

# EXPLORING THE USE OF INSTRUCTIONAL TECHNOLOGY: A SURVEY OF ACADEMICS AT TWO NIGERIAN UNIVERSITIES

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## ABSTRACT

The article reports empirical research findings on the use of instructional technology among Nigerian academics for effective instructional delivery. Using a quantitative approach, 267 questionnaires were distributed to academics from two purposively selected Nigerian universities in the South West geopolitical zone. A total of 215 questionnaires (80.5%) were returned and found useful for data analysis. The data were analysed with SPSS software to generate both descriptive and inferential statistics. The results indicated that various types of instructional technologies are used by academics for lecture preparation, presentation and communication. The findings also revealed that digital literacy skills and the use of instructional technology were positively related ( $R = 0.289$ ). The variable digital literacy skills accounted for 7.9 per cent of the total variance in technology use ( $R^2 = 0.079$ ). The result indicates a positive relationship between digital literacy skills and technology. The article concludes that academic libraries, being the nerve centre of the institutions which they serve, should accept responsibility for fostering the extensive use of technology in teaching in the academia. Therefore, librarians should develop and implement initiatives that will help Nigerian academics imbibe such a culture at institutional level.

**Keywords:** instructional technology; ICTs; UTAUT; universities; academics; technology use; Nigeria

## INTRODUCTION

The convergence of information and communication technologies has transformed the storage, retrieval and dissemination of information. Innovative techniques of scholarly communication, proliferation of the Internet, social media and the growth



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of mobile devices, among others, necessitate the use of emerging technologies in both the industry and educational settings. The magnificent change, that is the outcome of rapidly evolving technologies, has impacted drastically on the knowledge and skills requirements of twenty-first century academics and students. With the increasing advocacy that technology offers possibilities for solutions to some of the problems in education, universities the world over are altering their teaching approaches.

Instructional technology refers to resources that are used in implementing instruction or facilitating teaching and learning. These resources include computers, digital video discs (DVDs), the Internet, interactive video conferencing, laptops, multimedia projectors, smart boards, and specialised software and networks, among others. In this paper, instructional technology is conceptualised as hardware (such as personal computers or laptops), multimedia projectors, scanners, digital cameras, printers, software (such as word-processing software and presentation software), Learning Management Systems (LMS), e-resources (such as e-books, e-journals and e-databases), and social networking sites (such as Facebook, Twitter and wikis).

A cursory look into the use of instructional technology from the global landscape shows that different countries have developed diverse technological initiatives for institutions to imbibe the culture of embracing technology in teaching. These initiatives include the education technology strategy in Northern Ireland, the national grid for learning initiatives in Scotland, an e-learning strategy in Wales, an information economy initiative in Australia, and an online digital content initiative in Korea. In African countries like Kenya, South Africa and Nigeria, these initiatives consist of the African Virtual University (AVU), the Kenya Education Network (KENET), the e-campus strategy at the University of Stellenbosch, the Telematic Learning and Education Innovation Strategic Plan 2002–2005 at the University of Pretoria, the Nigerian Universities Network (NUNet), the Polytechnics Network (PolyNet), the National Virtual (Digital) Library, and the Nigerian Education Academic and Research Network (NEARNet). Despite these technological initiatives and enormous investments regarding information and communications technologies (ICTs) by universities the world over, the use of instructional technology in the academe is not widespread (Mirriahi, Dawson, and Hoven 2012).

Nigerian academics, like their counterparts elsewhere, have been exposed to the global technological torrent. Although there is research on how instructional technologies are being used by academics in developed countries, previous studies rated low the use of instructional technology in Nigerian universities (Onasanya et al. 2010). Such studies underscore that academics, particularly those in Africa have not reaped the full benefits of e-learning owing to the high dependence on the traditional lecture-based, chalk-and-talk method of teaching (Akuegwu et al. 2011). Moreover, most studies tended towards the influence of gender on technology acceptance and use (Owusu-Ansah 2013), and attitude to the use of instructional technology (Mbengo 2014). Getting academics to use instructional technology remains a key challenge for universities (Gates et al. 2000).

There are still many contexts where the need for additional constructs in the unified theory of acceptance and use of technology (UTAUT) need to be examined (Akbar 2013). Little information is available on the relationship between digital literacy and technology adoption and use. The study reported in this article attempts to fill this gap in literature by examining the use of instructional technology among academics in a developing nation. The following research questions guided this study:

1. What is the frequency and purpose of the use of instructional technology among academics?
2. What digital literacy skills do Nigerian academics have?
3. What influence does digital literacy skills have on the use of instructional technology?

## STUDY SITE

Nigeria has its geographical location on the Gulf of Guinea in West Africa. It is located between Benin in the west, Cameroon in the east, Chad in the north-east, and Niger in the north-west. The country is divided into six geopolitical zones: North Central, North East, North West, South East, South South and South West. The study was carried out in South West Nigeria. The South West was chosen because a larger percentage (30%) of the 129 universities in Nigeria is situated in the South West geographical zone (NUC 2014).

## LITERATURE REVIEW

### Use of Instructional Technology among Academics

All over the world, there is a paradigm shift in the role of academics from being transmitters of knowledge to facilitators and creators of learning environments. The twenty-first century academics are now expected to leverage ICT to foster the exchange of information, teaching, learning, dialogue, collaboration and access to teaching resources. To this end, universities the world over are now restructuring their environment in terms of teaching, research, infrastructure and curriculum to accommodate the use of instructional technology in the academe. Chawinga and Zinn (2015) argue that it is extremely important for academics to use instructional technology for lecture preparation and presentation. The rationale for the use of instructional technology among academics include access to varied resources, improved quality of teaching, knowledge sharing, networking, and communication with experts and colleagues around the world. Other benefits include access to enhanced communication and delivery of lectures to students. More recent literature reveals that the overarching importance of instructional technology

in the academe lies in the provision of a platform for both academics and students to further discuss the lecture outside the lecture rooms (Abdelraheem and Ahmed 2015).

In attaining plausible success in the use of instructional technology in the academe, Fageeh (2011) argues that academics must have the requisite digital literacy skills as a prerequisite for e-content development and e-learning. Ncube, Dube and Ngulube (2014) found that although academics in African universities appreciate the value of e-learning, it is imperative that e-learning strategic plans and e-learning training policies be developed by individual universities. The development of the e-learning strategic plan requires that an academics' skills audit be done so as to map out the capability and talents of academics.

Globalisation of education has also placed pressure on academics to become digitally literate. This is because educational institutions must begin to operate in a social space so that intellectual developments in one region of the world could be felt by academics and their students on the other side of the globe. Globalisation, a distinguishing characteristic of development, is brought about by pervasiveness of digital technologies. In the plethora of opinions on the issue, Cornali and Tirocchi (2012) affirm that globalisation should inspire stakeholders and decision makers in higher education to strive for the internalisation of curricula at all levels of education. To interpolate the stance of these authors, stakeholders in the education industry in Nigerian universities and elsewhere should develop curricula that promote e-lectures, and the use of web-based educational resources, e-mentoring and e-learning.

Information system researchers such as Mutingi and Matope (2013) opine that the use of instructional technology in any institution is a complex phenomenon. Technology use in the educational landscape is said to be complex because academics must be willing to use it, and there must be ease of use (Akinde and Adetimirin 2017). Impediments to the use of instructional technology among academics include, amongst other factors, institutional and environmental factors (Butler and Sellbom 2002; Mabawonku 2003), the high cost of hardware and software (Twinomujuni 2011), and the lack of funds (Ensafi, Zamiri, and Kahani 2007).

Hue and Ab Jalil (2013) found the use of multimedia projectors, the Internet, web applications, drill and practice software, wireless handheld devices, emails, LMS, web-publishing tools, and interactive whiteboards among academics. Singh (2012) found the use of electronic databases, web-based resources, e-journals, and emails among academics. Dangani and Mohammed (2009) found computers, CD-ROMs, printers, scanners and mobile phones as the most frequently used instructional technologies by academics.

The discourse in literature expounds that for African universities to experience milestone achievements in the use of instructional technology, there must be support from their governments and university management.

## Digital Literacy Skills and their Impact on the Use of Technology

Digital literacy is not a new phenomenon on the global scenery as its significance in technology use has been underscored by scholars (Masino 2013). It is the ability to use information technology, communication tools and networks to access, manage and integrate digital resources (Markauskaite 2007). Digital literacy is synonymous with digital competence, e-literacy, e-skills, e-competence, computer literacy, and media literacy. These diverse terms underscore that traditional literacy is no longer sufficient for survival in the digital age. Although some scholars argue that digital literacy and digital competence are two different concepts, Gallardo-Echenique et al. (2015) argue that digital competence is a requirement for, and an antecedent of, digital literacy.

The variety, frequency and extent of the use of instructional technology are influenced by digital competency (Laronde 2010). A study carried out by Majid and Abazova (1999) revealed a statistically significant relationship between digital literacy and the use of instructional technology. The authors argue further that those academics who are more digitally literate will use instructional technology more frequently than those who are not digitally literate. Asom (2011) observes that academics with an average level of digital literacy skills are capable of using instructional technology for lecture notes, computing of students' results, surfing the Internet for information, and sending emails. As the dependency on technology in all facets of life increases, digital literacy skills become more essential for academic empowerment and e-learning (Ezziane 2007). From the viewpoint of Redmann and Kotrlík (2009), learning from colleagues through conferences, workshops, and self-directed learning is one of the approaches academics can leverage to stay on the cutting edge of the technological diffusion in institutions. To reduce the effect of gender on digital literacy skills, Atan, Azli and Idrus (2002) argue for equal access for male and female academics to technology.

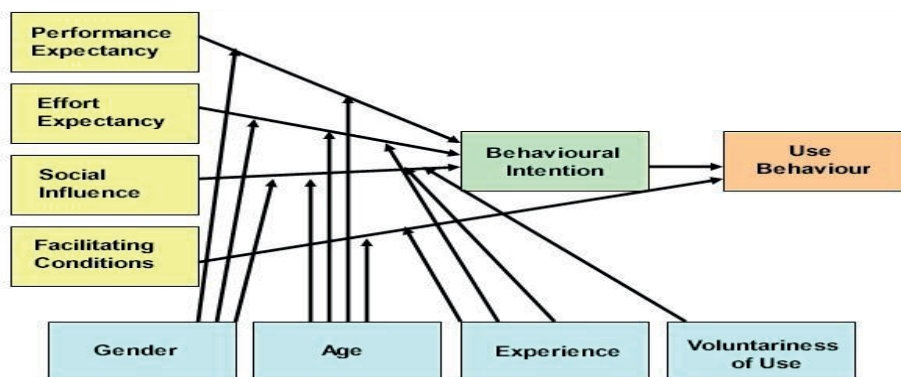
Universities in developing countries have a significantly lower rate of adoption and use of instructional technology when compared with those in developed countries (Sharma 2003) owing to the digital divide between academics in highly technologically driven countries such as Europe and the United States and a developing nation like Nigeria. The digital divide refers to the disparity of the availability of technological tools, in terms of hardware, software and network connections, autonomy of use, skills, social support, purposes for which the technology is used, and ownership (Acilar 2011). The digital divide is responsible for the disparity of digital competency between academics. In universities where academics have uninterrupted access to the Internet, both at work and at home, digital inequality and its effect become imperceptible.

The scholarly work of Oyelaran-Oyeyinka and Lal (2005) reflects that digital inequality within and between universities in Africa is as a result of differences in technological devices that people use to access the Internet, technical support, and the level of capacity building. The digital divide has also resulted in disciplinary differences in technology adoption and use among academics. Gombachika and Kanjo (2008) observed the disparity of instructional technology use among academics in science,

engineering and humanities. Iskandarani (2008) evaluates this situation and argues for an extermination of the digital divide between academics in less developed nations and their counterparts in the developed world. Ogunsola and Okusaga (2006) counselled that Nigeria and other African countries should strengthen their national information and communication infrastructural policies, and ICT initiatives in line with the demands of the knowledge society.

## THEORETICAL FRAMEWORK

The UTAUT model was the theoretical lens for the study reported in this article. This theory has been used to examine the acceptance and use and also the non-acceptance and non-use of technology in various contextual settings. The UTAUT is a unified theory derived from the constructs of eight individual theories of technology acceptance and use. It postulates that the intention to use technology or the actual use of technology is influenced by an individual's perception of performance expectancy, effort expectancy, social factors and facilitating conditions. Performance expectancy is the degree to which an individual believes that using a system will help him/her attain so much in a job performance. Effort expectancy, a construct equivalent with perceived ease of use in the technology acceptance model, refers to the degree of ease associated with using technology. Social influence depicts a normative belief in perceptions of others about whether one should or should not engage in technology use. Facilitating conditions reflect the degree to which an individual believes that organisational and technical infrastructure exists to support the acceptance and use of technology within the system. The four core constructs, namely performance expectancy, effort expectancy, social influence, and facilitating conditions are direct determinants of technology use, and the effect of these four core constructs is moderated by gender, age, experience, and voluntariness of use as shown in Figure 1.



**Figure 1:** The unified theory of acceptance and use of the technology (UTAUT) model (Venkatesh et al. 2003, 445)

The suitability, validity and reliability of the UTAUT model for a study such as this have been proven by previous studies such as those of Akbar (2013). Previous studies have examined technology adoption and use from the four major constructs of the UTAUT model. This research includes digital literacy skills as an additional variable to the UTAUT model to determine its influence on technology use. Donaldson (2011) extended the UTAUT model with additional constructs such as perceived playfulness and self-management to study the acceptance of mobile learning among students.

## RESEARCH APPROACH

A descriptive survey research design was used to examine the use of instructional technology among academics. The research was conducted among academics in two universities located in South West Nigeria. The University of Ibadan and the Covenant University were selected purposively based on the 2013 Webometrics Ranking of World Universities and the academic global ranking of universities in Nigeria where they ranked among the top ten in Nigeria. Moreover, both universities have a high presence of instructional technology. Using the purposive sampling method, academics from three faculties that have the majority of disciplines which are common to both universities were chosen. The sample size for the study was determined using a published table for selecting sample sizes by Israel (1992). The total sample size was 267 academics. The respondents for the study were selected using the systematic sampling technique. Questionnaires were used for data collection. To ensure the reliability of the instrument used in this study, a test-retest reliability method was adopted to determine internal consistency, reliability and overall reliability of the construct in the questionnaire. The instrument was pilot tested at the University of Lagos among 30 academics to determine the overall reliability of the questionnaire. The internal consistency and reliability of the multiple item scales returned Cronbach alpha values of 0.94 respectively for frequency and purpose of use, and 0.72 for digital literacy skills. The nearer the measure is to 1, the higher the reliability of the instrument (Brink, Van der Walt, and Van Rensburg 2012).

The first section of the questionnaire sought information on demographic characteristics of the respondents. Another section of the questionnaire sought information on the use of instructional technology by asking academics to respond to questions of frequency and purpose of use. The responses to the frequency of use were ranked thus: daily, weekly, monthly, rarely and never. On the purpose of use, academics were provided with a list of uses for each instructional technology and were asked to check against the options provided. Multiple responses were allowed in this case. The last part of the instrument investigated digital literacy skills of academics. The scale developed by Agbo (2015) was modified to measure digital literacy skills of academics on a five-point Likert scale of strongly agree, agree, neutral, strongly disagree and disagree.

Questionnaires were self-administered to academics who showed a willingness to participate in the survey. At the end of the survey, a total of 215 questionnaires representing 80.5% were returned and found useful for data analysis. Data obtained were analysed with the Statistical Package for Social Sciences (SPSS) to generate both descriptive (such as frequencies, percentages, mean, and standard deviation) and inferential statistics. All ethical procedures such as voluntariness of participation, anonymity and confidentiality of the information were ensured in this study.

## RESULTS

### Demographic Profile of Respondents

Respondents were asked questions that sought personal information, such as faculty, gender, age, highest academic qualification, number of years spent as academics, and designation within the university. Table 1 shows that nearly half of the respondents (47.9%) were from the Faculty of Science/Natural and Applied Science.

In terms of age, most of the respondents were within the age bracket of 36 to 46 years. The result indicates that individuals belonging to this age category are less likely to be technostressed (Elder, Gardner, and Ruth 1987). With regard to the highest educational qualification, the majority of academics (128 or 59.5%) had PhD degrees with a few (82 or 38.2%) who had master's degrees. The dominance of those with PhD degrees in the study could be explained by the fact that a doctoral degree is a prerequisite for individuals in the academe. Most of the academics (32.6%) surveyed have been working for six to ten years. Results further show that the respondents ranged from assistant lecturers to those in the professorial cadre, but a majority of the academics (59 or 27.4%) were in the lecturer grade II category. The findings showed considerable combinations across the demographic variables, hence data collected can be regarded as reliable for the purpose of this study.

**Table 1:** Demographic profile of respondents (N = 215)

Demographic profile	Category	Frequency	Percentage %
Faculty	Arts/School of Leadership	40	18.6
	Technology/Engineering	72	33.5
	Science/Natural and Applied Science	103	47.9
Gender	Male	157	73.0
	Female	58	27.0
Age (in years)	25–35	39	18.1
	36–46	112	52.1
	47–57	46	21.4
	58–68	18	8.4
Highest educational qualification	MSc	67	31.2
	MA	15	7.0
	PhD	128	59.5
	Others	8	2.3



Number of years served as an academic	Less than a year	7	3.3
	1–5	58	27.0
	6–10	70	32.6
	11–15	36	16.7
	16–20	29	13.5
	20 and above	15	7.0
Designation in the university	Professor	13	6.0
	Reader/Associate Professor	20	9.3
	Senior Lecturer	42	19.5
	Lecturer I	33	15.3
	Lecturer II	59	27.4
	Assistant Lecturer	48	22.3

### Use of Instructional Technology among Nigerian Academics

Table 2 shows the frequency of use of instructional technology among academics using attributes as daily, weekly, monthly, rarely and never. With a mean score above 4.00, respondents showed that academics use mostly the following instructional technologies: personal computers, Microsoft Word, Internet, emails, mobile phones, printers, e-journals, e-books, Microsoft PowerPoint and web resources. The analysis further indicates that the following instructional technologies: digital cameras, Twitter, blogs, wikis, LMS, and plagiarism software, with a mean score below 3.00 were rarely used by academics.

**Table 2:** Frequency of use of instructional technology (N = 215)

Instructional technology		Frequency of use Freq. (%)					Mean	Std. dev.
		Daily	Weekly	Monthly	Rarely	Never		
Hardware	Personal computer	207 (96.3)	3 (1.4)	1 (0.5)	2 (0.9)	2 (0.9)	4.91	0.508
	Multimedia projector	62 (28.8)	84 (39.1)	21 (9.8)	37 (17.2)	11 (5.1)	3.69	1.203
	Scanner	44 (20.5)	50 (23.3)	39 (18.1)	69 (32.1)	13 (6.0)	3.20	1.258
	Digital camera	34 (15.8)	48 (22.3)	25 (11.6)	78 (36.3)	30 (14.0)	2.90	1.332
	Printer	133 (61.9)	57 (26.5)	7 (3.3)	10 (4.7)	8 (3.7)	4.38	1.016
	Mobile phone	155 (72.1)	9 (4.2)	8 (3.7)	19 (8.8)	24 (11.2)	4.17	1.448
	Mobile device (iPad, tablet, etc.)	126 (58.6)	23 (10.7)	14 (6.5)	22 (10.2)	30 (14.0)	3.90	1.522
	CD/DVD	72 (33.5)	38 (17.7)	23 (10.7)	51 (23.7)	31 (14.4)	3.32	1.496
	Interactive whiteboard	64 (29.8)	56 (26.0)	14 (6.5)	52 (24.2)	29 (13.5)	3.34	1.457
Software	Microsoft Word	201 (93.5)	7 (3.3)	2 (0.9)	2 (0.9)	3 (1.4)	4.87	0.600
	Microsoft PowerPoint	101 (47.0)	69 (32.1)	21 (9.8)	21 (9.8)	3 (1.4)	4.13	1.035
	Spreadsheets (Excel)	97 (45.1)	45 (20.9)	30 (14.0)	33 (15.3)	10 (4.7)	3.87	1.270
	Learning Mgt. System	39 (18.1)	37 (17.2)	18 (8.4)	48 (22.3)	73 (34.0)	2.63	1.535
	Plagiarism software	17 (7.9)	26 (12.1)	38 (17.7)	62 (28.8)	72 (33.5)	2.32	1.269
E-Resources	Internet	192 (89.3)	9 (4.2)	3 (1.4)	5 (2.3)	6 (2.8)	4.75	0.833
	Email	165 (76.7)	10 (4.7)	5 (2.3)	17 (7.9)	18 (8.4)	4.33	1.325
	Web resource	110 (51.2)	55 (25.6)	19 (8.8)	24 (11.2)	7 (3.3)	4.10	1.156
	Electronic database	51 (23.7)	49 (22.8)	30 (14.0)	40 (18.6)	45 (20.9)	3.10	1.483
	E-book	109 (50.7)	65 (30.2)	26 (12.1)	12 (5.6)	3 (1.4)	4.23	0.963
	E-journal	116 (54.0)	62 (28.8)	20 (9.3)	13 (6.0)	4 (1.9)	4.27	0.987

Instructional technology		Frequency of use Freq. (%)					Mean	Std. dev.
		Daily	Weekly	Monthly	Rarely	Never		
Social Networking Sites	Facebook	93 (43.3)	39 (18.1)	12 (5.6)	32 (14.9)	39 (18.1)	3.53	1.585
	Twitter	34 (15.8)	30 (14.0)	16 (7.4)	75 (34.9)	60 (27.9)	2.55	1.429
	Wikis	32 (14.9)	39 (18.1)	23 (10.7)	61 (28.4)	60 (27.9)	2.64	1.433
	Blog	21 (9.8)	25 (11.8)	20 (9.3)	79 (36.7)	70 (32.6)	2.29	1.298
	YouTube	32 (14.9)	53 (24.7)	30 (14.0)	48 (22.3)	52 (24.2)	2.84	1.420

The study further required academics to indicate the purpose of use of the various instructional technologies. The study found that academics used personal computers, printers, Microsoft Word, the Internet, e-journals, e-books, and web resources to prepare lecture notes. Multimedia projectors and PowerPoint were used for the presentation of lectures while printers were used for producing assignments or course manuals. Spreadsheets such as Microsoft Excel were used by academics for data analysis and processing students' results. A few academics indicated that they use plagiarism software such as Turnitin for checking similarity of text among students. Mobile phones, emails, Moodle and Twitter were used for communication with students and colleagues, but only a few academics allowed students to submit research essays, term papers and assignments via email.

## Digital Literacy Skills of Nigerian Academics

Table 3 shows the digital literacy skills of academics using a five-point Likert scale comprising attributes such as strongly agree, agree, neutral, strongly disagree and disagree.

**Table 3:** Digital literacy skills of academics

Statement	N	Min.	Max.	Mean	Std. dev.	Rank
I am able to:						
use different types of instructional technology (such as computers, multimedia projectors, scanners, presentation software, Moodle, and e-books)	210	1	5	4.22	0.950	6th
use the Internet	211	1	5	4.47	0.841	1st
develop search strategies using keywords and Boolean terms to locate information on the Internet from one or more sources	209	1	5	4.06	1.055	9th

Statement	N	Min.	Max.	Mean	Std. dev.	Rank
I am able to:						
identify the appropriate electronic resources to prepare for my lectures	211	1	5	4.22	0.884	6th
download files from the Internet	214	1	5	4.42	0.823	2nd
upload files on the Internet	213	1	5	4.27	0.941	5th
save files from a web page	214	1	5	4.33	0.881	4th
send attachments with email messages	212	1	5	4.39	0.915	3rd
use web 2.0 tools or technologies (such as Facebook, Twitter, wikis, and Skype)	208	1	5	3.98	1.081	10th
design my lectures using instructional technology to facilitate mastery of the subject	212	1	5	3.64	1.218	12th
communicate with my students effectively using instructional technology	214	1	5	4.10	0.988	8th
use interactive whiteboards	212	1	5	3.88	1.053	11th

With a mean score well above 4.00, respondents showed possession of the following digital literacy skills: the ability to use the Internet, download files from the Internet, send attachments with email messages, save files from a web page, upload files on the Internet, use different types of instructional technologies (such as computers, multimedia projectors, scanners, presentation software, Moodle, and e-books). A mean score less than 4.00 seems to indicate that academics are not digitally literate enough to use web 2.0 tools or technologies for teaching, interactive whiteboards, and to design instructional programmes that can facilitate mastery of the subject in the selected universities.

### Influence of Digital Literacy Skills on the Use of Instructional Technology

Table 4 shows the regression analysis of the influence of digital literacy skills and the use of instructional technology.

**Table 4:** Summary of regression analysis of the relationship between digital literacy skills and the use of instructional technology

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	2449.017	1	2449.017	19.423	0.000 <sup>b</sup>
	Residual	26856.643	213	126.088		
	Total	29305.660	214			
	R = 0.289 <sup>a</sup>	R <sup>2</sup> = 0.084,	Adjusted R <sup>2</sup> = 0.079,	SEE = 11.229		

<sup>a</sup> Predictor (constant), digital literacy skills

<sup>b</sup> Dependent variable: use of instructional technology

This result suggests a significant relationship between digital literacy skills and the use of instructional technology  $\{F(1,213) = 19.423, p < .05\}$ . The findings also revealed that digital literacy skills and the use of instructional technology were positively related ( $R = 0.289$ ) though the relationship was weak. The variable digital literacy skills accounted for 7.9 per cent of the total variance in technology use ( $R^2 = 0.079$ ). The overall findings of the study revealed a significant and positive relationship between digital literacy skills and technology use. This is consistent with the findings reported by Mac Callum, Jeffrey and Kinshuk (2014).

## DISCUSSION OF FINDINGS

Academics in Nigerian universities now use instructional technology for teaching purposes. This study found the use of personal computers, printers, multimedia projectors, Microsoft Word, Microsoft PowerPoint, spreadsheets (Microsoft Excel), the Internet, emails, e-journals, e-books, and web resources more prominent among Nigerian academics. The result further indicated that the adoption and use of LMS and social networking sites, especially Twitter, blogs, and wikis among Nigerian academics are still predominantly low. This confirms the findings reported by Hussein (2011) but is at variance with that of Nagy (2016). Overall, the findings of this study indicate that Nigerian academics have shifted from the traditional method of teaching and have embraced the use of technology in teaching and learning like their counterparts in Europe, America, Asia, Australia and the rest of Africa. But unlike universities in the UK, the USA and the Middle East, where the adoption of LMS is more rampant, the use of LMS is yet to be entrenched among Nigerian academics.

The plausible explanation for the low usage of LMS among Nigerian academics could be because it is time consuming and intellectually demanding (Lonn and Teasley 2009). Moreover, most academics believe that using LMS will require additional time and effort, which would rather limit the time earmarked for research (Garrote 2012). However, LMS should readily be found acceptable by academics because it is classified among the first-order category of instructional technology like computers, blogs, wikis, laptops, interactive whiteboards, digital cameras, scanners and projectors (Groff 2013). However, the use of LMS would not be a daunting task in institutions where academics have hands-on training and adequate technical assistance from the ICT centres and libraries.

The finding of this study agrees with that of Mock (2004) who found that Microsoft Word and PowerPoint are commonly used by academics to prepare lecture notes in advance. As regards the use of e-resources, the Internet, emails, e-journals and e-books were found as the most commonly used instructional technology. This finding agrees with that of Egberongbe (2011) but contradicts the findings of Bashorun, Isah and Adisa (2011), who found online databases as the most widely used e-resources among academics. Electronic resources are pertinent in teaching, learning and research in

universities but the ability to use them proficiently depends on digital literacy skills among other factors. For reasons such as this, Ocholla (1996) unequivocally argues that academic libraries should encourage the utmost use of e-resources among academics through user education, liaison programmes and marketing strategies.

There are strong indications from previous scholars that the use of social networking sites in teaching is not common in universities. Yet, the current educational scenery requires the inclusion of Facebook, Twitter and LinkedIn in LMS to reinforce and strengthen the learning process (Lewis et al. 2013). To bring about milestone breakthroughs in the use of instructional technology in the academe, Akinola (2012) recommends that universities seek inter-institutional collaboration and partnership with industries. This idea, however, entails a whole lot of procedures, but universities within the same federation can look inward and see areas of collaboration regarding the integration of ICTs into teaching.

As regards the digital literacy skills of academics, the findings of this study are in concurrence with those of Agbo (2015) and Mac Callum, Jeffrey and Kinshuk (2014). The result of this empirical research suggests that there is a positive relationship between digital literacy skills and technology use. Anunobi (2015) concludes that the extent of use of instructional technology corresponds with the level of digital literacy. This finding implies that where academics are highly digitally literate, there will also be an increase in the usage of technology in teaching. Moreover, this result seems to strengthen the argument of Wario (2014) who argues that institutional stakeholders should support academics in acquiring the relevant digital literacy skills. As proposed by Ferrari (2012), this can be done through expanding information management skills (ability to identify, locate, access, retrieve, store and organise information); collaboration skills (ability to form links with others, to participate in online networks and communities, and to interact constructively); communication and sharing skills (ability to communicate through online tools, taking into account privacy, safety and etiquette skills); creation of content and knowledge (ability to construct new knowledge); ethics and responsibility (ability to behave in an ethical and responsible way, and to be aware of legal frames); evaluation and problem-solving (ability to identify digital needs, to solve problems through digital means, and to assess the information retrieved) and technical operations skills (ability to teach through digital media).

Overall, the findings of this study are not unusual for academics in Africa as developing nations are confronted with several limitations that forestall the desire to maximise instructional technology. These limitations include but are not limited to the following: inadequate technological infrastructure to support the integration of ICTs in the curriculum, poor Internet facilities, a shortage in electricity supply, and low budgetary allocation to education (Manda 2006). Similarly, Betchoo (2017) added that the low standard of living in sub-Saharan Africa, where a large number of citizenry earn less than \$2 per day, constitutes a barrier to the use of instructional technology. The exorbitant costs incurred in accessing the Internet also prohibit Nigerian academics

from fully embracing several existing technological tools as resourceful means of instruction. To this extent, one might claim that the adoption as well as the utilisation of instructional technology in Nigerian universities is still at its neophytic stage and distinctly differs from what obtains in developed nations.

## CONCLUSION AND RECOMMENDATION

Digital literacy is a major prerequisite for instructional technology use. If the Nigerian government is keen about implementing the vision 2020, which points to the achievement of ICT-driven processes such as examinations management and learning delivery, then stakeholders in the education industry, including librarians, should show more commitment towards improving the digital literacy capacity of teachers across the three tiers of education. The findings may be used by librarians in the university environment to align their roles to changes in education pedagogy brought forth by information and communication technologies. Therefore academic libraries, being the nerve centre of institutions which they serve, should accept responsibility for fostering the extensive use of technology in teaching in the academia. Librarians should develop and implement initiatives that will help Nigerian academics imbibe such a culture at the institutional level. Since digital literacy is a subset of information literacy, academic librarians should conduct an assessment of digital literacy skills of academics. Such an evaluation would provide baseline data for decision makers within the university about gaps between the current competency of academics in using instructional technology, and what they need to know in conforming to the global trend of collegiate teaching in the twenty-first century. The study further recommends that the UTAUT model be extended to include digital literacy skills as an additional construct.

## IMPLICATION FOR POLICYMAKERS AND INFORMATION SYSTEMS RESEARCHERS

A very practical implication of this study for the library and information science (LIS) profession is that the extent of the use of instructional technology corresponds with the level of digital literacy. This study contributes to the theoretical understanding of technology use in educational settings, especially from the context of a developing nation such as Nigeria. For policymakers, this study could provide guidance in developing policies on the integration of technology in teaching and learning. The study contributes to existing literature on technology adoption and use. The article is also a useful tool for evaluating technology use in higher institutions of learning, especially for institutions that are at the initial stages of incorporating instructional technology into teaching and learning.

## RESEARCH LIMITATIONS

The limitation of this study lies in its inability to include academics from higher institutions in other geopolitical zones in Nigeria. Future studies should include academics of other geopolitical zones in Nigeria. There is a need for studies that focus on issues such as legal and regulatory frameworks, capacity building, and mentoring on technology use. Future studies should include measures of digital literacy skills other than those used in this study to further validate the relationship between digital literacy skills and technology use.

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