ENQUIRY STUDIES OF FACTORS DETERMINING THE USE OF MOODLE FOR LEARNING AMONG STUDENT- TEACHERS IN NIGERIA

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ABSTRACT

Given the trend of uptake of free online resources for learning by higher institutions globally and reasons advances about usage decision, this study set to enquire into determinant of factors influencing the use of Moodle an online resources for learning among student-teachers in Nigeria. The study was a survey type and cross sectional in design. The sample consisted of Two hundred (200) student-teachers. The data of the study was collected via a questionnaire in which school environment, computer self-efficacy and students attitude was an independent variable, while student behavioural intention was the dependent variable. The data of the study was analysed using structural equation modeling (SEM) approach. The findings of the study showed that school environment statistically influence students behavioural intention, students attitude and computer self-efficacy. In fact, attitude was the strongest determinant of student behavioural intention, while school environment greatly influence student computer self-efficacy. The study suggested among other the imperative need of improving the school information technology infrastructures for effective and efficient use of online resources among students and faculty members.

Keyword: Blended Learning, Student attitude, Computer Self Efficacy, School environment, Behavioural intention

Introduction

The application of different internet platform for managing and implementing teaching function has dramatically altered how students learn and ultimately make them more active participants in their learning process. The need to use best practice and acceptable standard for implementing educational curriculum explain the rationale behind the wide spread use of free Internet resources as a medium of transmitting knowledge to the present generation of students all over the world.

Attesting to how the Universities are taking advantages of internet platform for educational related activities, Tarhini, Home and Liu (2013), opined that in the last decade, universities and other institutions of learning are increasingly investing in the use of Information technology and other related innovation for supporting education.

In Nigerian Universities, the integration of technology for classroom teaching continue to evolve and in the recent time, almost all the Universities have in one way or the other integrate internet platform for teaching and learning as well as for school management purposes (Shittu, Sule & Gambari 2013). In line with mission of using global best practice which is also in-tune with policy statement in the National policy of education (FGN, 2013), Federal University of Technology Minna,

Nigeria set to encourage the application of internet resources for teaching among faculty members. To implement this, Centre for Open and Distance Education (CODEL) of the university begin a sensitization mission to all Schools and Departments of the University with a view of encouraging academic members the need to key into the new paradigm and to create awareness of the activities of the centre in the university.

One of the major platforms proposed for e-learning activities in the university by the Centre for distance and e-learning is MOODLE (Modular Object Oriented Development Learning Environment) platform. Moodle is a learning Management System (LMS), it is a free online resources that enable teachers to create their dynamic and effective elearning site for learner (Hsu, 2012). In the recent time, the utilization of Moodle for teaching and learning activities is gaining popularity among educators in developed world due to its ease of use. As learning management system (LMS), moodle contain the following functions such as automate administration, rapid assembly and delivery of learning content, self service and self guided, scalable web based platform, portability and standard support (Ellis, 2009; Hsu, 2012).

Cheung (2006) reiterating the effectiveness of moodle platform for e-learning activities, submitted that moodle is the best

choice for teaching and learning due to its support system. As moodle become an adopted tool among educators, so also research on it use started to grow considerably. Existing stream of literatures suggests that moodle can improve teaching and learning (Davies & Sinclair, 2013; Wu & Hwang, 2010; Blount & McNeill, 2011; Hajjar, 2014). What this suggest is that moodle has becomes another platform to revolutionize the learning process (Hsu, 2012).

The role of student teachers in the implementation of technology for classroom use has been reported to be very important, as a result, their acceptance of new technologies in teaching has become a subject of research in the past decade (Wong, Osman, Goh & Rahmat, 2013). The student teachers are those undergoing training to become professional teacher and by their professional calling, they are to become the gate keeper in the use of technology for implementing school curriculum.

More than any other profession, the student teachers are the touch-bearer when it come to pedagogical use of technology, hence the need to ascertain and gauge their personal belief on the implementation of new innovation in learning.

Various studies have shown that successful implementation and use of new information technologies in teaching to a large extent depends on the user perception and their knowledge of computer skill. For instance, Tarhini et al. (2013) posited that initial acceptance of technology will affect future behavior regarding the use of web based learning platform. Another relevance issue in acceptance of new technologies for teaching, specifically by student teacher is related to their behavioural intention and attitude towards technology itself. Teo (2011) submitted that student teacher attitude is an important determinant of successful integration of technology, while Wong et al. (2013), were of the opinion that student teacher behavioural intention and the support they make will contribute to or inhibit the integration of computer technology in the classroom. With inconsistency in the findings of users' acceptance of technology in teaching and more so, when evident has shown the paucity of research on factors that may influence student teacher use of Moodle for learning in developing country like Nigeria, this study therefore, set to gain insight into factors that may influence acceptance of Moodle as a learning platform.

Theoretical Framework of the Study

Overtime, several models and theories have been developed and used to explain users' attitudes, beliefs, perception and eventual decision towards information system use. Some of these theories include Theory of reason action (TRA), Theory of planned behavior (TPB), Technology acceptance model (TAM) among others. The justification for development of these models arise from huge investment expended by organizations on information technology, since technology by itself cannot guarantee productivity except it is accepted and used by employee, users acceptance therefore become a crucial factor to adoption (Westland & Clark, 2000; Venkatesh, Morris, Davis & Davis 2003).

The development of these models has left researchers in information system and other allied field to array and multitude of choice in terms of model and theory to choose when it come to what determine users adoption pattern (Venkatesh et al, 2003). Among all these theories, technology acceptance model (TAM) developed by Davis (1986) was adjudge to be most parsimonious and widely used (Psycharis, Chalatzuglidis & Kalogiannakis, 2013). In TAM, Davis (1993) posited that actual use of information system is a function of users' behavioural intention, attitude, perceived usefulness and ease of use or degree of difficulty in the system operation. While some studies try to understand how simple or complex an information system is through TAM or UTAUT constructs in relation to adoption decision, some studies focus on user' personal characteristic and attributes. In this study, variable such as computer self efficacy, attitude, and school environment is use as the independent variable, while student behavioural intention is the dependent variable of the study.

Computer Self Efficacy

In Information system literature, computer self efficacy has been identify as an important factor predicting an individual use of information technology related software. The construct was coined by Bandura (1977), computer self efficacy refers to people judgment of their capabilities to organize and execute courses of action required to attain designated types of performance (Bandura, 1986; Wu, Chang & Guo, 2008). To Compeau and Higgin (1995), CSE is an important determinant of intention to deploy information system.

Research study suggested that those

individuals who possess high CSE are more likely to use information technology tool frequently. In a study involve the use of Moodle among practicing teacher in Malaysia by Wong, Hamzah and Hamzah (2014), the study revealed that the driving force behind the use of Moodle is teachers' computer self efficacy. In a similar study which involves science teacher intention towards technology integration in Taiwan by Wu et al. (2008) showed that CSE was found to be a critical determinant of science teacher attitude and intention about technology integration. In this study, based on literature, it is assumed that CSE will influence student teacher behavioural intention toward acceptance of Moodle platform for their learning.

Attitude

In information system domain, users' attitude on acceptance of new innovation for teaching continues to attract researchers' attention. Attitude toward using information technology is defined by Davis (1989), Trayek and Hassan (2013) as the degree to which individual associates and evaluate the target system with his/her job, whether his/her reaction will be positive or otherwise. Ajzen and Fishbein (2005) were of the opinion that attitude toward a behavior is very important in determining technology use. Ajzen explaining a component of the theory of Planned behavioural control stated that the theory is a perception of internal and external behavioural constraint. While internal behavioural constraint has to do with skill and knowledge required to exhibit a specific behavior, external behavioural constraint has to do with resources and opportunities available to an individual to engage in a behavior (Ferdaous, 2009).

A cursory examination of the internal and external behavioural constraints could represent self efficacy and enabling school environment in terms of resources provided for Information technology use for teaching and learning function. Relating Theory of Planned Behaviour (TPB) and Technology Acceptance Model (TAM) as reported by Mathieson (1999) show that attitude is statistically important to explain user intention to use information technology resources. To Bhattachjee and Premkumar (2004), attitude is also a strong construct that can influence an individual to use IT in an organizational setting. Corroborating previous study on attitude, Ndubisi (2004) explained that attitude is related to behavioural intention and that people develop intention to perform a behavior on what they have positive feeling for.

Empirical study on e-learning implementation by Liaw (2007) showed that effective e-learning implementation solely depends on individual user's positive attitude toward information technology and that once an individual develop positive attitude this will give rise to their intention toward use. Similarly, a study by Shih (2008) on understanding the intention to use e-learning system among undergraduate students revealed that student attitude positively influence their intention toward use of e-learning. Sam, Othman and Nordin (2005) study also showed that positive attitude and high computer self-efficacy is a strong determinant for the integration and use of computer for educational activities.

In a study of Hsu (2012) on acceptance of Moodle, the study revealed that behavioural intention was a mediating factor influencing student involvement in the use of moodle. In another study on student attitude and behavior during online testing through Moodle conducted by Berg and Lu (2014) in Taiwan, the finding of the study showed that student express positive attitude to online testing. In a related study on Moodle as a teaching tool by Zakariah and Daud (2013), the study gauge the student perception toward the use of Moodle for learning. The finding revealed that student indicated to have positive perception towards Moodle platform as a medium of learning.

School Environment

In this study like other studies, attempt is made to understand the effect of school environment in term of support from school administration, academics, non-academic staff, technical support as well as availability of information technology facilities for ease of use of internet tool for teaching and learning. For instance, the study of Wong et al. (2014) on understanding what influence practicing teacher use of Moodle for teaching, revealed that school environment greatly influence acceptance of Moodle. Similarly, Chanl.in, Hong, Hong, Chang, and Chu (2006) reported the importance of school environment in the acceptance and use of computer in teaching and learning.

Relating school environment to facilitating condition construct in Venkatesh et al of UTAUT model of acceptance of Information system. The two is almost measuring the same psychological construct in terms of availability and provision of enabling environment. In the study of Raman, Don, Khalid and Raman

(2014) on usage of learning management system (Moodle) among postgraduate students, the finding of the study revealed that facilitating condition significantly influence student behavioural intention to accept and use Moodle as learning management system. In view of evidences' from literature and attempt to reexamine if the reason advance for accepting new innovation in teaching and learning could be extrapolated to Nigeria educational environment, we hypothesized as follow:

Hypotheses

H1: Computer self-efficacy will positively influence student teachers' behavioural intention towards use of Moodle for learning in Nigeria.

H2: Computer self-efficacy will positively influence students attitude toward use of Moodle for learning

H3: Attitude will positively influence student teachers behavioural intention toward use of Moodle for learning

H4: School environment will positively influence student teachers computer self-efficacy to use Moodle for learning

H5: School environment will positively influence student teachers attitude toward use of Moodle for learning

H6: School environment will positively influence student teachers behavioural intention towards the use of Moodle for learning

Methodology

The study employed quantitative research approach. The participants of the study were undergraduate student teachers in one of the Federal University in Nigeria. The instrument used for gathering the data of the study was adapted and modified. Prior to administration of the instrument, it was pilot tested, so as to ascertain the validity and it reliability for the study. In all, a total of two hundred (200) questionnaire were administered and one hundred and eighty-four (184) was found useable. The participants voluntarily participated in the study, in other word purposive sampling method was used for sampling those who volunteer to be part of the study. Out of the participants, one hundred (100) representing 54.3% were male, while eight-four (84) representing 45.7% were female. The student teacher uses were at various levels of their study. Those at 200level were 60(32.4%), 300level were 22(16.3%), 400level were 69(37.5%), and 500level were

33(17.9%) respectively.

Research Instrument

An instrument which was previously validated was adapted, modified and used. The items has been subjected to use in the following studies, Davis, (1989); Venkatesh et al. (2009); Teo, (2009), Compeau and Higgin, (1995) and Thompson et al. (1991). The instrument was divided into two sections. The first section contains the demographic information of the respondents, while the second section contains items used as indicator for the variable of the study (Computer self-efficacy, Attitude, School Environment and Behavioural intention). Each of the construct was measure on a five point Likert-Scale with 1 standing for Strongly Disagree to 5 Strongly Agree.

Data Analysis Method

To analyze the data of the study, structural equation modeling (SEM) was employed. This was carried out to observe the casual relationship in terms of effects of independent on dependent variable. According to Teo, (2009) structural equation modeling allows simultaneous analysis to be perform through which relationship among variables and errors of each variable can be independently estimated, an analysis which cannot be perform with regression technique.

To compute structural equation model, the following steps were taken (a) the data of the study was initially screen for missing and outliers (b) convergent and discriminant validity was computed (c) and the normality of the data was ascertained. To achieve this, the following statistical analysis was computed: computation of factor analysis for ascertaining the dimentionality of the items of the study; computation of skewness and kuitois, mean, and standard deviation. In other to get the reliable result with SEM, the sample size of 100 to150 cases was recommended (Hair, Black, Babin, Anderson & Tatham, 2006; Kline 2005). In the present study, a sample size of 184 student teachers was involved, which meet the recommend threshold for SEM computation.

Descriptive Statistic

The descriptive statistic of the items was computed. Prior to this, the measurement model examined the instrument validity in terms of reliability, convergent and discriminant validity. To ascertain convergent validity, a factor analysis using principal

component with varimax rotation and Kaiser normalization rotation were computed. A total of four construct were extracted, the factor loading were within the range of .79 and .54, and no cross loading of items was observed. As presented in Table 1, the reliability of the construct was computed, and a cronbach alpha of .70, .70, .61 and .64 were obtained for the four constructs of the study. Though the reliability of two construct among the four construct were less than .70 desirable threshold as suggested by Nunnally and Bernstein (1994),

yet a reliability of .60 is still within acceptable range. Other analysis includes ascertaining the normality of the construct by computing for mean, standard deviation, skewness and kurtosis. All the means are above 3.00, the standard deviation range from 1.15 to .71, the skew index ranges from -1.96 to -1.17, while kurtosis index ranges from 4.84 to .99. Based on the adequacy of all the threshold computed, the psychometric properties of the instrument is considered satisfactory for the study.

Table 1:   Descriptive Statistic, Factor Loading and Reliability index of the Items

Items	Mean	Std-Dev	Skewness	Kurtois	Loading	AVE	Cronbach
CSE1	3.97	1.15	-1.37	1.16	.77		
CSE2	4.20	1.01	-1.30	1.03	.62		
CSE3	4.36	.86	-1.96	4.84	.79	.56	.70
ATT3	4.16	.88	-1.25	1.92	.71		
ATT4	3.98	.98	-1.07	.99	.54		
\ATT5	4.20	.89	-1.25	1.55	.65	.65	.70
BI1	4.32	.75	-1.32	2.67	.73		
BI2	4.34	.73	-1.47	3.42	.62		
BI4	4.32	.71	-1.38	4.16	.60	.63	.61
ENV3	4.22	.90	-1.58	3.23	.62		
ENV4	4.26	.76	-1.17	2.48	.55		
ENV5	4.15	.92	-1.49	2.78	.72		
ENV6	4.19	.82	-1.58	3.97	.55	.70	.65

Discriminant Validity

The discrimant validity of the items was ascertained. According to Fornell and Larcker (1981), discriminant validity is observed when the variance share among a construct and other construct in a model is less than the variance that the construct share with its indicator. To check for discriminant validity therefore, the

square root of the average variance explains (AVE) should be greater than the off-diagonal elements in the corresponding rows. In the present study as shown in Table 2, the AVE in the diagonal of the correlation matrix are greater than the elements in the corresponding row. Therefore, discriminant validity is satisfied.

Table 2:   Discriminant Validity of the Measurement Model

	CSE	BI	ATT	SCHENV
CSE	(.56)			
BI	.197**	(.63)		
ATT	.177**	.470**	(.65)	
SCHENV	.271**	.174**	.419**	(.70)

**. Correlation is significant at the 0.01 level (1-tailed).

Test of the Measurement Model

The results of the statistical analyses in figure 1 revealed a near adequacy of the hypothesized model; Chi-square, $X^2(df=37)=$ 533.676; P= .000; RMSEA= 0.090; GFI= .905; CFI= .838. The parameter estimates of the model were free from offending values. Most path effect size yielded a statistical significant critical ratio (CR >1.96). The total standardize effect sizes of
(a) computer self-efficacy → behavioural intention= .17
(b) computer self efficacy → attitude= .13
(c) environment → computer self-efficacy= .52
(d) environment → attitude= .61
(e) environment → behavioural intention= -.36
(f) attitude → behavioural intention= .69. A further look at the analyses showed that the two exogenous variables (CSE and ENV) explained 31% of the variance on student behavioural intention toward free online Moodle for learning, while (CSE, ENV and mediating student ATT) collectively explained 15% of the variability of student behavioural intention of use of free online Moodle for learning.

Fig 1: The structural model of student behavioural intention to free online Moodle for learnin
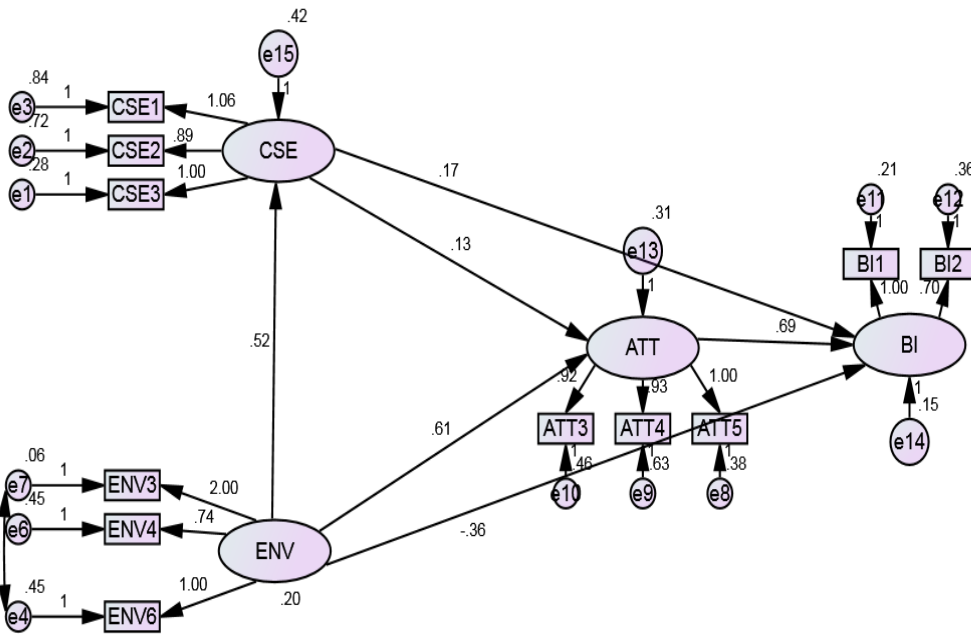
DF 37
CMIN 100.526
RMSEA .104
GFI .905
CFI .838

The model was revised and re-estimated to examined its overall adequacy. In the revise model the direct path between CSE and BI was dropped and also, the direct path between ENV and BI was dropped majorly because of its negative path co-efficient.   After removing the two paths the revised model exhibit a good but marginally adequate compare to acceptable goodness of fit threshold Masrom and Hussein, (2008) with the following fit indices: X^2 (df = 49)= 533.676; p<0.000; RMSEA= 0.097; GF1= 0.93; CFI= 0.90; TLI= 0.90.

Fig 2: The revised of student behavioural intention model to free online Moodle for learning
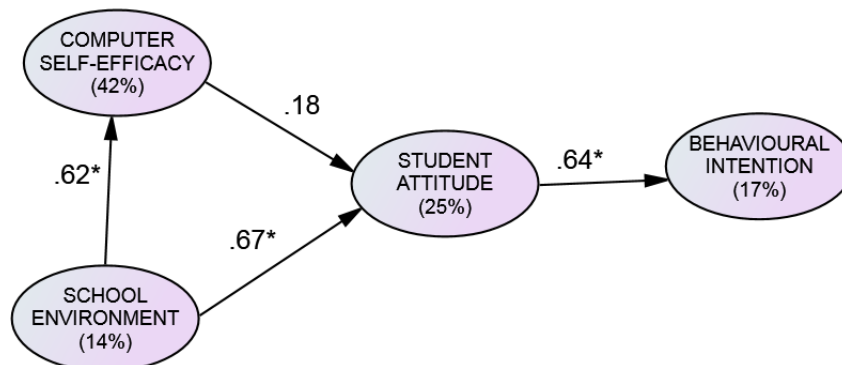
Note: * P<.01 R Square VALUES ARE SHOWN IN PARENTHESES

Hypotheses Testing

In line with the first hypothesis earlier stated that computer self efficacy will positively influence student teachers behavioural intention towards the use of Moodle for learning, the finding in figure 1 revealed an effect size of (β = .17, p < .005), the hypothesis stand validated. On the second hypothesis, that stated computer self efficacy will positively influence students teachers attitude toward the use of Moodle for learning also revealed an effect size of (β = .13, p < .005), also stand validated. The third hypothesis which stated that student teachers attitude will positively influence their behavioural intention toward the use of Moodle for learning revealed an effect size of (β = .69, p < .005), this also stand validated. The forth hypothesis which stated that school environment will positively influence student teacher computer self efficacy revealed an effect size of (β = .52, p < .005), stand validated. The fifth hypothesis which stated that school environment will positively influence student teacher attitude toward the use of Moodle revealed an effect size of (β = .61, p < .005), equally stand validated. The sixth hypothesis which stated that school environment will positively influence student teachers behavioural intention toward the use of moodle with effect size of (β = -.36, p < .005), show that the hypothesis is not supported.

Table 4: Hypothesis Testing Results

Hypotheses	Path	Path coefficient	t-value	Results
H1	CSE→BI	.17	1.998*	Supported
H2	CSE→ATT	.13	1,302*	Supported
H3	ATT→BI	.69	4.517*	Supported
H4	ENV→CSE	.52	2.212*	Supported
H5	ENV→ATT	.61	2.199*	Supported
H6	ENV→BI	-.36	1.585	Non-Supported

Discussion of Findings

Empirically, this study has contributed to the understanding of what informed student teachers behavioural intention toward the use of free online resources (Moodle) for learning. The findings have provided evidence that the items adapted for the study can be used to measure student teachers behavioural intention. As hypothesized, computer self efficacy positively influence students behavioural intention toward uptake of Moodle for learning. This variable was found to explain 47% of the variance in acceptance of Moodle by the student teachers, this finding was in agreement with Wong et al. (2014) study that reported a statistical influence of computer self efficacy as an important factor to the use of Moodle among Malaysia teachers. Similarly, the

finding also supported Wong, Osman, Goh and Rahman (2013) findings on student teachers behavioural intention to the use of technology. Also, the finding of this study revealed that computer self efficacy positively influence student teachers attitude toward the use of Moodle. The finding was consistent with Wu et al. (2008) that reported the importance of CSE to science teacher attitude and intention to the integration of technology for teaching.

Furthermore, the finding of this study revealed that student teachers attitude positively influences their behavioural intention toward the use Moodle. In fact, the finding was statistically strong in term of regression weight and it show 25% of the variance explained. This finding was consistent with earlier studies of Liaw (2007), and Shih (2008) which reported that effective e-learning implementation depend on individual user teachers and student positive attitude toward information system. Another important finding of the study was about the school environment, this study showed that the school environment positively influence computer self efficacy and student teacher attitude toward behavioural intention. The finding revealed 14% variance explained on school environment. The finding was consistent with Wong et al. (2014) and Chanl.in et al (2006) study that revealed the statistical significant of school environment on the use of Moodle. However, the last hypothesis which stated that school environment will positively influence student teacher behavioural intention toward Moodle use was not supported by the data, though, finding from previous studies have reported the importance of school environment to the uptake of Moodle and other e-learning environment (Wong et al, 2014)

Theoretical Implication
The findings of this study have contributed in no small measure to the current understanding of student teachers behavioural intention toward uptake of Moodle for learning in Nigeria. Empirically the study proved that school environment stand to be one of the strongest determinant of Moodle use and it even showed a strong influence on student computer self efficacy. A look at the direct regression weight (effect size) of school environment on CSE and student attitude is enough as evidence. The two paths exhibit the strongest effects in terms of influencing student behavioural intention as shown in the revise model (fig 2).

The model of the study showed a positive and a strong direct relationship between student attitude and their behavioural intention towards Moodle use for learning. In conclusion, the data of this study was found to marginally fitted the theorized model specified and therefore this findings has statistically confirmed some of the reasons for student acceptance decision on Moodle use for learning. Though there could be other reasons which are not capture in the conceptual model which other research study could look into. However this study have tested a model about student behavioural intention towards the use of Moodle and the findings could be a bench-mark for other study in a similar cultural set-up where the study is carried-out and generally it has contributed to literatures on information system research.

Recommendations.
Based on the findings of this study, the followings are recommended:

- Since school environment in terms of availability of internet resources and other computer infrastructures, technical support, and management support has shown to be a strong determinant on student computer self-efficacy which invariably influences students behavioural intention, it is important that the school administration should continue to improve on the existing facility to encourage both students and faculty members use of free online resource (Moodle) for curriculum implementation.
- Students attitude was also a strong determinant on intention to use, it is therefore important that the faculty members should encourage and motivate student so as to increase their positive disposition for the use of online resources for learning.
- Since the university is transiting into the use of this new tool, regular training and workshop is required to increased both student and teachers technology skills in terms of content delivery through online resources and effective use of the Moodle platform for productive learning and collaboration among student-teachers.

References
1. Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracin, B.T Johnson, & M.P. Zannaa (Eds). The handbook of attitudes. Mahwah NJ: Lawrence Erlbaun Association
2. Bandura, A. (1977). Self efficacy: Toward a unifying theory of behavioural change. Pshychological Review. 84, 191-215
3. Bandura, A (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall
4. Berg, D.R., & Lu, Y.C. (2014). Taiwanese student attitudes towards and behavior during online testing with moodle. Proceeding of classic 27-39
5. Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *MIS Quarterly, 28 (2), 229-254*
6. Blount, Y., & McNeill, M. (2011). Fostering independent learning and engagement for postgraduate students. Using a publisher-supplied software program. *International Journal of Educational Management. 25 (4). 390-404*
7. Chanl.in, L.. Hing, J., Hong, T., Chang, S., & Chu, H. (2006). Factor influencing technology integration in teaching: A Taiwanese perspective. *Innovation in Education and Teaching International. 44 (1), 57-68*
8. Compeau, D.R., & Higgin, C.A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly. 19 (2). 189-211*
9. Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, pg. (319-340)*
10. Davies, M., & Sinclair, A. (2013). The effectiveness of on-line discussion for preparing students for a Paaideia Seminar. Technology, Pedagogy and Education. 22 (2), 173-179
11. Ell-Hajar, S.T. (2014). An empirical study about the influence of moodle on the teaching-learning process at higher institution
12. Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation modeling with unobservable variables and measure error. *Journal of Marketing Research, 48 (1). 39-50*
13. Hair, J., Black, B., Babin, B., Anderson, R., & Tatham, R. (2006). Multivariate data analysis.6th ed. Upper Saddle River. NJ: Prentice-Hall
14. El-Hajjar, S.T. (2014). An empirical study about the influence of moodle on the teaching – learning process at higher institution. *Journal of Advance in Educational Technologies. 182-185*
15. Hsu, H. (2012). The acceptance of moodle: An empirical study based on UTAUT. Creative Education, Vol 3. 44-46
16. Kline, R.B. (2005). Principal and practice of structural equation modeling. (2nd edition). New York: Guildfield Press.
17. Liaw, S. (2007). Investigating student perceived satisfaction, behavioural intention and effectiveness of e-learning: a case study of the blackboard system. Computer & Education. 49
18. Mathieson, K. (1999). Predicting user interaction: comparing the technology acceptance model with theory of planned behavior. *Information Systems Research. 2 (3), 173-199*
19. N dubisi, N.O. (2006). Factors of online learning adoption: a comparative juxtaposition of the theory of planned behavior and the technology acceptance model. *International Journal on E-learning. 5 (4), 571-592*
20. Psycharis, S., Chalatzoglidis, G., & Kalogiannakis, M. (2013). Moodle as a learning environment in promoting conceptual understanding for secondary school students. *Eurasia Journal of Mathematics, Science & Technology Education. 9 (1), 11-21*
21. Raman, A., Don, Y., Khalid, R., & Rizman, M. (2014). Usage of learning management system (Moodle) among postgraduate students: UTAUT model. *Asian social science. Vol 10 (14). 186-192*
22. Wong, K.T., Hamzah, M.S.G.B., & Hamzah, M.B. (2014). Factors driving the use of Moodle: An empirical study on Malaysia practicing teachers' perspective. *Journal of Research, Policy & Practice of Teachers & Teacher Education. Vol 4, (2) 15-23*
23. Wong, K.T., Osman, R., Goh, P.S.C., & Rahmat, M.K. (2013). Understanding student teachers' behavioural intention to use technology: Technology acceptance model (TAM) validation and testing. *International Journal of Instruction. Vol 6 (1) 89-104*
24. Wu, W., Chang, H.P., & Guo, C.J. (2008). An empirical assessment of science teachers' intention toward technology integration. *The Journal of Computers in Mathematics and Science*

Teaching. 27, (4) 499-520

25. Shih, H. (2008). Using a cognitive-motivation control view to assess the adoption intention for web-based learning. *Computer & Education. 50, 327-337*

26. Tarhini, A., Hone, K., & Liu, X. (2013). Factors affecting students' acceptance of e-learning environment in developing countries: A structural equation modeling approach. International Journal of Information and Education Technology. Vol 3. (1), 54-59

27. Teo, T. (2009).The impact of subjective norm and facilitating condition on pre-service teachers' attitude toward computer use: a structural equation modeling of an extended technology acceptance model. *Journal educational computing research. 40 (1), 89-109*

28. Teo, T. (2011). Factors influencing teacher intention to use technology: Model development and test. *Computer & Education. 56 (4). 1016-1023*

29. Thompson, R.I., Higgins, C.A., & Howell, J.M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly, 15 (1), 124-143*

30. Trayek, F.A.A., & Hassan, S.S.S. (2013) Attitude towards the use of learning management system among University students': A case study. *Turkish Online Journal of Distance Education. Vol 14 (3)*

31. Venkatesh, V., Morris, M.G., & Davis, F.D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27 (3). 425-478*

32. Wu, W., & Hwang, L-Y. (2010). The effectiveness of blended learning for blended courses in colleges: A multi-level empirical study. *International Business Management. 8(4), 312-322*

33. Zakaria, E., & Daud, M.Y. (2013). The role of technology: Moodle as a teaching tool in a graduate mathematics education course. Asian Journal of Management Sciences & Education. Vol 2 (4). 46-52