Original Article

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Behavioral Intention for Mobile Learning on 3G Mobile Internet Technology in South-West Part of Nigeria

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ABSTRACT [ENGLISH/ANGLAIS]

With the evolution and adaptability of 3G telecommunication features on handheld devices, education tends to go out of conventional campus into a feat where teaching and learning could be ubiquity, convenient, location independent and personalized. The rapid growth of mobile users will push educational institutions to adopt mobile learning solution. We propose and verify a theoretical framework of university students' m-learning acceptance and intention to use, based mainly on the Technology Acceptance Model (TAM). A sample of 458 university students took part in this research. The structural equation modeling techniques are employed to explain the adoption processes of hypothesized research model. A theoretical general framework TAMM is developed based on TAM. Our result proved that psychometric constructs of TAM can be extended and that TAMM is well suited, and of good theoretical tool in understanding users' acceptance of mobile learning in south west part of Nigeria. Mobile learning self-efficacy is the most importance construct influencing behavioral intention to use m-learning with path co-efficient of 0.77 and t-value of 1.76* at $p < 0.05$ which is significant. Self efficacy is able to explain the highest percent of the variance (70) observed in behavioral intention to use m-learning in south-west part of Nigeria.

Keywords: Mobile learning ,TAM, TAMM, mobile learning self-efficacy

RÉSUMÉ [FRANÇAIS/FRENCH]

Avec l'évolution et l'adaptabilité des fonctions de télécommunication 3G sur des appareils portables, l'éducation tend à sortir du campus conventionnel en un exploit où l'enseignement et l'apprentissage pourrait être ubiquité, emplacement pratique et indépendant et personnalisé. La croissance rapide des utilisateurs mobiles va pousser les établissements d'enseignement à adopter solution mobile d'apprentissage. Nous proposons et vérifier un cadre théorique des étudiants d'université «m-learning acceptation et l'intention d'utiliser, basée principalement sur le modèle d'acceptation de la technologie (TAM). Un échantillon de 458 étudiants universitaires ont pris part à cette recherche. Les techniques de modélisation par équation structurale sont utilisées pour expliquer le processus d'adoption du modèle de recherche hypothétique. Un cadre général théorique TAMM est développé sur la base de TAM. Notre résultat a prouvé que les constructions psychométriques de TAM peut être étendu et que TAMM est bien adapté, et d'outil théorique pour comprendre l'acceptation de bons utilisateurs de l'apprentissage mobile dans le sud-ouest partie du Nigeria. L'apprentissage mobile auto-efficacité est le plus important de construire influençant l'intention comportementale d'utiliser m-learning avec le chemin de la co-efficacité de 0,77 et t-value de 1,76 * p <0,05 ce qui est important. L'auto-efficacité est capable d'expliquer le plus élevé pour cent de la variance (70) observée dans l'intention comportementale d'utiliser m-learning dans le sud-ouest partie du Nigeria.

Mots-clés: Mobile learning ,TAM, TAMM, mobile learning self-efficacy

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INTRODUCTION

The proliferation of mobile computer technology and handheld IT devices play a vital role in mobile learning, which allow users to access learning materials anytime and anywhere [1,_2,_3,_4,_5,_6]. Chen [7] summarized the characteristics of mobile learning which distinguish it from conventional learning where all the educational activities are carried out at a designated time and place, and from desktop computerized education where leanings are confined to places where wired connection are available. The IT and telecommunication industries need to understand what factors will influence the user' intention to adopt m-learning technology to support their implementation. The 3G mobile internet technology can be used as an efficient and instructional learning tool. Our aim is to examine factors affecting the user's adopting mobile learning on 3G mobile telecommunication. The objectives of the study are to

analyze the hypothesized relationship of university students' intention to use m-learning with selected latent constructs such as their attitude, perceived usefulness , perceived ease of use, subjective norm, enjoyment, self–efficacy of m-learning and system acceptability , to develop a general linear structural model, (TAMM), of m-learning acceptance of university students that would provide comprehensive insights for both educational managers and educational policy markers to implement mobile learning.

Technology acceptance model (TAM) originally proposed by Davis in 1986 is one of the well known models related to technology acceptance and its use. TAM has been theoretically tested to be a model in helping to explain and predict users' behavior of information technology [8]. Davis [9] and Davis et al [10] proposed TAM to explain why a user accepts of rejects Information Technology by adapting TRA, Theory of Reasoned Theory. TAM suggests that perceived usefulness and perceived ease of use are beliefs about a new technology that influence and individual's attitude toward and use of that technology [10]. Original version of TAM can be obtained from Davis [9]. TAM appears to account for less than 50% of user acceptance [11]. Original version of TAM is shown in Figure 1. Figure 2 represents a theoretically interesting model to be tested and analyzed (TAMM). The arrows linking constructs (latent variables) indicate hypothesized causal relationships in the direction of arrows.

MATERIALS AND METHODS

Study Area

The study was carried out in Joseph Ayo Babalola University (JABU), Ikeji-Arakeji in Osun-State, Nigeria. It is located approximately at the intersection of latitude 7° 24′ 58″ North of the Equator and longitude 4° 58′ 08″ East of the Greenwich Meridian. Ogunrewo et al [12] published that JABU has had an ICT policy in place in order to drive its ICT activities. The constituents of the policy include: establishment of a portal and functional website, establishment of social networks, introduction of e-learning /e-library, establishment of computer management policy, creating of hotspots and expansion of networks, creating a website for entrepreneurship and innovation, formulation of distance and e-learning policy, etc. Joseph Ayo Babalola University is ICT driven and is five years old now.

Research Mobile Devices

Handheld devices that are compatible with and supported by the organization providing the m-learning are carefully selected. The ability to read the screen, upgrade the devices OS, built in application by means of flashable read only memory, its adaptability to its attached devices using Java Micro Editor (J2ME): JSR75 (for managing XML files) JSR 184 (for visualizing the M3G and M4G files) and JSR 234 (for reproducing multimedia), and extend functionality by connecting an external keyboard, a wireless network card. The various mobile and IT handheld devices used in this study are Smart phone Motorola MOTO Q9c, PDA; Nokia N91 communicator, Nokia E90, Nokia 9500 communicator, palmtop and laptop.

Data Collection

Respondents for this study are the students in Joseph Ayo Babalola University, [JABU], that have much interest to access mobile learning via given/their handheld devices. They were made to study in m-learning and thereafter taking part in all m-learning activities for the success of this research study. The population was divided into four groups. Each group in the survey was provided with various mobile devices highlighted above selected students were also encouraged and allowed to use their personal mobile devices in addition to the ones supplied for this study. All the smart phones used are empowered by MTN and Zain Telecommunication that offer 3G broadband internet access by EV.DO Rev. The rest of the handheld devices used are empowered MTN internet data cable by MTN Telecommunication that also offers 3G Broadband Internet access. The handheld devices have inserted memory card for easy communication and for self-evaluation at the end of the studying and for learning processes. Individual group thereafter used their handheld devices to study on m-learning websites on m-learning learning activities discussed below. Thereafter mobile-evaluation took place between the students and their attached memory cards. All data took place between the mobile sites, the devices and the attached memory card. Participants were consequently administered a test to evaluate the knowledge they have acquired. Survey mobile instructional-materials were made available to the participants via the selected websites. After the m-learning exercises they are to complete the questionnaire on the sites or via given questionnaire. Apart from completing questionnaires after the survey for data collection, participants were also made to answer multiple choice tests on the mobile sites. Over 500 participants took place in the survey but 458 completed questionnaires were made available.

Research Mobile Learning

In line with Costabile et al. [13], Mobile learning websites used in this survey are:

(i) www.jabu.edu.ng
(ii) www.jabulibraryonline.org
(iii) www.yahoomail.org

The participants were to open site (i) and (ii) above with respective user name/password, after click m-learning box, download instructional materials with mobile devices and thereafter study the mobile materials and answer the questions and Questionnaire. Each participant was required to open his/her yahoo mailbox and open mobile instructional materials that had been sent to each participant's mailbox, study the materials, answer the questions and fill the questionnaires.

Survey Instrumentation

Content validity is established by carefully examining, selecting and modifying the scale items of TAM in order to represent the concept about generalizations which are to be made. Items selected for the constructs are adapted from previous researchers. The completed instrument consists of four parts. Part I is designed to identify demographic attributes of the respondents. The questions in Part II are not only made based on Davis's prior studies, [8,_9} with modifications to fit the specific context of the TAMM m-learning but also mainly adapted from the three studies [14,_ 15_, 16] for the objectives of the study. Part II consists of four sub-sections, as follows: perceived ease of use (PE), perceived usefulness (PU), attitude (AT), and behavioral intention (BI). The questions in Part III are developed by the researcher to measure enjoyment (EJ) and m-learning self-efficacy (SE). The questions in Part IV were divided into two sections: subjective norms (SN) and system accessibility (SA). All constructs were measured on seven-point Likert-type scales, from 1 = strongly disagree to 7 = strongly agree. The survey instrument is shown in appendix A.

Statistical Procedure

All data are collected and coded. The coded version is recorded in an MS Excel Program and later analysis by Statistical Analysis System (SAS), for descriptive statistical analyses. Hypotheses by structural equation modeling (SEM) are tested by LISREL program. Two online Research Calculators, Construct Validity and direct/indirect effect of path analysis were employed and used in [17] and [18] respectively to justify objectives of this study.

RESULTS

Data analysis and the result for this study will be grouped into: measurement assessment model, descriptive analysis, analysis of measurement model, assessment of the model and structure model analysis.

The Assessment of Measurement Model

To measure the integrity and acceptability of the TAMM's indicators, exploratory factor analysis was conducted on all the indicators. However, after factor analysis testing, this study found 3 items generated low factor loadings (EJ1, EJ2 and SE1) in Table 6. These 3 items were deleted from measurement instruments and from TAMM in line with Teresa et al [19]. Result of the remained measurement indicators is shown in Table 5 as summary of psychometrics properties of constructs and items.

Descriptive Analysis

Table 2 presents demographic information of the respondents. As a result, 458 usable questionnaires were obtained, of which 48.03% were male respondents. The majority of the respondents, 73.36%, were between 21 and 25 years of age, and 100% possessed mobile-devices. Approximately, 43% of the populace had used internet based mobile devices to date. 100% of the populace had used wireless mobile communication devices for 8years, with a mean of 4.6 years. 54% of the survey sample has had mobile learning experience before the research. 93% (N=424) attested to the fact that they have acquired knowledge/ information at the end of the m-learning exercises.

Analysis of Measurement Model

In the measurement model, both convergent and discriminate validity were checked and validated. Convergent validity implies the extent to which the indicators of a factor that are theoretically related should correlate higher. All factors loading range from 0.53 to 1.0, of average of 0.72, and which accounted for 51 percent of variances in the observed indicators of TAMM measurement model. The factor loadings for all the indicators are shown in Table 5 and 6. Hair *et al.* [20] recommended retaining items with factor loading of 0.50 or above and considered them to be very significant. Considering the sample size of this study, these scores are significant at a 0.05 significant level and a power level of 80 percent [20,_21,_11]. Therefore, this result suggests an adequate convergent validity of the measurement. Discriminant validity was also confirmed by examining correlation among the constructs. As a rule of thumb of 0.85 correlation or larger correlation to be poor discriminant validity in structural equation modeling [8]. None of the correlations is above .85 as shown in Table 3. The result suggests an adequate discriminant validity of the measurement.

The Assessment of Model

The fit of the entire model was assessed by several common model fit measures. As a result, the LISREL all the model goodness-of-fit indices were within the accepted thresholds, which mean that all the goodness-of-fit indices surpassed the acceptable levels. Except for the χ^2 test result, all absolute measures were significant and considered acceptable. Since χ^2 statistics are sensitive to the number of subjects and require assumption of multivariate normal distribution, other measures are better to consider as criteria for model fitting. Goodness-of-fit (GFI), adjusted goodness-of-fit (AGFI), normalized fit index (NFI), comparative fit index (CFI), root mean square residual (RMSR), root mean square error of approximation (RMSEA), root mean squared residual (RMR), and critical N (CN) are examined and shown in Table 1. Assessing all measures, the full general structural model was accepted and believed to be good enough to analyze the parameter estimate.

Structural Model Analysis

According to Bagozzi [22] and Park, S. Y. [11], hypotheses can be examined and analyzed according to three parameters: statistically significant relationship in

the predicted direction, magnitude of the path coefficients among constructs and the explanatory power among the constructs. Hypotheses are examined by confirming the presence of a statistically significant relationship in the predicted direction by observing the value of t-value of the path coefficients among constructs. Liao C.H et al [23] claimed that paths t-value less than 1.2 are judged to be non-significant. As far as behavioral intention is concerned, attitude, perceived usefulness, perceived ease of use and m-learning self efficacy are identified to be significant. The parameters for the hypothesized paths, their t-values, and result of hypotheses are summarized in table 4. Also, hypotheses are examined by confirming the magnitude of the path coefficients among constructs in the TAMM. The coefficients larger than 0.1 are judged to be significant [24,_20]. In the context of behavioral intention, key endogenous construct of the study, all the relationships among the constructs (path coefficients) were significant except subjective norms and system accessibility. The strongest magnitude was found in a relationship between m-learning self efficacy and behavioral intention (γ_{15} = 0.77) followed by perceived ease of use (β_{13} =0.42). Parameter estimates of general structural model are shown clearly on figure 3. Considering the above statements in aggregate with the objectives of this study, the following affirmative deductions can be made:

1. Self efficacy was the most important variable influencing behavioral intention to use m-learning with path coefficient of 0.77 and t-value of 1.76* at P<0.05 which is significant. Self efficacy was able to explain the highest percent of the variance (70) observed in behavioral intention to use m-learning.
2. Followed by self-efficacy was the perceived usefulness with path coefficient of 0.42 and t-value of 3.04*** at P <0.001 which is very highly significant. It explained 51 percent of the variances observed in behavioral intention to use m-learning.
3. Followed by perceived usefulness was the perceived ease of use with path coefficient of 0.32 and t-value of 1.96* at P <0.05 which is significant. It explained 49 percent of the variances observed in behavioral intention to use m-learning.
4. Lastly was the m-learning attitude with path coefficient of 0.29 and t-value of 5.9*** at P <0.001 which is very highly significant. It explained 23 percent of the variances observed in behavioral intention to use m-learning.

Figure 1: This figure shows original technology acceptance model (TAM) as adopted from Davis et al 1989

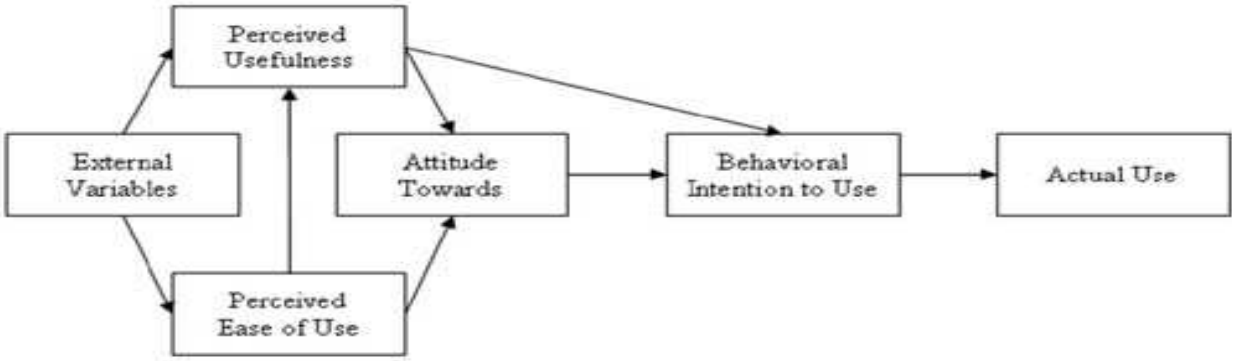


Table 1: This table shows goodness of fit measures for SEM

Fit measures	Values	Recommended Values
X^2	207.4 (p = 0.0)	p > 0.05
RMR	.041	<.05
RMSEA	0.079	<.10
GFI	.967	>.90
AGFI	.930	>.90
NFI	.972	>.90
CFI	0.99	>.90
CN	245.4	>.200

DISCUSSION AND CONCLUSION

This study proved that m-learning self efficacy, perceived ease of use, perceived usefulness and attitude were the major determinants influencing behavioral intention to use m-learning in mobile technology. These assessments are in line with Selim [25] who claimed that perceived usefulness and perceived ease of use turned out to be good determinants of the acceptance and use of a course

website as an effective and efficient learning technology. Chau [26] hypothesized that behavioral intention to use a particular technology is dependent on perceived ease of use. Similarly, the above findings are in line with Bhattecherjee [27], who confirmed perceived usefulness and attitude toward usage have a significant impact on intention to use electronic commerce service. A number of studies on perceived ease of use [10,_28,_29] have indicated that perceived ease of use significantly affects intention to use computers. However, results of this research acclaim to the fact that m-learning self efficacy and perceived ease of use play important roles in behavioural intention to use m-learning on 3G mobile internet technology. Self efficacy may be considered as intrinsic motivational factor that could help university students self-regulate their motivation on mobile learning.

Figure 2: This figure shows theoretical Research Model (TAMM)

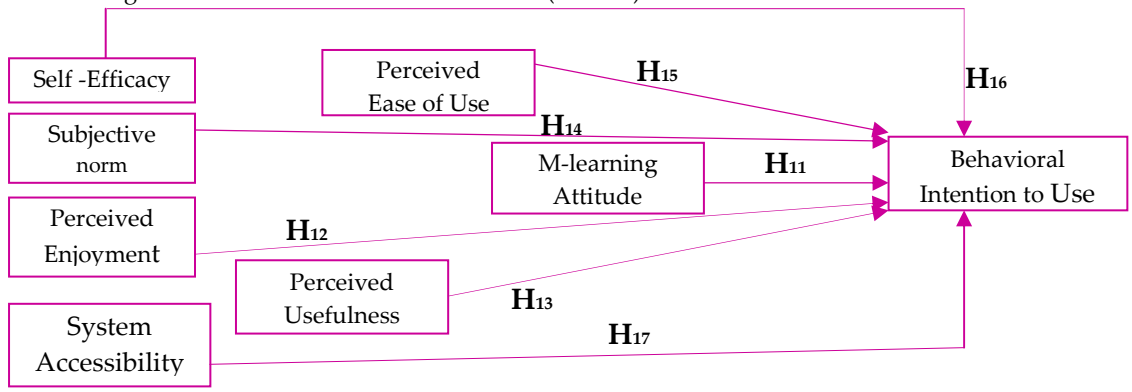
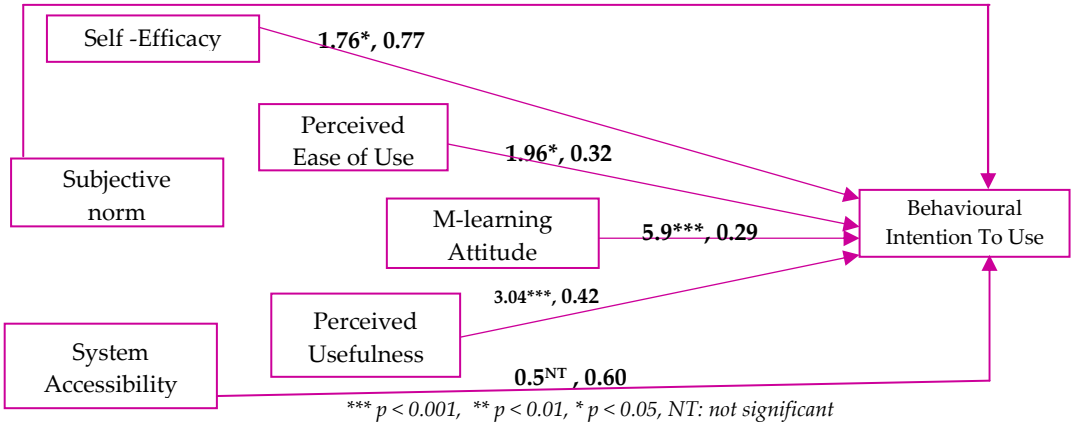


Figure 3: This figure 3 shows Parameter Estimates of Theoretical Research Model (Structure equation model analysis)



In JABU, all students are motivated and encouraged to use IT gadgets to meet their studentship needs. University wide local area network (WLAN) also serves as motivational tools to launch out to the world of university e-library, a mobile library, in which every student has accesses to via their mobile devices to get electronic text, electronic journal and e-instructional materials to support their teaching and learning processes. This study has virtually increased JABU students' interest to engage in m-learning teaching and learning processes because they think m-learning experience will be beneficial for future job preparation. However, as the world turns into global village, they are emotionally ready to engage in m-learning as most of their course materials are electronic, and as university sets to be among the best in the nation and in the world. Majority of the claims are consistent with previous research, whereas some parts are contrary to previous researchers. One possible reason is that learning to use the Internet is considered and generally believed easy nowadays. Ogunrewo et al. [12] concluded that the use of internet had greatly enhanced and contributed to effective, efficient and high performance level of academic staff members in the university (JABU) which have also impacted and influenced the students positively. Majority of our students have gained and acquired learning experiences via compulsory training they were earlier subjected to by the university authority. Therefore, both cognitive constructs could not directly affect the university students' intention to use m-learning. Rather, those constructs affected attitude toward m-learning and attitude affected intention to use. The results of this study have demonstrated that some TAMM constructs had causal links on university students' behavioral

intention to use m-learning. For that reason, there is potential for practical and theoretical application in the development and management of m-learning in university. Firstly, educators and managers should make an effort in boosting university student m-learning self efficacy.

Table 2: This table shows demographic information of the respondents

Variables	Values	Number (N)	Percent (%)
Gender	Male	220	48.03
	Female	238	51.97
Age	<20	81	17.69
	21—25	336	73.36
	26---30	31	6.77
	31 >	10	2.18
Education	undergraduate	458	100
Degree of mobile devices usage	< 4 years	316	69.00
	> 4 years	142	31.00
Degree of internet based mobile devices usage	> 2 years	35	7.64
	< 2 years	162	35.37
	NIL	261	57.00
Degree of wireless mobile communication devices	< 4 years	278	61.00
	> 4 years	180	39.00
Degree of mobile learning experience	< 2 years	197	43.01
	> 2 years	50	10.92
	NIL	211	46.07
Degree of internet experience	< 4 years	360	78.60
	> 4years	98	21.40
Availability of internet	home	115	25.11
	Jabu	458	100
Degree of attestation to the knowledge acquired via m-learning activities	YES	424	92.58
	NO	34	7.4

Table 3: This table shows Correlation matrix between constructs

Constructs	BI	AT	PE	PU	SE	SN	SA
Behavioral intention (BI)	1.00						
Attitude toward m-learning (AT)	.484	1.00					
Perceived ease of use (PE)	.551	.56	1.00				
Perceived usefulness (PU)	.711	.68	.702	1.00			
M-learning self efficacy (SE)	.839	.245	.434	.603	1.00		
Subjective norm (SN)	.709	.681	.715	.755	.534	1.00	
System accessibility (SA)	.676	.241	.444	.538	.666	.591	1.00

Table 4: This table shows direct estimation of Structural relationship among TAMM

Parameters	Path Coefficient	t-value (β)	Coefficient Determination (%)	Hypotheses Path Symbol	Result of Hypotheses
AT---BI	0.29	5.9***	23	(β_{11})	supported
PU---BI	0.42	3.04***	51	(β_{13})	supported
PE---BI	0.32	1.96*	49	(β_{14})	supported
SE---BI	0.77	1.76*	70	(γ_{15})	supported
SN---BI	0.71	0.54	50	(γ_{16})	NOT supported
SA---BI	0.60	0.5	46	(γ_{17})	NOT supported

Both on- and off-line support should be provided to build up m-learning self efficacy. In JABU university electronic library-virtual tools as alternate to teaching and learning need to be appraisal and given better attention. Therefore, it is necessary for the university to put more emphasis on m-learning by offering a greater variety of m-learning courses and advertising the benefits of m-learning to attract students. With the proliferation of technology-based initiatives in education, studies evaluating the adoption of such IT-based initiatives in education provide insight of such initiatives. These results can be used for diagnostic purposes and for the planning and management for technology-based initiatives in education. From a theoretical perspective, the research contributes to the general adoption of TAMM for mobile internet technology. In this research, some of our interests are in specifically looking at the roles that mobile technologies can play in helping university students in the learning process, be more productive and effective. One of the values of this research lies in a better understanding of how mobile technologies can be best used in a learning environment and how the effectiveness of mobile learning system plays role in learning system. In this research we found that self-efficacy as the major determinants in affecting behavioural intention to use, perceived usefulness and perceived ease of use. Students who have higher self efficacy are likely to cultivate behavioural culture, to intention to use m-learning on 3G mobile technology. Conclusively, m-learning reduces the barriers of time, place and distance and provides learning opportunities to individual learners, companies and institutions.

Table 5: This table shows summary of psychometrics properties of constructs and items

Constructs Measurement	Mean	Standard Deviation	Factor Loadings	Squared Multiple Correlation	Composite Reliability	Average Variance Extracted
Perceived ease of Use						
E1	5.18	0.98	.59	0.35		
E2	4.17	1.01	.64	0.41	.82	.54
E3	4.35	1.21	.68	0.46		
E4	4.76	1.01	.66	0.44		
Perceived Usefulness						
U1	4.24	1.20	.69	0.48		
U2	4.36	0.99	.78	0.62	.89	.68
U3	4.85	0.93	.73	0.52		
U4	4.92	1.16	.76	0.58		
Attitude						
A1	4.52	1.23	.81	0.66		
A2	4.50	1.27	.86	0.74	.91	.67
A3	4.43	0.88	.64	0.74		
A4	4.22	1.11	.69	0.49		
A5	4.88	1.02	.66	0.44		
Behavioral intention						
BI1	4.30	1.25	.65	0.42		
BI2	4.41	1.12	.88	0.77	.885	.723
BI3	4.47	1.32	.78	0.61		
M-learning Self efficiency						
SE2	4.0	1.28	.67	0.45		
SE3	4.75	1.10	.65	0.42	.72	.56
Subjective norm						
N1	4.36	1.01	.70	0.49		
N2	3.46	1.21	.67	0.45	.77	.53
N3	3.55	1.22	.53	0.28		
System Accessibility						
SA1	5.01	0.99	1.0	1.0	N/A	

Scale: 1 = strongly disagree ~ 7 = strongly agree. All loadings were significant based on t-values.

Table 6: This table shows summary of means, standard deviations, construct loadings, and reliabilities

Construct	Measurement instrument	Mean/STD	Loading	α/ρ
Perceived ease Of use (PE)	I find m-learning website system easy to use (E_1)	5.18/ 0.98	.59	
	It is easy to interact with the sites via the given handheld device (E_2)	4.17/1.01	.64	
	It is easy to become skillful at using handheld device in m-learning (E_3)	4.35/1.21	.68	.82/.54
	Learning via m-learning is understandable (E_4)	4.76/1.01	.66	
Perceived Usefulness (PU)	M-learning would improve my learning performance (U_1)	4.24/1.20	.69	
	M-learning would enhance my academic effectiveness (U_2)	4.36/0.99	.78	
	M-leaning would increase my academic productivity (U_3)	4.85/0.93	.73	.89/.68
	M-learning could make teaching & learning easier to study (U_4)	4.92/1.16	.76	
Attitude (AT)	Studying through m-learning is a good idea (A_1)	4.52/1.23	.81	
	Studying through m-learning is a wise decision (A_2)	4.50/1.27	.86	
	I am positive toward m-learning (A_3)	4.43/0.88	.64	.91/.67
	Studying via m-learning is affective appealing (A_4)	4.22/1.11	.69	
	I am of the view that students should adopt m-learning (A_5)	4.88/1.02	.66	
Behavioral intention (BI)	I intend to check other meanings given to m-learning in other sites via my handheld device (BI_1)	4.30/1.25	.65	
	I intend to be a heavy user of m-learning websites (BI_2)	4.41/1.12	.88	.885/.723
	I would not hesitate to start m-learning at my own (BI_3)	4.47/1.32	.78	
Enjoyment (EJ)	I can easily remember what I have learnt (EJ_1)	4.32/1.26	.074	
	Studying/learning via m-learning is enjoyable (EJ_2)	4.66/1.09	.07	. 17/.097
M-learning self efficacy(SE)	I feel confident finding information/ knowledge /acquiring new thing in the m-learning system (SE_1)	4.66/1.20	0.06	
	I have the necessary skills for using handheld devices on selected websites (SE_2)	4.01/1.28	.67	.72/.56
	I am capable to studying in m-learning environment (SE_3)	4.75/1.10	.65	
Subjective norm (SN)	What m-learning stands for is important for me as university student (N_1)	4.36/1.01	.70	
	In order for me to prepare for future research/job, it is necessary to studying in m-learning environment (N_2)	3.46/1.21	.67	
	Society will embrace m-learning as I value it (N_3)	3.55/1.22	.53	.77/.53
System accessibility (SA)	I no difficulty accessing and using m-learning website with given handheld devices (SA_1)	5.01/0.99	1.0	N/A

Scale: 1 = strongly disagree ~ 7 = strongly agree. All loadings were significant based on t-values

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SURVEY INSTRUMENTS (QUESTIONNAIRE)

Part I

Please circle/tick and answer the fill the instrument appropriately

Gender: M / F

undergraduate……..postgraduate……

Age Group: 15—20…… 21----25…… 31 & above…….

i. Have you used mobile devices before……,if *YES* since when …….. and mention the type/name……
ii. Have you used internet based-mobile devices before……,if *YES* since when …….. and mention the type/name……
iii. Have you used wireless mobile communication device before…….. if *YES* since when …….. and mention the type/name……
iv. Have you received on-line learning /knowledge/information before on your mobile phone or Handset before ……..if YES since when……
v. Have you used internet before, if YES since when…….
vi. Availability of high speed internet at home …….. at school……
vii. Have you learnt anything by using given handheld device to study on the selected websites:…… if YES what & what…...

Part II

Please indicate your agreement with the next set of statements using the following rating for instruments in part II to Part IV:

1 2 3 4 5 6 7

Strongly Agree Somewhat Neural Somewhat Disagree Disagree
Agree Agree Disagree Strongly

Perceived Usefulness (PU):

M-learning would improve my learning performance (U_1)
M-learning would enhance my academic effectiveness (U_2)
M-leaning would increase my academic productivity (U_3)
M-learning could make teaching & learning easier to study (U_4)

Perceived Ease of Use (PEOU):

I find m-learning website system easy to use (E_1)
It is easy to interact with the sites via the given handheld device (E_2)
It is easy to become skillful at using handheld device in m-learning (E_3)
Learning via m-learning is understandable (E_4)

Attitude:

Studying through m-learning is a good idea (A_1)
Studying through m-learning is a wise decision (A_2)
I am positive toward m-learning (A_3)
Studying via m-learning is affective appealing (A_4)
I am of the view that students should adopt m-learning (A_5)

Behavioral intention (BI)

I intend to check other meanings given to m-learning in other sites via my handheld device (BI_1)
I intend to be a heavy user of m-learning websites (BI_2)
I would not hesitate to start m-learning at my own (BI_3)

Part III

1 2 3 4 5 6 7
Strongly Agree Somewhat Neural Somewhat Disagree Disagree
Agree Agree Disagree Strongly

Enjoyment:

I can easily remember what I have learnt (EJ_1)
Studying/learning via m-learning is enjoyable (EJ_2)

M-learning Self-Efficacy:

I feel confident finding information/ knowledge /acquiring new thing in the m-learning system (SE_1)
I have the necessary skills for using handheld devices on selected websites (SE_2)
I am capable to studying in m-learning environment (SE_3)

Part IV

Subjective norm:

What m-learning stands for is important for me as university student (N_1)
In order for me to prepare for future research/job, it is necessary to studying in m-learning environment (N_2)
Society will embrace m-learning as I value it (N_3)

System Accessibility:

I have no difficulty accessing and using m-learning website with given handheld devices (SE_1)