172	.043	.075	-.102	.128
C1: Ind 2 minus Ind 4	-.043	.069	-.089	.172	.062	-.135	-.131
C1: Ind 3 minus Ind 4	.102	.064	-.236	-.144	.055	-.126	.143

Note: LC(e) = lecturers' characteristics (experience), LC(g) = lecturers' characteristics (gender), PEU = perceived ease of use, PU = perceived usefulness, LS = level of skills, LU = level of usage, and IU = information use, IC = Institutional culture CI = confidence interval; LL= lower limit; UL= upper limit; ns: non-significant.

Table 8 showed the results of the indirect effects of perceived ease of use, institutional culture, informational use and perceived usefulness on LMS skills possessed and level of usage. The finding of the result revealed the following specific indirect effects: .098 through perceived ease of use, .043 through lecturers' experience (LC(e) and institutional culture (IC), and .188 through lecturers' gender (LC(g), and finally, .086 through perceived usefulness (PU). Considering the lecturers' experience and institutional culture as a set, we found that the two constructs mediate the effect of LMS skills possessed and level of usage (see Table 8 Bias-Corrected CI: .018 to .163; percentile CI: .013 to .106). In the same vein, close observation of the specific indirect effects as shown on the Table 8, it is clear that lecturers' experience and

institutional cultures are mediators of LMS skills possessed and level of usage. This is indicated by the fact that the result has no zero value on the 95% Confidence Interval of the bias-corrected side and also on the percentile. Similarly, the result also showed that perceived usefulness mediates the effect of LMS skills possessed and level of usage. This implies that perceived usefulness mediates LMS skills possessed and level of usage (see figure 4).

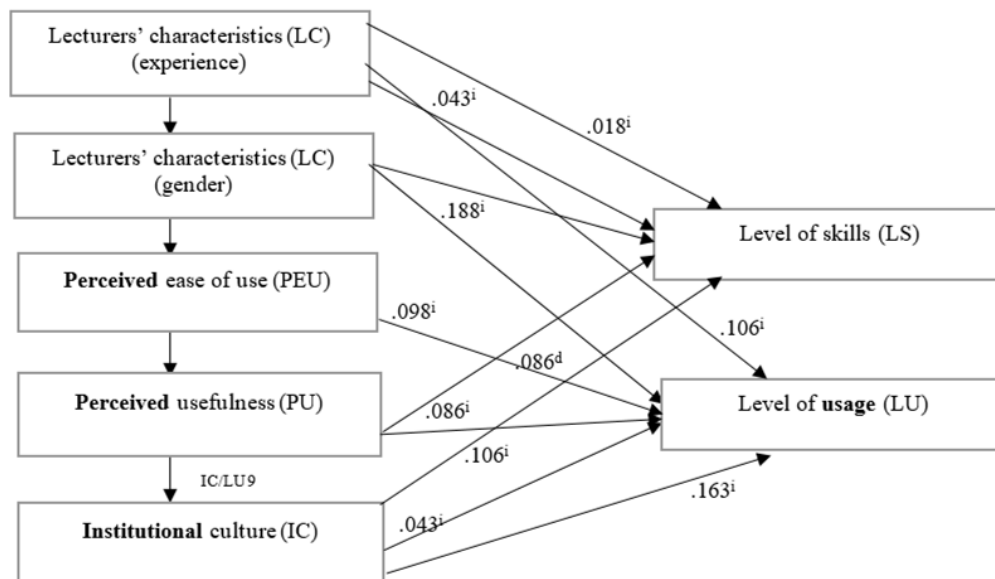


Fig. 4 - Conceptual Model depicting the outcome of the variables studied based on direct and indirect mediation
* i = Indirect mediation, d = Direct mediation

4. Discussion

This study examining the relevance of the Technology Acceptance Model (TAM) model in influencing vocational educators and students' acceptance and usage of learning management systems (LMS) in the teaching and learning process. The findings of this study on TAM are consistent with previous studies (Lazim, Ismail & Tazilah, 2021; Taat & Francis, 2020). One of the major findings of this study is that TAM supports educators' intention to embrace technological tools like LMS as a new learning environment that supports educators' teaching practices and inspires students' interest in learning. This finding is congruent with Lazim, Ismail and Tazilah (2021) who noted that educators' acceptance and attitude towards using ICT tools is influenced by their perceived ease of use and perceived usefulness of such tools. Similarly, this relationship is in agreement with the TAM model and in line with the findings of Lazim, Ismail and Tazilah (2021) who hypothesized that perceived usefulness can influence learning online learning environments and users' interest and acceptance behaviour. The findings on TAM supports Kalayou, Endehabtu and Tilahun (2020) who observed that the online learning environment has recently become a necessary learning environment considering the continued treating nature of the conventional face-to-face learning environment that has been perverted by viral pandemics like the Covid-19 outbreak.

The findings on vocational educators' perceptions of LMS usage as an effective tool for teaching and learning of TVET courses in tertiary institutions in Enugu and Anambra States, the result revealed that vocational educators perceived LMS as an effective learning environment, which has the necessary capacities and features for effective teaching and learning of TVET skills in the tertiary institutions. This view is revealed in the opinions of 97% of respondents who stated that LMS is an effective learning environment that could enhance the teaching and learning of TVET skills. Also, 75% of the educators responded that LMS can support the teaching of TVET skills because it has hyperlink capacity that supports educators in directing students to other websites for online training. This finding supports Taat and Francis (2020) who observed that LMS improves lecturers' professional practices in instructional delivery and supports students' interest and attitude towards learning. Again, the majority of the respondents noted that using LMS helps their professional practices, and increases students learning interest and motivation respectively. About 80% of the respondents also stated that using LMS in teaching and learning increases their research skills. This is in line with the view of 92% of the respondents who pointed out that LMS is user-friendly and interactive; arouses students' interest in learning and improves their academic performance. The findings support Oguguo, Nannim, Agah, Ugwuanyi, Ene, and

Nzeadibe (2021) who observed that constant usage of LMS helps educators to develop ICT skills and it helps students to remember things taught and by extension helps them to improve in their academic performances.

Furthermore, the findings on the LMS skills possessed by the vocational educators showed that a greater number of the vocational educators do not possess sufficient ICT skills needed for effective usage of LMS in instructional delivery. This finding validates Jegede (2009) who observed that lecturers' poor ICT skills have a direct bearing with inadequate ICT training and poor orientations. This indicates that the vocational educators have a similar perception of the LMS skills required and possessed by them for effective use of LMS in teaching and learning of TVET courses. Furthermore, it was revealed that lack of basic ICT skills; technophobia; incessant and epileptic power supply; and paucity of training on the use of LMS in instructional delivery of TVET courses amongst others are LMS barriers. The findings on vocational educators' technophobia are in agreement with Ghavifekr and Rosdy (2015) who revealed that some teachers do not use ICT facilities for instructional delivery because they lack self-confidence especially before the students who have better ICT knowledge.

Again, our finding showed that there was no significant difference in the mean responses of the respondents in federal and state universities on LMS skills possessed by them. Therefore, hypothesis one was not rejected. Similarly, the result showed that there was no significant difference in the mean responses of educators in federal and state institutions on their perception of LMS usage in instructional delivery. Therefore, hypothesis 2 was not rejected. With respect to hypothesis 3, we found that lecturers' experience in the use of LMS for instructional delivery of TVET courses has a positive prediction on the level of LMS skills they possessed. This implies that the more an educator uses LMS in instructional delivery, the more he or she develops ICT skills and by default improves the level of usage of the LMS for instructional delivery of TVET courses. In the same vein, we found that gender has an effect on the level of LMS usage. Males are more committed to achieving goals and often resilient to work and at achieving set learning goals even when stressed up than their female counterparts. On the other hand, female educators are moved to use LMS systems with interactive features and they are also excited to use chat and forum features of the LMS more than the males. This finding is in agreement with Morris, Venkatesh, and Ackermann (2005) who found that both experience and gender have an effect on the level of LMS usage. Similarly, the findings on the educators' teaching experience are in agreement with the previous studies (Idoga, Toyacan, Nadiri, & Çelebi, 2019; Wang, Xiao, Sun, Wu, 2016), but in contrast with Kalayou, Endehabtu and Tilahun (2020) who found in an institutional-based cross-sectional study that there was an insignificant association between IT experience and intention to use of ICT tools online learning environment.

Again, we found that perceived ease of use of LMS does not affect the users' level of usage of LMS. Therefore, we rejected hypothesis 5. Though previous researches showed that perceived ease of use and usefulness are the dominant factors that predict LMS usage (Davis, (1989), our findings showed that this assertion is not the same in all cultures and educational backgrounds. Moreover, we looked at perceived usefulness as a significant positive predictor of institutional culture. Our findings showed statistical significance. Therefore, we assumed that the level of perceived usefulness of LMS will determine if an institution will invest in such technology and motivate its staff through training and fringed benefits to use them for instructional delivery.

Finally, it was found in this study that institutional culture does not predict LMS level of use. Therefore, we assumed that an institution having technological supportive culture does not automatically increase faculties skills of the use of the technology. However, we identified that institutional factors such as LMS training, ICT technical support, among others can predict improved faculty LMS skills possessed.

4.1 Implication of Findings

The examination of the seven-dimensional (multiple) mediation models pathways whereby lecturers' characteristics (experience and gender), institutional culture, and informational use are the mediators, revealed that the indirect mediating effect was statistically significant. Our results established that lecturers teaching experience on the LMS mediates their level of usage. This implies that there is a positive relationship between constant years of teaching practice on LMS and improved LMS/ICT skills. This outcome suggests that TVET lecturers should expose themselves to training, seminars and workshops that can enrich their usability of LMS for instructional delivery. The outcome of this study places a responsibility on the lecturers to take initiative in using the available LMS platforms in their respective institutions to teach the students. Through this measure, the TVET students' interest will be enriched and by extension, the institutional and learning objectives will be achieved. Similarly, it was established in this study that the lecturers' characteristics like gender mediate the level of usage of LMS. The implication is that the LMS platform is gender-friendly and can be used for effective instructional delivery without any gender bias. This has placed responsibilities on the TVET educators (male and female) to devote more time in developing their lesson notes and instructional materials on LMS. Through this approach, they would develop ICT skills and achieve their instructional objectives.

To this end, we inferred that the lecturers' characteristics such as experience and gender, institutional culture and information usefully mediated the level of LMS skills possessed and level of usage. This is one of the ways this study has contributed to the existing body of knowledge. As of the time this study was conducted, from the best of our knowledge, this research work is about the first to investigate the multiple effects of lecturers' characteristics (gender and experience), institutional culture, informational use on LMS skill, and level of usage in instructional delivery in TVET. For vocational educators to effectively use LMS in teaching and learning of TVET courses. TVET institutions should

create an enable virtual learning environment, LMS training, and also provide motivational incentives that will encourage them and increase their interest in LMS use. Again, informational use which includes video, simulations, and text-based, among others should be of high quality and must target teaching the graduates 21st-century skills that are needed in today's world of work.

5. Conclusion

This study determined vocational educators' experience and perception of the use of learning management systems in TVET instructional delivery in tertiary institutions in Enugu and Anambra States, Nigeria. It was concluded that vocational educators perceived LMS as a credible ICT tool that can support the teaching of TVET courses and enhance the transfer of TVET skills to TVET students. However, most of the vocational educators lack the required ICT competencies required for effective usage of LMS in instructional delivery. But with the provision of enabling LMS strategies by vocational institutions, LMS will be enhanced to impart in the students the 21st century ICT and TVET skills required for economic development and sustainability.

5.1 Policy Recommendations

From the findings of the study, the researchers formulate the following recommendations:

- i. The TVET educators should adopt LMS in teaching and learning of TVET courses in Nigerian tertiary institutions.
- ii. TVET institutions should continually organize seminars, workshops and symposiums and training for the TVET educators to equip them with the skills they require for the effective application of LMS in instructional delivery.
- iii. The federal government should in addition to the statutory allocation of funds for tertiary institutions create an ICT trust fund for TVET institutions for procurement of 21st-century state-of-the-art teaching facilities and development of virtual learning environments like LMS, and virtual realities for effective delivery of TVET courses.
- iv. TVET agencies and promoters like UNESCO-UNEVOC, United Nations Institute for Training and Research, World Bank, and other TVET stakeholders should vigorously provide ICT resources and mobilize financial resources for manpower development and training with regard to LMS usage.

Acknowledgement

The authors appreciate our respective School Administrators for giving us an enabling platform to successfully carry out this research work. Also, the authors sincerely appreciate all the research assistants and all those who contributed in one way or the other to the completion of this work.

References

- Abanyam, F.E. & Onimwo, J.A. (2020). Green netnographic marketing strategy for eliminating contact research practices in Nigerian Universities: A Post-Corona virus paradox. *Journal of Technology and Humanities*, (2); 1-12
- Ahmad, S. A., Chinade, U. B., Gambaki, A. M., Ibrahim, S., & Ala, N. A. (2012). The need for moodle as a learning management system in Nigerian universities: Digesting University Utara Malaysia learning zone as a case study. *Academic Research International*, 2(3). Retrieved on June 10, from: www.savap.org.pk
- Al-Gahtani, S. S., Hubona, G. S. & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. *Information & Management*, 44, 681-691
- Baki, R., Birgoren, B., & Aktepe, A. A. (2018). Meta analysis of factors affecting perceived usefulness and perceived ease of use in the adoption of e-learning systems. *Turk. Online Journal of Distance Education*, 19, 4-42. Available online: <https://dergipark.org.tr/en/download/article-file/555808> (accessed on 13 October 2018)
- Belias, D. & Koustelios, A. (2013). A pilot study of TVET teaching with LMS platform. *International Journal for e-Learning Security (IJeLS)*, 3(1/2). Retrieved on September 4, 2018 from: www.infonomics-society.org
- Bordbar, F. (2010). English teachers' attitudes toward computer-assisted language learning. *International Journal of Language Studies*, 4(3), 27-54
- Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8(1), 136-155

- Cavus, N., Mohammed, Y.B., Yakubu, M.N. (2021). Determinants of Learning Management Systems during COVID-19 Pandemic for Sustainable Education. *Sustainability*, 13, 5189. <https://doi.org/10.3390/su13095189>
- Chang, C.T., Hajiyev, J., & Su, C.R. (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? The general extended technology acceptance model for e-learning approach. *Computer Education*, 111, 128–143
- Correa-Baena, J.P. Hippalgaonkar, K. Van Duren, J., Jaffer, S., Chandrasekhar, V.R., Stevanovic, V., Wadia, C., Guha, S., & Buonassisi, T. (2018). Accelerating materials development via automation, machine learning, and high-performance computing. *Joule*, 2, 1410–1420
- Davis, F. & Venkatesh, V. (1996) A Critical Assessment of Potential Measurement Biases in the Technology Acceptance Model: Three Experiments. *International Journal of Human-Computer Studies*, 45, 19-45. <http://dx.doi.org/10.1006/ijhc.1996.0040>
- Dias, S.B., Hadjileontiadou, S.J., Diniz, J.A., & Hadjileontiadis, L.J. (2017). Computer-based concept mapping combined with learning management system use: An explorative study under the self-and collaborative-mode. *Computer Education*, 107, 127–146
- Drent, M., & Meelissen M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers & Education*, 51, 87–199
- Esa, A. B., Jemali, M. A. B., Mohamad, N. H. B. (2017). Emotional intelligence based practice, technology and curriculum in Malaysian teacher education institute. *Turkish Online Journal of Educational Technology*, (December Special Issue ITEC), pp. 265–271
- Federal Republic of Nigeria FRN. (2013). *National Policy on Education*. Lagos: Federal Government Press
- Ghavifekr, S. & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES)*, 1(2), 175-191
- Idoga, P.E., Toycan, M., Nadiri, H., & Çelebi. E. (2019) Assessing factors militating against the acceptance and successful implementation of a cloud based health center from the healthcare professionals' perspective: a survey of hospitals in Benue state, northcentral Nigeria. *BMC Medical Information Decision Making*, 19(1):1–18. doi:10.1186/s12911-019-0751-x
- Jegade, P. O. (2009). Issues in informing science and information technology Volume 6, Ile-Ife: Assessment of Nigerian Teacher Educators' ICT Training, Obafemi Awolowo University, Ile-Ife
- Kalayou, M.H., Endehabtu, B.F., & Tilahun, B. (2020). The applicability of the modified technology acceptance model (TAM) on the sustainable adoption of eHealth systems in resource-limited settings. *Journal of Multidisciplinary Healthcare*, 13; 1827–1837
- Kant, N., Prasad, K.D. & Anjali, K. (2021). Selecting an appropriate learning management system in open and distance learning: a strategic approach". *Asian Association of Open Universities Journal*, 16(1); pp. 79-97. <https://doi.org/10.1108/AAOUJ-09-2020-0075>
- Khan, M. S. H., Hasan, M., & Clement, C. K. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *International Journal of Instruction*, 5(2), 61–80
- Kulshrestha, T. & Ramswaroop, R. (2013). Benefits of learning management system (LMS) in Indian education. *International Journal of Computer Science & Engineering Technology (IJCSET)*, 4(8), 1154-1164
- Lazim, C.S.L.M., Ismail, N.D.B., & Tazilah,, M.D.A.K. (2021). Line learning during covid-19 pandemic: accounting students perspective. *International Journal of Business, Economics and Law*, 24 (1); 2289-1552
- Moate, R. M., & Cox, J. A. (2015). Learner-centered pedagogy: Consideration for application in a didactic course. *The professional Counselor*, 5(3), 379–389
- Morris, M. G., Venkatesh, V. & Ackermann, P. L. (2005). Gender and age differences in employee decisions about new technology: An extension to the theory of planned behavior. *IEEE Transactions on Engineering Management*, 52 (1), 69-84
- Nair, C. S., & Patil, R. (2012). A Study on the Impact of Learning Management Systems on Students of a University College in Sultanate of Oman. *International Journal of Computer Science Issues*, 9(2) 2
- Obutte, P. C. (2014). ICT laws in Nigeria: Planning and regulating a societal journey into the future. *PER / PELJ* (17)1. <http://dx.doi.org/10.4314/pelj.v17i1.10>

- Oguguo, B.C.E., Nannim, F.A., Agah, J.J. Ugwuanyi, C.S., Ene, C.U., & Nzeadibe, A.U. (2021). Effect of learning management system on Student's performance in educational measurement and evaluation. *Education and Information Technologies*, 26; 1471–1483. <https://doi.org/10.1007/s10639-020-10318-w>
- Oguguo, B.C.E., Nannim, F.A., Agah, J.J., Ugwuanyi, C.S., Ene, C.U., & Nzeadibe, A.C. (2021). Effect of learning management system on Student's performance in educational measurement and evaluation. *Education and Information Technologies*, 26; 1471–1483 (2021). <https://doi.org/10.1007/s10639-020-10318-w>
- Ologunde, A. O., Asaolu, T.O. & Elumilade, D. O. (2015). Labour turnover among university teachers in South Western Nigeria – Issues, solutions and lessons. Retrieved on March 5, 2016 from: <http://www.readbag.com/unpan1-un-intradoc-groups-public-documents-aapam-unpan029860>
- Ololube, N. P. (2011). *Education and society: An interactive approach*. Owerri: Springfield Publishers
- Pallant, J. (2005). *SPSS Survival Manual. A Step-by-Step Guide to Data Analysis using SPSS for Windows (Version 12)*. Australia: Allen & Unwin. Retrieved on February 22, 2018 from: www.allenandunwin.com/spss.htm
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects of multiple mediator models. *Behavior Research Methods*, 40, 879–891. Retrieved on March 20, 2019 from: <http://dx.doi.org/10.3758/BRM.40.3.879>
- Sabharwal, R., Hossain, M. R. Chugh, R. & Wells, M. (2018). Learning Management Systems in the Workplace: A Literature Review.” Paper presented at the 2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE), 387–393. Wollongong, December 4–7
- Taat, M. S. & Francis, A. (2020). Factors Influencing the Students Acceptance of E-learning at Teacher Education Institute: An Exploratory Study in Malaysia. *International Journal of Higher Education*, 9(1), 133–141
- Turnbull, D., Chugh, R., & Luck, J. (2019). Learning management systems: An overview. In *Encyclopedia of Education and Information Technologies*, edited by A. Tatnall. Cham: Springer Nature. doi:10.1007/978-3-319-60013-0_248-1
- Ugwoke, E.O, Edeh, N.I., & Ezeemma, J.C. (2018). Effect of Flipped Classroom on Learning Management Systems and Face-to-Face Learning Environments on Students' Gender, Interest and Achievement in Accounting" (2018). *Library Philosophy and Practice (e-journal)*. 1875. <http://digitalcommons.unl.edu/libphilprac/1875>
- Ugwoke, E.O, Edeh, N.I., & Ezeemma, J.C. (2019). Business Education Lecturers' Perception of Learning Management Systems for Effective Teaching and Learning Accounting in Universities in South-East, Nigeria" (2019). *Library Philosophy and Practice (e-journal)*. 2122. <http://digitalcommons.unl.edu/libphilprac/2122>
- Uzoagulu, A. E. (2011). *Practical Guide to Writing Research Project Reports in Tertiary Institutions*. New Edition. Enugu: Cheston Ltd
- Venkatesh, V., & Bala, H. (2008), Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39, 273–315. doi.org/10.1111/j.1540-915.2008.00192.x
- Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). *User acceptance of information technology: Toward a unified view*. *MIS Quarterly*, 27, 425–478
- Wang, Y, Xiao, Q., Sun, L., Wu, Y. (2016). Chinese nurses' acceptance of PDA: a cross-sectional survey using a technology acceptance model. *Studies in Health Technology and Inform*, 225:889–890
- Yoloye, E. O. (2015). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. In C. U. Nwokefor (Ed.), *Information communication technology (ICT) integration to educational curricula: A new direction for Africa* (pp. 250–260). Maryland: University Press of America