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EXAMINING FACTORS INFLUENCING THE ADOPTION OF MOODLE 1.9 FOR ONLINE LEARNING PLATFORMS

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Abstract:
E-learning is a rapidly growing approach in higher education, driven by the need for innovation and competition among institutions. This method leverages information and communication technology tools to enhance individual and group learning experiences. As the landscape of education evolves, higher institutions are increasingly adopting e-learning to stay competitive, deliver content efficiently, and create global learning communities. E-learning eliminates the constraints of time and distance, providing students with access to a wide range of learning materials and the ability to pursue their education regardless of geographic location.
However, while e-learning offers many advantages, its implementation is not without challenges. This paper explores the benefits and drawbacks of e-learning in higher education. It sheds light on how e-learning can help institutions gain a competitive edge while also addressing the limitations and issues that may arise during its implementation.

Keywords: E-learning, higher education, competition, innovation, technology, drawbacks.

Introduction and Background

Increasing competition, similarities in academic products and lack of available materials to be accessed by lecturers and students have been leading higher institutions to search for modern approach of improving training and education through electronic learning commonly called e-learning (Deng, Liu and Qi, 2011). The primary objective of e-learning is to improve organizational performance goals through enhancing individual and group learning process with the use of information and communications technology tools (Chiu & Wang, 2008). E-learning has also been confirmed as a strategic tool through which internationally recognized higher institutions gain competitive advantage over their current and potential rivals (Ferrer, 2004). Notable among its strengths is material delivery is made easy without any time or distance constraints, opportunity to create learning community and wide range of material sources, and finally promoting students mobility across the globe (Zhou et al., 2010).
As competition intensifies among higher institutions, the extant literature indicates that there are few drawbacks in e-learning implementation (Maldonado, Khan, Moon and Rho, 2011).
Included among these drawbacks is chronic shortage of skilled academics that could help in transferring pedagogical knowledge and ideas into readily available technical solutions for lecturers and students consumption (Maldonado et al., 2011). Equally important is that many academic staffs cannot keep pace with the current development and challenges that are inherent in information technology. Another major constraint to e-learning implementation is lack of substantial institutional financial supports, copy right issues in utilizing digital and digitalized academic materials. There are, however, indications that any

higher institution that wants to be internationally recognized need to efficiently establish a standardized e-learning technologies that will assist in improving its organizational performance goals.

Recent among notable literature in this area of research is Heinrich, Milne and Granshaw (2012), that investigates the relevant supports that e-learning could provide for lecturers in managing and marking students' assignments. To do this, Heinrich et al (2012) detailed out important tasks that ought to be carried out for effective marking and management of assignment. They finally provide alternative available architectures for lecturers and higher institutions wishing to use e-learning system in marking and managing students' score such as *Moodle* and *Lightwork.* In a study conducted by Williams, Birch and Hancock (2012), they empirically establish that the use of online lecture recordings through e-learning is on the horizon of supplementing physical lectures at many universities. Their conclusion is that both techniques are mutually dependent for students to achieve the desired performance.

Deng et al (2011), conducted an empirical research to determine the driving factors in adopting web based questions and answer services called WBQAS in China. To do this, they made use of unified theory of acceptance and use of technology (UTAUT) in determining the level of WBQAS's adoption among Chinese Users. Their result indicated that performance expectancy and users' effort expectancy are two major predictors of Chinese users' intention to use WBQAS.

In another similar study conducted by Maldonado et al., (2011), they empirically validates modified UTAUT model by including e-learning motivation as one of the antecedents of South American students in adopting and using e-learning systems. Their result indicated that motivation towards e-learning and social influence has positive influence on students' behavioral intention. However, facilitating condition had no effect on students' e-learning portal use (Maldonado et al., 2011).

Theoretical Background

UTAUT was brought to fore through series of reviews and consolidation of constructs that were previously developed to establish the relationship between these constructs among which includes; Technology acceptance model (TAM), theory of reasoned action (TRA), theory of planned behavior (TPB), Innovation diffusion theory (IDT), model of PC utilization, and social cognitive theory.

TRA was initially proposed by Fishbein and Ajzen (1975), where they assert that the behavior of potential users goes along with its intention to perform. This behavior with the common intention of influencing an individual approach is a subjective standard, with respect to adoption behavior and standard control (Ajzen, 1985) and behavior to produce an idea that encourage and lead to standard perception of social pressure or subjective norm. The combinations of these beliefs lead to particular behavior. TAM depicts an adaptation protocol and the specific options that have been included to explain the computer usage behavior (Davis et al, 1989). It is in fact one of the best model to predict the transition users.

A lot of researchers have used these models in explaining consumer acceptance of different technologies (Chen et al, 2002; Gefen et al, 2003, Moon & Kim, 2001). TAM assumes that a person's intent to use a new technology is mostly determined by two major concepts i.e. perceived ease of use and perceived usefulness. However, Rogers (1995) has through IDT acquisition behavior identifies several characteristics that influence innovative behavior to use new technology as complexity, relative advantage, compatibility, trial ability, and observability. Similarly observed among early researchers that have also worked on the development of this device to measure these qualities is Moore and Benbasat (1991). For this study, the researchers have adopted the UTAUT model to measure students' behavioral intention and actual use of online learning-zone among students in a northern university in Malaysia.

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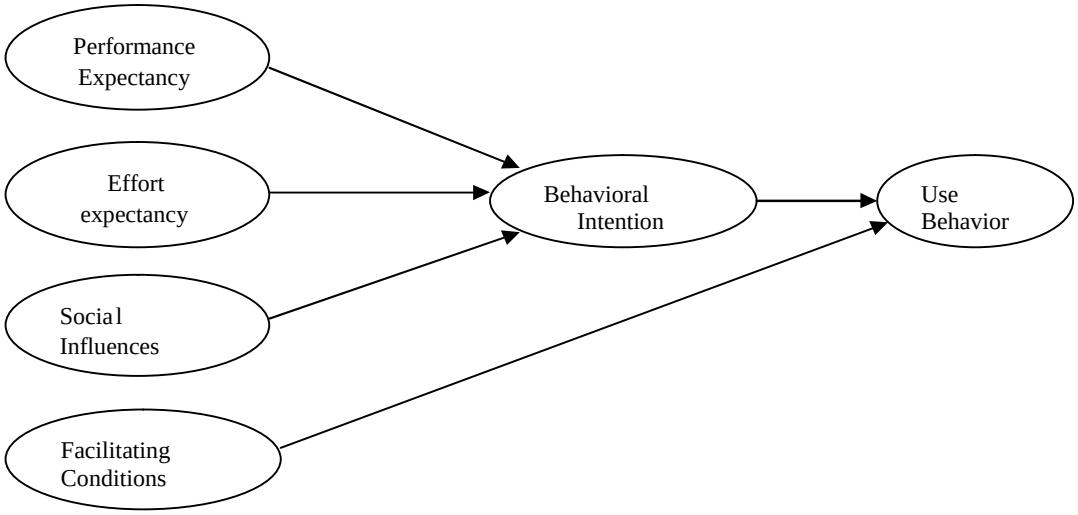

Figure 1. The Study Model

Hypotheses Development

Performance Expectancy

Performance expectancy is the degree to which a user believes that using a technology will help him/her to attain some certain stipulated benefits and gains in performing a particular task. As established by Venkatesh et al. (2003), performance expectancy has been extensively accepted as a predictor of behavioral intention to use IT. For Bhattacherjee (2001), performance expectation is significantly influenced by the user's first-hand experience and belief. In an empirical research on mobile banking adoption by Zhou et al. (2010), they revealed that performance expectancy, facilitating conditions and social influence directly influence user's adoption. Chiu and Wang (2008) also suggested that user's expectation will positively influence its continuous intention to adopt and use web-based learning. Hence the hypothesis below is proposed:

H1. Performance expectancy positively relates to behavioral intention to use online learning zone.

Effort Expectancy

Effort expectancy has been described as the degree of ease to use a new system or technology (Venkatesh et al., 2003). Based on this therefore, it is believed that the acceptance of online learning zone by Malaysian university students strongly dependent on how relatively easy it is.

It has been revealed that there is a positive correlation between effort expectancy and actual usage of ICT in public sector organizations (Gupta et al., 2008). In a similar fashion, Kijsanayotin et al. (2009) discovered that effort expectancy is an integral forward planner and forecaster of technology adoption in the aspect of health information. Given the above evidence and many other arguments in support of the relationship between effort expectancy and users' behavioral intention, this research proposed that:

H2. Effort expectancy positively influences the behavioral intent to use online learning zone.

Social Influences

Venkatesh et al (2003) defines social influence as individual perceptions of the degree of how important people such as relatives, friends and associates believes it should make use of a new technology. Existing literature have also established social influence as a construct that is based on similar characteristics of other constructs such as image, social factors and subjective norms. Notable among previous empirical

studies that have suggested a positive and significant impact of social influence on behavioral intention are Maldonado et al (2011), Zhou et al (2010) and Chiu and Wang (2008). Remarkably, we also expect a similar result that Malaysia's university students as users of online learning zone will be more willing to use Moodle 1.9 if they are persuaded by important people to them such as friends, family, lecturers etc. Based on the aforementioned arguments, this research proposes that:
H3. Social influence is positively related to behavioral intentions.

Facilitating Conditions

Facilitating conditions explains the adequacy and accessibility of the required assets such as resources, expertise, knowledge and money to implement a new system or technology. As Venkatesh et al. (2003) pointed out; facilitating conditions explains the level at which potential users believes that infrastructures are made readily available to support the use of the new system or technology. This definition unravels that a system will be faced with a lot of challenges if the intended users do not possess the requisite knowhow to fully engage in the activity. Several researches have pointed to the significant impact that facilitating conditions has on behavioral intentions (Zhou et al., 2010). Cheong et al. (2004) also unravels the fact that facilitating conditions is a significant motivator of user's intention to adopt and use bank credit cards. As also proffered by Hung et al. (2007), facilitating conditions are major determinants in the adoption and usage of e-government services. Based on the aforementioned evidence, the following hypothesis is proposed:
H4. Facilitating conditions is positively associated with behavioral intention to use online learning zone.

Behavioral Intention

DeLone and McLean (2003), argued that one cannot successfully measure the success of an event from a simple intention; it has to be put into action. For Wang and Lio (2008), system usage has become a very common variable that is used and tested in researches that have to do with new system or technology implementation. A lot of researches have also established a positive link between intention to use and actual usage behavior of online technology (i.e Ilham et al, 2011; Pavlou, 2003; Szjana, 1996). The above arguments and findings lead to the next proposed hypothesis.
H5. Behavioral intention to use online learning zone positively correlates to the actual usage of online learning zone

Research Methodology

Learning-zone at this university is a new online learning environment established to support the university's learning and teaching activities. It is built on Moodle 1.9, a dynamic web based learning management software that allows academic instructors to create, modify and sequence their teaching materials for students. Included among the activities that could be performed in this learning-zone are video presentations, pdf files, word document, web page, sound files, excel spreadsheet, multiple-choice quiz that grades itself etc. Through its flexibility, Moodle provides different approaches for enhancing learners' ability. To establish the behavioral intention and actual use of this learning-zone, the researchers conducted a survey primarily to collect data to assess the conceptualized model between May and June, 2012.
Out of 221 questionnaires that were sent to postgraduate and undergraduate students in a northern university in Malaysia via e-mail, only 145 were returned. From these 145 returned questionnaires, 137 were valid, finally putting the useful response rate at 61.9 percent.

Results

Measures

As availed in social science research, researchers have been using a 5 or 7 likert scales for measuring and establishing valid prepositions between variables of interest (Byrne, 2010). For this research, the researchers have structured all the measurement instruments for measuring the five variables of interest to use five point Likert scale, starting from the dependent, mediating and the independent variables. A major reason for this decision includes the unique inherent benefits in five point Likert scale such as providing detail feedback and not subjecting respondents to undue cognitive dissonance. Below is Table 1 that summarizes the number of items, their cronbach alphas and variance extracted.

Table 1: Summary of Measures

Construct	Measurement items	Cronbach Alpha	Variance Extracted (VE)
Performance Expectancy	1. I find this online learning-zone useful 2. Using this learning-zone enables me to accomplish my academic tasks more quickly 3. This learning-zone has increased my effectiveness in acquiring knowledge and solving academic problems 4. Compared to other online systems, information delivered by this learning-zone is very important to me 5. In overall, I am satisfied with the functions provided by this learning-zone	0.865	0.986
Effort Expectancy	1. My interaction with this learning-zone is clear and understandable 2. I am skillful in using this learning-zone 3. Learning to use this learning-zone is easy for me 4. I find it easy to use this learning-zone to do what I want it to do	0.821	0.981
Social Influences	1. People who are important to me think that I should use this learning-zone 2. Many people who are close to me think I should use this learning-zone. 3. In general this university has supported the use of this learning-zone 4. This students that made use of online learning-zone have good reputations 5. My lecturers are very supportive of the use of online learningzone for my academic tasks	0.858	0.980

Facilitating Conditions	1. This learning-zone looks secured and attractive for caring out academic tasks 2. This learning-zone gives opportunity for personalizing or customizing individual needs 3. My organization has the right hardware to serve our customers. 4. The university made available adequate references to solve any encountered problem when using this learning-zone 5. This learning-zone is easy to access	0.853	0.982
Behavioral Intention	1. I intend to use this learning-zone in the near future 2. I predict I would use this learning-zone in the near future 3. I plan to use this learning-zone in the near future	0.936	0.996
Use Behavior	1. My knowledge of this learning-zone is 2. My experience of using this learning-zone is: 3. My frequency of using this learning-zone (monthly) is	0.749	0.970

As contained in Table 1, this empirical research has used of content reliability to established the consistency of the hypothesized items in measuring each constructs (John and Reve, 1982).
To achieve reliability in data analyses and hypotheses testing, the researchers used SPSS and AMOS software to test factor and reliability analyses for validity and reliability of measures. The above results in table 1 are good indication of the strengths in the measurement items that were employed in this study.

Results and Discussions

A detailed review of the extant literatures as shown that there are two main methods through which researchers can statistically measure the discriminant validity of a data set, i.e. average variance extracted AVE (as suggested by Fornell and Larcker, 1981) and comparing chi-square of a model through its nested model (Hair et al., 2006). To assess discriminant validity of the data set, this study made used of the average variance extracted (AVE) procedures as described by Fornell and Larcker (1981). Below is table 2 that summarized the average variance extracted (AVE) which is the variance of the indicators that is explained by each factor in the model:

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

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"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 the values of 0.50 and above statistically indicates that the measurement instruments truly measure what it was purported to measure. Notably, the average variance extracted in most existing literatures, usually varies from 0 to 1 and normally represents the output of the ratio as obtained from the total variance that are due to each latent variables as shown in Table 2. For this study, the results in Table 2 indicated that the ratio for all the latent variables were all above the suggested 0.50, ranging from 0.975 to 0.991. Thus, the results in table 2 statistically confirmed that the validity of performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating condition (FC), behavioral intention (BI), use behavior (UB) as valid measure for this research.

Sequel to the above, this study went further to test the proposed conceptual model as shown in Fig. 1 by using the above six constructs. The above measurement items in Table 1 were used in measuring the all the six variables. Below is fig. 2 that aptly depicts the results of the structural equation modeling (SEM) analysis, while the fit indices for each variable in the model are summarized in table 3.

Structural Inner Model with path analyses and R^2

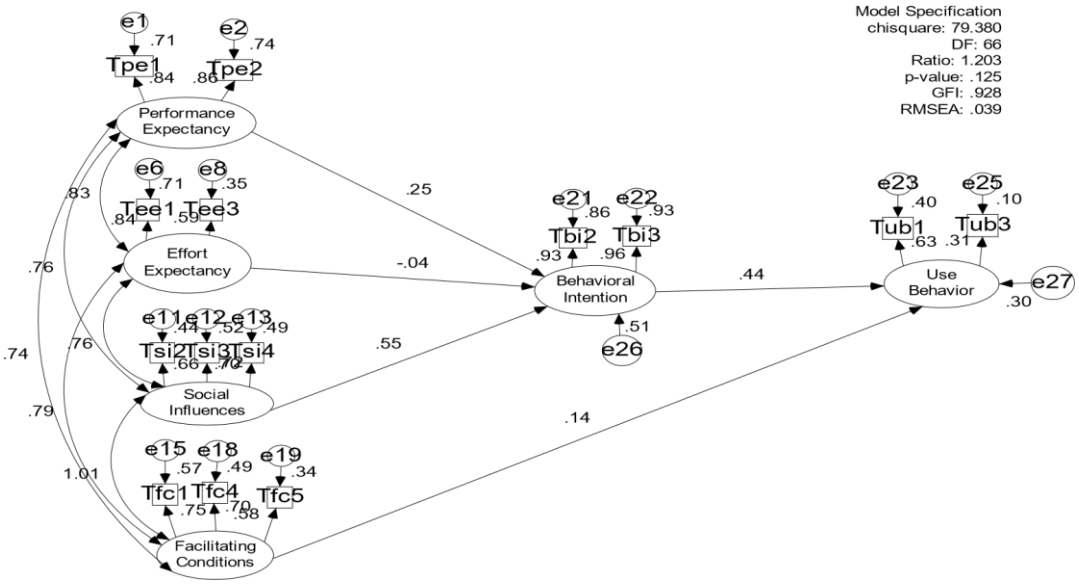

Figure 2: Research Model and Path Coefficients

As illustrated in Figure 2, the result from the final structural model shows that the latent variables in this research explain 51% of the variations in behavioral intention. Similarly, the aggregate results shows that the combined effect of behavioral intention and facilitating conditions only account for 30% of the variability in use behavior, with strong statistical significance between behavioral intention and use behavior. However, the positive relationships between performance expectancy to behavioral intention and facilitating conditions to use behavior are consistent with the hypothesized relationships, but not statistically significant. This result further confirms the findings in Maldonado et al (2011) which established a weak relationship between facilitating conditions and use behavior of elearning. Detail explanations are provided under the discussion and implication part of this study. For further verifications

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of the detail list of the above results, below are tables 3, 4 and 5 which are directly extracted from AMOS 16 on the goodness of fit index, path coefficients, R^2 and the standardized beta estimates for your perusal.

Table 3: Goodness of Fit Index for the Model

Final Models	**Criteria**	**Results**
CMIN/Df	< 5	1.203 (79.380/66)
P-value	> 0.05	0.125
GFI	> 0.9	0.928
CFI	> 0.95	0.985
TLI	> 0.9	0.979
NFI	> 0.9	0.920
RMSEA	< 0.05	0.039

Table 4: Direct Effects of Revised Model

Hypotheses			Estimate	.E.	.R.		Label	R^2
Behavioral Intention	---	Performance Expectancy	.278	.225	1.234	.217	Not Sig	
Behavioral Intention	---	Effort Expectancy	-.048	.249	-.195	.846	Not Sig	
Behavioral Intention	---	Social Influences	.774	.223	3.469	***	Sig	
Use Behavior	---	Facilitating Conditions	.125	.184	.682	.496	Not Sig	
Use Behavior	---	Behavioral Intention	.289	.145	1.994	.046	Sig	
Behavioral Intention								.511
Use Behavior								.299

*__P__ < 0.10;**__P__< 0.05; *** __P__< 0.01, **Sig**, Significant; **Not Sig**, Not Significant

Table 5: Squared Multiple Correlations (R^2)

	Estimate
Behavioral Intention	.511
Use Behavior	.299

As evident in the extant literatures that the path coefficients is statistically equivalent to the

normal standardized beta weights in any multiple regression analysis (Byrne, 2010). Some authors have also argued that the standardized path coefficients should normally be between the values of 0.20 and 0.30 for it to be meaningful (Kantsperger and Kunz, 2005). Meanwhile, Hair et al (2006) argued on the need for a path coefficient to be up to 0.08 as a criteria for retaining it, and that other higher paths values mainly indicates the significant effects that such variables has on the hypothesized relationships. To validate the suggested preposition by Hair et al (2006), the researchers delete the hypothesized relationship between effort expectancy and behavioral intention due to its low path coefficient (-0.04). The results from rerunning an alternative competing structural model without effort expectancy indicates no significant improvement, with an R^2 of 51% for behavioral intention and 29% for use behavior.

In overall, the above results as obtained from the structural model analyzes have empirically show that social influence has a significant effect on students' ability to behave positively towards online learning zone. Remarkably, the path coefficient of 0.55 and p-value of $p < .000$ in the relationship between social influence and behavioral intention depict the importance of university support and folks influence on students' behavior towards online technology adoption. This same result apply to the significant effects that behavioral intention has on students' knowledge and frequency of using online learning zone (path coefficient of 0.44, $p < .04$). Although the direct effect of performance expectancy and facilitating conditions are not statistically significant. However, the result is still consistent with the argument in the extant literatures that the use of online learning zone is very useful for enabling students to personalize and customize their needs in order to accomplish their academic tasks more quickly and that it is positively related to students' behavioral intention. Below is table 6 which consist of detail list of hypotheses as conceptualized in figure 1:

Table 6: Summary of the Hypotheses Testing Results

Hypotheses	Relationships Testing Results
H1	Performance Expectancy → Behavioral Intention Not Supported
H2	Effort Expectancy → Behavioral Intention Not Supported
H3	Social Influences → Behavioral Intention Supported
H4	Facilitating Conditions → Use Behavior Not Supported
H5	Behavioral Intention → Use Behavior Supported

Table 6 proffer answers to the hypothesized relationships of students' intentions to use university online learning zone in Malaysia and their subsequent usage behavior. As hypothesized, the results of the 5 direct structural analyses were entirely based on the minimum error level of 0.05, meaning that there is 95% confidence that the same results would occur if the data were collected over time.

These 5 hypotheses as listed in this research extensively covered the theoretical relationships that exist in technology acceptance model as formulated by Venkatesh et al (2003). Specifically, there are four independent variables in the research model, performance expectancy, effort expectancy, social influence and facilitating conditions. It is good to emphasized that the entire variables in the research model were originally conceptualized by Venkatesh et al (2003) as determinants of technology acceptance, with valid empirical arguments in favor of its applicability within users' acceptance of newly implemented information technology. As indicated in the list of hypothesis above, Hypotheses 1, 2 and 4 were rejected based on their insignificant effects on behavioral intention and use behavior. However, hypotheses 3 and 5 support the hypothesized positive relationships and are both statistically significant on the relationships

between social influence, behavioral intention and use behavior. The rejection of hypotheses 1 and 4 were based on the insignificant impacts that they have on behavioral intention and use behavior.

Conclusion and Implications

The objective of this research is to empirically establish students' behavioral intention and actual use of Moodle 1.9 online learning-zone for academic purposes. This research has established that social influence is a major consequence of student's behavioral intention towards online technology usage. The hypotheses testing results showed that the greater the influence of lecturers, friends, and family, the higher the students adopt online learning zone. Similarly as hypothesized, performance expectancy and facilitating conditions are positively related to student's behavioral intention and actual use of online learning zone. Observably, these relationships lack significant effect that is required to impact students' attitude towards the use of online learning zone. These lacks of significances between performance expectancy, facilitating conditions, behavioural intention and use of Moodle 1.9 type of online learning technology practically suggests that the presence of all needed resources will not automatically guarantee students' adoption of online learning zone. This result is similar to the findings in Maldonado et al (2011), where they found an insignificant relationship between facilitating conditions and students' use of online education portal.

As expected, students' behavioral intention is positive and significantly related to use behavior, an indication that the operational efficiency in students' usage of online technology for learning purposes is strongly dependent on their behavioral intention. However, in contrast to the other four hypotheses, effort expectancy is negative and insignificantly related to students' behavioral intention to use the university's Moodle 1.9 software. Remarkably, the result practically shows that the interactions by this university's students with Moodle 1.9 online learning zone is not clear, hence making it difficult to maximize available opportunities.

A notable reason for this is lack of proper orientation and training that is required to avail students the technical know-how and inherent benefits in using Moodle 1.9 as online learning zone. To avert reoccurrence of students' lack of technical know-how in using online learning zone, this research has the following suggestions. First, the selected university in this study and any other academic institutions should put in place orientation and training programs that will educate lecturers and students with the required skills and knowledge to maximize opportunities in online learning technology. The use of online learning zone should be made compulsory for all lecturers, thereby indirectly influencing students' participation.

This empirical research has clearly availed university authorities with reasons for evaluating students' attitude towards technology implementation. Importantly, academic institutions should focus more on students' technical know-how and inherent benefits in online learning zone. It thus suggest that universities have to provide enough time and training to their lecturers and students to understand the impact of using online learning zone in adding value to their teachings, learning and academic performance. For those academic institutions that are currently considering implementing sophisticated online learning technology, it would be efficient and prudent if they could first determine their students' characteristics and human resource capability. Observably, this research believes that the involvement of information technology experts in online learning zone implementations is beneficial, but it would be far better if academic institutions can provide academic oriented training to these IT officers before deciding on what best online learning technology to be implemented. Similarly, the IT managers ought to practically provide students and lecturers with clear communication and visual demonstrations of the intended IT strategy to be implemented. Doing this will avail academic institutions the likely impact online learning technology could have on their current and potential students.

There are some limitations in this study as it applies to any other studies. The first limitation is that this study has empirically sampled one university in assessing students' behavioral intention towards online learning zone. Hence, the research findings cannot be generalized on other academic institutions. Future research may extend the model to larger sample of academic institutions in regions or countries for establishing students' behavioral intention to online learning zone. This study is also limited in scope given that the conceptualized online learning zone measurement items did not integrate or differentiate the functionality of the actual technology (Moodle 1.9) that is adopted. It thus shows that the scope of this present study primarily avails useful practical and theoretical insights; meanwhile the incorporations of additional factors or measurement instruments are left for further research.

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