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A Correlate of Acceptance and Actual Use of Cloud Computing Technology for Teaching among University Lecturers in Southwestern Nigeria

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Abstract

Cloud computing technology had been found effective and efficient in providing online learning at all levels of education. This study investigated the relationship between the lecturers' acceptance of the technology and its' actual use for teaching. It also determined the influence of sex, academic qualifications and university ownership on the acceptance and actual use of the technology for teaching. The study is a survey. The population consisted all the lecturers in all the universities in southwestern Nigeria. Three hundred lecturers selected from one Federal, one State and one Private university using multistage sampling technique were the sample. AUCT an adapted questionnaire was used for data gathering. Analysis of data showed a significant relationship between acceptance and actual use of cloud computing technology for teaching among the lecturers ($R^2 = 0.37$; $p = 0.00$). Also neither sex ($F_{(1,274)} = 1.83$; $p > 0.05$), academic qualifications ($F_{(3,274)} = 0.30$; $p > 0.05$) nor ownership of university ($F_{(3,274)} = 2.57$; $p > 0.05$) significantly influenced lecturers' acceptance of cloud computing technology for teaching. Sex, academic qualifications and ownership of university combined also had no significant influence on the lecturers' acceptance of cloud computing technology for teaching ($F_{(3,274)} = 0.12$; $p > 0.05$). Sex, academic qualifications and ownership of university combined also had no significant influence on the lecturers' actual use of cloud computing technology for teaching ($F_{(3,274)} = 0.23$; $p > 0.05$). Acceptance of cloud computing technology for teaching has positive correlation with actual use among university lecturers in southwestern Nigeria.

Keywords*: Acceptance; Actual Use; Cloud Computing.*
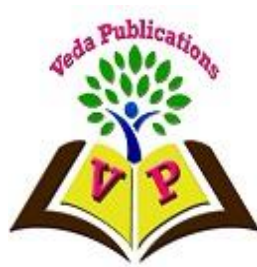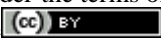
INTRODUCTION

Education is the hallmark of national development as no nation can grow beyond her level of education. Education is the only tool that can bring about socio-economic emancipation of any nation. The arson, political instability, poor health and poverty witnessing across the developing nation of the world is consequence upon the level of and access to education. Without quality education, people will continue to grope in darkness and anarchy will be the other of the day. For nation to adopt democracy and rule of law education is paramount.

Access to university education in Nigeria is becoming difficult by the day. While the number of admission seekers to the universities is increasing geometrically the number of universities are increasing arithmetically. Unfortunately, the available ones are poorly funded and there are infrastructural decadence across the institutions of learning. The Academic Staff Union of Universities, the umbrella body for all the lecturers in public universities always frown at what is referred to as proliferation of universities in the country because the available ones are not adequately funded. These universities ranked very low among the universities in the world (Ranking web of university, 2021). Aside this, the NEEDS assessment conducted in 2012 by the Federal Government of Nigeria which is the basis for the incessant strike by the lecturers revealed extremely large students to lecturers' ratio (Committee on Needs Assessment of Nigerian Public Universities, 2012).

Universities in Nigeria can be categorized into three based on ownership: The Federal universities owned by the Federal Government of Nigeria with the President of the Federal Republic of Nigeria as the visitor to the universities. These universities are funded by the Federal Government of Nigeria; The State University owned by the various State Government with the Executive Governor of the State as the visitor. The management and funding of such universities is vested in the State Governors; and the Private Universities owned by Private organizations, individuals and religious organizations. These universities are funded by the various organizations and individuals. There are forty-three Federal universities, forty-eight State universities and seventy-nine accredited Private universities in Nigeria (Statista, 2022)

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Virtual and online learning has been advocated as the alternative mode of instructions in the country (Oteyola, Oyeniran, Awopetu & Bello, 2021). Cloud computing technology can provide the opportunities for online academic collaborations among the lecturers. It can also provide adequate academic engagements for the students. Learning opportunities provided by the technology can be individualized, self-regulated and as well self-paced. Deployment of learning management systems and other social networking platform has been found effective for instructions outside the four-walled classroom. The learning management systems as well as the social networking platforms are some of the applications of cloud computing technology.

Cloud computing is defined by the National Institute of Standards and Technology (NIST) in Elnajar, Sahly, Farkash and Faraj (2019) as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. According to Gartner (2013) in Kurelović, Rako and Tomljanović (2013), cloud computing is a style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies. Kurelovic et al (2013) said

> *"For everyday users of the Internet and computers, cloud computing is any online activity, such as accessing data or using a software program, which can be done form different devices regardless of the on-ramp to the Internet. In this vision, the data or software applications are not stored on the user's computer, but rather are accessed through the web from any device at any location a person can get web access".*

Benefits of application of cloud computing in education as stated in Elnajar et al (2019) include among others teachers and students' access to applications from anywhere without loading them onto their devices, and also access to individual files stored from any computer through the Internet; providing support for students to learn in new and modern ways and also help them in managing their projects and duties; providing ease of communication and interaction between students and also teachers; access to free software or pay per use and also protection of the environment by using green technologies. In the light

of these, cloud computing provide opportunities for lecturers and students to interact and engage in learning activities without the constraint of time and space with minimal cost.

Covid-19 pandemic serves as catalyst to the adoption of e-learning in the Nigeria educational systems. Prior to this, attitude as well as the acceptance of online learning has been lackadaisical despite the favourable policy statements in the Nigeria Use "IT" Policy of 2006. The reasons for this are arguably traceable to level of awareness of cloud computing among the lecturers, infrastructural deficiency, cost, inadequate devices and soon.

To ameliorate the challenges of large class teaching as well as post covid-19 effect on classroom effects on university education, the adoption of e-learning, online learning and web-based instructions become imperative. Successful application of any of this modes of instructions involve the use of cloud technology. Cloud computing enables collaborative teaching, information sharing and team teaching among scholars without location barriers and time constraint. Effective open and distance education requires effective use of cloud computing tools. Technology acceptance model as promulgated by Davis (1989) posited that technology acceptance is directly correlated to individual's intention to use a technology. Actual use of cloud computing technology by the lecturers is opined will be influenced by the individual user's technology acceptance. This study therefore investigated the relationship between universities lecturers' acceptance of cloud computing and its' actual use for teaching in southwestern part of Nigeria. The study also determined the influence of moderating variables of sex, academic qualifications, and ownership of university on the acceptance as well as actual use of the technology for teaching.

Variables such as sex, academic qualifications and ownership of universities are arguably some of the social conditions that can influence teachers' acceptance of cloud computing technology for teaching. Garcia-Martinez, Fuentes-Abeledo and Rodriguez-Machado (2021) in their study showed that women had higher mean than the men in attitude towards the use of ICT and that there were significant differences in the attitudes. Attitude is therefore one of the major factors that affect technology acceptance.

Nistor, Göğüş, and Lerche (2013) in their study to determine technology acceptance among nationals and professionals in Europe found out that the effect of technology use intention on the actual use behavior is extremely weak. That people had intention to use a

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technology does not imply that they will actually use the technology. In other word technology acceptance does not translate to actual use. The situation in developing nation particularly among lecturers in southwestern Nigeria may be different. There is cultural variations among the Europeans and Africans. This may influence the relationship between technology acceptance and actual use among the people in the different space. Aside this, Europe is a developed nation. European countries are classified as first world where as Nigeria is classified as a third world country.

THEORETICAL FRAMEWORK

This study is premised on Unified Theory of acceptance and Use of technology (UTAUT) as promulgated by Venkatesh, Morris, Davis and Davis (2003). The Theory was developed to take into account research evidence of eight technology acceptance models: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT). The theory suggested that categories such as, facilitating conditions, social influence, effort expectancy and performance expectancy and their relation to age and gender, as well as experiences and voluntariness of the use are crucial to technology acceptance by individuals. The effort expectancy, performance expectancy, social influence and facilitating conditions determined the intention to use and eventually the actual use of any technology. The theory according to Venkatesh et al predicted technology acceptance to about 75% degree of accuracy. UTAUT aligns with previous researches on teachers' use of ICT. For an example, it recognizes Ertmer's (1999, 2005) first and second order barriers, it is related to Technology Pedagogical Content Knowledge TPACK – model (Koehler & Mishra, 2009). 1st order barriers are external from the teacher such as infrastructure, available devices, and software, training or lack of time for collaboration. By nature, they represent such elements which can be referred to as "not existing" when teachers explain and/or justify why using ICT is not possible. 2nd order barriers can be focused even if 1st order barriers are conquered; these are internal like beliefs, attitudes, practices, and openness to change (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2015). This theory stressed the interaction between developing people and the use of technology in teaching and learning process.

Technology Acceptance Model promulgated by Davis (1989) according to Hong Hwang, Hsu, Wong and Chen *(2011)* has been one of the most influential models of technology acceptance, with two primary factors influencing an individual's intention to use new technology. These factors are perceived usefulness and perceived ease of use. Can the intention to use a technology translate to the actual use of the technology? This study therefore investigated the relationship between the lecturers' acceptance and actual use of cloud computing for teaching in universities in the southwestern Nigeria. It also determined the influence of moderating variables of sex, academic qualifications, and ownership of university on the acceptance as well as actual use of the cloud computing technology for teaching.

HYPOTHESIS

H_{01}: The lecturers' acceptance has no significant relationship with their actual use of cloud computing technology for teaching.

H_{02}: The demographic variables sex, academic qualifications and ownership of universities have no significant influence on the lecturers' acceptance and actual use of cloud computing technology for teaching

METHODOLOGY

The study adopted the descriptive survey research design. The population of the study consisted all the lecturers in all the universities in southwestern Nigeria. Three hundred lecturers were selected across the universities using multistage sampling procedure. Three States were randomly selected from the six states that made up the Southwestern Nigeria. Purposive sampling technique was used in selecting one Federal, one State and one Private university each from each of the selected States based on their positions on the 2021 university webometric ranking. Disproportionate sampling technique was employed in selecting 86 (28.8%) lecturers from Private Universities, 89 (29.4%) from State Universities and 125 (41.8%) from Federal universities. One hundred and eighty (60.1%) were male while 120 (39.9%) were female. Fifteen (5.1%) of the lecturers had Bachelor degree, 7 (2.3%) had PGD, 110 (36.6%) had Master degree while 168 (56.0%) had Doctoral degree. Convenient sampling technique was employed in administering copies of the questionnaire on the respondents.

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Acceptance and Usage of Cloud Computing Technologies for Teaching (AUCT) was used for data gathering. It was a four-option likert-type questionnaire adapted from Elnajar, Sahly, Farkash and Faraj (2019). Section A of the questionnaire was demographic, Section B with 15 items gathered information on the lecturers' actual use of cloud computing technology for teaching at the universities. Section C with 22 items elicited information on the lecturers' acceptance of cloud computing technologies. The face validity of the instrument was conducted. The content validity of the items in the questionnaire was done on 7 subscales: clarity and direction of items, presentation and organization of items, suitability of items, adequateness of the content, attainment of purpose, objectives and scale and evaluation rating. The clarity of the language of composition of the items as well as the general formatting of the questionnaires was also appraised. The content Validity Ratio of the instrument was determined by administering 6 copies of the questionnaires on 3 lecturers in the Department of Educational Technology and Library Studies and 3 lecturers in the Department of Computer Science at Obafemi Awolowo University, Ile-Ife. The lecturers who served as assessor evaluated the suitability of the items in the questionnaire in achieving the objectives of the study using the 7 subscales in the validation sheet that were provided. The content validity ratio was determined using Lawshe' Test and the content validity ratio (α) = 0.80 was obtained. The reliability of the instrument was determined by administering the questionnaire on 20 lecturers of a Private own University which was outside the scope of the study. Cronbach alpha analysis of the instrument produced r = 0.96. Thus the instrument was considered reliable.

Three trained research assistants were engaged in the administration of the copies of the questionnaire. The research assistants visited the universities after permission had been sought from the university management. Consent of the respondents were sought before the questionnaire was administered. The research assistants visited each of the schools, covid-19 protocols were strictly observed while administering the instrument. The items in the questionnaire were score such that strongly agree on the scale was scored 4, agree was scored 3, disagree was 2 and strongly disagree was scored 1. Items not responded to was scored 0. The total score for each of the respondents on the acceptance as well as the actual use of cloud computing technology for teaching were determined. The maximum score obtainable

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for each of the respondents on the acceptance of the tool was 88 while the maximum score obtainable for the actual use of the tool for teaching was 60.

RESULTS AND DISCUSSIONS

H_{01}: The lecturers' acceptance has no significant relationship with their actual use of cloud computing technology for teaching.

Table 1: Regression analysis of the technology acceptance as predictor of application of cloud computing technology for teaching at the universities in southwestern Nigeria.

Model		Unstandardized Coefficients		Standardized Coefficients					
		B	Std. Error	Beta	t	R	R square	Adjusted R Square	Sig.
1	(Constant)	11.546	2.897		3.985	0.61	0.371	0.367	.000
	Acceptance	.449	.043	.609	10.412				.000

a. Dependent Variable: Application

The hypothesis was tested using regression analysis. The result has shown in Table 1 showed significant relationship with $R^2 = 0.37$; p = 0.00. Thus, the hypothesis which state that the lecturers' acceptance has no significant relationship with their actual use of cloud computing technology for teaching is rejected. This finding corroborates Davis (1989) that technology acceptance is a predictor of individual's intention and actual use of such technology. This implies that the higher the acceptance of cloud computing technology by an individual, the higher the fact that the individual will actually use the technology for teaching. Factors that are responsible for technology acceptance are equally responsible for actual use of technology among the lecturers. Cloud computing technology with higher usability, performance expectancy and effort expectancy are prone to be better use than those with lower usability, performance expectancy and effort expectancy. It is therefore pertinent that technology designers and producers considered these factors when producing information technology driven tools for teaching.

H_{02}: The demographic variables sex, academic qualifications and ownership of universities have no significant influence on the lecturers' acceptance and actual use of cloud computing technology for teaching

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Table 2: MANOVA of the influence of sex, academic qualifications and ownership of universities on the lecturers' acceptance and application of cloud computing technology for teaching at the universities

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Acceptance	14541.03[a]	20	727.05	1.55	.07
	Application	6964.02[b]	20	348.20	1.40	.13
Intercept	Acceptance	133571.50	1	133571.50	284.93	.00
	Application	57244.26	1	57244.26	230.13	.00
Sex	Acceptance	856.18	1	856.18	1.83	.18
	Application	354.09	1	354.09	1.42	.24
Qualification	Acceptance	423.37	3	141.12	.30	.83
	Application	578.44	3	192.81	.78	.51
University	Acceptance	3611.66	3	1203.89	2.57	.06
	Application	1195.46	3	398.49	1.60	.19
Sex * Qualification	Acceptance	650.68	3	216.89	.46	.71
	Application	315.59	3	105.20	.42	.74
Sex * University	Acceptance	1538.28	3	512.76	1.09	.35
	Application	965.60	3	321.87	1.29	.28
Qualification * University	Acceptance	4879.00	4	1219.75	2.60	.04
	Application	2089.92	4	522.48	2.10	.08
Sex * Qualification * University	Acceptance	163.25	3	54.42	.12	.95
	Application	170.40	3	56.80	.23	.88
Error	Acceptance	68443.84	146	468.79		
	Application	36317.01	146	248.75		
Total	Acceptance	740150.00	167			
	Application	314496.00	167			
Corrected Total	Acceptance	82984.87	166			
	Application	43281.03	166			

a. R Squared = .175 (Adjusted R Squared = .062)
b. R Squared = .161 (Adjusted R Squared = .046)

Table 2 shows the influence of each of the demographic variable sex, academic qualifications and ownership of university on the lecturers' acceptance and application of cloud computing technology for teaching. The table showed no significant influence of sex on the lecturers' acceptance of cloud computing ($F_{(1,274)} = 1.83$; $p = 0.18$) and also on the lecturers' application of the technology for teaching ($F_{(1,274)} = 1.42$; $p = 0.24$). Academic

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qualifications also has no significant influence on the lecturers' acceptance of cloud computing technology ($F_{(3,274)} = 0.30$; $p = 0.83$) and also on the application of cloud computing technology for teaching ($F_{(3,274)} = 0.78$; $p = 0.51$). Likewise, ownership of University has no significant influence on the lecturers' acceptance of cloud computing technology for teaching ($F_{(3,274)} = 2.57$; $p = 0.06$) and also on the application of the technology for teaching ($F_{(3,274)} = 1.60$; $p = 0.19$). The variables sex, academic qualifications and ownership of university combined have no significant influence on the lecturers acceptance of cloud computing technology ($F_{(3,274)} = 0.12$; $p = 0.95$) as well as the application of the technology for teaching ($F_{(3,274)} = 0.23$; $p = 0,88$). The hypothesis which state that the demographic variables sex, academic qualifications and ownership of universities have no significant influence on the lecturers' acceptance and application of cloud computing technology for teaching is therefore not rejected ($p > 0.05$). The lecturers' sex, academic qualifications in the Federal universities, state universities and private universities does not influence the acceptance of cloud computing technology and likewise the actual use of the technology for teaching. Cloud computing is one of the technologies that are not gender bias. This finding disagrees with Nistor, Göğüş and Lerche (2013). The lecturers' acceptance of cloud computing technology had high correlation with the actual use of the technology. The reason for this may be due to limited exposure to educational technology tools and also because of the cultural differences.

IMPLICATIONS OF THE STUDY

The study showed that lecturers' acceptance of cloud computing technology for teaching is significantly positively correlated with their application of the technology for teaching. This implies that technology acceptance can be effectively used in predicting the actual usage of such technology in general and cloud computing technology for teaching in particular. An individual who accept to use the technology will actually use such a technology. Thus any university lecturer who accept to use cloud computing technology for teaching will actually use it. Variables such as sex, academic qualifications and ownership of university does not significantly influenced this position.

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CONCLUSION AND RECOMMENDATIONS

Technology acceptance is a predictor of technology application among university lecturers in southwestern Nigeria. The lecturers' acceptance of cloud computing technology for teaching is high and likewise their application of the technology for teaching. Variables such as sex, academic qualification and ownership of university (Federal, State or Private) have no significant influence on the acceptance as well as the application of cloud computing technology for teaching. The study recommended that workshop and training on effective and appropriate use of cloud computing technology for teaching should be organized for the lecturers. Studies on the relationship between technology acceptance and actual usage of the technology should be conducted for other educational learning and teaching tools in other institutions of learning such as among preschooler teachers, secondary school teachers and other tertiary institution lecturers.

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