

Do demographic characteristics moderate the acceptance and use of the Moodle learning system among business students?

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ABSTRACT

Continuous development of new educational digital learning such as the Moodle Learning System (MLS) for students, has become an integral part of the evolution of modern educational systems. Despite considerable effort by academic institutions in motivating students to use new digital learning for blended and virtual learning, there is practical evidence of mixed feelings among students whether to accept or not to accept the use of this new technology. This study aims to provide an integrated view of user acceptance of digital learning based on validated constructs from well tested and proven theoretical models. This study used random sampling and hierarchical regression analysis through structural equation modelling in AMOS to determine the relationships among conceptualised constructs. Research results indicated that social influence has a significant influence on behavioural intention and behavioural intention has a significant influence on system usage. Gender, age and experience are vital moderators in the relationships between performance expectancy and behavioural intention, social influence and behavioural intention, facilitating conditions and system usage among business students in tertiary institutions.

Keywords: *Technology support services; Unified Theory of Acceptance and Use of Technology (UTAUT); behavioural intention; user acceptance; University learning zone.*

INTRODUCTION

The imperatives to remain competitive in the global economy demand that institutions all over the world invest extensively in Information Communications Technologies (ICT). Higher education institutions, in this case, are not left out. To cope with the challenges in the education sector requires that higher education providers commit to e-learning technologies (Lonn & Teasley, 2009). ICT potentially transforms teaching and learning through the Internet (Liu, Liao & Peng, 2005). ICT makes possible a learning environment and experience that is not limited to the brick and mortar classroom and the paper-based curricula (Roca, Chiu & Martinez, 2006). Research shows that all efforts to implement e-learning will eventually gravitate towards total automation of administering the pedagogical processes using Learning Management Systems (LMS) (Govindasamy, 2002). Coates, James and Baldwin (2005) argue that LMS are becoming ubiquitous at higher institutions all over the world. The authors stated that the most traditional campus-based institutions had embraced the virtual dimension to their practice. University learning zone is an innovative e-learning system that supports teaching and learning at the institution. The system is capable of helping students to be responsible for their learning; and also serves as a guide to useful and relevant content.

Similarly, the LMS also enhances students' learning, and engagement through pedagogical functions such as synchronous and asynchronous communication, content development and

delivery, assessment design and development, class and user management (Webb & Cox, 2004; Coates et al. 2005). Several studies have investigated the motivators of LMS usage among students. Evidence from research indicates that perceived usefulness, perceived ease of use, enjoyment, subjective norm, and satisfaction, affects students use of the LMS (Fındık-Coşkunçay et al. 2018). Research also shows the significant importance of computer self-efficacy in accounting for attitude and usage of Moodle (Yeou, 2015). Ifinedo et al. (2018) concluded that usability factors (perceived usefulness and perceived ease of use) have positive effects on students' use outcomes regarding academic performance, positive learning and perceived learning assistance. Technical characteristics of LMS, ease of use, feedback options of LMS and advantages of LMS use were significant success factors in online courses (Kyzy, 2018). It is interesting to note that several theoretical frameworks and conceptual models have been used to analyse the motivational determinants of students' adoption and use of LMS. However, most of these recent works and research models are grounded in the technology acceptance model (Fındık-Coşkunçay et al. 2018; Yeou, 2015; Ifinedo et al. 2018; Kyzy, 2018).

Conversely, research that draws from the UTAUT model in explaining the acceptance of LMS in a blended learning environment remains neglected. It is therefore vital to explain LMS acceptance from the UTAUT theoretical lens. Insights from this study will enhance our understanding and knowledge of the crucial role of LMS in tertiary education. This study aims to investigate the influence of UTAUT factors on the acceptance of the Moodle learning management system in a blended learning environment in Malaysia. This study contributes to knowledge by providing evidence about the adoption of the Moodle platform in a tertiary setting.

First, we review the theoretical background of the study by providing relevant literature on UTAUT and the research hypotheses. The next section presents the research methodology, data collection analysis. The final section presents the results, discussion of research findings, implications, limitations and suggestions for further studies.

THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) has been adopted to investigate the use of the Moodle Learning System (MLS) among business students in a tertiary institution. UTAUT is a theory that is potent in explaining the acceptance and use of information systems in diverse contexts. Yu (2012) argues that while primarily UTAUT highlights the core constructs that predict behavioural intention to use and actual use, it helps researchers to study the chances of moderators boosting or constraining the effects of the core constructs.

This study employs the UTAUT theoretical model to develop the research hypotheses. Figure 1 below depicts the path relationships among the exogenous, endogenous and categorical variables as the moderators in this study.

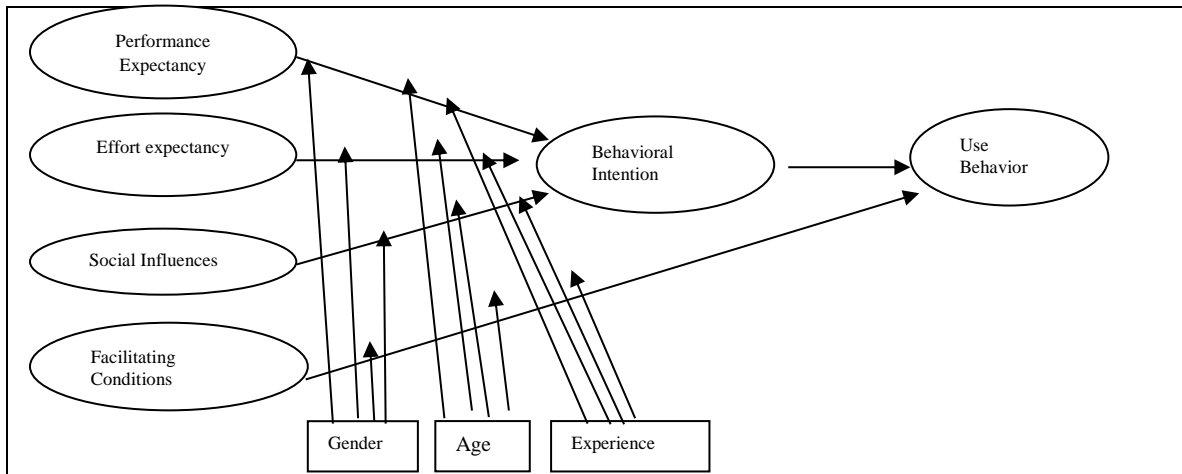


Figure 1: *Conceptual model*

Performance Expectancy

Performance expectancy (PE) represents the degree to which users believe that using a system will help them achieve expected gains in job performance (Venkatesh et al., 2003). In other words, PE represents the extent to which individuals believe that a system will enhance subsequent performance. Research has empirically demonstrated the influence of PE on attitude towards the use of systems in different contexts. For instance, Sumak and Sorgo (2016) revealed that PE affects performance expectancy and more strongly affects attitudes toward using an interactive whiteboard among teachers. Similarly, research reveals that performance expectancy directly motivates adoption behaviours among users (Zhou et al., 2010). Mohammadyari and Singh (2015) associate performance expectation and e-learning continuance intention. Performance expectancy connotes the extent that users believe that continued use of the MLS will affect their behavioural performance. The above evidence suggests that continuous use of the MLS will result in improved performance. Thus, we hypothesise:

H1. Performance expectancy will positively affect the intention to use MLS.

Effort expectancy

Effort expectancy is the extent to which users believe that using an application is free of effort (Venkatesh et al., 2003). Effort expectancy represents the perception of ease associated with the use of a system. End-users assume that a system is user-friendly and this will motivate behavioural intention and adoption attitudes. Effort expectancy seems to have tapped on the ease-of-use construct, which maintains that a system that is seen to be easy to learn would influence usage intention (Davis, 1989). Several studies have indicated that ease-of-use associates with performance outcomes (Arasanmi et al. 2017; Amoako-Gyampah and Salam 2004). Effort expectancy was found to predict usage attitude among pre-adopters of educational technology (Sumak & Sorgo, 2016) and behavioural intention (Tosuntas et al., 2014). Following this line of thought, we hypothesised:

H2. Effort expectancy will positively affect the intention to use MLS.

Social influence

The notion of subjective norm (Ajzen, 1991) as a predictor of attitude is popular in adoption and acceptance literature. Social influence (SI) is like the operationalisation of the concept of the subjective norm in the Theory of Planned Behaviour (TPB) model. SI refers to the degree to which individuals perceive that referent others believe they should use a system (Venkatesh et al., 2003). Ajzen (1991) avers that the more favourable the subjective norms of a specific behaviour, the stronger would be the users' intention to perform the behaviour. SI indicates approval or support from essential individuals for the activation of behaviour. Hence it has been validated as a strong predictor of adoption behaviours (Sumak & Sorgo, 2016; Tosuntas et al., 2014). Students are expected to accept and use MLS based on the influence of the salient stakeholders (peers, teachers, family) in encouraging, persuading the students to use the MLS to achieve some anticipated academic outcomes. Therefore, we propose:

H3. Social influence will positively affect the intention to use MLS

Facilitating conditions

Facilitating conditions (FC) refers to the factors and resources that facilitate and support an individual's activities. This concept is analogous to perceived behavioural control of the TPB model which accounts for the role of a user's knowledge, ability and resources (Venkatesh et al., 2003). In this study, facilitating conditions indicate the perception of an individual concerning the availability of organisational and technical infrastructure to support the use of an MLS. Several studies have shown the significant impact of FC on end-users behavioural intention and the system's usage (Zhou et al., 2010; Sumak & Sorgo, 2016; Tosuntas et al., 2014). We reasoned that the provision of organisational and technical infrastructure would lead to the users' willingness to use the Moodle learning system. Therefore, we propose:

H4. Facilitating conditions will positively affect the intention to use MLS

Intention to use and actual usage

Behavioural intention (BI) is a person's subjective probability that he will perform some behaviours (Sykes et al., 2009). The intention to use a learning technology seems to associate with the belief that routinised use of a system will lead to an essential and attractive or valued outcome (Vroom, 1964). From a motivational perspective, behavioural intention connotes the desire to continue the use of a system and the preparedness to depend on the technology for actual or routine task performance. BI is a precursor of the actual usage of an information system (IS). BI has been validated in several psychologically-based models, such as TPB, TAM and UTAUT in different contexts (Chauhan & Jaiswal, 2016; Sumak & Sorgo, 2016; Tosuntas, et al., 2015). Relying on the arguments from prior studies, we propose a relationship between BI and MLS use:

H5. The behavioural intention will positively affect the intention to use MLS

Modifiers of Intention to use Online Learning Zone

In the original UTAUT model, age, gender, experience and voluntariness are regarded as critical moderating variables (Venkatesh et al., 2003). As a result, our study further examines the moderating effect of gender, age and experience on the intention to use the Online Learning Zone. This research model excluded voluntariness because the use of Online Learning Zone as a learning tool is compulsory for all students.

Gender

There is evidence of the moderating effect of gender on the behavioural intention to use information technology in the literature (Magsamen-Conrad, Upadhyaya, Joa, & Dowd, 2015; Maldonado, Khan, Moon and Rho, 2011; Wang & Shih, 2009). For instance, in their study, Wang and Shih (2009) found that gender significantly moderated the effect of performance expectancy, more in men than women in regard to the intention to use an information kiosk. The perception of the usefulness of the information kiosk tends to be stronger in men thus influencing their intention to use. Regarding social influence, women were more likely to be influenced by their significant other in using the information kiosk than men. While some studies have seen a significant difference in the moderating effect of gender on the behavioural intention to use information technologies, others have found no significant difference. For instance, Gupta et al. (2008) did not find any significant moderating influence of gender on the adoption of ICT in a government organisation in India. Maldonado et al. (2011) also did not find gender influence to be significant in a study on the adoption of e-learning in Peru. Based on the above literature, we hypothesised that gender differences would moderate the influence of performance expectancy, effort expectancy, social influence and facilitating conditions on behavioural intention.

Age

Wang and Shih (2009) found that age was significant regarding effort expectancy in determining intention to use an information kiosk. Older citizens are more inclined to the user-friendliness of the system than their younger counterparts. In a study that attempts to predict multigenerational tablet adoption practices, Magsamen-Conrad et al. (2015) found that age is a significant predictor of behavioural intention to adopt the tablet. The assertion means that the older a person gets, the intention to adopt or use a tablet decreases. In line with previous studies, we hypothesised that age would moderate the influence of performance expectancy, effort expectancy, social influence and facilitating conditions on behavioural intention.

Experience

Kijsanayotin, Pannarunothai, and Speedie (2009) in a study of the adoption of health information technology amongst health workers in Thailand showed that experience has a moderating effect in behavioural intention to use the technology. They found that previous IT experience had a stronger effect than facilitating conditions. Giannakos and Vlamos (2013) found that previous experience with online webcast significantly affects the use of the technology in their study of online webcast learners in Greece. Therefore, the third moderating hypothesis of this study is that experience would moderate the influence of performance expectancy, effort expectancy, social influence and facilitating conditions on behavioural intention.

RESEARCH METHOD

Sample and data collection

This study is a cross-sectional survey-based study. The survey questionnaire was drawn from prior studies in this area and modified to fit the aims of this study. The survey items were measured with a five-point Likert scales ranging from strongly agree, agree, neutral and disagree to strongly disagree, were used to measure the items. A five-point Likert scale can obtain detailed feedback from respondents (Byrne, 2010). The variables measured in this study include; performance expectancy (PE), effort expectancy (EE), social influences (SI), facilitating conditions (FC), behavioural intention (BI) and usage (Use). We distributed 200 survey questionnaires to research

participants who are mainly students of a tertiary institution in Malaysia. We included a total of 137 returned and useable questionnaires in this study.

Data cleaning

To establish the assumption of psychometric properties before applying necessary data analysis techniques; this study employed a series of data screening approaches which includes; detection and treatment of missing data, outliers, normality and multicollinearity issues. The preliminary analysis is required because the data distribution and the selected sample size have a direct impact on whatever choice of data analysis techniques and tests chosen (Byrne, 2010). For this research, there is no missing data. For outliers, several pieces of evidence have established outliers as any observations which are numerically distant if compared to the rest of the dataset (Byrne, 2010; Hair et al., 2010). For this research, the table of chi-square statistics has been used as the threshold value to determine the optimal values for the research. This decision is in line with the arguments of Hair et al. (2010) which emphasised the need to create a new variable in the SPSS file to be called "response" numbering from the beginning to the end of all variables.

Measures

Research has established the use of 5 or 7 point Likert scales in social and business research (Byrne, 2010). A five-point Likert scale was used to measure the research constructs. As detailed in Table 1 below, this empirical study has used construct reliability, variance explained in establishing the reliability and validity measures (John & Reve, 1982). SPSS and AMOS software is used to achieve reliability and validity of measurement constructs and in testing the hypothesised relationships. The results as listed below in Table 1 indicate the strength of selected measurements, including the discriminant validity of the data set in this research as calculated using average variance extracted (AVE) described by Fornell and Larcker (1981).

Table 1: *Descriptive Statistics of Indicators and Reliability*

Variable Name	No of Items	Mean (Std Deviation)	Cronbach Alpha	AVE
Performance Expectancy	5	3.7912 (.65837)	0.865	0.986
Effort Expectancy	4	3.7938 (.64447)	0.821	0.981
Social Influences	5	3.5416 (.73611)	0.858	0.980
Facilitating Conditions	5	3.5270 (.67731)	0.853	0.982
Behavioral Intention	3	3.5231 (.87708)	0.936	0.996
Use Behavior	3	3.6691 (.75027)	0.749	0.970
Total Items	25			

RESEARCH FINDINGS

To provide theoretical arguments in support of the calculated discriminant validity for this research, that is, the average variance extracted AVE was used (as suggested by Fornell and Larcker, 1981). Table 2 below summarised the results of the AVE for each factor in the research framework:

Table 2: Discriminant Validity – AVE

	PE	EE	SI	FC	BI	UB
PE	1					
EE	0.983	1				
SI	0.983	0.980	1			
FC	0.984	0.981	0.981	1		
BI	0.991	0.988	0.988	0.989	1	
UB	0.978	0.975	0.975	0.976	0.983	1

“Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Behavioral Intention (BI), Use Behavior (UB)”

Byrne (2010) suggested that an AVE with values of 0.50 and above is a statistical indication of good measurement instruments. For this research, the values shown in Table 2 indicated that all latent variables were well above the suggested 0.50 criterion, starting from 0.975 to 0.991. Thus, the AVE results in Table 2 have statistically confirmed that the obtained discriminant validity were valid measures for this theoretical model.

Statistically, depending on the above results, this research further tested the proposed theoretical framework as depicted in Figure 1 with the above six variables. Figure 2 below provides a theoretical depiction of the structural equation modelling (SEM) analysis in this study.

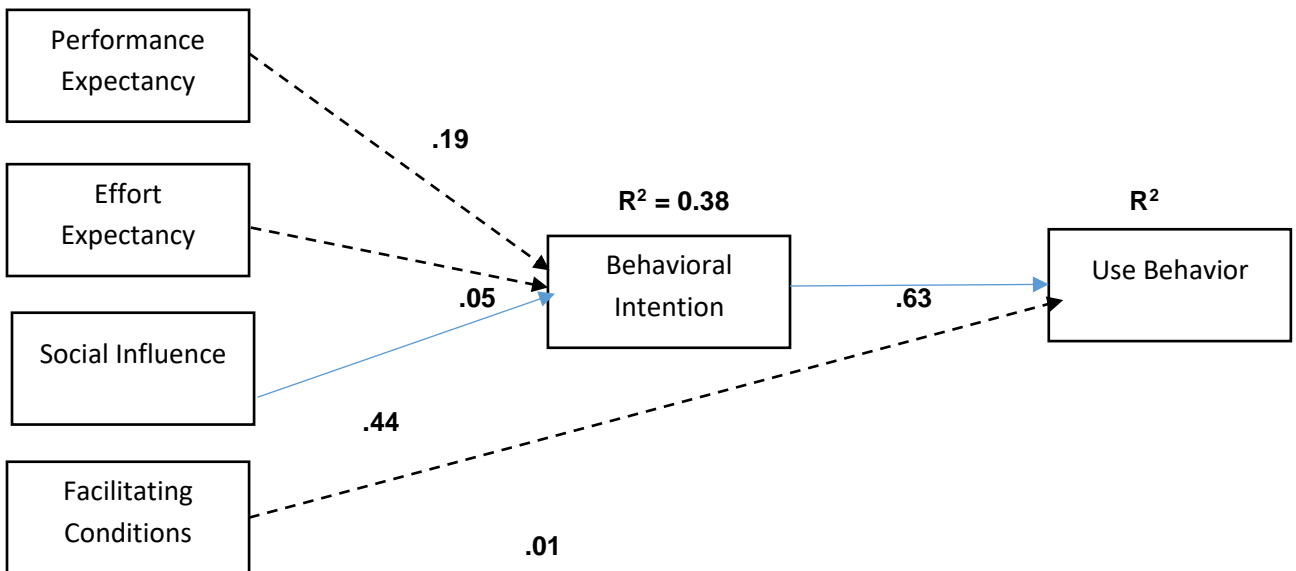


Figure 2: Research Model and Path Coefficients

Figure 2 shows the final results from the structural model. The structural model shows that the four latent constructs in this study explain 38% of the variations in behavioural intention (BI) to use the online learning zone. In addition, students' behavioural intention and facilitating conditions accounted for 40% of the variability in students' use behaviour. These results have further confirmed the strong relationship between behavioural intention and use behaviour (Venkatesh et al. 2013).

The results of the model fit indices are detailed in Table 3 below.

Table 3: Goodness of Fit Index for the Final Structural Model

	Fit index Recommendation	Results
X ² /df	<3.0 0	1.65 2
Goodness-of-fit index (GFI)	>0.9 0	0.96 9
Adjusted Goodness-of-fit index (AGFI)	>0.8 0	0.83 7
Comparative fit index (CFI)	>0.9 0	0.98 6
Root mean square residuals (RMSR)	<0.1 0	0.02 5
Root mean square error of approximation (RMSEA)	<0.0 8	0.04 0
Normed fit index (NFI)	>0.8 0	0.87 3
Non-normed fit index (NNFI)	>0.9 0	0.94 6
Incremental fit index (IFI)	>0.9 0	0.98 6

Tables 4, 5, 6 and 7 provide detailed results as obtained for the path coefficients results for the hypothesised direct effects, UTAUT causal effect sizes about moderating factors and the endogenous R² for the direct effects. We will discuss the theoretical arguments in support of these results in the concluding part of this article.

Table 4: Hypothesis testing results for the direct effects of the revised model

	Estimate	S.E.	C.R.	P	Sig/Not Sig
H1 BI <--- PE	.287	.362	.793	.428	Not Sig
H2 BI <--- EE	.093	.384	.241	.810	Not Sig
H3 BI <--- SI	.580	.244	2.376	.018	Sig
H4 UB <--- FC	.011	.192	.057	.955	Not Sig
H5 UB <--- BI	.470	.114	4.128	***	Sig

Notes: *P < 0.10; **P < 0.05; *** P < 0.01, Sig = Significant; Not Sig = Not Significant

Table 5: UTAUT causal effect sizes on moderating factors

Factor	PE → BI	EE → BI	SI → BI	FC → UB
Male	0.287 ^{NS}	0.093 ^{NS}	0.580 ^{**}	0.011 ^{NS}
Female	0.346 ^{***}	0.115 ^{NS}	0.506 ^{***}	0.326 ^{**}
Younger	0.488 ^{**}	0.143 ^{NS}	0.391 ^{**}	0.471 ^{**}
Older	0.277 [*]	0.083 ^{NS}	0.614 ^{***}	- 0.020 ^{NS}
Early user	0.476 [*]	0.134 ^{NS}	0.408 ^{**}	0.469 ^{**}
Experienced student	0.277 [*]	0.082 ^{NS}	0.615 ^{***}	- 0.022 ^{NS}

Notes: *P < 0.10; **P < 0.05; *** P < 0.01, Sig = Significant; Not Sig = Not Significant; NS = P > 0.05

Table 6: Results of the hypotheses related to the moderating factors

	Path	Support	Findings
H6a	PE → BI	Yes	Stronger for female, younger students. Stronger for older students and early users.
H6b	EE → BI	No	Neither gender, age nor experience of business students moderates their intention and use behaviour.
H6c	SI → BI	Yes	Both gender, age and experience of business students moderates their intention and use behaviour.
H6d	FC → UB	Partial	Stronger for female, younger and early users among business students.

Table 7: Squared multiple correlations (R²) for direct effects

	Estimate
BI _{intention}	.377
UB _{behavior}	.400

The study analysed the moderated effects of age, gender and experience. A moderator affects the direction of the relationship between an independent and a dependent variable. The results of the analysis as shown in Tables 4, 5, 6 and 7 above have statistically established that gender, age and experience have significant moderating effects in the relationships between performance expectancy, effort expectancy, social influence, facilitating conditions, behavioural intention and business students to adopt the Moodle online learning system. The path coefficients and p-values for behavioural intention and use behaviour are statistically consistent with the existing literature. The hypothesised relationship between effort expectancy and behavioural intention is not statistically significant, however, the results shown in Figure 2 and Tables 4 and 5 indicate consistency with the extant argument that effort expectancy is positively related to user's behavioural intention to use online learning zone.

DISCUSSION, CONCLUSION AND IMPLICATIONS

This study analysed the determinants of students' academic use of the Moodle Learning Management System. The study established that social influence is a strong predictor of a student's behavioural intention in the use of Moodle. The results confirmed that lecturers, friends, and family are relevant referents influencing the use of Moodle technology. The analysis supports the notion that, the higher the influence of these referents, the higher the adoption behaviour among students. As hypothesised, performance expectancy and facilitating conditions were found to be significantly related to student's adoption behaviour and actual use of the Moodle system. However, the observed relationships had no substantial effects on students' adoption attitude. This finding is consistent with prior research which suggests an insignificant effect of facilitating conditions on adoption attitudes of students (Maldonado et al. 2011). This outcome indicates that the availability of needed resources may not spontaneously trigger technology acceptance behaviours among students.

In line with our projection, the statistical analysis confirmed the impact of behavioural intention on adoption behaviours of students. The result affirmed that students' behavioural intention positively correlated with system usage behaviour. This finding shows that students' behaviour is a precursor and strong predictor of online technology usage. Students' positive behaviours towards the technology will lead to and facilitate a stronger usage behaviour. The structural model established an insignificant relationship between effort expectancy and students' behavioural intention to use the Moodle system. This outcome may be due to initial difficulties encountered in the use of the platform or negative perceptions of the ease-of-use by students of the system; this reason may limit their interaction and efforts in the use of the system. Other factors such as lack of adequate training and orientation may affect their attitudes towards the system. Training is a pervasive method used for acquiring the requisite knowledge and skills in a new information system online environment like Moodle. To facilitate students' technical knowledge and skills in the use of Moodle, we suggest that Academic institutions conduct proper training and orientation that will facilitate the skills and knowledge that are useful in optimising the benefits of the Moodle system. The provision of training will support and impact students' positive attitudes in the use of the technology. Research suggests that training facilitates user's perception of ease of use and usage behaviours.

The empirical findings from this study justify evaluating students' adoption attitudes toward online technology. Notably, it is important for academic institutions to provide training support as a mechanism for improving students' self-efficacy in the use of a learning management system. Provision of training support helps in meeting the training needs of the students in using Moodle. It is equally important for new adopter tertiary institutions to determine students' competencies and capabilities before the deployment of the technology. It is beneficial for academic institutions to involve information technology professionals in the planning stages of the implementation. Finally, we suggest that the IT managers be integrated into the technical support team to solve technical problems that may characterise the early phase of the adoption and usage of the technology. Research suggests that end-users struggle initially with the use of a system. However, adequate support from the IT team and the provision of user manuals help in mitigating such problems. The above suggestions if implemented have the potential to influence students' positive attitudes towards technology acceptance and use.

Limitations

One of the noted limitations of this study is that it analysed cross-sectional data from a tertiary institution in determining the predictors of Moodle acceptance and usage behaviours among business students. Consequently, the research findings should be interpreted with caution regarding generalisability. Based on this limitation, the research model could be improved and tested with more substantial sampled data collected from multiple sources. Despite this limitation,

insights from this study add to the growing knowledge in this area. Future research should test additional variables that may provide more significant insights into students' online learning systems adoption behaviour.

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