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To cite this article: Anijesushola Ajayi, Charles Korede Ayo & Olusanmi Olamide | (2019) Mobile learning and accounting students' readiness in tertiary and professional institutions in Nigeria, Cogent Arts & Humanities, 6:1, 1676570, DOI: [10.1080/23311983.2019.1676570](https://doi.org/10.1080/23311983.2019.1676570)

To link to this article: <https://doi.org/10.1080/23311983.2019.1676570>



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Published online: 15 Oct 2019.



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Received: 31 July 2019
Accepted: 26 September 2019
First Published: 08 October 2019

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Ajayi, AO, Ayo, CK & Olusanmi, O (2019). Mobile learning and accounting students' readiness in tertiary and professional institutions in Nigeria. In (ed.), Emmanuel O. Amoo, Covenant University Discourse on Sustainable Development. Cogent Arts and Humanities.

Reviewing editor:
Emmanuel O Amoo, Covenant University, Nigeria, Nigeria

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DIGITAL HUMANITIES | RESEARCH ARTICLE

Mobile learning and accounting students' readiness in tertiary and professional institutions in Nigeria

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Abstract: Mobile Learning (m-learning) a learning method facilitated by the convenience of mobile technology has a crucial role to play in the development of quality education in Nigeria which represents the fourth Sustainable Development Goal. However, Despite the advantages of mobile learning as an emerging learning method and its adoption across several disciplines, research into its adoption in accounting education and within developing contexts including Nigeria is still at infancy. This study, therefore, investigates the readiness of Accounting students in Nigeria to utilize m-learning for their accounting education. The survey research design was employed with copies of a relevant questionnaire distributed to 1,225 accounting students in three tertiary as well as three professional institutions in Nigeria, a total of 1021 of the retrieved copies were deemed suitable for data analyses. The study observes that there is a widespread usage of mobile devices and technology, especially smart devices among accounting students in both tertiary and professional institutions. It also found that the cost of internet access, instability of network as well as the level of the inexperience of students and instructors may impede the successful adoption of m-learning in Nigeria. The study recommends that m-learning adoption of m-learning in Nigerian should go in-line with the enhancement of mobile infrastructure especially network coverage and the training of students as well as instructors in the country to use mobile technology for learning. This will bring sustainable development to education in Nigeria.

Subjects: Accounting; Information Science; Education

Keywords: mobile learning adoption; accounting education; readiness; mobile technology

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PUBLIC INTEREST STATEMENT

The adoption of mobile learning in education across several disciplines globally is exponentially on the increase, however, due to the device and technological requirements of the learning method, it becomes essential to investigate its suitability and readiness for use in developing countries and contexts from the perspective of infrastructural availability, affordability and readiness. An investigation is therefore required on the level of availability of mobile infrastructure including smartphone ownership, skilled use, frequency of engagement in mobile activities, intended learning activities, internet access and perceived implementation challenges.

1. Introduction

Quality education is listed as the fourth Sustainable Development Goal (SDG) by the United Nations (Amoo, 2018) and in view of the influence of Information Communication Technology (ICT) on education globally; Mobile Learning (M-learning) made possible by the convenience of mobile technology has a vital role to play in ensuring the sustainability of quality education in Nigeria. The exponential growth and influence of mobile technology have necessitated the inclusion of the technology into all aspects of life, especially in developing countries. The ownership and use of mobile technology in Africa are among the highest globally with Nigeria alone boasting of about 174 million active mobile lines as well as the highest mobile traffic growth in the world (International Telecommunications Commission [ITU], 2018; Nigerian Communications Commission [NCC], 2019; Twinpine, 2017). The developments of mobile technology with its merits made educators realize that it can be integrated with existing learning methods to proffer solutions to the challenge of combining the ever-evolving state of information technology with education. Put differently, the portability, affordability and ease of access to information at anytime and anywhere made possible by mobile technology led to the development of mobile learning (m-learning) (Amiaya & Ranor, 2015; Stockley, 2011). This study, therefore, investigates the state of readiness of students for m-learning adoption in Nigeria which is critical to the achievement of quality and sustainable education, an SDG that is critical to the achievement of several other SDGs (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2017).

M-learning has been described as education facilitated through the interactions with mobile devices, and the functionalities they provide for both the learner and instructor (Rimale, El-Habib, & Tragha, 2016; Sherpherd & Vardiman, 2014). M-learning as a learning method evolved as a result of the interaction between electronic learning (e-learning) which is electronic enhanced learning and mobile technology. These mobile technology covers a spectrum of hardware such as smart devices (smartphones and tablets) and other facilities such as Global System of Mobile Communication (GSM), Wireless Application Protocol (WAP), Dynamic Adhoc Wireless networks (DAWN) and Wi-Fi among others (Akpakwu, Silva, Hancke, & Abu-Mahfouz, 2018; Amiaya & Ranor, 2015). The central point of m-learning is the facilitation of information sharing, and this makes interaction and sharing of knowledge among learners possible at any time. This kind of interaction encourages collaboration, an extension of learning beyond lecture classrooms and removes some of the limitations imposed on learning like distance and space. Furthermore, m-learning is compatible with other learning pedagogies and prior learning technologies in the sense that it can still support traditional classroom learning tools and also enhance e-learning content (Azeta, Gberebie, Ayo, & Williams, 2016; Shonola & Joy, 2014).

Due to the prospects of m-learning, various fields of learning including mathematics, computer science and literary studies are at advanced stages of research on its deployment and adoption, however, there is still a shortage of research on m-learning adoption and its actual deployment both in developing contexts such as Nigeria and in accounting education (Akomo, Ajowi, & DVC, 2015; Baldwin, 2014; Eloff, 2017; Okafor & Ogbodo, 2015; Roux, 2016). These issues can be traced to the limitations to m-learning adoption including; the need for mobile infrastructural support, the small screen-size as well as the abysmal power level of mobile devices. These necessitate adequate power supply and the development of resources to maximize the deployment of m-learning (Oyelere, Suhonen, & Sutinen, 2016). Specifically, inadequate mobile infrastructural support refers to the irregularity of power supply, poor internet access and the lack of proper m-learning infrastructure including hardware, software and learning contents (Kaliisa, Palmer, and Miller, 2017; Nicholas-Omoregbe, Azeta, Chiazor & Omoregbe, 2016; Asiiimwe & Gronlund, 2015; Shonola & Joy, 2014; Osinaike & Adekunmisi, 2012).

Additionally, since the availability of mobile infrastructure is crucial to m-learning in order to facilitate anywhere and anytime education (Griffin, 2014), it becomes important to begin the investigation of its adoption from the point of infrastructural readiness based on the opinions of the prospective end-users of the learning method. Abu-Al-Aish (2014) and Abu-Al-Aish and Love (2013) in

agreement, opine that m-learning research especially in developing contexts should begin by investigating the level of readiness of users and as well as institutions. The investigation should be based on the availability and state of mobile technology to ensure smooth deployment as well as establish the sustainability of m-learning adoption. Chaka and Govender (2017) also found that m-learning conditions significantly predicted the readiness of students to adopt m-learning in Nigeria and calls for in-depth studies on factors affecting readiness and intention to adopt m-learning in Nigeria. While prior studies have attempted to investigate m-learning adoption in Nigeria, there is still a paucity of extensive research on the readiness of students to embrace this ever-evolving learning method for their education in the country (Ajayi, 2019).

Focusing on accounting education, there is the pressure to produce graduates as well as professionals who are able to digitally compete on the global landscape due to the global adoption of the International Financial Reporting Standards and International Public Sector Accounting Standards (Haque & Islam, 2015). This has led to calls for in-depth research into the deployment of m-learning in the discipline to ensure the proper integration of the ever-evolving state of digital technology in its learning processes (Eloff, 2017; Roux, 2016; Staples, Collum, & McFry, 2016). It is based on the foregoing, that this study investigates the readiness of students in Nigeria to use m-learning for their accounting education. Specifically, the study answers the research question: To what extent are accounting tertiary and profession students ready to utilize m-learning for education in Nigeria?

2. Literature review

Quite a number of researches have been undertaken in Nigeria on the potential of m-learning, however, most still point out the need for in-depth studies into the level of readiness to adopt the learning method. Oguchinalu and Sunday (2018) conducted a study to assess the adoption of m-learning in Nigeria and opined that while m-learning will enhance education in Nigeria, it is faced with a lot of challenges including the availability of mobile infrastructure such as the instability and the high cost of subscription to adequate internet facilities as the most critical challenges. The study recommends that studies should be carried out to further assess the level of readiness to adopt m-learning in Nigeria. Oyelere et al. (2016) studied the readiness of students for m-learning in primary and secondary schools to accept m-learning and use specific mobile devices. The study showed that only 12% of the respondents did not own a mobile device and further reveals that students are in support of the use of social media forums, blogs, task feature and availability of course material on m-learning platforms for education. This study, however, is limited by its focus on schools in Nigeria.

Ayoade (2015) in a conceptual study looked at the ability of mobile technology to transform education and the health sectors of Nigeria. The study stated that the two components required to adopt m-learning are the universal accessibility of mobile devices and cellular connectivity. However, being a conceptual study, there is a need to gather data to substantiate the claim. Osang, Ngole, and Tsuma (2013) carried out a study on the readiness for m-learning in Nigeria by investigating faculty and students of the National Open University of Nigeria (NOUN). The study found that while mobile device ownership and use is widespread, there remains the challenge of infrastructural readiness and support including power supply, adequate security and institutional support. Chaka and Govender (2014) carried out an assessment of the status of m-learning in Higher Education Institutions (HEIs) in Nigeria also through a conceptual approach. The study opined that there is little indication of m-learning success in Nigeria despite its huge adoption in the international education scene. Specifically, the study opined that there is no evidence of m-learning adoption or application in Nigerian Colleges of education and calls for an in-depth study in order to facilitate the development of a suitable model for the application of m-learning in Nigeria.

Moving unto the foreign context, Kaliisa et al. (2017) carried out a review on m-learning in African higher institutions. The study investigated m-learning researches in Africa based on factors including geographical spread, focus, language, the level of education, research base and the period of research. Based on these 31 studies were selected for the review. The study found significant challenges in the process of m-learning integration in HEIs in Africa. These challenges

include poor technological infrastructure, poor attitudes among instructors and students, unsuitability of mobile devices with HEIs' Learning Management Systems (LMSs), lack of policies and models for implementation, the lack of m-learning use skills among lecturers and lack of access to modern mobile devices. The study also shows that there is the absence of large-scale m-learning researches. Asiimwe and Grönlund (2015) carried out a study in Uganda investigating the use of LCMS on mobile phones at Makerere University. The study used a mixed research design and a total number of 30 students were sampled. The study showed that the positive perception of the use of LMS on mobile phones is severely challenged by technical and content issues.

Haji, Shaame, and Kombo (2013) investigated the prospects and challenges of using mobile phones as tools for Higher learning for students in the developing countries. The study which was carried out in Zanzibar used a case study approach and 106 participants. It found that the hurdles of m-learning in higher learning include poor infrastructure and the high cost of mobile devices; it also showed that in order to increase students' engagement of m-learning, self-motivation must be encouraged. Mtega, Bernard, Msungu, and Sanare (2012) studied the use of mobile phones to teach and learn in higher institutions and found that a significant challenge to the adoption of mobile phones is the high cost of purchasing internet access to download learning content.

In accounting education, Roux (2016) focused on m-learning as a model instrument to enable practical courses in an undergraduate financial information system course from a developing country's perspective. The study which was carried out in South Africa used the experiment and survey research designs to investigate the performance of accounting students in the use of mobile devices for their studies. Joseph and Rahmat (2018) explored the perception of students on the use of a video as a pedagogical tool in an accounting course. The study which employed the experiment and survey research designs administered copies of the questionnaire on specific video contents to 90 accounting students at the Universiti Teknologi MARA in Malaysia. Staples et al. (2016) focused on the use of mobile devices in an accounting classroom. The study focused on the use of Substitution Augmentation Modification Redefinition (SAMR) theory and Bloom's Revised Taxonomy for the conceptual design of a framework for m-learning. It was discovered that technology and pedagogy must be considered before introducing mobile technology into accounting courses.

Based on the review of literature, therefore, within the Nigerian as well as other developing contexts, while the call to adopt mobile learning is high, the current researches on m-learning readiness and adoption which are crucial to its successful adoption are either conceptual or do not adequately capture the various categories of HEIs. As such, they cannot substantiate on a broad level the readiness of students or institutions for m-learning adoption. Additionally, while prior studies have focused on m-learning readiness, there is a dearth of literature specifically on m-learning readiness in accounting education. Furthermore, Africa based researches as reviewed above also show that quite a number of laudable efforts at inculcating m-learning into mainstream education are being limited by the level of availability and readiness of mobile infrastructure in the various countries. This study, therefore, addresses the gap in the literature by investigating the level of readiness of students in the different categories of HEIs in Nigeria for m-learning adoption with a focus on accounting education.

3. Methodology

This study analysed the readiness of accounting students to use m-learning and covered both tertiary and professional accounting institutions in Nigeria. The study employed the survey method through the administration of a series of questions in a well-structured questionnaire. The population of the study consisted of tertiary (universities, polytechnics and colleges of education) and professional accounting students (currently writing ICAN, ANAN and CITN certification examinations) in Nigeria. The choice of students from these institutions stems from the knowledge that the students in the tertiary institutions are often different from those in the professional ones. Professional students can be divided into two groups. The first consists of candidates of the basic professional levels such as the Accounting Technician Scheme (ICAN) and these are

graduates of secondary schools and students in Nigerian tertiary institutions. The second group consists of candidates of advanced professional examination levels who are tertiary institution graduates as well as working-class accountants.

All accounting students in the tertiary and professional institutions from the six geopolitical zones in Nigeria are eligible for this study. However, because of the size of this population, a subset was considered as the sample frame from which the sample size was drawn. The South-west zone which has the highest number of tertiary institutions offering accounting courses was selected for tertiary accounting students. For professional students both the South-west because of the highest concentration of ICAN and CITN study centres and the North-central zone because of the location of the only study centre of ANAN in Jos, Nigeria were selected as the sample frame (National Universities Commission [NUC], 2018; Joint Admission Matriculation Board [JAMB], 2018; Institute of Chartered Accountants of Nigeria [ICAN], 2018; Prospectus and examination syllabus—ANAN (2016); CITN accredited tuition houses, 2016). The following were selected as the tertiary institutions for the research: Covenant University in Ota, Ogun State; the Federal Polytechnic, Ilaro, Ogun State and Adeyemi College of Education, Ondo State. These institutions were selected because they represent the best ranking institutions within their categories in the South Western part of Nigeria (Chijioke, 2018; Ojerinde, 2018). They also represent institutions with varying degrees of infrastructural support for mobile learning adoption.

As this study was part of a broader study investigating the behavioural intention of accounting students to accept m-learning in Nigeria based on the Unified Theory of Acceptance and Use of Technology (UTAUT) 2, the sample size was determined based on the Tabachnick and Fidell (2001) criteria for Structural Equation Modelling (SEM) which posited that a minimum of 500 should suffice as a very good sample size for each of the institutional groups (tertiary and professional). This makes a total of 1,000 minimum for the combined sample size. The SEM method of analysis was however used in another aspect of the study which is not reflected in this particular study. The analyses of data for this study were conducted through descriptive statistics and inferential statistics. Specifically, the Analysis of Variance (ANOVA) test was carried out. ANOVA was used in order to compare the readiness of tertiary and professional students to accept m-learning for their accounting education. This was done to bridge the gap in literature where studies have mostly been conducted have been limited to a single institution per time.

In all, through judgmental sampling and based on the rate of response from each institution, a total of 1,225 copies of the questionnaire were distributed. 250 copies of the instrument were distributed to Covenant University students, 150 copies distributed at the college of education to a section of Business students who majored in accounting. For the Federal Polytechnic in Ilaro, 200 copies of the questionnaire were distributed making a total of 600 copies. For ICAN and CITN, 200 copies of the questionnaire were administered to students from each of the institutions. This was administered both electronically and at identified study centres. For ANAN, 225 copies of the same survey material were administered at the only institute in Jos, Plateau state making a total of 625 copies for the professional institutions. The excesses were to ensure that the minimum sample size of 1000 is achieved for the combined group.

For the survey instrument, the first section elicited questions on demographic background, mobile device ownership and experience while the second section gathered data on students' readiness to accept m-learning. Questions were asked to gather data on participants' use of mobile infrastructure including mobile devices and enabling facilities such as wireless networks and the internet. Furthermore, questions were asked about the various activities that participants use their mobile devices for ranging from online shopping to listening to music. Finally, questions on the learning activities that participants would like to use m-learning for were also asked. These questions were adapted from past studies (Abu-Al-Aish, 2014; Ahmed, 2016).

4. Results

A total of 1,225 copies of the questionnaire were administered to students from the six identified institutions while 1,143 were retrieved. The retrieved data were as follows; Covenant University-250, Federal Polytechnic Ilaro-189, Adeyemi Polytechnic-130, ICAN-187, CITN-162 and ANAN-225. The data obtained were screened for missing data and 121 copies were expunged due to the lack of complete data. Therefore, 1021 copies were retained for data analyses. Specifically, 503 and 518 copies respectively were retained for the tertiary and the professional institutions.

Table 1 depicts the demographic data of the respondents based on their institutional groupings. The gender distribution of the respondents shows 48.09% males and 51.91% females. Of the 491 males, 42.74% were tertiary students while of the 530 females 57.26% were tertiary students. Data obtained shows the following age distribution; 9.9% were below 18 years of age, 17% belonged to the 18–20 years age category, 30.9% were between 21–25 years, 15.8% belonged to the 31–40 years age category and 12.4% respondents indicated ages above 40 years. Furthermore, level of study distribution for the respondents depicts, 32.5% first-year/stage students, 18.0% second level/stage students, 34% third level/stage students and 15% fourth level/stage students.

Table 2 depicts the respondents' ownership and use of mobile devices, the first part of the table shows that 71.68% of the respondents possessed smartphones, 13.86% indicated the possession of both smartphones and tablets, 3.69% reported no mobile device at all as well as feature phones. The analysis of device ownership depicts that a good number of accounting students have a smartphone which is crucial to m-learning deployment and adoption in Nigeria. The second part of the table shows the brand specification of mobile devices owned by accounting students and out of the 707 indicated devices 38.7% were Techno phones or tabs, 2.45% indicated Infinix smartphone, 15.98% had Samsung phones or tablets, ITEL and iPhone/iPad ownership distribution of 7.36% and 7.78% respectively. Additionally, on the mobile device information, the third segment of Table 2 depicts the skill level of accounting students in using a mobile device, 39.47% indicated expertise in use, 51.22% showed average mobile skill and 9.30% indicated limited skills in the use of mobile devices. The data analysed show that Nigerian accounting students are ready for m-learning adoption based on mobile device ownership and usage.

4.1. Descriptive analysis—mobile activities

The third segment of the survey instrument was to find out the mobile activities accounting students carry out on their devices. The activities survey include; online shopping, reading ebooks, online banking, distributing files, social networking, accessing educational content, watching movies, playing games, listening to music and distributing files.

Table 3 depicts that Social Networking was the activity with the most mobile device use with an aggregate of 86.97% responses for the often-used category. This is followed by Assessing Educational Content with 79.85% for the often category. The third most frequently engaged mobile activity was Online Banking with 70.02% closely followed by Listening to Music with 73.28% for the often category. The least engaged activity was Online shopping with an aggregate of 38.09% for the often Likert category. The Online, however, is also the only activity that elicited a “never” response of 1.8% of the students among the nine different activities listed.

Looking at the tertiary and professional institution grouping for the data obtained, Table 3 shows that similarity of responses from the two groups for the mobile activities and this is further concretized by Table 4 which shows that Online Banking, Social Networking, watching movies and Listening to Music are the only mobile activities that differ significantly ($P < 0.001, 0.01, 0.05$) between the groups from the nine observed activities. Looking at the distribution in Table 3, Online Banking is a mobile activity engaged more by professional students this could be due to the working class category of the students. The reverse is the case for Listening to Music which depicts a mobile activity that is more preferable among tertiary institutions students who represent a younger category of

Table 1. Demographic characteristics of the survey participants (tertiary and professional accounting students)

Institutions	Male		Female		Total
	No	%	No	%	
Tertiary	215	42.74	288	57.26	503
Professional	276	53.28	242	46.72	518
Combined	491	48.09	530	51.91	1021

	Age												
	Below 18 Yrs		18–20 Yrs		21–25 Yrs		26–30 Yrs		31–40Yrs		Over 40 Yrs		Total
	No	%	No	%	No	%	No	%	No	%	No	%	
Tertiary	101	20.1	154	30.6	213	42.3	35	7.00	0	0.00	0	0.00	503
Professional	0	0.00	20	3.9	102	19.7	108	20.8	161	31.1	127	24.5	518
Combined	101	9.9	174	17	315	30.9	143	14.	161	15.8	127	12.4	1021

	Level of Study								
	1st Year/Found.		2nd Year/Skills		3rd Yr/Prof./HND1		4th Yr/HND 2		Total
Institution	No	%	No	%	No	%	No	%	
Tertiary	97	19.3	89	17.7	200	0.00	117	23.3	503
Professional	235	45.4	95	18.3	147	28.4	41	7.9	518
Grand	332	32.5	184	18.0	347	34.0	158	15.5	1021

Source: Authors' Computation (2019)

Table 2. Accounting students' mobile device ownership and usage

Institution	Type of Mobile Device											
	Feature Phone		Smartphone		Tablet		Both		None		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
Tertiary	19	3.84	307	62.02	50	10.10	108	21.8	11	2.22	495	
Professional	18	3.54	412	81.10	21	4.13	31	6.10	26	5.12	508	
Combined	37	3.69	719	71.68	71	7.08	139	13.8	37	3.69	1003	
Institution	Make of Mobile Device											
	Techno/Tab		Infinix		Samsung/Tab		Iitel		Iphone/iPad		Others	
	No	%	No	%	No	%	No	%	No	%	No	%
Tertiary	141	39.5	38	10.64	61	17.09	25	7.00	38	10.64	92	25.77
Professional	133	38.0	50	14.29	52	14.86	27	7.71	17	4.86	71	20.29
Combined	274	38.7	88	12.45	113	15.98	52	7.36	55	7.78	163	23.06
Institution	Mobile Device Skill											
	Expert		Average		Limited		Total					
	No	%	No	%	No	%	No	%				
Tertiary	236	46.92	252	50.10	15	2.98	503					
Professional	167	32.24	271	52.32	80	15.44	518					
Combined	403	39.47	523	51.22	95	9.30	1021					

Source: Authors' Computation (2019)

Table 3. Mobile activities and accounting students' frequency of use

	Institution	Often		Sometimes/Rarely		Never		Total
		Freq	%	Freq.	%	Freq	%	
Online Shopping	Tertiary	190	38.08%	223	44.69%	86	17.23%	499
	Professional	192	38.10%	189	37.50%	123	24.40%	504
	Combined	382	38.09%	412	41.08%	209	20.84%	1003
Reading Ebooks	Tertiary	337	67.94%	126	25.40%	33	6.65%	496
	Professional	308	60.99%	148	29.31%	49	9.70%	505
	Combined	645	64.44%	274	27.37%	82	8.19%	1001
Online Banking	Tertiary	300	60.12%	137	27.45%	62	12.42%	499
	Professional	403	81.41%	58	11.72%	34	6.87%	495
	Combined	703	70.72%	195	19.62%	96	9.66%	994
File Distribution	Tertiary	219	51.29%	142	33.26%	66	15.46%	427
	Professional	228	45.33%	160	31.81%	115	22.86%	503
	Combined	447	48.06%	302	32.47%	181	19.46%	930
Social Networking	Tertiary	416	91.63%	33	7.27%	5	1.10%	454
	Professional	418	82.77%	53	10.50%	34	6.73%	505
	Combined	834	86.97%	86	8.97%	39	4.07%	959
Assessing Educational Content	Tertiary	403	81.58%	75	15.18%	16	3.24%	494
	Professional	358	78.00%	72	15.69%	29	6.32%	459
	Combined	761	79.85%	147	15.42%	45	4.72%	953
Movies	Tertiary	258	65.48%	118	29.95%	18	4.57%	394
	Professional	228	53.90%	126	29.79%	69	16.31%	423
	Combined	486	59.49%	244	29.87%	87	10.65%	817
Games	Tertiary	316	64.10%	133	26.98%	44	8.92%	493
	Professional	224	46.86%	166	34.73%	88	18.41%	478
	Combined	540	55.61%	299	30.79%	132	13.59%	971

(Continued)

Table 3. (Continued)

	Institution	Often		Sometimes/Rarely		Never		Total
		Freq	%	Freq.	%	Freq	%	
Music	Tertiary	422	85.60%	60	12.17%	11	2.23%	493
	Professional	258	59.31%	123	28.28%	54	12.41%	435
	Combined	680	73.28%	183	19.77%	65	7.00%	928

Source: Authors' Computation (2019)

Table 4. Analysis of variance between tertiary and professional groups on frequency of use of mobile activities

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Online Shopping	Between Groups	25.055	3	8.352	4.486	.004
	Within Groups	1859.944	999	1.862		
	Total	1884.999	1002			
Reading eBooks	Between Groups	11.113	3	3.704	3.251	.021
	Within Groups	1136.169	997	1.140		
	Total	1147.283	1000			
Online Banking	Between Groups	6.124	3	2.041	1.823	.141
	Within Groups	1119.864	1000	1.120		
	Total	1125.988	1003			
Distributing files	Between Groups	22.805	3	7.602	4.864	.002
	Within Groups	1559.595	998	1.563		
	Total	1582.400	1001			
Social Networking	Between Groups	2.999	3	1.000	1.822	.141
	Within Groups	548.693	1000	.549		
	Total	551.692	1003			
Accessing Educational Content	Between Groups	6.265	3	2.088	2.891	.034
	Within Groups	685.429	949	.722		
	Total	691.694	952			
Watching movies	Between Groups	9.068	3	3.023	2.442	.063
	Within Groups	1174.523	949	1.238		
	Total	1183.591	952			
Playing games	Between Groups	21.869	3	7.290	4.776	.003
	Within Groups	1445.550	947	1.526		
	Total	1467.420	950			

(Continued)

Table 4. (Continued)

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Listening to music					
Between Groups	1.583	3	.528	.550	.648
Within Groups	911.961	951	.959		
Total	913.543	954			

Source: Authors' Computation (2019)

students. For Social Networking, the percentages of tertiary and professionals who undertake the mobile activity are quite close, however, the dissimilarity is obvious in the number of respondents who engage sometimes/rarely and those who do engage in the activity at all.

4.2. Descriptive analysis of intended mobile accounting learning activities

The analysis in Table 5 shows that the accounting learning activity that participants will like to use mobile resources for the most is to search for educational resources 93.81% very closely followed by the use of mobile applications for learning supported by 93.28%. The third activity with the highest frequency is to use online resources 90.32% followed by a local collaboration with colleagues 90.26%. The least favourite accounting learning activity participants would want to use mobile resources for is taking notes during lectures 72.85% followed by local interactions with lecturers 77.14%, the third least favourite learning activity is viewing video or audio lectures 77.5% and then taking assessments, quizzes, surveys and polling 77.75%.

Table 6 displays divergent views from the tertiary and professional accounting students for most of the intended mobile accounting learning activities except using mobile applications to learn and using video and audio recorded lectures. Table 5 gives a clearer picture on the divergence, for instance, while 87.80% of tertiary students like the idea of taking assessments on their mobile devices, 66.81% of professional students support the idea with 23.23% choosing to remain neutral on the use of mobile devices for this particular activity. This divergent view could be due to the fact that tertiary institution students especially those who are familiar with Learning Management Systems such as Covenant University students are more likely to embrace the idea more professional institution students who are most familiar with the traditional pen and paper assessments.

4.3. Descriptive analysis of internet access

The data contained in Table 7 depicts data on internet access by tertiary and professional accounting students. The first part was based on the question of whether the participants had constant access to use the internet and the responses were obtained using a yes or no format. The responses show that 67.09% had constant access to the internet while 23.7% did not. The second part of the table shows that 72% pay to access the internet while 17.3% do not pay. The third section of the table elicits data on the participants' opinion of the price of accessing the internet via their mobile devices and from the general responses, 27.03% participants stated that the cost of accessing the internet was high, 51.03% considered the cost as average while 5% thought that the cost was inexpensive. The missing responses from the entire population were 16.94%. The fourth section of the table sought further details on the use of the internet on mobile devices by the participants by asking the question "how often do you use the internet on your mobile device?" From the combined responses, 69.54% use the internet daily, 11.66% indicated weekly usage, and 4.9% showed monthly usage

4.4. Descriptive analysis of mobile learning readiness and acceptance challenges

Table 8 show the responses to the open question on participants' opinion of the challenges that might face the implementation of m-learning in accounting. The challenges listed by the respondents were sorted into four main issues; infrastructure availability challenge cost challenges, development and implementation challenges and use challenges. From the Table, based on the combined data the highest challenge overall is the cost of internet access 43.02% followed by the internet availability and network access challenge 40.5%, the third most reported challenge was the inexperience of instructors and students 15.89% followed by mobile device availability 10.08%. Other significant challenges mentioned include the cost of m-learning resources and materials 9.5%, how to manage accounting course complexities 6.01%, students getting distracted 5.23% and the cost of training, research and implementation 4.26%. The least mentioned challenge was adjusting from the traditional teaching method 0.19% followed by how to adequately evaluate 0.39% and developing a complicated m-learning application 0.91%.

Based on the issue related groups, the category with the highest number of challenges mentioned was the cost group with 59.30% respondents indicating challenges within the group very

Table 5. Accounting students' intended M-learning activities

	Institution	Agree		Disagree		Neutral		Total
		Freq.	%	Freq.	%	Freq.	%	
(a)	Tertiary	473	96.33%	12	2.44%	6	1.22%	491
	Professional	402	89.93%	9	2.01%	36	8.05%	447
	Combined	875	93.28%	21	2.24%	42	4.48%	938
	Tertiary	421	85.57%	35	7.11%	36	7.32%	492
	Professional	274	59.31%	75	16.23%	113	24.46%	462
	Combined	695	72.85%	110	11.53%	149	15.62%	954
	Tertiary	449	91.26%	17	3.46%	26	5.28%	492
	Professional	370	80.09%	27	5.84%	65	14.07%	462
	Combined	819	85.85%	44	4.61%	91	9.54%	954
	Tertiary	458	93.85%	14	2.87%	16	3.28%	488
	Professional	400	86.58%	18	3.90%	44	9.52%	462
	Combined	858	90.32%	32	3.37%	60	6.32%	950
	Tertiary	478	97.55%	5	1.02%	7	1.43%	490
	Professional	416	89.85%	18	3.89%	29	6.26%	463
	Combined	894	93.81%	23	2.41%	36	3.78%	953
	Tertiary	414	84.49%	35	7.14%	41	8.37%	490
	Professional	323	70.07%	44	9.54%	94	20.39%	461
	Combined	737	77.50%	79	8.31%	135	14.20%	951
	Tertiary	432	87.80%	26	5.28%	34	6.91%	492
	Professional	302	66.81%	45	9.96%	105	23.23%	452
	Combined	734	77.75%	71	7.52%	139	14.72%	944
	Tertiary	435	88.78%	17	3.47%	38	7.76%	490
	Professional	309	68.06%	53	11.67%	92	20.26%	454
	Combined	744	78.81%	70	7.42%	130	13.77%	944

(Continued)

Table 5. (Continued)

	Institution	Agree		Disagree		Neutral		Total
		Freq.	%	Freq.	%	Freq.	%	
Local Interactions with Lecturers	Tertiary	400	81.30%	31	6.30%	61	12.40%	492
	Professional	329	72.63%	31	6.84%	93	20.53%	453
	Combined	729	77.14%	62	6.56%	154	16.30%	945
(b)								
Social Network Learning	Tertiary	449	91.26%	3	0.61%	40	8.13%	492
	Professional	391	85.75%	19	4.17%	46	10.09%	456
	Combined	840	88.61%	22	2.32%	86	9.07%	948
Local Collaboration with Coll.	Tertiary	462	94.48%	6	1.23%	21	4.29%	489
	Professional	391	85.75%	15	3.29%	50	10.96%	456
	Combined	853	90.26%	21	2.22%	71	7.51%	945
Int. Collab. With Colleagues	Tertiary	433	88.55%	20	4.09%	36	7.36%	489
	Professional	364	80.00%	28	6.15%	63	13.85%	455
	Combined	797	84.43%	48	5.08%	99	10.49%	944
Int. Collab. With Lecturers	Tertiary	421	86.09%	27	5.52%	41	8.38%	489
	Professional	343	75.22%	36	7.89%	77	16.89%	456
	Combined	764	80.85%	63	6.67%	118	12.49%	945

Source: Authors' Computation (2019)

Table 6. Analysis of variance between tertiary and professional accounting student groups on intended M- learning activities

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Using Mobile Applications for learning	Between Groups	3.764	3	1.255	3.105	.026
	Within Groups	384.634	952	.404		
	Total	388.397	955			
Taking notes during lectures	Between Groups	4.479	3	1.493	1.617	.184
	Within Groups	876.850	950	.923		
	Total	881.329	953			
Reading eBooks	Between Groups	3.525	3	1.175	2.167	.090
	Within Groups	514.946	950	.542		
	Total	518.471	953			
Using online resources	Between Groups	3.323	3	1.108	2.453	.062
	Within Groups	427.108	946	.451		
	Total	430.431	949			
Searching for educational resources	Between Groups	1.507	3	.502	1.279	.280
	Within Groups	372.919	949	.393		
	Total	374.426	952			
Viewing video or audio recorded lectures	Between Groups	11.972	3	3.991	5.029	.002
	Within Groups	751.505	947	.794		
	Total	763.476	950			
Taking assessments, quiz, surveys and polling	Between Groups	3.867	3	1.289	1.702	.165
	Within Groups	711.658	940	.757		
	Total	715.524	943			
Submitting assignments	Between Groups	.194	3	.065	.087	.967
	Within Groups	696.484	940	.741		
	Total	696.678	943			

(Continued)

Table 6. (Continued)

		ANOVA					
		Sum of Squares	df	Mean Square	F	Sig.	
Local Collaboration with Interacting Lecturers	Between Groups	.995	3	.332	.425	.735	
	Within Groups	734.205	941	.780			
	Total	735.200	944				
Using Social Networking for learning	Between Groups	2.721	3	.907	1.822	.141	
	Within Groups	469.898	944	.498			
	Total	472.619	947				
Local Collaboration with Colleagues	Between Groups	.719	3	.240	.514	.673	
	Within Groups	438.896	941	.466			
	Total	439.615	944				
Int. Collaborating with colleagues	Between Groups	1.341	3	.447	.755	.519	
	Within Groups	556.235	940	.592			
	Total	557.576	943				
Int. Collaboration with instructors or lecturers	Between Groups	.300	3	.100	.141	.936	
	Within Groups	668.616	941	.711			
	Total	668.916	944				

Source: Authors' Computation (2019)

Table 7. Accounting students' perceived level of internet access

Constant Internet Access						
	Yes		No		Total	
	No	%	No	%	No	
Tertiary	395	81.11%	92	18.89%	487	
Professional	290	65.91%	150	34.09%	440	
Combined	685	73.89%	242	26.11%	927	

Payment for Internet Access						
	Yes		No		Total	
	No	%	No	%	No	
Tertiary	375	77.64%	108	22.36%	483	
Professional	359	83.88%	69	16.12%	428	
Combined	735	80.59%	177	19.41%	912	

Opinion of Cost							
	High Price		Average		Inexpensive		Total
	No	%	No	%	No	%	
Tertiary	140	31.25%	281	62.72%	27	6.03%	448
Professional	136	34.00%	240	60.00%	24	6.00%	400
Combined	276	32.55%	521	61.44%	51	6.01%	848

Frequency of Usage							
	Everyday		Every week		Monthly		Total
	No	%	No	%	No	%	
Tertiary	374	80.78%	66	14.25%	23	4.97%	463
Professional	336	80.77%	53	12.74%	27	6.49%	416
Combined	710	80.77%	119	13.54%	50	5.69%	879

Source: Authors' Computation (2019)

closely followed by infrastructural issues 58.72%, the third is the use category 28.48% and the last group is the development and implementation category with 12.4% responses. Respondents indicated more than one challenge per category. Therefore, the addition of the total is irrelevant to this analysis.

5. Discussions

The capacity of the Nigerian education system to achieve sustained quality education (SDG4) in this era of ever-evolving ICT and mobile technology use is dependent on m-learning and the readiness of different stakeholders including students, teachers and institutions to accept the learning method represent a crucial determinant in its eventual adoption. The discussion, therefore, centres on the readiness of accounting students in Nigeria to adopt m-learning based on various factors. In the area of smart device availability, a good number of the students from the surveyed institutions owned smart devices, ranging from smart mobile phones to tablets and some even displayed ownership of the two different categories. Furthermore, smartphone ownership also shows a fair distribution between the tertiary and professional institutions. A study of the descriptive distribution of types of smartphones shows that Techno, Infinix and Samsung smartphones were the top three devices indicated. The high rate of ownership of smart mobile devices could be attributed to the proliferation of Techno and Infinix smartphones within the Nigerian economy. The introduction of such affordable devices with the average price ranging from N35, 000 to N50, 000 for a good smart model has affected the high rate of smart device ownership among accounting students both from the tertiary and the professional platforms. Based on the evidence of smartphone ownership, therefore, it can be inferred that accounting students in Nigeria are ready for m-learning as far as device suitability is concerned.

Table 8. Accounting students' perceived M-learning challenges

	Tertiary		Professional		Combined	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Cost Challenges	215	100	301	100	516	100
1. Internet Access	72	33.49%	150	49.83%	222	43.02%
2. M-learning Resource/Materials	17	7.91%	32	10.63%	49	9.50%
3. Mobile Devices	13	6.05%		0.00%	13	2.52%
4. Training, Research and Implementation	5	2.33%	17	5.65%	22	4.26%
	107	49.77%	199	66.11%	306	59.30%
Infrastructural Challenges						
1. internet Availability/Network access	79	36.74%	130	43.19%	209	40.50%
2. Mobile Device Availability	7	3.26%	45	14.95%	52	10.08%
3. Institutional Policies	6	2.79%	12	3.99%	18	3.49%
4. Power Supply	11	5.12%	7	2.33%	18	3.49%
5. Government Policies	1	0.47%	5	1.66%	6	1.16%
	104	48.37%	199	66.12%	303	58.72%
Use Challenges (Lecturer/Student)						
Inexperience	27	12.56%	55	18.27%	82	15.89%
Distraction—Students	20	9.30%	7	2.33%	27	5.23%
Inadequate Feedback between lecturers and students	5	2.33%	6	1.99%	11	2.13%
Willingness and readiness	6	2.79%	4	1.33%	10	1.94%
Students' laziness	4	1.86%	5	1.66%	9	1.74%
Ineffective resource preparation	3	1.40%	5	1.66%	8	1.55%
	65	30.23%	82	27.24%	147	28.48%
Development and Implementation Challenges						

(Continued)

Table 8. (Continued)

	Tertiary		Professional		Combined	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Managing Accounting Course Complexities	215	100	301	100	516	100
Implementing Student Demands	19	8.84%	12	3.99%	31	6.01%
Sourcing Appropriate Content	0	0.00%	19	6.31%	19	3.68%
Evaluation	4	1.86%	2	0.66%	6	1.16%
Complicated M-learning Application	1	0.47%	1	0.33%	2	0.39%
Adjusting from the traditional teaching methods	2	0.93%	3	1.00%	5	0.97%
	0	0.00%	1	0.33%	1	0.19%
	26	12.09%	38	12.62%	64	12.40%

Source: Authors' Computation (2019)

It is obvious from the self-indicated responses that about 90% of accounting students are either experts or good at navigating through a mobile device and by implication mobile applications, this result is also evident in a question answered later on the mobile activities frequently engaged in on mobile devices where a good percentage of respondents indicated social networking. Social networking application and sites such as Facebook, Twitter and Instagram among others do require some level of skill to navigate through. It can be inferred therefore that based on the self-indicated responses to the skill of smart device usage, students are ready for the use of the m-learning application for accounting education in Nigeria.

The most frequently engaged mobile activity is Assessing Education Contents followed by Social Networking. Reading Ebooks (which is a common mobile activity) comes in the fifth position and Online Shopping comes last. The result indicates that accounting students are familiar with mobile activities and frequently engage them on their mobile devices. It can be inferred therefore especially based on the finding that accounting students are ready to use mobile applications for m-learning purpose in Nigeria. Oyelere et al. (2016) and Mtega et al. (2012) opines that students are already engaged in different activities on their mobile devices.

Having inferred that accounting students are familiar with the use of mobile activities based on the reported frequency of use, the next question listed 13 accounting education-related activities students will like to use their mobile resources for. All the activities represent one form of m-learning activity or the other with a direct one captured as “using mobile applications for learning”. The that using mobile applications for learning is an idea they would like to use their mobile resources for, also there is more than average support for all the remaining 12 activities with the least being taking notes during lectures with mobile devices. It can be inferred that based on proposed accounting m-learning activities, students are ready for m-learning in Nigerian accounting education. This outcome is in line with the findings of Oyelere et al. (2016) with the opinion that students already learn on their devices through social media, blogs and also access course contents from those devices.

Looking across the responses to the enquiries, it can be deduced that a good number of accounting students have access to constant internet which they pay for. Furthermore, they opine that the cost is average, not too expensive or cheap but affordable and finally, a good portion of the respondents also make use of internet facilities on their mobile devices on a daily basis. These responses are actually favourable to the deployment of m-learning in Nigeria. While there are still rooms for improvement in the availability of constant internet access and also the need to make the cost of access more affordable, there is enough evidence to infer that m-learning can be successfully deployed for accounting education in Nigeria. Ayoade (2015) posits that for m-learning to be successful in Nigeria there is a need to improve on internet access and network availability. It is expected that as the proliferation of mobile devices and facilitating infrastructure continues; these factors will become more affordable and increasing the rate of success of m-learning deployment in the country.

Having asked various indirect m-learning readiness questions the last set of the question addressed directly students self-indicated levels of m-learning knowledge. From the responses, about 66.1% of the accounting students are quite comfortable with their current general knowledge of m-learning, and this also is favourable for its deployment in Nigeria. The final question which is an open-ended question solicited the opinion of students on the challenges they think m-learning deployment for accounting education in Nigeria might face. The challenges as highlighted by the respondents placed in groups based on cost, infrastructure, use and development and implementation challenges. Based on the tabulated responses, the following were inferred;

Students are most concerned about the costs associated with m-learning. The cost concerns cover internet access cost which takes the largest proportion of the cost group for both tertiary and professional institution students followed by the cost of accessing m-learning resources. The

cost of acquiring mobile devices and training students and instructors to use m-learning resources were also highlighted as challenges that might limit the implementation of m-learning in Nigerian accounting education. It is therefore important for institutions and providers of enabling infrastructure to ensure that these cost challenges are addressed by making internet access more affordable, m-learning developers should develop applications with reduced costs in mind, and mobile device manufacturers can develop affordable devices tailored at enabling m-learning within the Nigerian academic context. The issue of cost is in line with the findings of Haji et al. (2013) that the main issue in m-learning deployment is cost and infrastructure related.

A very paramount concern of students on m-learning implementation in Nigeria which follows the cost of internet access is the availability of internet access. This means it is one thing to have affordable internet while it entirely another matter to have internet network coverage whenever it is needed. The place of adequate internet network coverage cannot be overemphasised for m-learning because it is a major facilitator of learning on the go, at any time and anywhere. Other challenges within the infrastructure sub-group include an adequate power supply to ensure that the battery levels of mobile devices are optimal for learning purposes, institutional and government policies that create favourable enabling environments for m-learning deployment. Internet infrastructural issue in Nigeria is in tandem with the findings of Amiaya and Ranor (2015); Haji et al. (2013) Mtega et al. (2012).

Accounting students are also concerned about the level of the inexperience of lecturers and students in developing and using m-learning resources; it is important that accounting lecturers can convert their pedagogical content knowledge into technological tools appropriate for m-learning. There are authoring tools for the easy creation of m-learning applications, but even these still require a level of experience to manipulate. The inexperience of students in the use of m-learning can also be a challenging factor to their optimal use of robust m-learning applications. Also within the use challenge group is the place of ensuring that m-learning systems can facilitate adequate and timely feedback between students and instructors, this kind of interaction is important to simulate effective traditional learning environments through mobile learning. This finding is in consonance with the findings of Yusuf, Gambari, Daramola, Badmus, and Isiaka (2018), Asimwe and Grönlund (2015), Mtega et al. (2012) on the need to give adequate training to the lecturers and students.

A challenge that is also of concern to the students is the distraction limitation of using mobile devices to learn, due to the availability of other fun, entertaining and exciting applications at the touch of the student, it becomes easy to get easily distracted and abandon the m-learning process for social networking for instance. This challenge has the potential to limit the effectiveness of m-learning unless suitable solutions are developed to it.

From the development and implementation challenge group, students are concerned about how m-learning resources will be developed to manage the complexities of accounting courses. Most accounting courses are quantitative, requiring tables, calculations and detailed explanations. Students believe that creating m-learning applications that can successfully compete with traditional teaching techniques or at the very least supplement them is a challenge that needs to be mitigated to deploy m-learning for accounting education in Nigeria successfully. This finding is in tandem with the findings of Staples et al. (2016) that pedagogical and content issues must be taken into consideration before m-learning can be successful in accounting education. Other highlighted challenges within the group include; implementing students learning demands based on frequent updates, sourcing the appropriate content to ensure the right materials are communicated, the issue of effective evaluation methods and the need to ensure that easy to navigate accounting m-learning applications are developed. The adoption of m-learning in the Nigerian education system is the future of affordable, portable and sustainable education. This statement is based on the rate of adoption of m-learning by various disciplines globally. Therefore, if the goal of sustainable development in education should be achieved in Nigeria, the challenges of development and implementation as discussed should be adequately addressed.

6. Conclusions and recommendations

SDG4 which centres on quality education depends on the adoption of ICT driven learning methods such as m-learning and there is ample evidence to support the fact that students' are ready to accept m-learning for accounting education in Nigeria. The widespread and daily use of mobile devices, applications and facilitating infrastructure for various functions including learning is a clear indication that m-learning is already being practised in one form or the other. However, it can be concluded that concerns bothering on the cost of m-learning adoption, availability of internet facilities and other enabling infrastructure such as electricity should be addressed. The study concludes that, while there is significant evidence to show that students' are ready for m-learning, these issues need to be addressed on personal, institutional and national levels to ensure a higher rate of readiness for m-learning deployment in accounting education. In light of the findings, this study recommends that students and instructors begin to take adequate steps to become more experienced and acquainted with the development and use of m-learning resources for accounting education in Nigeria. Furthermore, institutions from the tertiary, professional to national levels should generate conversations and develop policies that can significantly improve the stability of mobile infrastructure in Nigeria. Policies should be introduced to favour the availability and stability of mobile infrastructure at the national level also.

Funding

The authors appreciate Covenant University Centre for Research, Innovation and Development (CUCRID) for funding the publication of this research output.

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Citation information

Cite this article as: Mobile learning and accounting students' readiness in tertiary and professional institutions in Nigeria, Anijesushola Ajayi, Charles Korede Ayo & Olusanmi Olamide, *Cogent Arts & Humanities* (2019), 6: 1676570.

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