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A critical review of the status of digital inclusion among learners in Open Distance Learning (ODL) institutions in South-West Nigeria

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Abstract
Globally, the integration of ICT has gained prominence with a strong emphasis on digital inclusion initiatives to enhance learning outcomes. However, the lack of accessibility and utilisation of digital technologies can lead to digital divide among learners despite the mass availability. The study aim was to review current state of digital inclusion among learners in ODL in South-West Nigeria. Descriptive survey design and multistage sampling procedure were adopted for the study. Split-half method was used for the pilot study giving reliability coefficient value of 0. 83. 514 copies of questionnaire were used as research instrument for data collection. Mean and standard deviation were used to answer research questions and hypotheses were tested using t-test independent, ANOVA and linear regression at 0.05 level of significance. The findings revealed a high level of digital infrastructure availability and accessibility with a moderate level of usage among learners in ODL in South-West Nigeria. This indicates a considerable improvement of digital infrastructure availability and accessibility compared with Covid-19 pandemic episode. It was recommended that ODL policymakers should develop institutional digital inclusion policies to foster accessibility and usage to meet the demand of distance and technology-enabled learning environment with global best practices.

Keywords: Accessibility, Availability, Digital Inclusion, Digital Infrastructure, Open Distance Learning, Usage

Introduction

Open Distance Learning (ODL) over the years has become a tool for promoting human development capital by increasing employment opportunities and creating successful entrepreneurship with diverse skills to reduce poverty through national development. As a result, distance education is situated to provide access for learners who have been denied access to higher education through Joint Admission and Matriculation Board (JAMB) and those who are unable to attend conventional institutions because of jobs as well as those economically sidelined (Uzoma, 2018). So an individual can choose between continuing full-time studies, combining work with study or embarking on full-time employment. This could be through open universities, part-time and sandwich programmes, continuing education programmes, weekend programmes, National Teacher Institute (NTI) E-learning programmes and work-study programmes in higher institutions (Awe, Olakulehin, Tilije & Leonard, 2021; Uzoma, 2018).

Distance education is regarded as any educational or learning processes that allowed geographical separation of facilitators and learners from each other. Within the space of nine decades, distance education has expanded from correspondence mode of study to open and distance learning (Awe et al, 2021; Atolagbe, Umaru & Oparinde, 2017). A significant milestone was reached in 2002 with the reestablishment of National Open University of Nigeria (NOUN) as the only single-mode University with 72 study centres spread across the states of the nation. The federal, state, and private universities have embraced ODL, providing various courses and programme to meet diverse educational needs as a Dual-mode system. The system enabled flexible programmes for working adults and non-traditional students, contributing to the democratisation of education in Nigeria (Atolagbe et al, 2017).

Today, distance education is also referred to as distance learning or distributed learning or e-learning through the influence of digital technology. It has undergone many transformations that reflect continuous dynamic increases within the field resulting in open distance learning.

Open Distance Learning involves open learning and distance learning with the operation of digital resources and digital devices for learners who cannot participate in traditional learning environment. They emphasise the need for significant investments in digital technologies as requirement for effective arrangement of instruction independent of space, pace, time, and location in ODL. Eyisi et al (2021) described open learning as method of learning that cannot be affected by age, gender, time, location or occupation which support policies and practices that makes education to be without borderline barrier.

In the word of Khalilova, Yakubova & Daukaeva (2020) distance learning is a system of learning that allows individuals to acquire necessary skills and new knowledge through a personal computer (PC) and having access to the internet for studying at home, workplace, online or anywhere. In this digital era, technology has expanded access to distance learning opportunities, notably in higher education through open universities (UNESCO, 2023). Digital technology is regarded as digital devices, systems, and resources that help create, store, and manage data such as Computer, Smartphone, Internet connectivity, Google classroom, Zoom, E-library for effective communication during learning process. Pundir & Goyal (2025) ascribe the growth of open distance learning over the years to technological advancements, innovative pedagogy and institutional practices. They opine that bridging the digital divide in India context could be traced to ODL institutions embracing innovative approaches to enhance access, quality and inclusiveness in education. Hence, ensuring everybody benefits from digital technology is a term known as social inclusion or digital inclusion or e-inclusion which has become an established field of research and practices over the years. Digital inclusion is referred to as one of the channels that can foster the actualisation of the UN Sustainable Development Global Agenda. Also, the COVID-19 emergency has proved that digital inclusion is one of the ways to leverage the development of equivalent and reliable societies, as recognised by the UN Roadmap for Digital Cooperation,

which calls for greater global attention and investment in the field of digital inclusion (United Nation, 2020).

Though, Nigeria is recognised to have a well-developed network infrastructure with largest telecommunication markets in Africa, having the largest economies with 111.6 million internet users, yet 46% of its estimated population could not have access to internet connectivity (International Finance Corporation, 2020; Adeleke, 2021; Pontianus & Oruonye, 2021). The effectiveness of technology integration into institutions is mostly dependent on the availability and accessibility to ICT resources such as hardware, software, and communications infrastructure (Hennessy, Harrison & Wamakote, 2010 as cited in Egbedokun & Oyewusi, 2014). Prior to this time, the findings of Shehu (2018) about NOUN's optimal utilisation of ICT potentials in its activities indicated seventy-three percent (73%) disagreement, which affirmed that NOUN lacks adequate digital infrastructure to fully utilise the potentials of ICT. Hence, it was stated that the e-learning system in Nigeria's tertiary institutions is a new innovation due to poor ICT infrastructure, with other socio-economic challenges. He attributed the problems facing developing countries to the high cost of digital infrastructure and inadequate access to internet connectivity and other digital devices.

According to Ragneddal et al (2018) digital inclusion is considered a very useful approach to ensure learners gain access to digital ICTs and learn how to use them. The discussion on the digital divide globally led to digital inclusion discourse in the late 1990s and early 2000s which brought the idea that DI could be achieved by providing access to ICTs. Digital Inclusion (DI) refers to the activities put in place to ensure facilitators and learners have equal access to digital infrastructure and develop ability to use digital technologies. Since usage of digital technologies has help to bridge the gap between facilitators and learners, attention needs to be given to how learners gain access to digital infrastructure and develop digital literacy skills to carry out learning processes. Currently there has been no survey of

measurement in relation to digital inclusion using a quantitative research survey. Moreover, recent surveys have focused exclusively on internet access and have not considered other aspects of digital inclusion (Hjort and Tian, 2021; Zhuravskaya et al., 2020, cited in Sharp, 2022). Also, the subject of digital inclusion in the operation within adult learning is said to be relatively under-researched according to the International Labour Organisation (ILO) (2020). This paper aims to fill these gaps. This necessitates a critical review of the state of digital inclusion in open distance learning institutions among learners in South-West Nigeria.

Statement of the Problem

The World Bank Development Report (2016) emphasises the need to improve digital inclusion as a key global policy priority (World Bank, 2016). Though digital inclusion has become a digital rights issue which revolves around opportunity (accessibility and affordability), infrastructure (internet and internet-enabled devices), and utilisation (quality ICT usage and digital literacy skills), Nigeria is a country within the countries with low digital opportunity index scores. Nigeria was ranked 31st in the African continent with a very low score of 0.41, 0.03 and 0.01 for opportunity, infrastructure and utilisation respectively (International Telecommunication Union, 2018). The Education Partnership (TEP, 2020) Centre study reveals that 34 million learners missed educational opportunities in Nigeria during the COVID-19 pandemic with 70% lacking essential digital devices while Nigeria Data Analysis Report 2022 reveals that 51% of the population had access to basic ICT infrastructure, and just 22% had internet access indicating a gap between Africa and other continents. The close variance in the level of digital infrastructure availability and accessibility in Nigeria environ between 2020 and 2022 necessitate a critical review of current state of digital inclusion in ODL institutions among learners in South-West Nigeria.

Purpose of the Study

The study is to carry out a critical review of the status of digital inclusion in ODL institutions among learners in South-West Nigeria. Specifically, the study is to:

1. investigate how level of digital infrastructure availability influences accessibility to digital infrastructure among learners in open distance learning institutions in South-West Nigeria;
2. ascertain difference in digital infrastructure availability level among the National Open University of Nigeria and conventional ODL at Obafemi Awolowo University (OAU), University of Ibadan (UI) and University of Lagos (UNILAG) in South-West Nigeria;
3. determine the extent accessibility to digital infrastructure influences the usage of digital technologies among learners in ODL institutions in South-West Nigeria.

Research Questions

The study was guided by the following research questions:

1. How does level of digital infrastructure availability influences accessibility to digital infrastructure among learners in open distance learning institutions in South-West Nigeria?
2. Is there difference in the level of digital infrastructure availability among National Open University of Nigeria and conventional ODL at OAU, UI and UNILAG in South-West Nigeria?
3. To what extent does accessibility to digital infrastructure influences usage of digital technologies among learners in ODL institutions in South-West Nigeria?

Research Hypotheses

The null hypotheses formulated for the study were tested at $\alpha = 0.05$ level of significance.

1. Level of digital infrastructure availability does not have significant influence on accessibility to digital infrastructure among learners in ODL institutions in South-West Nigeria.
2. There is no significant difference in digital infrastructure availability level among National Open University of Nigeria and conventional ODL at UI, UNILAG, and OAU in South-West Nigeria.
3. Accessibility to digital infrastructure does not have significant influence on frequent usage of digital technologies among learners in ODL institutions in South-West Nigeria

Research Methodology

Quantitative approach with descriptive survey research design was used for the study. The quantitative approach was considered necessary for collection of data to review the status of digital inclusion of learners in ODL Institutions for generalisation of findings and to support future replication of relates study. The population for the study was 40,006 from all the four federal universities offering open distance learning programme in Lagos, Oyo and Osun States. The content validity for the questionnaire was carried out by my supervisors and experts in Test and Measurement in Department of Educational Foundations, University of Lagos for necessary correction and modifications.

Tai Solarin University of Education was adopted for the pilot study. Split-half method was adopted to ascertain internal reliability of the research instrument using SPSS Version 25. Split-half reliability allow one research instrument to be administered and divided into odd and even items to ensure each half of the test measure the same characteristics. The result of reliability coefficient (r) was 0.83. The closer the Cronbach's alpha coefficient value is to 1.0, the more reliable the instrument is. Creswell (2014) rule of thumb was used to classify

Cronbach's alpha coefficient as: >.9 = Excellent; > .8 = Very Good; > .7 = Good; > .6 = questionable; and < .6 =Weak. The instrument with Cronbach's alpha coefficient above 0.7 is considered to have good internal consistency.

Multistage sampling procedure was used for this study. The six geopolitical states in South-West Nigeria were divided into two strata, having three states each using a stratified sampling technique. Lagos, Osun, and Oyo States were randomly selected from the strata to ensure equal representation of the selected States. Similarly, all four Federal Universities operating ODL programme at the time the study was carried out were purposively selected. Moreover, the selected ODL institutions have the same characteristic of operating ODL programme for over ten years. This is to ensure all the selected universities have equal operational standards, having acquired adequate digital infrastructure and being in operation for more than ten years.

Based on Taro Yamane's (1967) formula, 400 sample size was obtained moreover 30% attrition rate propounded by Quinlan, Zikmund, Babin, Carr & Griffin (2015) was adopted to increase the sample size from 400 to 520 to address low response and make possible generalisation of findings. Therefore, a sample size of five hundred and twenty (520) was considered appropriate for the study in agreement with Sekaran & Bougie (2016) assertion that larger sample size is better for the generalisation of findings. 514 copies of questionnaire were collected for data analysis from open distance learners in the selected institutions.

Results

Statistical Package for Social Sciences (SPSS) version 25 was used to analyse data collected. Frequency count and simple percentages were used to generate respondents' demographic information. The research questions were analysed using means and standard deviation with

Pearson product-moment correlation and linear regression to test the hypotheses at 0.05 level of significance.

Demographic Information of Respondents

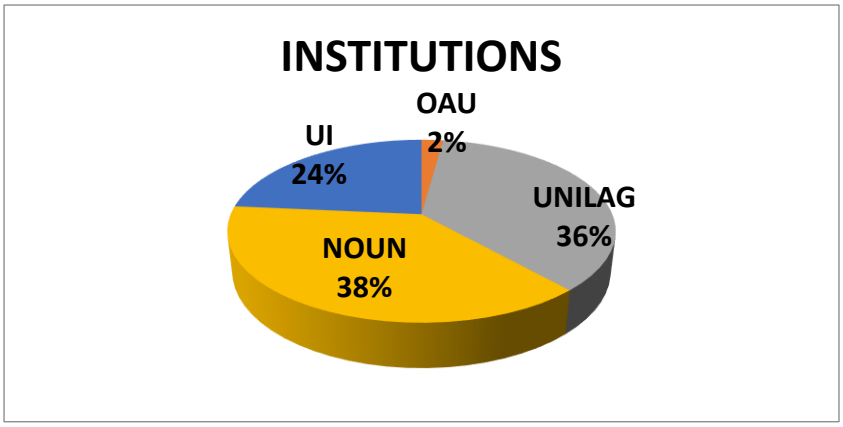

Figure 1: Open Distance Learning Institutions

The majority of the participants were from NOUN followed by University of Lagos and other universities.

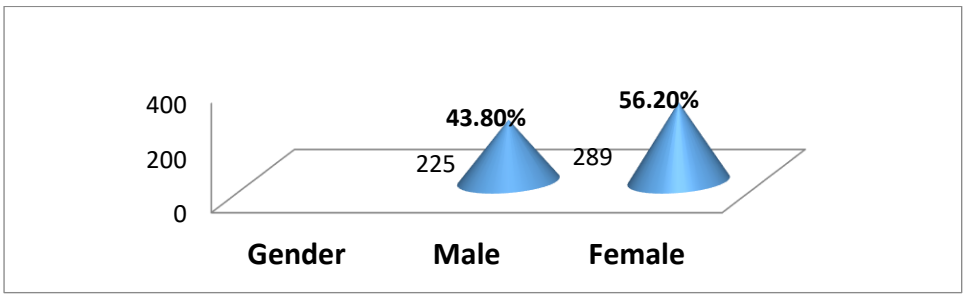

Figure 2: Gender of Respondents

There were more female respondents than the male indicating the possibilities of having more female learners in the selected ODL institutions.

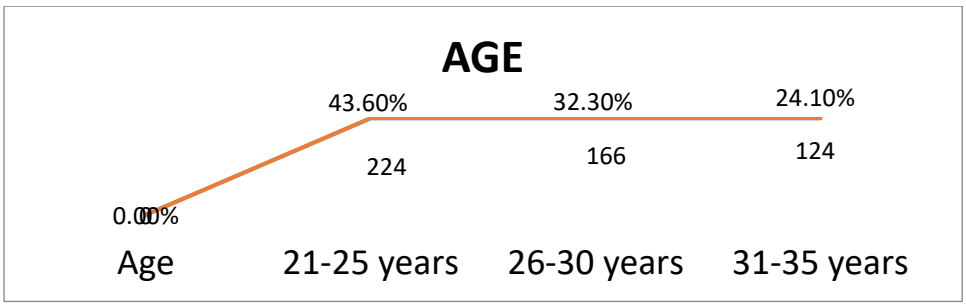

Figure 3: Age of Respondents

Majority of the respondents were between 21 to 25 years followed by 26-30 years and

31-35 years. This implies that the learners are young adults with capacity and readiness to adopt digital inclusion initiatives.

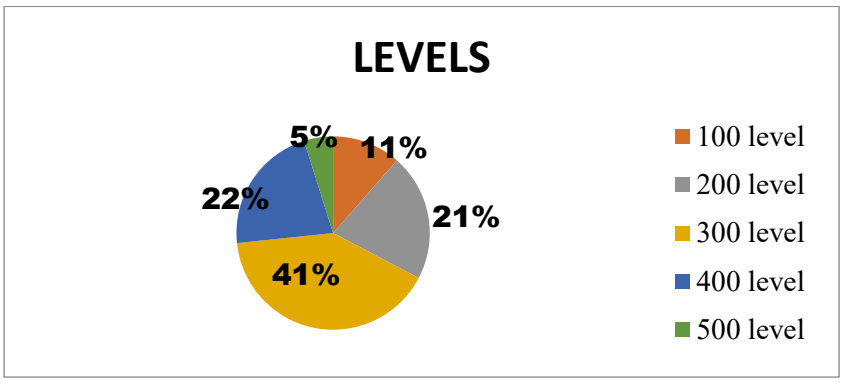

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Figure 4: Respondents' Level

The 300 level (209, 40.7%) formed greater part of the respondents followed by 400 level (112, 21.8%). This implies that respondents used for the study were learners that have learnt how to use digital technologies and have fully adjusted to ODL programme.

Research Question 1: Is there difference in digital infrastructure availability level among NOUN and ODL in OAU, UI and UNILAG in South-West Nigeria?

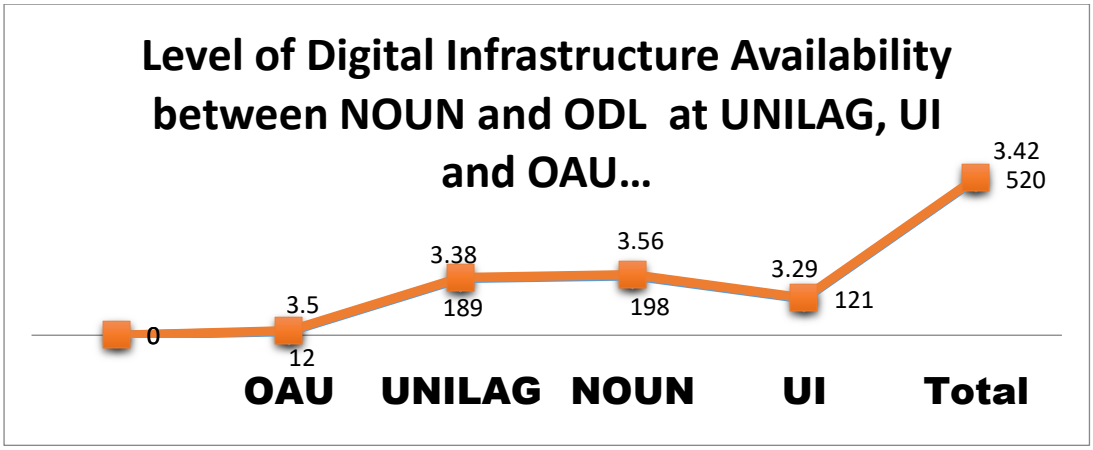

Figure 5: Descriptive Statistics of Differences in the level of digital infrastructure availability among NOUN and ODL at UNILAG, UI AND OAU

Source: Researcher's field computation (2024)

The results in Figure 5 revealed that National Open University of Nigeria (NOUN) has highest level of digital infrastructure availability with (Mean= 3.56, SD = 0.357) followed by UNILAG DLI (Mean = 3.38, SD = 0.453), OAU CDL (Mean = 3.11, SD = 0.412) and

University of Ibadan DLC (Mean = 3.29, SD = 0.496). All institutions showed high level of digital infrastructure availability with means above 3.0 on a 4-point scale across the institutions.

Research Question 2: How does level of digital infrastructures availability influence the accessibility of digital infrastructure among learners in ODL institutions in South-West Nigeria?

Table 1

Descriptive Statistics of Level of Availability and Accessibility to Digital Infrastructure of Learners in ODL institutions					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Level of digital infrastructure available	520	1	4	3.53	.545
Accessibility of digital infrastructure	520	1	4	3.48	.657
Valid N (listwise)	520				

Source: Researcher's field computation (2024)

The results in Table 1 revealed a relatively high level of digital infrastructure availability and good level of accessibility to digital infrastructure among learners. The results imply that both availability and accessibility to digital infrastructure are quite high among learners.

Research Question 3: To what extent does accessibility to digital infrastructures influences usage of digital technologies among learners in ODL institutions in South-West Nigeria?

Table 2

Descriptive Statistics of Extent of Accessibility and Usage of Digital technology					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Accessibility of digital infrastructure	520	1	4	3.27	.557
Usage of digital infrastructure	520	1	4	2.98	.750
Valid N (listwise)	520				

Source: Researcher's field computation (2024)

The results in Table 2 showed a high level of accessibility and a moderate level of digital infrastructure usage. These results revealed a gap between mean score of accessibility and usage implies that digital infrastructure is generally accessible but not used to its full potential. The standard deviation for usage (0.750) is higher than for accessibility (0.557), indicating

unevenness in how learners use digital technologies compared to accessibility to digital technologies.

Research Hypothesis 1: Level of digital infrastructure availability does not have significant influence on accessibility to digital infrastructure among learners.

Linear Regression Analysis Results of Contribution of Digital Infrastructure Availability and Accessibility

Table 4

Model summary
R= .621[a]
R^2= .385
R^2 (Adjusted) = .384
Standard Error of Estimate = .437
F=246.328, *P*<0.05

Model		Unstandardized Coefficients		Standardized Coefficients	T	p.**Decision**
		B	Std. Error	Beta		
1	(Constant)	.605	.171		3.535	.000**Reject**
	Availability	.778	.050	.621	15.695	.000**HO₂**

a. Predictors: (Constant), availability of digital infrastructure

b. Dependent Variable: availability of digital infrastructure

The results from Table 4 revealed that availability of digital infrastructure had a strong positive correlation with accessibility to digital infrastructure (R=.621). The availability is statistically significant with accessibility to digital infrastructure given (β=.621, t=246.328, p=.000<.005), the null hypothesis is rejected. Hence, level of digital infrastructure availability has significant influence on accessibility to digital infrastructure among open distance learners in South-West Nigeria.

Research Hypothesis 2: There is no significant difference in digital infrastructure availability level between NOUN and Conventional ODL at OAU (CDL), UI (DLC) and UNILAG (DLI).

Description of Level of Digital Infrastructure Availability

Table 5

Groups	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
					Lower Bound	**Upper Bound**		
OAU	12	3.50	.410	.047	3.40	3.59	2	4
UNILAG	189	3.38	.453	.043	3.29	3.46	2	4
NOUN	198	3.56	.357	.035	3.49	3.63	3	4

UI	121	3.29	.490	.047	3.20	3.38	1	4
Total	520	3.42	.445	.022	3.38	3.47	1	4

Table 5: Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Level of Digital Infrastructure Availability	Based on Mean	0.393	3	517	.474

ANOVA
Level of Digital Infrastructure Availability

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4.514	3	1.505	8.016	.000
Within Groups	73.392	517	.188		
Total	77.907	520			

Post Hoc - Multiple Comparisons

Dependent Variable: Level of Availability of Digital Infrastructure Tukey HSD

(I) institution	(J) institution	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
OAU	UNILAG	.120	.065	.254	-.05	.29
	NOUN	-.064	.066	.768	-.23	.11
	UI	.207*	.065	.008	.04	.38
UNILAG	OAU	-.120	.065	.254	-.29	.05
	NOUN	-.184*	.060	.012	-.34	-.03
	UI	.087	.059	.444	-.06	.24
NOUN	OAU	.064	.066	.768	-.11	.23
	UNILAG	.184*	.060	.012	.03	.34
	UI	.271*	.060	.000	.12	.43
UI	OAU	-.207*	.065	.008	-.38	-.04
	UNILAG	-.087	.059	.444	-.24	.06
	NOUN	-.271*	.060	.000	-.43	-.12

***.** The mean difference is significant at the 0.05 level.

One-way analysis of variance was conducted to evaluate the significant difference in the level of digital infrastructure availability between NOUN, UI, UNILAG, and OAU (N = 520). The findings revealed that there is significant difference between level of digital infrastructure availability in OAU and UI, UNILAG and NOUN, UI and NOUN respectively with $p < .05$ resulting to rejection of null hypothesis.

Research Hypothesis 3: Accessibility to digital infrastructure has not significant influence on frequent usage of digital technologies among learners.

Linear Regression Analysis Results of Relative Contribution of Digital Infrastructure Accessibility and Usage

Table 9

Model summary
R= .360[a]
R^2= .130
R^2 (Adjusted) = .128
Standard Error of Estimate = .701
F=58.692, *P*<0.05

Model		Unstandardized Coefficients		Standardized Coefficients	T	p.	**Decision**
		B	Std. Error	Beta			
1	(Constant)	1.393	.210		6.634	.000	**Reject**
	Accessibility	.485	.063	.360	7.661	.000	**HO_2**

a. Predictors: (Constant), accessibility of digital infrastructure
b. Dependent Variable: usage of digital infrastructure

The results from Table 9 revealed that accessible to digital infrastructure had a weak positive correlation with usage of digital infrastructure (R=.360). The accessibility is statistically significant with usage of digital infrastructure given (β=.621, t=246.328, p=.000<.005) hence null hypothesis is rejected. The accessibility to digital infrastructure has significant influence on frequent usage of digital technologies among learners in the selected institutions in South-West Nigeria.

Discussion of Findings

Descriptive and inferential statistics were used to answer research questions and test hypotheses as stated below:

The findings of research question one revealed that National Open University of Nigeria (NOUN) demonstrated highest level of digital infrastructure availability followed by UNILAG DLI, UI DLC and OAU CDL. The findings indicated high levels of digital infrastructure availability across the institutions with means above 3.0 on a 4-point scale. The

result of hypothesis one revealed significant difference in the level of digital infrastructure availability between NOUN and conventional open distance learning institutions in South-West Nigeria leading to the rejection of null hypothesis. However, Pundir & Goyal (2025) state that effectiveness of ODL in bridging digital divide would be based on promoting digital literacy, ensuring the availability of affordable and accessible learning resources. They stress that acceptance of innovative pedagogies and leveraging digital technologies can enabled ODL institutions perform a transformative role in democratising access to education and empowering learners from all walks of life Adeoye et al. (2020) note that inadequate access to reliable internet services is a significant barrier to effective online learning in Nigeria. This is compounded by high cost of data and limited availability of affordable devices, which limits learners' ability to fully engage in ODL programmes, especially among learners in rural areas with limited or no access to technology.

The findings of research question 2 revealed a relatively high level of digital infrastructure availability and a good level of accessibility. The mean score for level of availability of digital infrastructure showed 3.53(SD=0.657) and accessibility of digital infrastructure 3.48 (D=0.545). Also, the findings of hypothesis two indicated availability is statistically significant with accessibility to digital infrastructure given (β=.621, t=246.328, p=.000<.005). The null hypothesis is rejected. Hence, level of digital infrastructure availability has significant influence on accessibility to digital infrastructure among open distance learners. This was supported by Kümmel, Moskaliuk, Cress & Kimmerle (2020) comprehensive review of digital learning environments in higher institutions. The analysis of 246 articles revealed that digital infrastructures, such as reliable internet accessibility and learning management systems are essential for effective online learning. Quadri, Adetimirin &Idowu (2014) pose that inadequate e-resources, limited internet connectivity, erratic power supply and deficiency in technical know-how as major challenges faced by users which hinders the effective use of digital libraries. The results supported the fact that availability of e-resources

and skillfully usage make the provision of information services more meaningful to improve quality of education.

In addition, Van Deursen & Van Dijk (2019) opine that planned investments for digital infrastructure in underserved areas could significantly improve access to distance learning, suggesting that policymakers should prioritise such developments to bridge the gap. Government policies and investments in digital infrastructure are critical for improving accessibility in distance learning. As Ng & Gunasekaran (2021) emphasise poor infrastructure can lead to significant barriers to access, affecting learner engagement and academic performance. The accessibility to digital infrastructure can directly impact learner engagement in ODL institutions, promoting reliable access to digital tools for participation in online discussions, submitting assignments on time, and interacting with facilitators and peers. Also, Olumuyiwa & Olasunkanmi (2022) assert improvement of digital infrastructure accessibility would enhance learning experience and contributes to better intellectual outcomes. The accessibility to digital infrastructure would contribute to the achievement of ODL institutions objectives making availability of digital infrastructure essential for learner engagement giving all learners equal opportunities to be successful regardless of their location.

The results of research question 3 revealed a relatively high level of accessibility to digital infrastructure and moderate level of digital infrastructure usage among open distance learners. This implies that digital infrastructure is accessible yet digital technologies potential was not fully utilised. Hypothesis three revealed that accessibility is statistically significant with usage of digital infrastructure given (β=.621, t=246.328, p=.000<.005). This means the null hypothesis is rejected. Hence, accessibility to digital infrastructure has significant influence on frequent usage of digital technologies among learners in the selected institutions

in South-West Nigeria. According to Van Deursen & van Dijk (2019) accessibility is view as foundational factor in determining the usage of digital technologies. It was pointed out that when infrastructure is readily available and reliable, usage increases which imply that improving accessibility can directly enhance usage of digital technologies in educational settings. However, Adeoye et al. (2020) opine that inadequate access to reliable internet services is a significant barrier to effective online learning in many developing countries like Nigeria. It was further expressed that high cost of data and limited availability of affordable devices can limits learners' ability to fully engage in ODL programmes among learners who reside in rural areas having limited or no access to digital technology.

Conclusion

The findings provide valuable insights into level of digital infrastructure availability in ODL institutions in South-West Nigeria. The study established the significant influence of digital infrastructure availability on accessibility to digital infrastructure among learners. Provision of a well-developed digital infrastructure such as reliable internet connectivity, digital devices and power supply would make effective engagement with digital learning platforms possible. In addition, the findings indicated a remarkable disparity in the availability of digital infrastructure among institutions. Specifically, National Open University of Nigeria (NOUN) demonstrated a significantly higher level of digital infrastructure than conventional open distance learning at OAU, UI and UNILAG. The differences highlights institutional variation in digital investment which reflect NOUN’s elite mandate as a fully dedicated distance learning institution, as opposed to conventional universities that run ODL programmes alongside traditional modes. Furthermore, the study confirmed that accessibility to digital infrastructure significantly enhances the usage of digital technologies among learners. In an environment where digital infrastructure is not only available but accessible, affordable, reliable and user-friendly, learners are more likely to use digital tools consistently for their

studies. The findings draw attention to urgent need to close digital divide among ODL institutions in Nigeria. As technology becomes increasingly central to education delivery, ensuring equitable access to digital infrastructure is no longer optional but fundamental for achieving inclusive learning and quality education in line with United Nations' Sustainable Development Goal 4.

Recommendations

The digital inclusion effectiveness would require the following policy directions as recommended below:

1. **Institutional Digital Inclusion Policies:** ODL institution should design and implement a digital inclusion policy that ensures consistent funding for digital infrastructure, device access programmes for learners, and digital inclusion training initiatives.
2. **Public-Private Partnerships (PPPs):** Institutions can leverage partnerships with telecommunication and information technology companies to build infrastructure, provide support services for learners to have internet access, and expand connectivity to underserved learners.
3. **National ODL Digital Standardisation Framework:** A national framework should be established to harmonise the digital requirements and benchmarks across all ODL institutions, ensuring a baseline standard that promotes interoperability and access equity.
4. **Capacity Building for Staff and Learners:** Training of facilitators and learners with digital literacy skills necessary for effective online engagement to enhance full utilisation of the available digital infrastructure.

5. **Continuous Infrastructure Assessment and Investment:** A dynamic evaluation system should be put in place to monitor infrastructure needs and allocate resources regularly considering rapid technology changes.

In essence when strategic planning and dedicated policy action is effectively implemented, transformative and equitable digital learning in Nigeria's ODL landscape can be realised.

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