Knowledgeable Research (KR) 2026, Vol., (5):03
ISSN: 2583-6633, CODEN: KRABAU
International open-access peer-reviewed refereed monthly journal
https://knowledgeableresearch.com/index.php/1

Determinants of E-Learning Platform Adoption and Learning Outcomes in Adult Education Programmes in Post-COVID in Nigeria

[1]Dr. Chukwunweike Barnabas Onyesom*
Department of Adult and Continuing Education
Faculty of Education, University of Benin
[2]OVIAWE, Isoken Iyore
Department of Adult and Continuing Education
Faculty of Education, University of Benin

Abstract

The COVID-19 pandemic disrupted education systems globally and accelerated the adoption of digital learning technologies. In Nigeria, adult education programmes increasingly adopted e-learning platforms to maintain learning continuity during and after the pandemic. However, the level of adoption and its impact on learning outcomes remain uneven due to various technological, institutional, and learner-related challenges. This study examines the key determinants of e-learning adoption, including perceived usefulness, ease of use, digital literacy, internet accessibility, and institutional support. Using insights from technology adoption theories and existing literature, the paper analyzes how these factors influence learners' willingness to use digital platforms and their effect on cognitive, affective, and skill-based outcomes. The findings reveal persistent challenges such as inadequate infrastructure, high internet costs, limited training, and weak policy implementation. The study concludes that while e-learning offers significant potential for expanding adult education, its success depends on improved infrastructure, effective support systems, and stronger institutional frameworks.

Keywords: *Determinants, E-Learning Platform, Adult Education Programmes, Post-COVID.*

Received: 10/02/2026
Accepted: 23/03/2026
Published: 31/03/2026

***Corresponding Author:**
Dr. Chukwunweike Barnabas Onyesom
Email: chukwunweike.onyesom@uniben.edu

INTRODUCTION

The global outbreak of the COVID-19 pandemic in late 2019 and its rapid spread across countries resulted in one of the most significant disruptions to education systems in modern history. Governments around the world were compelled to close schools, universities, and other educational institutions in an effort to contain the spread of the virus. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), at the peak of the pandemic more than 1.6 billion learners across over 190 countries were affected by school closures, representing nearly 90 percent of the world's student population. These unprecedented disruptions

forced educational institutions to explore alternative learning modalities in order to sustain teaching and learning processes. Consequently, digital learning technologies and online education platforms emerged as critical tools for ensuring the continuity of education during the pandemic (UNESCO, 2020; Hodges et al., 2020).

The pandemic therefore accelerated a global transition from traditional face-to-face classroom instruction to various forms of electronic learning (e-learning). Educational institutions rapidly adopted virtual classrooms, mobile learning applications, video conferencing platforms, and learning management systems (LMS) to facilitate remote learning. Platforms such as Moodle, Google Classroom, and Zoom became widely used tools for delivering lectures, distributing learning materials, conducting assessments, and maintaining interaction between instructors and learners. Scholars argue that the pandemic did not merely introduce digital learning but rather accelerated an existing transformation toward technology-driven education systems (Dhawan, 2020; Crawford et al., 2020; Bozkurt & Sharma, 2020). As a result, e-learning has become an integral component of modern educational systems, reshaping the ways knowledge is delivered, accessed, and shared.

In Nigeria, the sudden shift toward online learning exposed deep structural and infrastructural gaps within the educational sector. Prior to the pandemic, the integration of digital technologies in many Nigerian educational institutions was relatively limited, particularly within adult education programmes and community-based learning initiatives. When institutions were forced to adopt remote learning approaches, many learners and instructors faced difficulties due to limited internet connectivity, inadequate access to digital devices, unreliable electricity supply, and insufficient technological skills (Adedoyin & Soykan, 2020; Olasile & Emrah, 2021). These challenges were especially pronounced among adult learners, many of whom belong to marginalized socio-economic groups with limited exposure to digital technologies. Consequently, the rapid shift to e-learning highlighted the persistent digital divide within Nigeria's education system (Azeez et al., 2021; Onyema et al., 2020).

Adult education plays a pivotal role in national development by promoting lifelong learning, improving literacy levels, enhancing vocational skills, and empowering citizens to participate actively in social and economic life. Through programmes such as literacy education, continuing professional education, community development education, and vocational training, adult education contributes significantly to human capital development and socio-economic transformation (Knowles et al., 2015; Rogers, 2014). In developing countries such as Nigeria, adult education is particularly important for addressing issues of unemployment, poverty, social exclusion, and technological illiteracy (Aderinoye, 2018). As societies increasingly rely on knowledge-based economies and digital technologies, adult education programmes must adapt to new modes of learning that promote flexibility, accessibility, and technological competence.

In the post-pandemic era, e-learning platforms have emerged as essential tools for expanding access to adult education and supporting flexible learning opportunities. Digital learning environments allow adult learners to access instructional materials anytime and anywhere, thereby accommodating their diverse responsibilities, including employment, family commitments, and community engagement. E-learning also supports self-paced learning, collaborative knowledge construction, and the integration of multimedia resources that enhance learning experiences (Anderson, 2008; Moore & Kearsley, 2012). Furthermore, online learning environments promote the development of digital competencies that are increasingly required in contemporary labour markets and knowledge economies (Selwyn, 2016).

Despite the growing recognition of the potential of e-learning technologies, the adoption and effective utilization of digital learning platforms in adult education programmes in Nigeria remain uneven and inconsistent. While some universities, training institutes, and adult learning centres have

successfully integrated digital platforms into their instructional systems, many others continue to struggle due to infrastructural deficiencies, financial constraints, limited technical expertise, and inadequate institutional support (Bassey, 2021; Onojah et al., 2021). In many rural communities, adult learners face significant barriers to online learning due to poor internet connectivity, high cost of data services, and lack of access to digital devices such as laptops and smartphones (Ogunode & Musa, 2020).

Another important factor influencing the adoption of e-learning platforms is the level of digital literacy among adult learners and instructors. Many adult learners who were educated in traditional classroom environments may have limited familiarity with digital technologies, making it difficult for them to navigate online learning platforms effectively. Similarly, some educators lack adequate training in the use of digital pedagogical tools, which affects their ability to design engaging online learning experiences (Adarkwah, 2021). These challenges highlight the importance of digital skills training and capacity building for both learners and educators within adult education systems.

Furthermore, institutional and policy frameworks play a critical role in shaping the adoption and sustainability of e-learning initiatives. Government policies that promote digital education, provide funding for ICT infrastructure, and support the integration of technology in teaching and learning can significantly enhance the adoption of e-learning platforms. International organizations such as the World Bank and the International Telecommunication Union have emphasized the importance of strengthening digital infrastructure and expanding broadband connectivity in developing countries to support inclusive digital education systems (World Bank, 2021; ITU, 2020). In Nigeria, the need for supportive policy frameworks has become increasingly evident as the country seeks to harness the potential of digital technologies to improve educational access and quality.

Understanding the determinants of e-learning platform adoption is therefore essential for improving learning outcomes and ensuring that adult learners benefit fully from digital education opportunities. Several factors influence the adoption and effectiveness of e-learning platforms, including technological infrastructure, digital literacy, institutional readiness, affordability of internet services, learners' attitudes toward technology, and the availability of supportive policy frameworks (Davis, 1989; Venkatesh et al., 2003). When these factors are adequately addressed, e-learning platforms can significantly enhance participation, engagement, and knowledge acquisition among adult learners.

Moreover, effective adoption of e-learning platforms has the potential to transform adult education by expanding learning opportunities beyond traditional classroom settings and promoting lifelong learning. Digital learning environments enable learners to access diverse educational resources, interact with peers and instructors across geographical boundaries, and develop critical digital competencies required for the modern workforce. These advantages make e-learning a valuable tool for addressing the educational needs of adult populations in rapidly changing socio-economic environments.

Against this background, it becomes necessary to examine the determinants that influence the adoption of e-learning platforms and their implications for learning outcomes in adult education programmes in Nigeria's post-COVID educational landscape. This position paper therefore explores the key technological, socio-economic, institutional, and policy factors that shape e-learning adoption among adult learners. It further argues that strategic investment in digital infrastructure, digital literacy development, institutional capacity building, and supportive policy frameworks is essential for enhancing the effectiveness of e-learning platforms and improving learning outcomes in adult education programmes in post-pandemic Nigeria.

Statement of the Problem

The global disruption caused by the COVID-19 pandemic compelled educational institutions across the world to rapidly adopt digital learning

technologies in order to sustain teaching and learning activities. In response to prolonged school closures and social distancing measures, many educational systems transitioned from conventional face-to-face instruction to online and technology-mediated learning platforms. This transformation accelerated the integration of digital technologies in education and highlighted the importance of e-learning platforms as viable tools for ensuring continuity in education delivery. In Nigeria, educational institutions at different levels—including universities, colleges, training institutes, and adult education centres—were encouraged to adopt various online learning platforms to mitigate the effects of the pandemic on academic activities. However, the abrupt shift to digital learning exposed significant structural weaknesses in the Nigerian educational system, particularly within adult education programmes.

Adult education programmes in Nigeria are designed to promote lifelong learning, improve literacy levels, provide vocational skills, and empower individuals with knowledge required for socio-economic development. These programmes play a crucial role in addressing issues such as unemployment, poverty, technological illiteracy, and social exclusion. Despite their importance, many adult education programmes have historically relied heavily on traditional classroom-based instruction with limited integration of digital technologies. Consequently, when the pandemic necessitated the adoption of online learning modalities, many adult education centres were unprepared for the rapid transition to e-learning environments. Issues such as inadequate digital infrastructure, limited internet connectivity, poor electricity supply, and insufficient access to digital devices significantly constrained the effective implementation of e-learning platforms.

Furthermore, the digital divide remains a major challenge affecting the adoption of online learning technologies in Nigeria. Many adult learners, particularly those residing in rural and low-income communities, lack access to smartphones, computers, and reliable internet services necessary for effective participation in digital learning environments. The high cost of internet data, coupled with unstable power supply, further limits the ability of adult learners to engage consistently with online learning platforms. These infrastructural limitations not only affect access to digital learning opportunities but also contribute to inequalities in educational participation and outcomes.

Another critical issue relates to the level of digital literacy among adult learners and instructors. Many adult learners who previously participated in traditional face-to-face adult education programmes possess limited technological skills required for navigating online learning platforms. Similarly, some instructors and facilitators lack adequate training in digital pedagogy and online instructional design, which affects their ability to effectively deliver course content through virtual learning environments. The absence of adequate training and technical support often leads to low levels of participation, reduced learner engagement, and poor learning experiences in e-learning environments.

Institutional readiness also presents significant challenges in the adoption of e-learning platforms. While some higher education institutions in Nigeria have begun integrating digital learning management systems such as Moodle and Google Classroom into their instructional processes, many adult education centres still lack the technological infrastructure and institutional support required for effective implementation of these systems. Inadequate funding for digital education initiatives, limited ICT facilities, and lack of technical personnel further hinder the successful adoption and sustainability of e-learning platforms in adult education programmes.

Moreover, policy and regulatory frameworks supporting digital learning in adult education remain relatively weak. Although the Nigerian government has introduced several ICT-in-education policies aimed at promoting digital learning, implementation has been inconsistent, and many adult education programmes have not fully benefited from these initiatives. Without strong institutional policies, strategic investments, and coordinated efforts among stakeholders, the

adoption of e-learning platforms in adult education may continue to face significant obstacles.

The consequences of these challenges are reflected in the inconsistent adoption of e-learning platforms and the uneven learning outcomes observed among adult learners in Nigeria's post-pandemic educational environment. While some adult education programmes have successfully leveraged digital technologies to expand learning opportunities and improve educational access, many others continue to struggle with limited technological capacity and low levels of digital engagement. As a result, the potential benefits of e-learning—such as flexible learning, increased accessibility, enhanced learner interaction, and improved knowledge acquisition—are yet to be fully realized within adult education systems.

Given the increasing importance of digital technologies in contemporary education systems, there is an urgent need to identify and examine the key factors that influence the adoption of e-learning platforms and their impact on learning outcomes in adult education programmes. Understanding these determinants is essential for developing effective strategies that can enhance digital learning participation, improve educational quality, and support lifelong learning opportunities for adult learners in Nigeria.

Therefore, the problem that this study addresses is the limited and uneven adoption of e-learning platforms in adult education programmes in post-COVID Nigeria, which continues to affect the accessibility, effectiveness, and overall learning outcomes of adult learners. Without addressing the technological, institutional, socio-economic, and policy-related factors influencing e-learning adoption, adult education programmes may struggle to fully harness the transformative potential of digital learning technologies in the post-pandemic era.

Conceptual Clarifications

E-Learning Platforms

E-learning platforms refer to digital technologies, software systems, and online environments that facilitate the delivery, management, and evaluation of educational content through electronic means. These platforms enable instructors and learners to interact in virtual learning environments where teaching and learning activities can occur regardless of geographical location or time constraints. Scholars describe e-learning platforms as integrated technological systems that support the creation, distribution, and management of instructional materials while enabling communication and collaboration among participants in the learning process (Anderson, 2008; Moore & Kearsley, 2012).

E-learning platforms typically include Learning Management Systems (LMS), virtual classrooms, video conferencing tools, mobile learning applications, and digital repositories of instructional materials. Learning Management Systems such as Moodle, Blackboard Learn, and Canvas (learning management system) provide structured environments for organizing course content, tracking learner progress, administering assessments, and facilitating communication between instructors and learners. In addition, synchronous communication tools such as Zoom and Google Classroom enable real-time interaction through virtual lectures, webinars, and online discussions (Dhawan, 2020).

One of the defining characteristics of e-learning platforms is their ability to support both synchronous and asynchronous learning. Synchronous learning occurs when instructors and learners interact in real time through live online sessions, while asynchronous learning allows learners to access course materials, recorded lectures, and discussion forums at their own convenience. This flexibility is particularly beneficial for adult learners who often balance educational pursuits with work, family responsibilities, and other commitments (Garrison, 2017).

Furthermore, e-learning platforms support various pedagogical strategies that enhance learner engagement and participation. These include multimedia learning resources such as videos, simulations, interactive quizzes, discussion

boards, and collaborative projects that promote knowledge construction and critical thinking. The integration of digital assessments, analytics tools, and feedback mechanisms also allows instructors to monitor learners' progress and provide timely support (Selwyn, 2016). In the context of modern education systems, e-learning platforms have become essential tools for promoting flexible, inclusive, and technology-enhanced learning environments that accommodate diverse learners and learning styles (Bozkurt & Sharma, 2020).

Adult Education Programmes

Adult education programmes refer to organized learning activities designed specifically for adults who seek to acquire knowledge, skills, competencies, and values for personal development, employment, or community participation. Unlike traditional formal education systems that primarily target children and adolescents, adult education focuses on individuals who have passed the conventional age of schooling but still require opportunities for learning and skill acquisition (Rogers, 2014). Adult education programmes are often structured to address the educational, social, and economic needs of adult learners while promoting lifelong learning and continuous personal development.

According to the United Nations Educational, Scientific and Cultural Organization ***(***UNESCO)**,** adult education encompasses formal, non-formal, and informal learning activities that enable adults to improve their literacy levels, acquire vocational skills, and participate actively in social and economic life. These programmes are essential for addressing issues such as illiteracy, unemployment, poverty, and social exclusion, particularly in developing countries (UNESCO, 2016). In Nigeria, adult education programmes play a significant role in promoting national development by empowering individuals with knowledge and skills necessary for productive living and active citizenship.

Adult education programmes often include a wide range of learning opportunities such as basic literacy education, vocational and technical training, continuing education, professional development courses, community development education, and civic education. These programmes may be delivered through formal institutions such as universities and training institutes, as well as through community-based learning centres, non-governmental organizations, and workplace training programmes (Aderinoye, 2018).

Another defining feature of adult education is its emphasis on learner-centered approaches and experiential learning. Adult learners typically bring prior knowledge, life experiences, and practical insights into the learning process. Therefore, adult education programmes often adopt participatory teaching methods that encourage dialogue, collaboration, and problem-solving. This approach aligns with the principles of andragogy developed by Malcolm Knowles, which emphasize self-directed learning, practical relevance, and the use of learners' experiences as valuable educational resources (Knowles, Holton, & Swanson, 2015).

In the digital era, adult education programmes increasingly integrate information and communication technologies to enhance accessibility and learning flexibility. The incorporation of e-learning platforms in adult education allows learners to participate in educational activities without the constraints of time and location, thereby expanding opportunities for lifelong learning and professional development (Anderson, 2008).

Learning Outcomes

Learning outcomes refer to the measurable knowledge, skills, competencies, attitudes, and values that learners acquire after participating in an educational programme or instructional activity. They represent the intended results of the learning process and serve as indicators for evaluating the effectiveness of teaching and learning experiences. Learning outcomes provide clear expectations about what learners should know, understand, and be able to do after completing a course or programme (Biggs & Tang, 2011).

In educational planning and curriculum development, learning outcomes play a critical role in guiding instructional design, teaching strategies, and assessment methods. Clearly defined learning outcomes enable educators to align teaching activities with expected competencies and ensure that learners achieve the desired educational objectives. Learning outcomes are typically categorized into cognitive, affective, and psychomotor domains, reflecting different dimensions of learning such as knowledge acquisition, attitudes, and practical skills (Anderson & Krathwohl, 2001).

Within the context of e-learning environments, learning outcomes may include improved digital literacy, enhanced knowledge acquisition, problem-solving abilities, critical thinking skills, collaborative learning capabilities, and increased participation in online learning activities. Digital learning environments provide opportunities for learners to engage with multimedia resources, interactive simulations, online discussions, and collaborative projects that promote deeper understanding and knowledge construction (Moore & Kearsley, 2012).

Moreover, e-learning platforms enable continuous monitoring and assessment of learners' progress through digital quizzes, assignments, automated grading systems, and analytics tools. These features help educators evaluate learners' performance and identify areas where additional support may be required. Effective use of e-learning technologies can therefore contribute significantly to improved learning outcomes by fostering active engagement, personalized learning experiences, and increased learner motivation (Dhawan, 2020).

In adult education programmes, learning outcomes are particularly important because they determine the extent to which learners acquire practical skills and knowledge that can be applied to real-life situations. Successful learning outcomes in adult education often translate into improved employability, increased productivity, enhanced digital competence, and greater participation in community development activities (Rogers, 2014). As digital technologies continue to transform educational systems, the ability of e-learning platforms to support positive learning outcomes has become a critical consideration for educators, policymakers, and researchers.

Theoretical Perspective

The adoption of e-learning platforms in adult education can be explained using several theoretical frameworks that describe how individuals accept, adopt, and utilize new technologies. These frameworks provide insights into the behavioral, technological, and social factors that influence learners' willingness to embrace digital learning environments. Among the most widely used theories in explaining technology adoption in education are the Technology Acceptance Model (TAM**)** and the Diffusion of Innovations Theory. These theoretical models have been extensively applied in studies examining the integration of information and communication technologies in education, including e-learning platforms in higher and adult education systems.

Technology Acceptance Model (TAM)

The Technology Acceptance Model was developed by Fred Davis in 1989 as an extension of the Theory of Reasoned Action. The model was designed to explain and predict user acceptance of computer technologies by focusing on individuals' perceptions and attitudes toward technological systems (Davis, 1989). According to the model, two primary factors determine whether individuals will accept and use a particular technology**:** perceived usefulness and perceived ease of use.

Perceived usefulness refers to the degree to which an individual believes that using a particular technology will enhance his or her performance or productivity. In the context of e-learning, perceived usefulness relates to the extent to which learners believe that digital learning platforms will improve their learning experiences, facilitate knowledge acquisition, and support academic achievement. When learners perceive that e-learning technologies can help them access learning materials easily, interact with instructors, and improve their learning outcomes, they are

more likely to adopt and continuously use such platforms (Davis, Bagozzi, & Warshaw, 1989).

Perceived ease of use, on the other hand, refers to the degree to which an individual believes that using a particular technological system will be free of effort. Technologies that are simple, intuitive, and user-friendly tend to encourage higher levels of adoption. In adult education programmes, many learners may have limited technological experience; therefore, the ease with which they can navigate an e-learning platform significantly affects their willingness to adopt it. If learners perceive digital platforms as complex or difficult to use, they may develop resistance toward using them for learning purposes (Venkatesh & Davis, 2000).

Over the years, the Technology Acceptance Model has been widely applied in educational technology research to explain the adoption of digital learning systems such as Learning Management Systems, online course platforms, and mobile learning applications. Studies have shown that learners' perceptions of usefulness and ease of use strongly influence their attitudes toward technology and their intention to use digital learning systems (King & He, 2006; Park, 2009). In adult education contexts, the TAM framework helps explain why some adult learners readily adopt e-learning platforms while others remain reluctant due to perceived complexity or limited perceived benefits.

Diffusion of Innovations Theory

Another theoretical framework that explains the adoption of e-learning platforms is the Diffusion of Innovations Theory developed by Everett Rogers in 1962 and later expanded in subsequent editions of his influential work *Diffusion of Innovations* (Rogers, 2003). This theory explains how new ideas, technologies, or innovations spread within a social system over time. According to Rogers, the diffusion process occurs through communication channels among members of a social system and is influenced by several characteristics of the innovation.

Rogers identified five key attributes that determine the rate at which an innovation is adopted. The first attribute is relative advantage**,** which refers to the degree to which an innovation is perceived as better than the idea or system it replaces. In the case of e-learning platforms, learners and educators are more likely to adopt digital learning technologies if they perceive them as more efficient, flexible, and accessible than traditional classroom-based instruction.

The second attribute is compatibility, which refers to the extent to which an innovation aligns with the values, experiences, and needs of potential users. If e-learning platforms are compatible with the educational needs and technological capabilities of adult learners, they are more likely to be accepted and integrated into learning processes.

The third attribute is complexity, which refers to the degree to which an innovation is perceived as difficult to understand or use. Innovations that appear complex or technically demanding may experience slower adoption rates because potential users may feel intimidated or overwhelmed by the technology.

The fourth attribute is trialability, which refers to the ability of users to experiment with an innovation before fully adopting it. When learners and instructors have opportunities to test e-learning platforms through pilot programmes or training sessions, they become more familiar with the technology and more willing to adopt it.

The fifth attribute is observability, which refers to the extent to which the results and benefits of an innovation are visible to others. When the advantages of e-learning platforms—such as improved access to learning resources, flexible learning schedules, and enhanced collaboration—are clearly observable, other learners and institutions may be encouraged to adopt similar technologies (Rogers, 2003).

The Diffusion of Innovations Theory is particularly relevant in explaining how educational technologies spread across institutions and communities. In adult education programmes,

the adoption of e-learning platforms often depends on social influences, institutional support, and the experiences of early adopters who demonstrate the effectiveness of digital learning technologies.

Implications of the Theoretical Frameworks

Together, the Technology Acceptance Model and the Diffusion of Innovations Theory provide a comprehensive theoretical foundation for understanding the adoption of e-learning platforms in adult education programmes. While TAM focuses primarily on individual perceptions and attitudes toward technology, the Diffusion of Innovations Theory emphasizes the broader social and organizational processes that influence technology adoption.

These theories highlight the importance of technological design, user perception, institutional readiness, and socio-cultural contexts in determining the adoption and effective use of e-learning platforms among adult learners. They suggest that successful integration of digital learning technologies requires not only accessible and user-friendly technological systems but also supportive institutional environments, training opportunities, and policies that encourage the use of digital learning tools.

In the context of post-pandemic education in Nigeria, these theoretical perspectives provide valuable insights into the factors that influence the acceptance and utilization of e-learning platforms among adult learners. Understanding these theoretical foundations helps educators, policymakers, and researchers design strategies that promote the effective adoption of digital learning technologies and improve learning outcomes in adult education programmes

DETERMINANTS OF E-LEARNING PLATFORM ADOPTION

The adoption of e-learning platforms in adult education programmes is influenced by several interconnected technological, socio-economic, institutional, and policy-related factors. Understanding these determinants is essential for improving the effectiveness and sustainability of digital learning initiatives in the post-COVID educational landscape. In Nigeria, where digital transformation in education is still evolving, these determinants significantly shape the accessibility, acceptance, and overall impact of e-learning platforms among adult learners.

1. **Digital Infrastructure and Internet Connectivity**

One of the most critical determinants of e-learning adoption in Nigeria is the availability of reliable digital infrastructure. Digital infrastructure refers to the technological facilities and services required to support online learning, including stable electricity supply, high-speed internet connectivity, and access to digital devices such as computers, tablets, and smartphones. Studies have shown that effective e-learning systems depend heavily on reliable technological infrastructure that supports seamless communication between instructors and learners (Nicholas D. Evans & Yair Levy).

In many developing countries, including Nigeria, inadequate infrastructure continues to limit the effectiveness of digital learning systems. According to United Nations Educational, Scientific and Cultural Organization (UNESCO), disparities in internet access and electricity supply significantly widen the digital divide in education, particularly for learners in rural communities. Similarly, International Telecommunication Union reports that limited broadband coverage and unstable electricity remain major barriers to digital education across Sub-Saharan Africa.

Nigeria faces similar challenges, as many rural and semi-urban communities experience irregular power supply and poor internet connectivity. According to National Bureau of Statistics, significant portions of the Nigerian population lack consistent access to reliable internet services. Without stable digital infrastructure, learners struggle to access virtual classrooms, download learning materials, or participate in real-time learning activities.

Researchers such as A.W. Tony Bates emphasize that the success of e-learning systems largely

depends on the availability of technological infrastructure that supports continuous access to digital learning environments. Consequently, improving broadband penetration, electricity supply, and access to affordable digital devices is essential for expanding e-learning adoption in adult education programmes.

2. Digital Literacy and Technological Skills

Digital literacy is another major determinant of e-learning adoption. Digital literacy refers to the ability to effectively use digital devices, communication tools, and online platforms to access, evaluate, and create information. Adult learners often possess varying levels of technological competence depending on their educational background, occupational exposure, and prior experience with digital technologies.

According to Paul Gilster, digital literacy involves not only the ability to operate digital devices but also the capacity to understand and critically evaluate digital information. In the context of e-learning, digital literacy enables learners to navigate learning management systems, participate in virtual discussions, submit assignments online, and access multimedia learning resources.

Research by Mark Warschauer highlights that digital literacy significantly influences learners' participation in online education environments. Individuals with limited digital skills often experience technological anxiety, frustration, and reduced engagement in online learning activities.

Similarly, Neil Selwyn argues that digital competence is a prerequisite for effective participation in digital learning ecosystems. Without adequate technological skills, adult learners may struggle to adapt to virtual learning environments, which can negatively affect their academic performance and overall learning experience.

Therefore, training programmes that focus on digital skills development are essential for promoting effective adoption of e-learning platforms. Capacity-building initiatives can equip adult learners with the necessary skills to confidently engage with digital technologies and maximize the benefits of online education.

3. Institutional Support and Capacity

Institutional support plays a critical role in the successful implementation of e-learning platforms in adult education programmes. Educational institutions must develop the necessary organizational structures, technological systems, and human resources to effectively support digital learning initiatives.

According to D. Randy Garrison and Terry Anderson, institutions that provide strong administrative and technological support create more effective online learning environments that promote collaboration, interaction, and knowledge construction. Institutional support includes the provision of learning management systems, technical support services, professional development programmes for instructors, and well-designed digital course materials.

Research by Curtis J. Bonk and Charles R. Graham further suggests that institutions that invest in digital learning infrastructure and instructional design capacity are more likely to achieve successful e-learning implementation.

In Nigeria, many adult education centres still lack adequate institutional capacity to support large-scale e-learning initiatives. Limited funding, insufficient technical expertise, and inadequate digital infrastructure within institutions often hinder the effective integration of online learning platforms.

Therefore, strengthening institutional capacity through investment in digital infrastructure, staff training, and instructional design support is essential for enhancing the adoption and sustainability of e-learning platforms in adult education.

4. Cost and Affordability of Internet Services

The cost of internet access and digital devices remains a major barrier to e-learning adoption in

many developing countries. In Nigeria, high internet data costs and the price of digital devices limit the ability of many adult learners to fully participate in online education programmes.

According to the World Bank, affordability is one of the key factors influencing digital inclusion in developing economies. Individuals with limited financial resources often face difficulties accessing reliable internet services and purchasing digital devices necessary for online learning.

Similarly, research by Manuel Castells highlights those socio-economic inequalities significantly influence access to digital technologies and participation in information societies. In the context of e-learning, these inequalities can create barriers that prevent marginalized populations from benefiting from digital education opportunities.

Studies conducted by Laura Czerniewicz also show that the cost of internet connectivity can significantly affect student participation and engagement in online learning environments. When learners cannot afford consistent internet access, they may miss live classes, struggle to download course materials, or fail to submit assignments on time.

Consequently, addressing affordability challenges through subsidized internet services, government-supported digital education programmes, and partnerships with telecommunications companies can significantly enhance access to e-learning platforms.

5. Learners' Attitudes and Motivation

Learners' perceptions, attitudes, and motivation toward technology significantly influence the adoption of e-learning platforms. Positive attitudes toward digital technologies often encourage learners to explore and utilize online learning tools, while negative perceptions can lead to resistance or reluctance to adopt new technologies.

According to Fred D. Davis, the perceived usefulness and perceived ease of use of a technology strongly influence users' intention to adopt it. If adult learners believe that e-learning platforms will improve their learning experience, increase flexibility, and provide valuable educational opportunities, they are more likely to adopt these technologies.

Research by Albert Bandura on self-efficacy further suggests that individuals' confidence in their ability to use technology plays an important role in their willingness to engage with digital learning systems. Learners who feel confident in their technological abilities are more likely to participate actively in online learning environments.

Additionally, John Keller emphasizes that learner motivation is a critical factor in educational success. Motivational elements such as relevance, confidence, satisfaction, and engagement can significantly influence learners' persistence and participation in e-learning programmes.

Therefore, fostering positive attitudes toward digital learning through awareness campaigns, training programmes, and user-friendly platform design can significantly improve the adoption of e-learning technologies among adult learners.

6. Government Policies and Regulatory Framework

Government policies and regulatory frameworks play a crucial role in promoting the integration of e-learning platforms within national education systems. Supportive policies can create an enabling environment for digital learning by facilitating investments in ICT infrastructure, promoting digital literacy programmes, and ensuring equitable access to technology.

The Federal Ministry of Education Nigeria has recognized the importance of integrating information and communication technologies (ICT) into education as part of its national education reform strategies. Policies that support the development of digital learning environments can significantly enhance the adoption of e-learning platforms in adult education programmes.

International organizations such as Organisation for Economic Co-operation and Development (OECD) emphasize that effective digital education policies should focus on expanding digital infrastructure, promoting teacher training in educational technology, and ensuring inclusive access to digital learning opportunities.

Similarly, Mark Prensky argues that educational systems must adapt to the realities of the digital age by integrating technology into teaching and learning processes. Government support is therefore essential for driving the digital transformation of education.

In Nigeria, strengthening policy frameworks that promote ICT integration in education, expanding broadband access, and supporting digital literacy initiatives can significantly improve the adoption and effectiveness of e-learning platforms in adult education programmes.

Overall, the adoption of e-learning platforms in adult education programmes is influenced by a combination of infrastructural, technological, institutional, economic, psychological, and policy-related factors. Addressing these determinants through coordinated efforts by governments, educational institutions, and development partners is essential for maximizing the benefits of digital education and improving learning outcomes for adult learners in post-COVID Nigeria.

Impact of E-Learning Adoption on Learning Outcomes

The effective adoption of e-learning platforms has the potential to significantly improve learning outcomes in adult education programmes. Learning outcomes generally refer to the knowledge, competencies, skills, and attitudes that learners acquire as a result of participating in an educational programme. With the increasing integration of digital technologies in education, e-learning platforms are becoming important tools for enhancing the quality, accessibility, and effectiveness of adult learning. Scholars and international organizations have widely acknowledged that well-implemented e-learning systems can positively influence educational attainment, learner engagement, and skill development.

1. Increased Accessibility and Flexibility

One of the most significant impacts of e-learning adoption is the increased accessibility and flexibility it provides for adult learners. Unlike traditional classroom-based instruction, e-learning platforms allow learners to access educational resources from any location and at any time. This flexibility is particularly important for adult learners who often balance educational pursuits with work responsibilities, family obligations, and other social commitments.

According to A.W. Tony Bates, digital learning environments enable learners to participate in education regardless of geographical location, thereby expanding access to educational opportunities for individuals who might otherwise be excluded from formal learning systems. Similarly, Michael G. Moore argues that distance education technologies significantly reduce the barriers associated with time and place, allowing learners to manage their learning schedules according to their personal circumstances.

Research conducted by the United Nations Educational, Scientific and Cultural Organization also highlights that digital learning platforms play a crucial role in promoting lifelong learning by enabling individuals to continuously update their knowledge and skills throughout their lives. For adult learners in Nigeria, the flexibility of e-learning platforms makes it easier to participate in literacy programmes, vocational training, and continuing education without disrupting their employment or family responsibilities.

Furthermore, studies by Otto Peters suggest that the flexibility provided by distance and online learning systems supports self-directed learning, which is a key characteristic of adult education. By allowing learners to control the pace and timing of their studies, e-learning platforms empower adults to take greater responsibility for their educational development.

2. Interactive and Collaborative Learning Environments

Another important impact of e-learning adoption is the creation of interactive and collaborative learning environments. Modern e-learning platforms incorporate a variety of digital tools such as discussion forums, virtual classrooms, video conferencing systems, online quizzes, and collaborative workspaces that enhance learner engagement and participation.

According to D. Randy Garrison and Terry Anderson, effective online learning environments are characterized by meaningful interaction between learners, instructors, and learning content. Their Community of Inquiry framework emphasizes that cognitive presence, social presence, and teaching presence are essential for successful online learning experiences.

Digital collaboration tools enable learners to share ideas, participate in group discussions, and work collectively on projects. Such interactions promote deeper understanding of course materials and encourage critical thinking. Research by Curtis J. Bonk indicates that interactive online environments can significantly enhance learner engagement and knowledge retention compared to passive learning methods.

Additionally, multimedia learning resources such as videos, simulations, and interactive presentations improve the quality of instructional delivery. Richard E. Mayer, a leading scholar in multimedia learning theory, argues that the integration of visual and auditory instructional materials enhances comprehension and improves learning outcomes by making complex information easier to understand.

In adult education programmes, interactive digital tools help create learner-centered environments where participants actively contribute to knowledge construction rather than passively receiving information.

3. Development of Digital Competencies

The adoption of e-learning platforms also contributes to the development of digital competencies among adult learners. Digital competence refers to the ability to use information and communication technologies effectively for communication, information management, problem-solving, and knowledge creation.

According to Paul Gilster, digital literacy has become an essential skill in modern societies where economic and social activities increasingly rely on digital technologies. Through participation in online learning environments, adult learners develop practical technological skills such as navigating learning management systems, participating in online discussions, managing digital files, and using collaborative tools.

Research by Mark Warschauer highlights that access to digital technologies and opportunities to use them for meaningful learning activities significantly enhance individuals' digital competencies. These skills are particularly important in the contemporary labour market, where digital proficiency is often required for employment and professional advancement.

Furthermore, the Organisation for Economic Co-operation and Development emphasizes that digital competence is a critical component of the modern knowledge economy. By engaging with e-learning platforms, adult learners acquire technological skills that improve their employability and enable them to participate more effectively in digital societies.

For adult learners in Nigeria, the acquisition of digital competencies through e-learning participation can also promote entrepreneurship, innovation, and access to global information networks.

4. Personalized Learning Experiences

E-learning platforms also facilitate personalized learning experiences, which can significantly improve learning outcomes. Personalized learning refers to instructional approaches that adapt to the individual needs, learning styles, pace, and preferences of learners.

According to Benjamin Bloom, individualized instruction can significantly improve learning performance because it allows learners to receive targeted support that addresses their specific learning challenges. Digital learning platforms often incorporate features such as adaptive learning systems, self-paced modules, and customized feedback that support personalized learning pathways.

Research by John Keller further suggests that personalized learning environments enhance learner motivation and engagement by allowing individuals to pursue learning activities that are relevant to their interests and goals.

Additionally, Diana Laurillard emphasizes that digital technologies enable educators to design flexible learning environments where learners can explore educational content in ways that best suit their learning preferences.

Through personalized learning systems, adult learners can revisit difficult concepts, access supplementary learning materials, and progress through courses at their own pace. This flexibility is particularly beneficial in adult education programmes where learners often have diverse educational backgrounds, experiences, and learning needs.

5. Improvement in Knowledge Retention and Skill Development

Another important impact of e-learning adoption is the improvement in knowledge retention and skill development. Digital learning environments allow learners to repeatedly access course materials, recorded lectures, and interactive exercises, which supports continuous practice and reinforcement of learning.

According to David A. Kolb, experiential learning processes that involve active engagement, reflection, and practical application significantly enhance knowledge retention and skill development. E-learning platforms often incorporate simulations, case studies, and practical exercises that enable learners to apply theoretical knowledge in real-world contexts.

Similarly, research by Donald A. Schön emphasizes that reflective learning experiences facilitated through digital discussion platforms encourage learners to critically evaluate their understanding and improve problem-solving skills.

In adult education programmes, these digital learning tools help learners acquire practical competencies that can be applied in professional and community settings.

6. Increased Participation and Lifelong Learning Opportunities

Finally, the adoption of e-learning platforms encourages greater participation in education and supports the concept of lifelong learning. Lifelong learning refers to the continuous acquisition of knowledge and skills throughout an individual's life.

The World Bank notes that digital learning technologies have expanded educational opportunities for individuals who previously lacked access to formal education systems. E-learning platforms enable adult learners to pursue additional qualifications, professional development courses, and vocational training programmes without the limitations of traditional classroom schedules.

Similarly, Malcolm Knowles, a leading scholar in adult learning theory, argues that adult learners are highly motivated when educational opportunities are relevant to their personal and professional development. E-learning platforms provide flexible pathways that align with these motivations, thereby encouraging continuous learning and skill acquisition.

For adult education programmes in Nigeria, the integration of e-learning platforms can significantly expand access to education, promote skill development, and enhance socio-economic empowerment.

Overall, the adoption of e-learning platforms has far-reaching implications for improving learning outcomes in adult education. By increasing

accessibility, promoting interactive learning environments, developing digital competencies, enabling personalized learning experiences, and supporting lifelong learning, e-learning platforms can transform adult education programmes and contribute to broader educational and socio-economic development in the post-COVID era.

Challenges Affecting E-Learning Effectiveness

Despite the benefits of e-learning, several challenges continue to affect its effectiveness in adult education programmes in Nigeria. These challenges are largely technological, institutional, and socio-economic.

Limited technological infrastructure: remains a major barrier. Effective e-learning depends on reliable electricity, internet connectivity, and access to digital devices. However, many communities—particularly rural areas—still experience unstable power supply and limited broadband coverage, which restricts learners' ability to access online educational platforms. The International Telecommunication Union and United Nations Educational, Scientific and Cultural Organization highlight that inadequate digital infrastructure continues to hinder the expansion of online education in many developing countries.

Low levels of digital literacy: among adult learners also affect the effective use of e-learning platforms. Many adults have limited experience using computers, smartphones, or learning management systems, making it difficult for them to fully participate in online learning activities. According to Paul Gilster, digital literacy is essential for effective participation in digital learning environments.

Inadequate funding for educational technology further limits the implementation of e-learning programmes. Many adult education institutions lack sufficient financial resources to invest in digital infrastructure, training, and online learning systems. The World Bank emphasizes that sustainable digital education initiatives require consistent investment in technology and capacity building.

Another major challenge is **poor internet connectivity in rural areas**. Many rural communities have limited access to high-speed internet, making it difficult for learners to attend virtual classes or access digital learning materials. According to the National Bureau of Statistics, disparities in internet access between urban and rural areas contribute significantly to the digital divide in Nigeria.

Additionally, **insufficient training for instructors** affects the quality of online instruction. Many educators were trained for traditional classroom teaching and may lack the necessary skills to effectively facilitate digital learning environments. Scholars such as D. Randy Garrison emphasize that instructors require training in online pedagogy and digital tools to effectively support e-learning.

Finally, **socio-economic inequalities** create disparities in access to digital education. Adult learners from disadvantaged backgrounds often cannot afford internet data, computers, or smartphones needed for online learning. As noted by Jan van Dijk, such inequalities contribute to the digital divide and limit participation in digital education.

Overall, addressing these challenges through improved infrastructure, digital literacy training, increased funding, and supportive policies is essential for enhancing the effectiveness of e-learning in adult education programmes in Nigeria.

Policy Implications and Recommendations

To improve the adoption and effectiveness of e-learning platforms in adult education programmes in post-COVID Nigeria, several policy measures are recommended:

1. **Investment in Digital Infrastructure:** Government and educational institutions should invest in broadband expansion, stable electricity supply, and digital learning facilities.
2. **Digital Literacy Training:** Adult learners and instructors should receive continuous

training to enhance their technological competencies.

3. **Affordable Internet Access:** Partnerships between government and telecommunications companies should aim to reduce the cost of internet data for educational purposes.
4. **Institutional Capacity Building:** Educational institutions should strengthen their e-learning systems by providing technical support, developing digital learning content, and adopting user-friendly platforms.
5. **Inclusive Education Policies:** Policies should focus on bridging the digital divide by ensuring that rural and disadvantaged communities have access to digital learning opportunities.

References

1. Adarkwah, M. A. (2021). *Online learning in higher education during COVID-19: Lessons learned from Ghana.*
2. Adedoyin, O. B., & Soykan, E. (2020). *Covid-19 pandemic and online learning: The challenges and opportunities.* Interactive Learning Environments.
3. Aderinoye, R. (2018). *Adult education and national development in Nigeria.*
4. Anderson, T. (2008). *The theory and practice of online learning.* Athabasca University Press.
5. Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives.* Longman.
6. Azeez, A., et al. (2021). *Digital divide and online learning challenges in Nigeria.*
7. Bassey, U. (2021). *Adoption of e-learning in Nigerian adult education: Institutional perspectives.*
8. Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university.* McGraw-Hill.
9. Bozkurt, A., & Sharma, R. C. (2020). *Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic.* Asian Journal of Distance Education.
10. Crawford, J., et al. (2020). *COVID-19: 20 countries' higher education intra-period digital pedagogy responses.* Journal of Applied Learning & Teaching.
11. Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology.* MIS Quarterly, 13(3), 319–340.
12. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). *User acceptance of computer technology: A comparison of two theoretical models.* Management Science, 35(8), 982–1003.
13. Dhawan, S. (2020). *Online learning: A panacea in the time of COVID-19 crisis.* Journal of Educational Technology Systems.
14. Garrison, D. R. (2017). *E-learning in the 21st century: A community of inquiry framework for research and practice.* Routledge.
15. Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between emergency remote teaching and online learning.* Educause Review.
16. King, W. R., & He, J. (2006). *A meta-analysis of the technology acceptance model.* Information & Management, 43(6), 740–755.
17. Knowles, M., Holton, E., & Swanson, R. (2015). *The adult learner: The definitive classic in adult education and human resource development.* Routledge.
18. Moore, M. G., & Kearsley, G. (2012). *Distance education: A systems view of online learning.* Cengage Learning.
19. Ogunode, C., & Musa, M. (2020). *Access and challenges of e-learning in Nigerian tertiary institutions.*
20. Olasile, O., & Emrah, A. (2021). *Digital literacy and adoption of e-learning in Nigeria.*
21. Onojah, T., et al. (2021). *Institutional challenges to e-learning adoption in Nigerian adult education programmes.*
22. Onyema, E. M., et al. (2020). *Impact of COVID-19 on education in Nigeria.* International Journal of Education Research Open.
23. Rogers, E. M. (2014). *Diffusion of innovations* (5th ed.). Free Press.

24. Selwyn, N. (2016). *Education and technology: Key issues and debates.* Bloomsbury Publishing.
25. Venkatesh, V., & Davis, F. D. (2000). *A theoretical extension of the technology acceptance model: Four longitudinal field studies.* Management Science, 46(2), 186–204.
26. World Bank. (2021). *Digital skills for work and life: Expanding opportunities through digital learning*