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Cover Page Footnote

All authors whose work were referenced are appreciated. The Editor and reviewers of the the Journal of Educational Technology Development and Exchange for their timeless effort in making this a reality. Also, we acknowledge the scholarly effort of the experts who validated the instrument. Finally, we acknowledge the respondents used for the study

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Abstract: *Most students could be adopting the mobile technologies available but may not be for learning purposes. This study investigated the postgraduate students' application of mobile technologies for learning and examined the differences in the application of mobile technologies by postgraduate students based on their area of specialization. The study was a quantitative research design. The population comprised all postgraduates' students in Nigeria out of which 750 of them were purposively sampled across eleven universities based on accessibility. The data for the study was gathered using a Researchers-developed questionnaire. Statistical form of Mean was used to answer the research questions while Kruskal Wallis H-Test was used to test the hypothesis. A coefficient reliability of 0.87 was obtained on the instrument. The finding among others were that, postgraduate students in the information and communication specialization apply mobile technologies for their learning and research more than other postgraduate students' counterparts; and there was significant difference among postgraduate student' utilization of mobile technologies for learning and research purposes based on specialization. The study concluded that, the thoughtful utilization of mobile technologies by postgraduates could be of enormous benefit towards their learning within and outside the classroom settings and also facilitate their research knowledge, training and skills. It was however recommended among others that most of the course lectures by postgraduate students as well as their research should be embedded in mobile technologies.*

Keywords: Postgraduate Students, Mobile Technologies, Stimulus, Application, Specialization

Introduction

The content, container, and the context as well as the broker could determine how a particular goods is been patronized. So also learning depends on some factors which include the means of learning. The consequential outcome of education should furnish the desires of every individual inhabitants and society at large because education is important for the development of any society. Education is the foundation of any nation on which the success or failure of such society solely depends on their investment on education. The importance of education to mankind cannot be underestimated, most especially in this global village dispensation of science and technological breakthroughs where learning can be implemented within and outside the classroom context. Education is a major tool for national socio-economic growth and development (Iloanusu & Osuagwu, 2009). Thus, any societies' socio-economic growth and development exclusively relies on the level of embrace on education as well as the extent which they make learning concern their much emphasis.

Effective learning takes place when students have an understanding of how to learn and this understanding requires emotional skills such as the capability to communicate, collaborate and the ability to cooperate with others (Yusuf, Yusuf, & Gambari, 2015). This significance of education to the societal progress led to the policies framed by the Federal Republic of Nigeria (FRN, 2013) via the National Policy on Education, who stressed the importance of education as an asset for economic, social and political developments; an aggregate tool

of empowerment for the poor and the socially marginalized groups; an effective revenue of developing the full capacities and potentials of human resources and as a development of capable work force through the acquisition of practical life skills relevant to the digital native society veritable means of developing sound intellectual learning societies, fit and pertinent to the 21st century.

Any man who wants an illumination on his path. In every organization, including the educational system, information is often generated and stored in a particular medium before it is transmitted. The concept of Information and Communication Technologies may best be defined as a various set of technological equipment and resources which are used to create, communicate, disseminate, store and manage information (Bahir, 2014). Although, the progression of generation and storage of this information is information technology, the process of its transmission to the intended audience or recipients is communication technology. Oludotun (2005) stated that ICT is a generic term referring to technologies for collecting, storing, editing, and passing on information in various forms. Communication has been described as the process of transferring information from one person to another as well as from the sender to the receiver with encoding and decoding means. The decoder, encoder, message, medium as well as the barriers all have effect on the communication standard.

Technology plays vibrant responsibility in transforming human living and its entire environment which has resulted in more meaningful living standard (Sanni, Amosa & Danmaigoro, 2017). In a rapidly changing

world, technology is indispensable for an individual to easily access and apply information technology that has impact on the educational system. The new innovation of devices which are enhanced via technology are becoming more attracting, as it arrests and arouse users' attention. With the way technology is improving so rapidly, a lot of modern professions who are not ready to embrace it could turn out to be extinct in some years from now (George, 2017). Integrating these technologies into educational activities is increasing students' academic performance. Thus, any institutions who refuse to metamorphosed with the trend of technology into learning may become less relevant in human capital growth and development in its economy. ICT is an umbrella term which necessitates any communication device or application (Nana, 2012). The adoption of ICT in education is capable of authorizing learners by transforming teaching and learning process from the teacher-dominated or centered to learner-centered where teachers oblige as facilitators of students learning' pace. This transformation via ICT drive result in increased learning, and also create opportunity for learners to develop their creativity, problem solving abilities, information reasoning skills and other higher-order thinking skills (Trucano, 2005). ICT can also be regarded as gadgets through which information could be sought and accessed.

Mobile Technologies denotes all forms of technologies which can be used to make learning easier and delivered in short time. Mobile technologies can also be regarded as handheld information technology and artifacts that involve hardware devices, software interface and applications and communication

network services (Jarvenpaa & Lang, 2005). Therefore, mobile technologies could be regarded as the combined integration of hardware like PDAs, for examples palm pilot or handspring, mobile phones, and video game players, software for instance the applications that run on the device which could be in form of phone books, calendar programs and others with its operating system and networking that is, infrastructure that supports the transfer of information (Bola, 2015). Learning with mobile technologies is the exploration of handheld devices with wireless and mobile networks to facilitate, sustenance, enhance and outspread the bandwidth of learning among postgraduates.

The competence of postgraduate students in the utilization of ICT tools in their learning system is necessary. This will in no doubt boost their academic, research and other learning services. ICT is radically altering the ways things are being done in nearly every field of human activity (Adeyanju, 2012). Postgraduate education in Nigeria covers studying for academic and professional degrees, certificates, diplomas or other qualifications for which first degree is required. In Nigeria, the postgraduate programme is operated in the university under the control of the postgraduate school (Auriol, 2014). Postgraduate students are expected to embrace the use of mobile technologies in their learning and research as this will enhance and increase their learning rates and research activities. By extending the educational services to wireless medium, the educational institutions can hypothetically bring great expediency to those off-campus learners who do not always have time to find Internet enabled computers to get the important information from their

academic institutions (Chen & Kinshuk, 2015). The more they embrace this innovation, the better as the transition from conventional means to technology application. The effective utilization of the mobile technologies by postgraduate students were of enormous benefit towards their learning activities within and outside the classroom sceneries (Issa, Onojah, Omoyajowo, Aderogba, Aboyeji & Giwa, 2019).

The specialization of postgraduate students is mostly resulting from the course they study during their first degree or related courses. In Nigeria, there are several specializations ranging from Sciences, Technology, Education, Humanities among others. Tunkun, Nordin, and Bello, (2013) revealed that area of specialization has a significant influence on both the perceived and objective knowledge in favor of ICT related courses than others. Psychometric analysis insist that all students cannot act perfectly in all fieds thereby neccessitating specialization which stratify individuals to their best field where they are most capable and relevant. The profligate developments in mobile technologies had made the need to learn mobile learning has become more imperative (Goksu & Atici, 2013).

Technology may not fully replace physical or human teachers but teachers who applied technology in their teaching process could substitute those teachers who do not apply technology. The new innovation of devices which are enhanced via technology are becoming more enticing and charming, as it arrests and arouse students' attention. Therefore, the limitation in the use of these technologies might jeopardize our

learning system and the application of these technologies might improve the learning means. The utilization of ICT tools in teaching and learning has become imperious at all levels of education. This is so because teaching cannot be adequately effective without the use of ICT tools in schools in this 21st century (Adebisi, 2013). The mobile technologies should not only be used for social activities like chat alone but it should be effectively applied into the teaching and learning process. Ogundiyile (2013) noted that some tertiary institutions have the electronic facilities but not maximizing its utilization to its fullest. The adoption of mobile technologies in Nigeria is still lagging behind when compared to other developed nations within the globe. Falade, Issa and Alimi (2016) established that majority of students use the mobile technologies for social self-chat instead for learning activities. Even when postgraduate students apply the mobile technologies for learning, it is possible for it to differ by their area of specialization. Kallum (2011) stated that some factors that affect the mobile learning adoption by educators seem to have been principally ignored Thus, the main purpose of the study was on the influence of postgraduate students' area of specialization on their application of mobile technologies for learning in south-west, Nigeria. Explicitly, the study examined Postgraduate students' level of application of mobile technologies for learning in South-west Nigeria; and examine the differences in the utilization of mobile technologies by postgraduate students based on their specialization. The study answered two research questions namely:

1. How do postgraduate students apply mobile technologies in South-west

Nigeria?

2. What is the difference in the adoption of mobile technologies by postgraduate students in South-west Nigeria based on their area of specialization?

One null hypothesis was tested:

H₀₁: There is no significant influence of area of specialization on the adoption of mobile technologies by postgraduate students.

Methodology

This study employs a quantitative research design. The population for this study comprised all postgraduate students studying within the South-western part of Nigeria. Postgraduate students were sampled across eleven universities in South-west, Nigeria. Stratified random sampling technique was used to sample respondents across the eleven universities and seven hundred and fifty (750) postgraduate students were sampled using Research Advisors (2006) model of sample size. The research instrument used for data collection was researchers-designed and researchers-developed questionnaire. It comprises of two sections A and B. Section A was for demographic data of the respondents which include their area of specialization and section B generated 15 items on their adoption of Mobile technologies for learning respectively. The response mode of Four likert scale of strongly agree, agree, disagree and strongly agree was used.

To ascertain validity, the questionnaire was vetted by the researchers and three other experts in the Department of Educational Technology and Department of Computer science for face and content validity. It was

thereafter pilot-tested at the University of Ilorin which is located in another region different from the region sample location for the study and subjected to split-half method. The coefficient of reliability of 0.82 was obtained through Cronbach alpha which makes the research instrument reliable. The copies of the questionnaires were personally administered by the researchers following all ethical issues. None of the respondents were forced to participate in the study as it was done voluntarily and their anonymity was catered for as well as their confidentiality. Mean was used to answer to analyze the research questions, while the hypothesis was tested using Kruskal Wallis H-Test at 0.05 level of significance.

Results

Out of 750 respondents, 658 copies of questionnaire were properly filled and returned by the respondents. This was thus used for the analysis.

Research Question 1:

How do postgraduate students adopt mobile technologies for Learning and Research?

The result on how postgraduate students utilize mobile technologies which was investigated in this study and presented in table 1. The results indicated that mobile technologies can be used to search and store information regarding lesson to be learnt and mobile technologies allow easy access to information regarding research with a mean score of 3.23. Also, a mean score of 3.55 established that majority of the postgraduate students agreed that Mobile Technologies

influence quick and better presentations and the use of mobile technologies allows receiving of lectures anywhere and anytime. Furthermore, the results established that the influence of mobile technologies results in competitive advantage compared other devices. The use of mobile technologies

leads to increased classroom product quality and also the use of mobile technologies gains significant skills and advantages in the learning process with their mean scores respectively. Mobile technologies allow for greater collaboration and promote group work.

Table 1: Postgraduate Students Adoption of Mobile Technologies

S/N	Items	Mean
1.	Mobile Technologies can be used to search and store information regarding lesson to be learnt as well as research articles	3.23
2.	Mobile Technologies allow easy access to information for research	3.55
3.	Mobile Technologies influence quick and better presentations.	2.65
4.	The use of mobile technologies allows receiving of lectures anywhere and anytime.	2.87
5.	The influence of mobile technologies results in competitive advantage compared other devices	2.90
6.	The use of mobile technologies leads to increased classroom and research product quality.	2.56
7.	Use of mobile technologies gain significant skills and advantages in the learning process	2.79
8.	Mobile technologies allow for greater collaboration and promote group work	2.53
9.	With mobile technologies, students' progress and reports can be easily tracked. Research progress can be tracked as well	3.32
10.	Unlimited source of information is possible with mobile technologies	3.01
11.	Mobile Technologies allow for Global communication	3.34
12.	Assessing students' performance can be done instantly with mobile technologies	2.34
13.	Course curriculum can reflect real world data and real-time information with Mobile Technologies	2.81
14.	Geographically isolated or economically disadvantaged students can benefit from access to online software, resources and published research articles for learning with Mobile Technologies	3.42
15.	Using mobile technologies in learning makes learning and Research addictive	3.18
Grand Mean		2.97

With mobile technologies, students' progress and reports can be easily tracked and postgraduate students can source for unlimited information with mobile technologies. Postgraduate students believe that mobile technologies allow for Global communication. Assessing students' performance can be done instantly with mobile technologies. Postgraduate students agreed that course curriculum can reflect real world data and real-time information with Mobile Technologies. Geographically isolated or economically disadvantaged students can benefit from access to online software or resources for learning with Mobile Technologies. Using mobile technologies in learning makes learning addictive. The grand mean score on postgraduate students' utilization of mobile technologies was 2.97. Using a bench mark of 2.50 for 4-likert scale, since the grand mean score of 2.97 was greater than the benchmark, it can thus be deduced that postgraduate students adopt mobile technologies for their learning and research.

Research Question 2:

What is the difference in the Adoption of

Mobile Technologies by Postgraduate Students based on their areas of specialization?

Table 2, presented the difference in the utilization of mobile technologies by postgraduate students based on areas of specialization. The table indicates that of the 658 postgraduate students that participated in this study, 158 science Postgraduate students utilized mobile technologies with a mean score of 3.11, 96 information and technology Postgraduate students' utilized mobile technologies more with a mean score of 3.07, while 216 Postgraduate students who specialized in Education had a mean score of 3.28 and mostly utilize mobile technologies for learning and research. Also, 101 postgraduate students who specialize in humanities averagely utilized mobile technologies with a mean score of 2.52 and 87 Postgraduate students with specialty in engineering utilized mobile technologies more with a mean score of 2.85. The difference in the mean gain of postgraduate students in their utilization of mobile technologies was averagely 0.22. This indicated that postgraduate students with specialty in education utilize mobile technologies for learning and research more than their other counterparts.

Table 2: Difference in the Utilization of Mobile Technologies by Postgraduates Students

Specialization	N	Mean	Remarks	Mean Deviation
Science	158	3.11	Utilized	0.14
Information and Technology	96	3.07	Utilized	0.10
Education	216	3.28	Highly Utilized	0.31
Humanities	101	2.52	Averagely Utilized	0.45
Engineering	87	2.85	Averagely Utilized	0.12
Total	658	2.97		0.22

Hypothesis

There is no significant influence of area of specialization on the adoption of mobile technologies by postgraduate students.

Kruskal Wallis H-Test results of

postgraduate students' adoption of mobile technologies for learning in relation to specialisation of the specialty of Science, Information and Technology, Education, Humanities and Engineering can be seen in table 3.

Table 3: Kruskal Wallis H-test on Adoption of Mobile Technologies among Postgraduate Students Based on their areas of specialization

Specialization	Frequency	Mean Ranks	df	X2	p	Significance
Science	158	290.76	656	36.05	.021	Education- Information and Technology
Information and Technology	96	216.42				Education- Humanities
Education	216	332.60				Education- Engineering
Humanities	101	113.58				
Engineering	87	189.84				
Total	658	100.0				

As indicated in table 3 postgraduate students' adoption of mobile technologies for learning shows a significant difference in the mode of specialization of Sciences and several other specializations [$X^2=36.05$, $p<.05$]. So as to find the source of the difference, H-test was conducted by apropos binary combination of the groups. There is a significant difference between postgraduate students who specialized in education and those whose specialty is in information and technology in their adoption of mobile technologies. There is also a significant difference between postgraduate students who specialized in education and those whose specialty is in Humanities and engineering in their adoption of mobile technologies for learning.

Discussions

Postgraduate students adopt mobile technologies for their learning and research. In support of this finding, Issa, Onojah, Omoyajowo, Aderogba, Aboyeji and Giwa (2019) established that postgraduate students utilize mobile technologies for their learning. Kallum (2011) also established that Mobile technology has been speedily adopted in everyday life, and it is common for majority people to have, and carry, a mobile device with them at all times. The use of computers and the Internet has successfully enabled the educational institutions to provide their students and staff members with various online educational services (Chen & Kinshuk, 2011).

Postgraduate students with specialty in education utilize mobile technologies for learning and research more than their other counterparts. Tunkun, Nordin, and Bello, (2013) stated that the utilization of ICT for learning differs by students area of specialization. There is significant influence of area of specialization on the adoption of mobile technologies by postgraduate students. Goksu and Aciti (2013) stated that the importance of information is increasing more and more, and this has led the institutions to look for new methods in order to access the information.

Conclusion

The study concluded that postgraduate students adopt mobile technologies for their learning but the adoption of the mobile technologies differ based on specialization. The effective utilization of the mobile technologies by postgraduate students could be of immense benefit towards their learning within and outside the classroom settings and also facilitate their research knowledge and skills. The findings indicated that postgraduate students who specialize in education utilized mobile technologies more than their counterparts in other specialty. This could be because they are teachers in training who need to engage in learning activities after graduation more than their counterparts since their major role will be with students of different levels ranging from pre-primary, primary and post-primary and even tertiary level. This implies that differences existed in the utilization of mobile technologies by postgraduate students based on specialization and the differences were significant.

Recommendations

Based on the findings and conclusions, the following recommendations were made:

1. postgraduate students should be encouraged to improve in their adoption of mobile technologies in their academic activities;
2. more workshop and training should be organized for postgraduate students on the usefulness of mobile technologies for both learning and research. This will bridge the gap in the differences between postgraduate students in their utilization of mobile technologies for learning based on specialization;
3. lecturers are also encouraged to adopt mobile technologies in their course works strategies and also in collaborating their research with their supervisees.

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