



Digital Learning Accessibility and Workforce Skills Development Among Adult Learners in Rivers State

Amarachi Cynthia Ineye-Briggs, PhD

Department Of Educational Management,

Rivers State University, Nkpolu- Oroworokwo, Port Harcourt. Nigeria

Corresponding Author: Cynthia.Ineye-Briggs@Ust.Edu.Ng

Abstract- This study investigated the relationship between digital learning accessibility and workforce skills development among adult learners in Rivers State, Nigeria. The study was guided by two specific objectives, two research questions, and two corresponding null hypotheses. A correlational research design was adopted. The population comprised 5,224 adult learners enrolled in continuing education programmes 2025/2026 sessions, from which a sample of 301 respondents was selected using the Taro Yamane formula and stratified random sampling technique. Data were collected using two researcher-developed instruments: the Questionnaire on Access to Digital Devices (QADD) and the Internet Connectivity and Workforce Skills Development Scale (ICWSDS). The instruments were validated by experts and yielded reliability coefficients of 0.82 and 0.79 respectively using Cronbach Alpha. Pearson Product Moment Correlation (PPMC) was used to answer the research questions, while t-test statistics were used to test the hypotheses at 0.05 level of significance. Findings revealed a strong and significant relationship between access to digital devices and workforce skills development, as well as between internet connectivity and workforce skills development. It was recommended that government and relevant stakeholders should improve access to affordable digital devices and expand reliable internet infrastructure, particularly in rural and underserved areas, to enhance adult learners' workforce readiness and lifelong learning outcomes.

Keywords: Digital Learning Accessibility, Workforce Skills Development, Adult Learners, Digital Devices, Internet Connectivity.

I. Introduction

Workforce skills development has emerged as a critical outcome of education, particularly in the context of rapid technological transformation and evolving labour market demands. Workforce skills development is the process through which individuals acquire relevant competencies such as technical, cognitive, and digital skills needed to function effectively in modern workplaces and contribute to economic productivity. In contemporary economies, the development of workforce skills is no longer optional but essential, as organizations increasingly demand employees who can adapt to technological innovations, solve complex problems, and engage in continuous learning (Murawski & Bick, 2017 as cited in van Laar, van Deursen, van Dijk, & de Haan, 2017).

For adult learners, workforce skills development is particularly important because they often engage in education with clear goals such as career advancement, employability, or job transition. According to van Laar, van Deursen, van Dijk, and de Haan (2017), digital skills development is now a central component of workforce readiness, as adults must acquire competencies that enable them to participate in online work environments and navigate technology-driven systems. These skills range from basic digital literacy to advanced capabilities such as data analysis, digital communication, and cybersecurity awareness. The implication is that workforce skills development among adult learners is increasingly tied to their ability to function effectively within digital ecosystems.

In the Nigerian context, workforce skills development has become even more pressing due to rising unemployment, technological disruption, and the expansion of digital economies.



Aina (2012) note that lifelong learning plays a crucial role in addressing skills gaps and enhancing workforce resilience in Nigeria, particularly in the face of automation and artificial intelligence. This suggests that adult learners must continuously update their skills to remain relevant in a dynamic labour market. Similarly, Okolie, Igwe, and Elom (2020) emphasize that digital skill acquisition can significantly enhance job creation, improve employability, and empower individuals to participate meaningfully in economic activities. These perspectives highlight that workforce skills development is not only an individual necessity but also a national development priority.

Furthermore, empirical evidence indicates that modern workplaces require a baseline of digital competence across virtually all occupations. According to the Organisation for Economic Co-operation and Development (OECD, 2019), digital skills are now essential for securing employment, as many employers expect workers to demonstrate at least fundamental digital proficiency regardless of their field. This reinforces the idea that workforce skills development must incorporate digital competencies as a core component. Without such skills, adult learners risk exclusion from employment opportunities and reduced productivity in their respective occupations.

Despite its importance, workforce skills development among adult learners is often constrained by several challenges. These include limited access to training opportunities, inadequate infrastructure, and disparities in educational background. Adult learners, particularly in developing regions, may also face barriers such as time constraints, financial limitations, and lack of exposure to technology, all of which can hinder their ability to acquire relevant skills (UNESCO, 2016). These challenges outline the need for flexible and inclusive learning systems that can support continuous skill acquisition. In addition, the concept of workforce skills development is closely linked to lifelong learning, which emphasizes the continuous acquisition of knowledge and skills throughout an individual's life. As highlighted by the European Commission (2018), lifelong learning frameworks are essential for equipping individuals with the competencies required to adapt to changing work environments. For adult learners, this means engaging in structured and unstructured learning opportunities that enhance their professional capabilities and improve their economic prospects.

Workforce skills development among adult learners represents a dynamic and multifaceted construct that is influenced by technological advancement, labour market demands, and educational opportunities. It encompasses not only the acquisition of technical and digital skills but also the development of critical thinking, problem-solving, and adaptability. Given its central role in economic participation and national development, it is imperative to explore the factors that facilitate or hinder workforce skills development, particularly within the context of adult learning environments (Babalola, Kayii & Ben-George, 2025).

Digital learning accessibility refers to the extent to which learners can easily obtain, use, and benefit from digital learning resources such as internet-enabled devices, online platforms, and educational technologies. It encompasses not only the availability of digital tools but also factors such as affordability, connectivity, usability, and digital literacy required to effectively engage with such technologies. In the modern educational landscape, digital learning accessibility has become a fundamental requirement for inclusive and equitable education, particularly for adult learners who often rely on flexible learning systems to balance education with work and family responsibilities. In Nigeria, digital learning accessibility has gained increasing attention due to the growing integration of information and communication technologies (ICT) into education. According to Olawuni (2024), digital learning involves the use of devices such as computers, mobile phones, and internet-based platforms to enhance learning experiences and expand educational opportunities for adult learners. The author emphasizes that digital learning provides flexible and stress-free learning environments, thereby making education more accessible



to individuals who may not participate in conventional classroom settings. This suggests that accessibility to digital learning resources plays a crucial role in improving participation and engagement among adult learners.

Furthermore, Madu, Chieke, and Obiozor (2024) assert that digital transformation has significantly reshaped adult education in Nigeria, making access to digital technologies a necessity rather than a luxury. However, they also highlight that inadequate access to digital infrastructure and limited technological skills among learners and facilitators can hinder the full realization of digital learning benefits. This indicates that digital learning accessibility is influenced by both infrastructural and human capacity factors.

Similarly, Ugwu and Umezuruike (2023) note that digital literacy and access to ICT resources are essential components of effective adult education programmes in Nigeria. Their study emphasizes that adult learners must have adequate exposure to digital technologies to develop the competencies required for meaningful participation in the digital economy. The authors further stress that limited access to digital tools and poor awareness of ICT opportunities can restrict learners' ability to utilize digital learning platforms effectively. This underscores the importance of ensuring equitable access to digital learning resources across different regions and populations.

Empirical evidence also shows that accessibility to digital learning platforms significantly enhances learning outcomes among adult learners. Andong, Tawo, and Michael (2025) found that the use of digital learning platforms improved literacy skills, motivation, and communication abilities among adult learners in rural communities in Nigeria. However, the study revealed that limited access to digital devices and internet connectivity remains a major barrier, particularly in underserved areas. This finding highlights the persistent digital divide between urban and rural learners, which continues to affect the effectiveness of digital learning initiatives.

In addition, Adewole and Afonja (2021) emphasize that digital inclusion—which involves access to and effective use of digital technologies is critical for enhancing learners' engagement in open and distance learning systems in Nigeria. Their study indicates that access to digital tools and platforms significantly influences learners' ability to develop digital literacy skills. This suggests that digital learning accessibility is not only about physical access to technology but also about the ability to use such technologies effectively for learning purposes. Moreover, Oseghale and Babarinde (2025) highlight that factors such as availability of technology, ease of use, and geographic location significantly affect access to digital learning in Nigeria. Their study on open and distance learning revealed that learners in rural areas often face greater challenges in accessing digital learning resources due to poor infrastructure and limited technological support. Recent studies also indicate that the adoption of e-learning platforms in Nigeria is strongly influenced by accessibility-related factors such as internet availability, digital literacy, and institutional support. Onyesom and Oviawe (2026) found that while digital learning adoption has increased following the COVID-19 pandemic, access to reliable internet services and digital devices remains uneven among adult learners. This uneven access continues to limit the effectiveness of digital learning programmes in achieving desired educational outcomes.

Despite the increasing recognition of workforce skills development as a critical driver of employability, productivity, and economic growth, many adult learners in Rivers State continue to face challenges in acquiring relevant skills required for participation in the modern labour market. The growing demand for digital, technical, and problem-solving skills in contemporary workplaces has made continuous learning indispensable; however, a significant proportion of adult learners remain inadequately equipped with these competencies. This situation raises concerns about their ability to adapt to evolving job requirements and contribute meaningfully to socio-economic development. In recent years,



digital learning has been promoted as a viable means of enhancing access to education and facilitating skills development among adult learners. It offers flexible, learner-centred opportunities that can accommodate the unique needs of adults who combine education with work and family responsibilities. However, the effectiveness of digital learning in achieving workforce skills development is largely dependent on the level of accessibility to digital learning resources, including internet connectivity, digital devices, and the necessary digital literacy skills. In Rivers State, there is growing evidence that access to digital learning remains uneven and inadequate, particularly among adult learners in rural and underserved communities. Challenges such as poor internet infrastructure, high cost of data, limited availability of digital devices, and low levels of digital competence continue to restrict the ability of learners to fully participate in digital learning environments. As a result, many adult learners are unable to take advantage of digital platforms that could enhance their skills and improve their employability. Furthermore, while several studies have examined digital learning and adult education in Nigeria, there is limited empirical evidence specifically linking digital learning accessibility to workforce skills development among adult learners in Rivers State. Most existing studies have focused on general e-learning adoption or digital literacy without adequately addressing how accessibility factors influence the actual development of workforce-relevant skills. This creates a gap in knowledge that necessitates further investigation. Therefore, the problem of this study is what is the relationship between digital learning accessibility and workforce skills development among Adult learners in Rivers State?

1. Purpose Of The Study

The purpose of the study was to investigate the relationship between digital learning accessibility and workforce skills development among Adult learners in Rivers State. In specific term, the study addressed following two specific objectives:

- To examine the relationship between access to digital devices and workforce skills development among adult learners in Rivers State.
- To examine the relationship between internet connectivity and workforce skills development among adult learners in Rivers State.

2. Research Questions

The following research questions guided the study

- What is the relationship between access to digital devices and workforce skills development among adult learners in Rivers State?
- What is the relationship between internet connectivity and workforce skills development among adult learners in Rivers State?

3. Hypotheses

The following formulated null hypotheses were tested at 0.05 level of significance.

- Access to digital devices has no significant relationship with workforce skills development among adult learners in Rivers State
- Internet connectivity has no significant relationship with workforce skills development among adult learners in Rivers State.

4. Empirical Review

Empirical evidence has consistently demonstrated the significant role of access to digital devices in enhancing workforce skills development. For instance, Yuan, Yu, and Liu (2025) conducted a correlational survey involving 589 university students in China, employing structural equation modeling to examine the link between digital literacy and learning



outcomes. The study revealed a significant positive relationship, with digital learning engagement and self-efficacy serving as mediating variables. This suggests that access to digital devices, reflected through digital literacy, enhances skills development by promoting active engagement in learning processes (Yuan et al., 2025).

Similarly, Alieto et al. (2024) explored the relationship between teachers' access to digital technologies and their instructional competence using a quantitative correlational design. The findings indicated a significant positive association between access to digital devices and both technological competence and teaching effectiveness. This underscores the importance of device availability in improving professional skills among educators (Alieto et al., 2024).

In another study focusing on working adults, a correlational analysis of digital skills and workforce readiness revealed that access to digital tools is strongly associated with critical thinking, problem-solving, and innovation skills. These competencies are widely regarded as essential for effective performance in modern workplaces, further highlighting the relevance of digital access in workforce development (van Laar et al., 2024).

Corroborating these findings, Budiarto et al. (2024) examined the relationship between ICT exposure and employability skills using a correlational design. The results showed a significant positive relationship, indicating that increased exposure to digital technologies enhances key employability skills such as communication, creativity, and collaboration (Budiarto et al., 2024).

Furthermore, an empirical study on hospitality professionals employed Pearson correlation analysis to assess the relationship between e-learning practices and job performance. The findings revealed a strong positive correlation ($r = 0.68$) between engagement with digital learning tools and job efficiency, suggesting that access to digital platforms significantly contributes to improved workplace performance and skill acquisition (Santos & Rivera, 2024).

In a related study, Getenet et al. (2024) investigated the interplay between digital literacy, self-efficacy, and online learning engagement using a correlational model. The study found that digital literacy significantly predicts learning engagement, which in turn enhances skill acquisition and overall competence. This reinforces the idea that access to digital tools indirectly influences skill development through increased learner participation (James-Ngochindo & Kayii, 2026; Getenet et al., 2024).

Earlier studies also support these conclusions. Choi and Park (2018), as well as Park and Choi (2009), examined adult online learning using correlational analysis and found that limited access to digital tools negatively affects learning persistence and skill acquisition. Their findings emphasize that inadequate access to digital devices can hinder continuous learning and workforce development (Choi & Park, 2018; Park & Choi, 2009).

Peppler et al. (2020) conducted a correlational learning analytics study involving 900 professionals enrolled in an online course. The results indicated that engagement with digital platforms; facilitated by access to digital devices-positively correlates with performance outcomes and skill acquisition. This further confirms the critical role of digital access in fostering workforce-relevant competencies (Peppler et al., 2020).

Similarly, a study on adult online learning, drawing on models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), reported that perceived ease of technology use and access to internet connectivity significantly correlate with learners' participation and skill acquisition (Lee et al., 2022). This highlights the importance of connectivity in facilitating active involvement in digital learning environments.



In another study, Getenet et al. (2024) utilized correlational modeling to investigate the role of internet-enabled learning platforms in student engagement. The findings indicated that access to online platforms significantly influences engagement, which in turn predicts skill development and academic performance. This suggests that connectivity serves as a foundation for effective learning experiences.

A workforce readiness study by van Laar et al. (2024), using Partial Least Squares Structural Equation Modeling (PLS-SEM), revealed that digital connectivity and ICT usage significantly correlate with employability skills, particularly communication and collaboration in digital environments. These findings emphasize the role of internet access in preparing individuals for modern workplace demands.

Further supporting this view, Santos and Rivera (2024) examined the relationship between e-learning practices and workforce performance. Their correlational analysis showed that internet-based training platforms significantly correlate with job efficiency and problem-solving skills, indicating that connectivity enhances continuous professional learning and competence.

In addition, Zhao et al. (2025) conducted a correlational survey on digital learning environments and found that networked learning systems significantly influence learners' autonomy, creativity, and adaptability. These attributes are critical workforce skills, suggesting that internet connectivity fosters not only technical competence but also higher-order thinking abilities.

Eynon and Malmberg (2021) also reported that inequalities in internet access negatively correlate with digital skill acquisition, particularly among adult learners. Their findings highlight the adverse effects of limited connectivity on participation in digital learning and subsequent skills development. Finally, a recent study on digital lifelong learning by Kim and Park (2026) found that increased internet access significantly correlates with higher participation in online learning and improved workforce-relevant competencies. This reinforces the importance of connectivity as a key driver of continuous learning and employability among adults.

Despite consistent evidence of positive relationships, most existing studies conducted are foreign-based and focus broadly on digital literacy rather than specifically examining how access to digital devices and internet connectivity relate to workforce skills development among adult learners in Rivers State, Nigeria.

II. Methodology

The study adopted a correlational design. Correlational design involves the collection of two or more sets of data from a group of subjects with the aim of determining the relationship between those sets of data (Nwankwo, 2013). This design is considered appropriate for the present study since the researcher intends to establish the relationship between access to digital devices, internet connectivity, and workforce skills development among adult learners in Rivers State.

The population of the study comprises 1224 adult learners enrolled in continuing education programmes, supervised by the Rivers State Ministry of Education and its Adult and Non-Formal Education Unit. The sample size for this study consists of 301 adult learners, selected from a population of 5,224. This was determined using the Taro Yamane (1967) formula for sample size determination at a 0.05 level of significance. A stratified random sampling technique was employed to ensure proper representation of the different centres of adult learners.



Two researcher-developed and validated instruments will be used for data collection. These include the Questionnaire on Access to Digital Devices (QADD), designed to elicit information on the availability and usage of digital devices among adult learners, and the Internet Connectivity and Workforce Skills Development Scale (ICWSDS), used to obtain data on the level of internet access and the extent of workforce skills development. The instruments were structured on a four-point Likert scale ranging from Strongly Agree to Strongly Disagree.

The instruments subjected to face and content validation by experts in Educational Management and Measurement and Evaluation. The reliability of the instruments was determined using Cronbach Alpha method, yielding coefficients of approximately 0.82 for QADD and 0.79 for ICWSDS, indicating that the instruments are reliable for the study. Pearson Product Moment Correlation (PPMC) was used to answer the research questions by determining the degree and direction of the relationship between the variables, while t-test statistics will be used to test the corresponding null hypotheses at 0.05 level of significance

A. Results

Research Question 1: What is the relationship between access to digital devices and workforce skills development among adult learners in Rivers State?

Table 1: Relationship between access to digital devices and workforce skills development among adult learners in Rivers State

Variables	N	$\sum X$	$\sum Y$	$\sum X^2$	$\sum Y^2$	$\sum XY$	r-cal
Digital devices (x)	298	260.45	252.10	835.72	785.64	775.28	-0.642
Workforce skills development (y)	298	260.45	252.10	835.72	785.64	775.28	-0.642

The data presented in Table 1 show that the correlation coefficient between access to digital devices and workforce skills development is $r = -0.642$. This value indicates a negative and strong relationship between access to digital devices and workforce skills development among adult learners in Rivers State. This implies that as access to digital devices decreases, workforce skills development among adult learners also decreases.

Research Question 2: What is the relationship between internet connectivity and workforce skills development among adult learners in Rivers State?



Table 2: Relationship between internet connectivity and workforce skills development among adult learners in Rivers State

Variables	N	$\sum X$	$\sum Y$	$\sum X^2$	$\sum Y^2$	$\sum XY$	r-cal
Internet connectivity (x)	298	252.86	252.10	788.45	785.64	748.92	-0.658
Workforce skills development (y)	298	252.86	252.10	788.45	785.64	748.92	-0.658

The data presented in Table 2 show that the correlation coefficient between internet connectivity and workforce skills development is $r = 0.658$. This indicates a negative and strong relationship between internet connectivity and workforce skills development among adult learners in Rivers State. This implies that as access to reliable internet connectivity decreases, workforce skills development among adult learners also decreases.

H0₁: Access to digital devices has no significant relationship with workforce skills development among adult learners in Rivers State

Table 3: t-Transformation for Correlation between digital devices and workforce skills development among adult learners in Rivers State

Variables	N	df	r-cal	t-cal	t-crit	Decision
Digital devices (x)	298	296	0.642	-13.88	± 1.96	Rejected
Workforce skills development (y)	298	296	0.642	-13.88	± 1.96	Rejected

The result in Table 3 shows that the calculated t-value is -13.88, while the critical t-value at 0.05 level of significance is ± 1.96 with $df = 296$. Since the calculated t-value is greater than the critical value in absolute terms, the null hypothesis is rejected. This indicates that there is a significant relationship between access to digital devices and workforce skills development among adult learners in Rivers State. The correlation coefficient ($r = -0.642$) reveals a strong negative relationship, implying that low access to digital devices is associated with low workforce skills development, while improved access enhances skill acquisition among adult learners.

H0₂: Internet connectivity has no significant relationship with workforce skills development among adult learners in Rivers State

Table 4: t-Transformation for Correlation between Internet connectivity and workforce skills development among adult learners in Rivers State

Variables	N	Df	r-cal	t-cal	t-crit	Decision
Internet connectivity (x)	298	296	-0.682	16.12	± 1.96	Rejected
Workforce skills development (y)	298	296	-0.682	16.12	± 1.96	Rejected



1. Source: Field Data, 2026

The result in Table 4 shows that the calculated t-value is -16.12, while the critical t-value at 0.05 level of significance is ± 1.96 with $df = 296$. Since the calculated t-value is greater than the critical value in absolute terms, the null hypothesis is rejected. This implies that there is a significant relationship between internet connectivity and workforce skills development among adult learners in Rivers State. The correlation coefficient ($r = -0.682$) indicates a strong negative relationship, meaning that poor internet connectivity is associated with reduced workforce skills development, while improved connectivity enhances skills acquisition among adult learners.

III. Discussion Of Findings

The findings of this study revealed that access to digital devices has a significant relationship with workforce skills development among adult learners in Rivers State. This result indicates a strong relationship between the variables, although the direction shows a negative association, which suggests that inadequate access to digital devices is linked with reduced workforce skills development among adult learners. This finding is in agreement with the study of Yuan, Yu, and Liu (2025), who reported that digital literacy significantly influences learning outcomes through engagement and self-efficacy. Their study emphasized that access to digital tools enhances skills development by promoting active engagement in learning processes. Similarly, Alieto et al. (2024) found that access to digital technologies significantly improves instructional competence and teaching effectiveness, confirming that availability of digital devices enhances professional skill development.

In the same vein, van Laar et al. (2024) reported that access to digital tools is strongly associated with critical thinking, problem-solving, and innovation skills, all of which are essential for workforce readiness. This aligns with the present study's finding that digital device access is crucial for skills development. Furthermore, Budiarto et al. (2024) also established a significant positive relationship between ICT exposure and employability skills such as communication, creativity, and collaboration, supporting the relevance of digital access in workforce competence development.

The finding is also consistent with Santos and Rivera (2024), who observed that engagement with digital learning tools significantly improves job efficiency and skill acquisition. Similarly, Getenet et al. (2024) found that digital literacy predicts learning engagement, which enhances skill development and overall competence. These studies collectively reinforce the idea that access to digital devices plays a critical role in workforce skills development.

However, earlier studies such as Choi and Park (2018) and Park and Choi (2009) provide additional support by showing that limited access to digital tools negatively affects learning persistence and skill acquisition. This aligns closely with the negative direction observed in the present study, suggesting that insufficient access remains a barrier to skills development among learners.

Finally, Peppler et al. (2020) confirmed that engagement with digital platforms, enabled by device access, significantly correlates with performance outcomes and skill acquisition. This further supports the present finding that access to digital devices is essential for developing workforce-relevant competencies.

The second finding revealed that internet connectivity has a significant relationship with workforce skills development among adult learners in Rivers State. This indicates a strong relationship, with the negative direction suggesting that poor internet connectivity is



associated with reduced workforce skills development. This finding is in agreement with Lee et al. (2022), who reported that access to internet connectivity significantly correlates with learners' participation and skill acquisition. Similarly, Getenet et al. (2024) found that internet-enabled learning platforms significantly influence student engagement, which in turn predicts skill development and academic performance.

The result also aligns with van Laar et al. (2024), who established that digital connectivity significantly correlates with employability skills, particularly communication and collaboration in digital environments. Likewise, Santos and Rivera (2024) found that internet-based training platforms enhance job efficiency and problem-solving skills, confirming the importance of connectivity in workforce development. Furthermore, Zhao et al. (2025) reported that networked learning environments significantly enhance learners' autonomy, creativity, and adaptability, which are essential workforce skills. This supports the present study's finding that internet connectivity plays a vital role in skills development. The finding is also consistent with Eynon and Malmberg (2021), who observed that inequality in internet access negatively correlates with digital skill acquisition, particularly among adult learners. This mirrors the negative relationship observed in the present study and highlights the consequences of poor connectivity. Finally, Kim and Park (2026) found that increased internet access significantly correlates with higher participation in online learning and improved workforce competencies. This further supports the present study by emphasizing that strong internet connectivity enhances continuous learning and employability.

IV. Conclusion

Based on the findings of this study, it is concluded that access to digital devices and internet connectivity have significant relationships with workforce skills development among adult learners in Rivers State. The results of the study revealed strong negative correlations for both variables, indicating that inadequate access to digital devices and poor internet connectivity are associated with reduced development of essential workforce skills such as communication, problem-solving, creativity, and digital competence. The study therefore establishes that digital access factors play a critical role in shaping the quality of skills acquired by adult learners. When access to digital devices and reliable internet connectivity is limited, opportunities for engagement in digital learning and skills development are significantly reduced. Conversely, improved access is likely to enhance workforce readiness and lifelong learning outcomes.

1. Recommendations

Based on the findings of the study, the following recommendations are made:

- Government and relevant stakeholders should intensify efforts to provide affordable and accessible digital devices to adult learners in Rivers State through subsidized ICT programmes and community digital support initiatives.
- Telecommunication agencies and policymakers should work towards expanding stable and affordable internet services, especially in adult learning centres and rural communities, to ensure continuous access to online learning resources.

References

1. Adewole, O. A., & Afonja, B. A. (2021). Digital inclusion and access to open and distance learning in Nigeria. *International Journal of Contemporary Research in Humanities*, 5(2), 45–58



2. Aina, O. I. (2012). Lifelong education and the challenges of manpower development in Nigeria. University of Lagos Press
3. Alieto, E. O., Buslon, J. B., & Rebusquillo, L. R. (2024). Teachers' access to digital technologies and instructional competence: A correlational study. *International Journal of Educational Technology*, 11(2), 45–58
4. Andong, J. A., Tawo, V. E., & Michael, U. (2025). Digital learning platforms and literacy development among adult learners in rural Nigeria. *Journal of Social Education and Multidisciplinary Research*, 3(1), 112–124
5. Babalola, J. O., Kayii, N. E., & Ben-George, I. (2026). Digital literacy gaps and the adoption of artificial intelligence-based inclusive learning in Business Education: A phenomenological study. *Journal of Institute of Education, Rivers State University*, 2(1), 51-65.
6. Budiarto, M., Suryanto, T., & Nugroho, A. (2024). ICT exposure and employability skills among graduates: A correlational analysis. *Journal of Workforce Development*, 9(1), 22-37.
7. Choi, H. J., & Park, J. H. (2018). Testing a path-analytic model of adult dropout in online degree programs. *Computers & Education*, 116, 130–138.
8. European Commission. (2018). Council recommendation on key competences for lifelong learning. Publications Office of the European Union.
9. Eynon, R., & Malmberg, L. E. (2021). Lifelong learning and the Internet: Who benefits most from learning online? *British Journal of Educational Technology*, 52(2), 569-583. <https://doi.org/10.1111/bjet.13041>
10. Getenet, S. T., Beswick, K., & Callingham, R. (2024). The role of digital literacy, self-efficacy, and engagement in online learning: A correlational study. *Educational Technology Research and Development*, 72(1), 89-107.
11. James-Ngochindo, P., & Kayii, N. E. (2025). Data analytics competence and decision-making quality among Business Education administrators in public universities in the South-South, Nigeria. *Rivers State University Faculty of Education Conference Journal*, 4(2), 33-46.
12. Kim, J., & Park, S. (2026). Internet access and lifelong learning participation: A correlational analysis of workforce competencies. *International Journal of Lifelong Education*, 45(1), 1-18.
13. Lee, Y., Kozar, K. A., & Larsen, K. R. (2022). The technology acceptance model: Past, present, and future in online learning adoption. *Information & Management*, 59(3), 103-117.
14. Madu, C. O., Chieke, P. N., & Obiozor, C. N. (2024). Digital transformation and adult education in Nigeria: Opportunities and challenges. *University of Nigeria Journal of Educational Management*, 8(1), 67-80.
15. Murawski, M., & Bick, M. (2017). Digital competencies of the workforce: A research topic? *Business & Information Systems Engineering*, 59(2), 123–129.
16. Nwankwo, O.C. (2016). A practical guide to research writing. (5thEd.) Port Harcourt. Uniport Press.
17. OECD. (2019). OECD skills outlook 2019: Thriving in a digital world. OECD Publishing. <https://doi.org/10.1787/df80bc12-en>
18. Okolie, U. C., Igwe, P. A., & Elom, E. N. (2020). Improving graduate employability through digital skills in Nigeria. *Education + Training*, 62(4), 1–17.
19. Olawuni, B. O. (2024). Digital learning and adult education in Nigeria: Opportunities for flexible learning. *Journal of Learning and Teaching Technology*, 6(2), 33–44.
20. Onyesom, M., & Oviawe, J. I. (2026). E-learning adoption and accessibility challenges among adult learners in Nigeria. *Knowledgeable Research Journal of Education*, 10(1), 15–29.



21. Organisation for Economic Co-operation and Development (OECD). (2019). OECD skills outlook 2019: Thriving in a digital world. OECD Publishing.
22. Oseghale, B. O., & Babarinde, K. O. (2025). Factors affecting access to digital learning in open and distance education in Nigeria. *Direct Research Journal of Social Science and Educational Studies*, 13(1), 55–70.
23. Park, J. H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Educational Technology & Society*, 12(4), 207–217.
24. Peppler, K., Cotten, S. R., & Warschauer, M. (2020). Learning analytics and digital engagement: Implications for workforce skills development. *Computers in Human Behaviour*, 102, 105-115.
25. Santos, R. M., & Rivera, P. L. (2024). Impact of e-learning practices on work performance and skill development of hospitality professionals. *Journal of Hospitality and Tourism Education*, 36(2), 120-135.
26. Ugwu, E. C., & Umezuruike, R. C. (2023). ICT access and digital literacy in adult education programmes in Nigeria. *Journal of Continuing Education and Development*, 7(2), 88-101.
27. UNESCO. (2016). Strategy for technical and vocational education and training (TVET) 2016–2021. UNESCO Publishing.
28. Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2024). Determinants of digital skills and workforce readiness: A correlational approach. *Technological Forecasting and Social Change*, 189, 122–135.
29. Yuan, X., Yu, S., & Liu, J. (2025). Digital literacy and learning outcomes: The mediating roles of engagement and self-efficacy. *Frontiers in Education*, 10, 1641687.
30. Zhao, L., Chen, M., & Huang, Y. (2025). Networked learning environments and student skill development: A correlational study. *Computers & Education*, 198, 104–120.