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Learners' Acceptance of Mobile Learning for Post-School Education and Training in South Africa

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Authors' contributions

This work was carried out in collaboration between both authors. Author AM perceived the concept, wrote the manuscript and performed the statistical analysis. Author PD revised and edited the subsequent drafts of the manuscript and also managed the literature review. Both authors read and approved the final manuscript.

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ABSTRACT

Mobile learning is no longer a new concept and has been fully embraced by a number of educational systems throughout the world. The aim of this study was to assess the learners' acceptance for mobile learning, focusing on post school education and training institutions in South Africa. A quantitative research design was used in this study in which a questionnaire with closed ended questions was administered to respondents for data collection. Cochran's method was employed to compute the sample size, n = 384 participants (learners) attending at a higher education institute in South Africa. Statistical software, STATA was used to analyse the data in which principal component analysis was used to ascertain linear combinations of variables considered in the study. The modified acceptance framework that is based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model was adopted to determine the factors that influence the learners' intention to use mobile learning. Study findings indicate that mobile learning is not well grounded in the learners' educational environment in South Africa and yet there is evidence of widespread use of mobile technologies. This was supported by 284 (72.29%) of 384

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learners who confessed to having no knowledge of mobile learning much as they used mobile gadgets.

Keywords: Electronic learning; mobile learning; learners' acceptance; user acceptance and use of technology.

1. INTRODUCTION

There is no doubt that technology has changed the world we live in today to levels that were previously unimaginable. Mobile devices have flooded our daily lives, providing unmatched access to information and communication. The report by [1] documented that the number of mobile devices was anticipated to exceed the world's population [2]. Learning is highly enhanced by the ever increasing affordability, power and functionality of these mobile and portable devices [3]. Most of these devices have assisted and are still assisting several groups of people in different domains of life to acquire new knowledge that is ultimately important to them. It may be to empower a woman in South Africa to receive daily audio messages to support her in turning her knowledge into economic gains, enhancing a student living in a rural community in Uganda to bridge the gap that exists between home and school environments or helping a child in Rwanda to obtain data and information that will equip her with science skills. Mobile technologies have unarguably transformed the lives and knowledge acquisition of several thousands of people in ways inconceivable in the recent past. However, in spite of this transformation and over fifteen years of investigation, mobile learning has so far failed to have a remarkable long-term impact on the education environment [4].

An exponential trend of electronic learning (e-Learning) implementation in the educational systems of several countries across the globe is evidently visible, and continues to grow at an increasing rate. In most developing states like South Africa, the concept of anytime anywhere knowledge dissemination still benchmarks on the tools like personal computers, and this is primarily visible in the governmental departments and various corporate settings. As well in other sectors like education the learning concept is still focusing on the traditional modes of knowledge dissemination to the learners where some electronic learning has been embraced, focus is still on the personal computer or PC. Owing to the physical demerits of the PC, both learners and teachers cannot be in touch after school hours, public holidays imply no learning or access to learning materials. Even then learning materials cannot be readily accessed in some environments. This is the real gap that should be filled or bridged by the increasing mobile technologies. In other words, the mobile devices that are becoming overwhelmingly popular among the youths could be employed in the ubiquitous learning phenomenon. Researchers [5,6,7] have stated that e-Learning with mobile technologies is primarily mobile learning (m-learning).

2. MOBILE LEARNING

M-learning cannot be taken as just the amalgamation of two grammatical words, say mobile and learning. It covertly implies mobile electronic learning; in this regard its structure should be taken as an extension of the orthodox e-learning and as a counter action to the conventional or orthodox e-learning [8], and also to its viewed shortfalls and the many hiccups. The component of mobility specified in the mobile learning phenomenon, positions it at another level as compared to other forms of learning, more importantly structuring learning capabilities which exploit the merits that can be provided by the mobile learning framework. M-Learning puts emphasis on the nomadism of the end-user, in this case the student, interaction with the handheld technologies as well and knowledge sharing that views and puts attention on how society and its many establishments can embrace and enhance the exponentially increasing population [9]. The underlying factors in this are that mobile technologies have the power and capabilities to support the learners. An example is, study material including, time table, study guides, assignments, memos, and study plans can be uploaded by the concerned institutional authorities and downloaded by the learners. It is stated that mobile learning has been growing for the last decade from a phenomenon of insignificant study to highly funded undertakings or research projects in schools, both higher and lower levels, workplaces, and industries, provincial government bodies to rural and urban settings all over the globe [10].

Singh [11], documents that the M-Learning community still lacks cohesion and widely presents itself in perches or fragments with varying state standpoints, huge gap that exist between academia and industry, and between the school, higher education and lifelong learning segments.

3. M-LEARNING IN POST SCHOOL OR HIGHER EDUCATION

Mobile learning has been defined differently by different scholars and researchers depending on their contextual and intuitional understanding of the phenomenon in regard to the portability and convenient application of the devices, anywhere, any-time. [12] define it as learning that entails the application of mobile and handheld technological gadgets like cellular phone, palmtops, iPods, Tablets, personal digital assistances (PDAs) technologies in both learning and teaching [13]. It has been stated by a number of researchers [14,5,15] that mobile learning enhances learning and teaching and some of the advantages mentioned are;

- There is free interaction among learners and their teacher.
- Less space is required to use a considerable number of devices which is not the case with desktops.
- Reduction in volumes of material carried by the learner as a single mobile device can accommodate resources for a number of disciplines.
- The writing apparatus the stylus that comes with some mobile gadgets is more appealing than the traditional mouse on a PC.
- Increased collaboration between the learners and their lecturers, sharing of notes, guidance and counselling from teacher on a one to one basis, on-time feedback and many others.
- The concept of mobile devices can enable learning anywhere, anytime, and also supports home based training for handicapped learners.

4. THEORETICAL STANDPOINT

For the past twenty years or so, a number of theories have been proposed to try and illuminate the contexts of end users acceptance to apply the innovative technologies that have been cropped from the 1980s [5,16]. Theories that have recently become very prevalent and widely employed in a number of studies are; [17] suggested the Theory of Reasoned Action (TRA), [18] proposed the Technology Acceptance Model (TAM). The Unified Theory of Acceptance and Use of Technology model (UTAUT), [18,19]. For a thorough discussion of more theories refer to [5,14]. In this section focus is put on the discussion of the theory that is employed in the study.

4.1 The Unified Theory of Acceptance and Use of Technology (UTAUT)

From [8] and [18] the most prevalent model in the domain of information and communication technology is UTAUT, Fig. 1. Developed by [19] it is regularly used in the acceptance modelling framework and it is perceived to be explaining about 70% acceptance behaviour [14]. The most significant constructs that constitute UTAUT are; Performance Expectancy (PE) (supposed practicality), Effort Expectancy (EE) (supposed ease to use), Social Factors (SF) and Facilitating Conditions (FCs) and these have unswerving impact on the purpose or intention to use the model [19]. Researchers like [5,14,20] investigated UTAUT model and documented that the model was formulated based on eight theories. The presented four aspects are not entirely novel aspects, they are all modified from existing aspects or constructs; PE is analogous to perceived usefulness and EE is comparable to perceived ease of use of Technology Acceptance Model (TAM). SFs is related to subjective norm of Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB). From Fig. 1, the variables, gender, age, experience and voluntariness of use are the moderating factors for the relationships that exist in the model.

5. STUDY FRAMEWORK AND HYPO-THESES

From all models mentioned, Section 4, the UTAUT model was found more appropriate for this study due to its flexibility in application section, 4.1. Fig. 1, shows the model on which this study is based, and five primary constructs

are considered (Performance expectancy, Effort expectancy, Social factors, Facilitating Conditions, Behavioural Intention) that have a direct impact on the intention to use the model in mobile learning. The intervening factors gender, age, experience and voluntariness of use are firstly ignored. [5], argues that the truncated model can present the explanation of mobile learning in this study framework Fig. 2.

5.1 Study Framework

UTAUT model has been investigated by [20] and it draws on eight theories and four factors which are not entirely new.

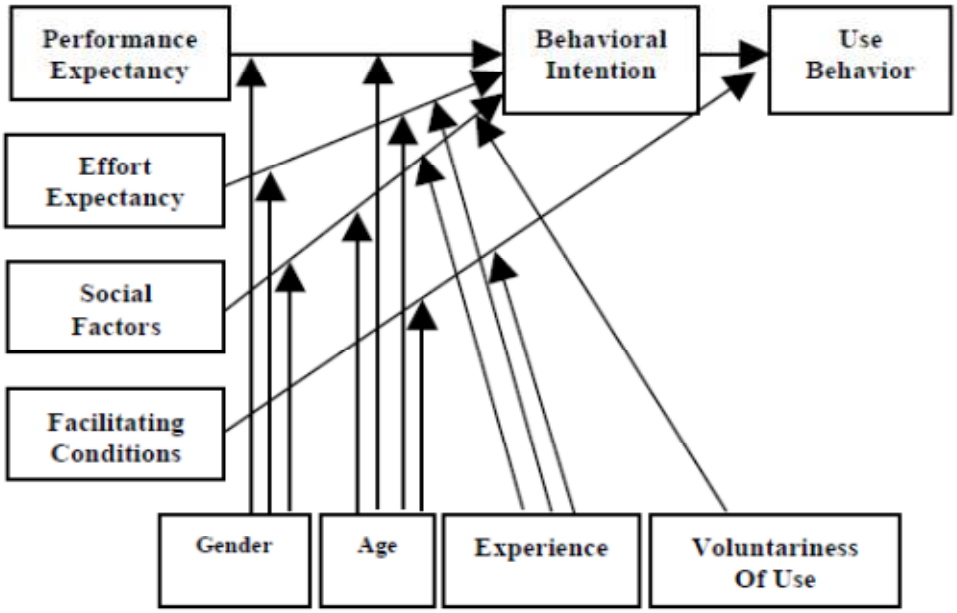

Fig. 1. UTAUT model
Venkatesh et al. ([19], p.447)

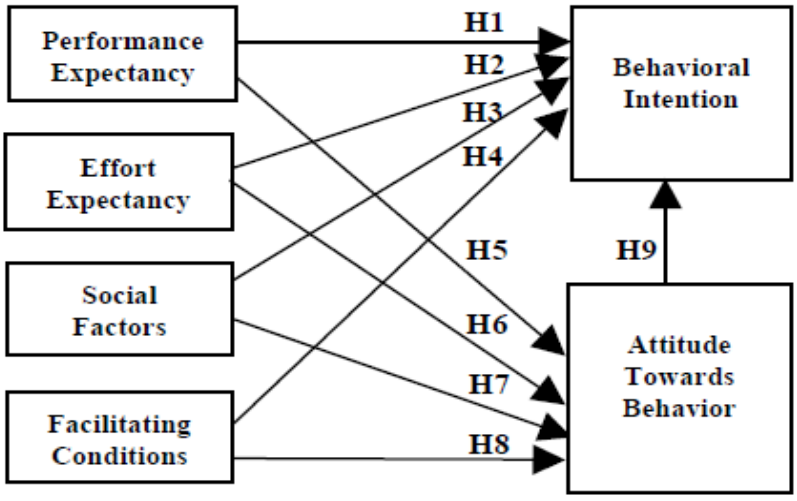

Fig. 2. Study framework

5.2 Hypotheses

H1: There is a positive association between performance expectancy and attitude towards behaviour.
H2: There exists a positive influence between effort expectancy and attitude towards behaviour.
H3: There is a positive association between social factors and attitude towards behaviour.
H4: There is a positive influence of facilitating conditions on attitude towards behaviour.
H5: There exists a positive influence of performance expectancy on behaviour intention to use.
H6: There is a positive relationship between effort expectancy and behaviour intention to use.
H7: There is a positive association between social factors and behaviour intention to use.
H8: There is a positive relationship between facilitating conditions and behaviour intention to use.
H9: There exists a positive influence between attitude towards behaviour and behaviour intention to use.

6. MATERIALS AND METHODS

A sample of 384 post school students attending an institute in South Africa, Gauteng Province was considered for this study. The sample was computed using Cochran's sample size formula [21]. As an instrument for data collection, a questionnaire was designed which comprised of three sections, one was for demographics of the study participants, the second section for the acceptance assessment of mobile technology and the third was about the respondents perspectives or opinions about mobile learning technologies. The questionnaire was an adaption from two questionnaires one concerning "survey on acceptance of sms learning amongst distance education students in universiti of sains Malaysia" and the other concerning "The Acceptance of Mobile Phones for Teaching and Learning with a Group of Pre-service Teachers in Hong Kong" [22].

Table 1. Shows question shores and corresponding measures

Item	Measure	Frequency of item
PE_1	M-Learning enhances the overall education system.	
PE_2	Application of M-learning enables learners work fast on given assignments.	4
PE_3	On line transaction outputs for learners are improved owing to M-Learning.	
PE_4	Productivity of learners is increased due to M-Learning application	
EE_1	M-Learning easy to application.	
EE_2	Usage of a menu driven application is made easy by application of M-learning.	3
EE_3	Knowledge of M-learning operations is easy to grasp.	
SF_1	Influential individuals to my behaviour think that one should use M-Learning	3
SF_2	Important individuals to my behaviour thinks that one should use M-Learning	
SF_3	The instructors in this institute have been supportive in the use M-Learning	
FC_1	There is an overall support of using M-learning by the institution	
FC_2	Necessary resources to apply M-learning are available.	4
FC_3	Information required to apply M-learning is available.	
FC_4	Someone to assist in difficult time when learning M-learning is available.	
AT_1	It is a good impression to apply M-learning.	
AT_2	I have a liking for the application of M-learning.	3
AT_3	It is fun to work with M-learning.	
BI_1	I have intentions of applying M-learning.	
BI_2	I predict I will use m-Learning.	3
BI_3	I have the plan to use m-Learning.	

Over 10 items for the respective constructs were used for questions in section two. This was aimed at determining the association between the four main aspects or factors with the variable *behaviour intention to use* mobile learning and also to examine the acceptance level. The questions employed a 5-point scale to obtain the respondents views on the subject under investigation. For the analysis, under univariate; means and standard deviation statistics were considered. For the bivariate; regression analysis was considered in order to ascertain associations and their directions between the variables stated in the hypotheses. The studentized t-test was employed for the testing of the hypotheses stated. Analysing the respondents opinions on mobile learning, clustering and some statistics in the univariate level were considered.

6.1 Constructs Used

Constructs that were proposed in the questionnaire aimed at determining the degree of acceptance of mobile learning by the learners, and [19]'s tool was used in the construction of the constructs. However, suggested additional constructs Table 1, are significant. Question spheres and their designs are shown in Table 1. In all 20 items were employed within 6 factors or constructs.

The question spheres include: PE 4 items, EE 3 items, SFs 3 items, FCs 4 items, Attitude toward using technology (AT) 3 items and Behavioural intention (BI) 3 items.

7. ANALYSIS AND INTERPRETATION

Different levels of statistical analysis were performed using STATA in order to make meaning of the collected data. A sample of 384 respondents (learners) was considered.

Large amounts of data, just like the one that was gathered in this study, usually prove to be difficult to comprehend without the application of sophisticated statistical software that can provide a description from them in form of summaries. Factor analysis abridges a matrix of correlations into easily understandable factors. Factors, in turn, represent a summary of the associations or relationships among sets of variables. Principal Component Analysis (PCA) was employed in this work since it is a good technique for exploring comprehensive questions about the relationship among variables large datasets. In addition PCA is a distribution free techniques as it makes no distributional assumptions about the data arising from the UTAUT.

7.1 Validity and Reliability

In order to measure the internal consistence and reliability as well as ensuring construct validity, as mentioned above STATA statistical software was employed. The assessment was done using principal component analysis with Varimax rotations and the Cronbach's alpha coefficients (0.78-0.90), for a well detailed use of the cronobach's alpha [23] Table 2.

The Factor analysis technique does not define the determination of factors, but rather a consequence of objective judgement or heuristics. The common guidelines [24] were used; that if the eigenvalue of a particular factor is equal to 1 or greater than 1, then that variable is selected. Variables with factor loading equal to 0.3 or greater are considered to have a statistically significant impact or influence on the factor, more particularly in large datasets or samples.

Table 3, shows the background characteristics of the respondent (n = 384), who participated in the survey. The gender composition of learners who participated in the survey was 261 (67.97%) female and 123 (32.03%) males. It is clear that the female participants more than doubled that of males. The age categories were (18-20); (21-23) and over 23. The assumption for this grouping was that, all learners who had completed high school were 18 years and above. 97.92 percent of the learners interviewed were using mobile phones. This could be an indication that there is an extremely high degree of mobile phone acceptance and usage in South Africa's post school learners. Majority of the learners, 254 (67.55%) who participated in the survey use smart phone, this could be due to affordability of the gadgets. Again it is observed from Table 3, that of the 376 (97.92%) of the learners who use mobile phones 347 (92.29%) access the internet via their mobile phones. Of the 384 participants only 104 (27.08%) had knowledge of mobile learning and a large number of 284 (72.92%) indicated to having no idea about the concept. This could indicate that learners are not aware of the capabilities of the mobile technologies much as they have fully embraced their adoption.

Table 2. Rotated factor loading and Cronbach's α

Components	1	2	3	4	5	6
PE_1	0.729					
PE_2	0.684					
PE_3	0.654					
PE_4	0.634					
EE_1		0.759				
EE_2		0.789				
EE_3		0.799				
SF_1			0.863			
SF_2			0.859			
SF_3			0.567			
FC_1				0.532		
FC_2				0.798		
FC_3				0.829		
FC_4				0.687		
A_1					0.668	
A_2					0.698	
A_3					0.453	
BI_1						0.791
BI_2						0.803
BI_3						0.812
α	0.813	0.909	0.837	0.851	0.789	0.794

Table 3. Background characteristics of respondents (n = 384)

Variable and categories	Frequency	Percentage freq.
Gender		
Female	261	67.97
Male	123	32.03
Age		
18-20 years	119	30.99
21-23 years	192	50.00
>23 years	73	19.01
Use of mobile		
Yes	376	97.92
No	8	2.08
Type of device		
Blackberry	73	19.41
Net book	22	5.85
Smart phone	254	67.55
PDA phone	15	3.99
I-Phone	12	3.19
Internet use on mobile		
Yes	347	92.29
No	29	7.71
I know m-learning		
Yes	104	27.08
No	280	72.92

7.2 Learners' Acceptance of Mobile Learning

To ascertain the levels of acceptance for mobile learning, a module in the questionnaires were incorporated which contained questions on the acceptance concept for mobile learning.

From Table 4, averages of responses from the study participants were computed depending on the constructs mentioned therein. It was considered that responses with a mean value ranging from 3.0 to 3.5 were considered moderate. Two constructs had a high level of acceptance. It is viewed that acceptance for

mobile learning is still lacking among the post school learners.

Table 4. Level of perception and acceptance for m-learning

Constructs	Mean	Std. dev	Degree/ level
PE	3.59	0.83	High
EE	3.34	0.71	Moderate
SFs	3.31	0.74	Moderate
FCs	3.12	0.82	Moderate
AT	3.24	0.69	Moderate
BI	3.67	0.77	High

8. SUMMARY RESULTS FOR THE HYPOTHESIZED FACTORS

In Table 5, a summary of the results for hypothesis testing is presented. In this work a statistic used to explore whether a relationship or association does exist between the two hypothesized variables is the p-value also generated is the corresponding β-values which indicates a change in the explained variable per unit change in the explanatory variable. Hypothesis testing is done at both 1% and 5% levels of significance. From [12] two variables are said to be associated if the p< 0.01 at the 1% significance level and also when p< 0.05 at the 5% significance level.

From the Table 5, it is observed that hypotheses number four; *there is a positive influence of facilitating conditions on attitude towards behaviour* and number five; *there exists a positive influence of performance expectancy on behaviour intention to use,* rejected at both 1% and 5% significant level. Rejecting the impact of facilitating conditions towards behaviour could imply that, regardless of the availability of conditions (good or bad), still the behaviours of the learners may not be changed, in fact it is always more likely that those with enabling facilities will tend either not to use them or destroy them and the converse, will seek for them so as to try and *fit in*. Also rejecting performance expectancy could imply that motivation of the learners does not necessarily translate to behavioural intention to use the available application. However, for the rest of the hypotheses we fail to reject them at both the 1% and 5% significant levels.

Table 5. Hypotheses testing and p-values

Hypotheses	Resultant β-value. and P-value
PE with AT	β =.0.378; p < 0.002**
EE with AT	β =.0.221; p < 0.000*
SFs with AT	β =.0.209; p < 0.012**
FCs with AT	β =.0.031; p < 0.211
PE with BI	β =.0.008; p < 0.115
EE with BI	β =.0.092; p < 0.000*
SFs with BI	β =.0.267; p < 0.000*
FCs with BI	β =.0.239; p < 0.035**
AT with BI	β =.0.272; p < 0.026**

Note: (*) significant at 1% and (**) significant at 5%

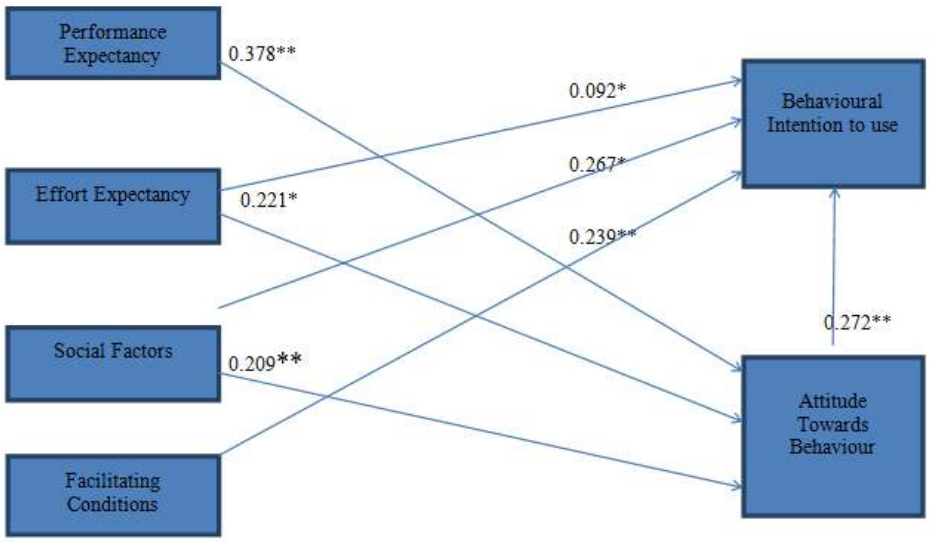

Fig. 3. Factor associations with corresponding β-values

8.1 Simple Linear Regression (SLR)

SLR was considered in order to obtain the relationship between the explained variable and the corresponding explanatory variable. In this study the relationship was accessed between the five main factors and behavioural intention to use mobile learning technologies Table 5.

9. CONCLUSION

The presented results were ascertained from a sample, n = 384 learners attending at the Institute for Advanced Learning and Education in South Africa. This is a vocational educational Institute with two learning centres in Gauteng Province and one centre in Rustenburg. The aim of this study was to analyse the learner's acceptance of mobile learning and as well assess factors that have a significant relationship with behaviour intention to use mobile learning in South Africa focusing on post school education and training environments. The benchmark for this study was the UTAUT model.

Although 376 (97.92%) of the interviewed learners use mobile devices, equally majority 284 (72.29%) do not know about mobile learning and only paltry 104 (27.66%) learners has some knowledge about mobile learning. It would rather be important to know whether there can be acceptance of what a leaner has no idea about. This indicates that mobile learning acceptance is still low in South Africa. Much as there is a wide use of mobile gadgets by the learners, little do they know about their benefits when used for educational purposes.

The study finding indicated that there is a positive attitude to behavioural intention to use mobile learning; I believe this is supported by the use of mobile gadgets among the learners. It now remains with the institutional administrators to adopt the mobile learning framework within their teaching and learning systems to enable students realise the benefits that come with mobile learning.

It is suggested that this study be replicated to all provinces in South Africa to probably give the general picture concerning mobile learning acceptance in the entire country. This initial study could be regarded as a pilot to enable a wider survey.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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