



DIGITAL LEARNING AND THE ATTAINMENT OF SUSTAINABLE DEVELOPMENT GOAL 4 (SDG-4) AMONG UNIVERSITY STUDENTS IN NIGERIA

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Abstract

The study examined digital learning and the attainment of sustainable development goal 4 (sdg-4) among university students in Nigeria. It was guided by three research questions and a hypothesis. A descriptive research design of survey type was used. The population of the study comprised 1,076 undergraduates in the Department of Educational Technology in Tai Solarin Federal University of Education for the 2024/2025 academic session. A total of 230 undergraduates of selected university were sample size of the study using purposive technique. Researcher developed questionnaire; titled: Attainment of Sustainable Development Goal 4 and Applicability of Digital Learning Questionnaire (ASDG4ADLQ) was used for data collection with 0.93 as reliability coefficient. Mean and standard deviation were used for analyzing research questions. Hypothesis was tested using PPMC. The findings of the study revealed that office lens, notability, dragon microphone, sound note, study-blue, google-drive, pinterest, coursera, google-dou and manzo were among digital learning tools needed for the attainment of sustainable development goal 4. Lifelong learning, inclusive education, research and innovation, learning outcomes., collaboration and communication, assessment and monitoring, sustainable development, teaching and learning and access to education were among the benefits of digital learning for the attainment of sustainable development goal 4. There was significant relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning. It was recommended that Governments should partner with the private sector in ensuring that the necessary infrastructures that will facilitate digital learning and attainment of sustainable development goal 4 are provided.

Keywords: Attainment, Sustainable Development Goal, Digital Learning

Introduction

The Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030 (United Nations, 2015). The Sustainable Development Goals (SDGs) are a set of 17 global goals established by the United Nations General Assembly in 2015 as part of the 2030 Agenda for Sustainable Development. The goals include no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice and strong institutions, and partnerships for the goals (United Nations, 2015). The SDGs are intended to be achieved by 2030 through the collective efforts of governments, civil society, the private sector, and individuals. Specifically, this study only focused on Goal 4 aims to ensure quality education.

Sustainable Development Goal (SDG) 4 is emphasizes that education should be of high quality, not just accessible. This includes focusing on learning outcomes and ensuring students are proficient in basic education and technology skills SDG 4 extends beyond formal schooling to include opportunities for adults to acquire new skills throughout their lives, such as technical, vocational, and digital skills. It specifically targets the elimination of gender disparities in all levels of education, recognizing that progress has been made but significant gaps remain, particularly at higher education levels and that a major component is to ensure young people and adults have the skills needed for decent jobs and entrepreneurship, which is crucial for sustainable development and breaking cycles of poverty (Ezepue et al., 2024). However, this study concerned on the attainment of quality education for students. Quality education as one of SDGs refers to the education that must go beyond access to classrooms and textbooks. It requires a holistic approach that equips learners with essential skills for life, work, and personal development (Ezepue et al., 2024). Quality education relates to the one that focuses on the whole student, the social,

emotional, mental, physical, and cognitive development of each student regardless of gender, race, ethnicity, socioeconomic status, or geographic location. Similarly, Jukes (2024) showed that the use of appropriate digital tool, such as mobile devices and e-learning platforms, can bring about and support quality education for lifelong learning and improve educational outcomes.

Nigeria's quality of education faces significant challenges, including underfunding, poor infrastructure, a shortage of trained teachers, and a large number of out-of-school children. While the government has made recent budget increases and some policy initiatives, the current situation is characterized by overcrowded classrooms, inadequate technology in teaching and learning, outdated curricula, and disparities, particularly for girls and in northern regions. Also, Nigeria is characterized by a significant gap between policy and practice. While Nigeria has legal frameworks like the 2018 Discrimination Against Persons with Disabilities (Prohibition) Act, which promotes inclusive education and rights, the system faces major challenges such as poor public awareness, inadequate funding, inaccessible infrastructure, and a lack of qualified teachers. Consequently, the implementation of inclusive education is very low, with most schools not operating in a truly inclusive setting and students with disabilities continuing to face stigma and exclusion. This can portrait Nigeria as a country that yet to attained SDGs goal 4.

Nigeria's recent education technology (EdTech) policies and context are characterized by a significant government push to integrate digital tools into all education levels, driven by the new National EdTech Strategy and the "Renewed Hope Agenda". National EdTech Strategy (Launched August 2025) is a primary, recent framework designed to provide a coordinated roadmap for integrating technology across the entire education system. Its core principles include inclusivity, multi-stakeholder collaboration, and long-term sustainability, aiming to ensure every child has access to technology-enabled learning opportunities. Digitalisation of public schools' initiatives which was launched in October 2025, this initiative involves the distribution of interactive smart

boards to public schools nationwide, moving away from traditional chalkboards to dynamic and interactive classrooms (Federal Ministry of Education, 2025).

Attaining Sustainable Development Goal 4 (SDG 4) in Nigeria requires some digital tools including office lens, notability, dragon microphone, mobile devices (smartphones, laptops, tablets) google-drive, pinterest. In most of Nigeria public schools, these tools seem not available leading to issues for the attainment of SDGs 4. These missing links have also prevented students from having or acquiring immense benefits towards quality education (Ezepue et al. (2024). Importantly, digital learning can support teaching and learning by enhancing access to education, improving the quality of education, and fostering lifelong learning. Digital or technology refers to the application of scientific knowledge, skills, and tools to create, design, develop, and innovative useful products, systems, and services that improve human life and solve real-world problems (Ezepue et al., 2024). Digital learning involves the use of machines, devices, software, and other tangible and intangible resources to facilitate the creation, storage, retrieval, and dissemination of information and knowledge. In today's digital age, digital learning has become an essential part of modern life, affecting various aspects of society, such as education, health care, business, and entertainment. According to UNESCO (2017), digital learning or educational technology refers to any technology that is used to support teaching, learning, assessment, or administration in education. Hence, the appropriate use of digital learning in education can improve the quality and relevance of education (Bates, 2023).

Digital learning or technology plays a crucial role in supporting the achievement of the SDG Four in Nigeria. Digital learning can help overcome geographic and logistical barriers to education, allowing students in remote or under-served areas to access high-quality educational resources. For example, online courses and digital learning platforms can provide students with access to educational content and resources from anywhere in the world (Miao & Mishra, 2019). Digital learning can provide new tools and resources that can improve the effectiveness of teaching and learning. For example, educational

software and apps can help students learn at their own pace and provide personalized feedback, while virtual and augmented reality can create immersive learning experiences that engage students in new ways (UNESCO, 2017). Digital learning can provide opportunities for teachers to develop new skills and stay up-to-date with the latest educational practices. Online courses, webinars, and other digital resources can help teachers stay connected with their peers and access new ideas and resources for their classrooms (Arroyo-Moreno, Hernández-Gómez, & de la Torre-Díez, 2021). Digital learning can play a key role in promoting sustainable development by helping students and teachers understand the complex interplay between environmental, social, and economic factors. For example, digital simulations and modelling tools can help students explore the impacts of human activity on the environment and develop strategies for mitigating these impacts (Hämäläinen & Puhakka, 2017).

By and large, the role of digital learning in supporting the achievement of the SDG 4 related to education is multifaceted and complex. However, by leveraging the power of digital learning to expand access to education, enhance teaching and learning, and support sustainable development, which help to ensure that all students have the opportunity to succeed and thrive in the 21st century. Digital learning can play a crucial role in supporting the achievement of the SDGs related to education (Abdullah & Ward, 2019). One way that digital learning can do this is by expanding access to education. Abdullah and Ward (2019) further note that digital learning can help overcome geographic and logistical barriers to education, allowing students in remote or under-served areas to access high-quality educational resources. Digital learning platforms and online courses, for example, can provide students with access to educational content and resources from anywhere in the world. In addition, digital learning can enhance teaching and learning by providing new tools and resources that improves the effectiveness of education (Jukes, 2024).

Digital learning can also foster sustainable development by helping students and teachers understand the complex interplay between environmental, social, and economic factors

(Jukes, 2024). Digital simulations and modelling tools, for example, can help students explore the impacts of human activity on the environment and develop strategies for mitigating these impacts. Furthermore, digital learning can improve assessment and monitoring of student learning outcomes as well as digital assessments and analytics tools can provide real-time feedback on student performance, enabling teachers to adjust their teaching strategies and provide targeted support (Bates, 2023). Digital technology can also enhance collaboration and communication between students, teachers, and other stakeholders, promote lifelong learning, support inclusive education and facilitate research and innovation in education.

The ideal situation for attaining quality education in Nigeria is a holistic, well-funded, and effectively managed system that focuses on quality inputs, processes, and outcomes to facilitate the all-round development of learners and society. Attaining quality education in Nigeria offers extensive benefits for individuals, society, and the nation as a whole, driving economic growth, promoting social well-being, and fostering sustainable development. However, the quality of education in Nigeria is currently in a state of crisis, characterized by inadequate funding, a high number of poor outputs of graduates, a shortage of qualified teachers, poor infrastructure, and inadequate usage of technology for instruction and have resulted in a significant decline in the quality of education, leading to poor student outcomes, high dropout rates, and an under-skilled workforce. Thus, this study was an assessment of sustainable development goal 4 (quality education) through digital learning among undergraduates. Based on this, the following objectives are raised: the main objective was to examined digital learning and the attainment of sustainable development goal 4 (SDG-4) among university students in Nigeria. Specifically, the study sought to:

- 1 . identify digital learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria;
- 2 . ascertain the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria;
- 3 . find out the relationship between the

attainment of sustainable development goal 4 (quality education) and applicability of digital learning.

The following research questions guided this study:

- 1 . What are the digital learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria?
- 2 . What are the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria?

The following null hypothesis was tested at 0.05 level of significance and when $p > 0.05$, the null hypothesis rejected or otherwise:

H₀1: There is no significant relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning.

Literature Review

This section provided related studies and the gaps that were filled.

Ezepue et al. (2024) examined the impact of educational management and technology on the achievement of Sustainable Development Goal (SDGs) four in the Nigerian educational system. The results showed that effective educational management practices and the use of appropriate technology are critical for achieving the SDGs. Specifically, the findings of the study revealed that effective educational management practices, such as strong leadership expectation and governance were essential for achieving. The study also identified best practices for educational management and technology integration that can contribute to the achievement of SDGs in the Nigerian educational system. Makinde et al. (2024) examined the transformative role of technology in education system and its potential to advance the Sustainable Development Goals (SDGs). The findings revealed that digital tools and online platforms significantly expand educational access, reduce disparities between well-resourced and under-resourced schools, and support lifelong learning through flexible, on-demand resources. Personalized learning technologies, which adapt content to individual student needs, are shown to enhance student engagement and improve learning outcomes. Additionally, interactive tools like virtual reality

(VR) and augmented reality (AR) are recognized for their effectiveness in simplifying complex concepts. Okechukwu and Adeime (2024) examined how digitalisation of secondary education can be managed for sustainable development in Imo State, Nigeria. The findings of the study revealed, among others, that digitalisation of secondary education, which brings about change in learners' behaviour that will drive sustainable development depends largely on the ways principals manage the available digital learning facilities and harness the teachers towards integrating technological devices in the teaching-learning process. Uche et al. (2023) examined the roles of Information Communication Technology in the achievement of Sustainable Development Goals in Nigeria. Findings showed that technologies are fundamental enabler of economic prosperity, recently identified among the main facilitators for the three pillars of sustainable development: social, economic and environmental are the principal enablers of the SDGs 2030. Onyam and Chukwu (2022) explored the impact of digital literacy on Sustainable Development in Nigeria. The paper revealed that the poor state of Nigeria's economy is a factor that is responsible for digital illiteracy in Nigeria; the state of infrastructures such as ICTs and digital literacy skills is a serious impediment to digital literacy in Nigeria; inadequate funding of libraries in Nigeria is affecting provision of ICTs and encouraging digital illiteracy, library services are very significant in digital literacy and sustainable development in Nigeria. Daniel (2021) explored the potentials of digital transformation for achieving the United Nations Sustainable Development Goals (SDGs), with emphasis on SDG 4 and SDG 9 in Nigeria. The results indicate that digital transformation potentially enhances the attainment of SDGs 4 and 9, but this is mediated by the level of stakeholder commitment and e-governance performance.

However, despite significant numbers of previous studies on digital learning and sustainable development goal 4 (SDG-4), some of these studies used only content analysis and none of the studies conducted in Tai Solarin Federal University of Education. These are the gaps this study filled by empirically examined digital learning and the attainment of sustainable

development goal 4 (SDG-4) among university students in Tai Solarin Federal University of Education. The study further ascertains the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) and the relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning as way towards contributing to the literature.

Research Methods

The study used descriptive research design of survey type. This design was considered very appropriate because the researchers intended to collect data from the selected respondents to provide answer to the study research questions. The population for this study comprised 1,076 undergraduates in the Department of Educational Technology for the 2024/2025 academic session. The sample size was 230 undergraduates of Educational Technology in Tai Solarin University of Education, Ijagun, Ogun State. This sample size was selected among 200, 300 and 400 levels using purposive technique. Only 100 level do not take part in the study because they are regarded as immature in university education. The study used researchers developed questionnaire; titled: Attainment of Sustainable Development Goal 4 and Applicability of Digital Learning Questionnaire (ASDG4ADLQ). The questionnaire (ASDG4ADLQ) requested responses on a four (4) - point scale format which was a modification of 5-point Likert scale. The responses rating scales are as follows: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The questionnaire divided into two sections A and B. Section A focused on demographic characteristics of the respondents, while section B embraced items relating to the digital learning tools needed for the attainment of sustainable development goal 4 (quality education); ascertain the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) and the likely challenges confronting the attainment of sustainable development goal 4 (quality education). The initial drafts of the instrument ASDG4ADLQ was subjected to face and contents validity by the experts from the department of Educational Technology. To ensure

the reliability of the instrument, a test-retest reliability of the instrument was carried out. The copies of the instrument were administered to a sample of 20 undergraduates of Test and Measurement Department. The purpose was to determine the stability and consistency of the instruments. Pearson Product Moment Correlation (PPMC) was used to determine the level of reliability coefficient and reliability coefficient was reported as 0.93. Data were

collected using the validated instrument. The researcher ensured that respondents are adequately briefed on the content and procedure for filling the questionnaire. Enough time was given to the respondents to respond to each item in the questionnaire. Mean and standard deviation were used for analyzing research questions 1 and 2. Hypothesis was tested using Pearson Product Moment Correlation (PPMC).

Results

Research Question 1: What are the digital learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria?

Table 1: Descriptive statistics on the digital learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria

Items	Mean	SD
Office lens	2.52	.902
Notability	2.71	.813
Dragon microphone	2.77	.895
Sound Note	2.56	.847
Study-Blue	2.98	.799
Google-Drive	2.54	.932
Pinterest	2.63	.902
Coursera	2.87	.842
Google-Dou	2.67	.888
Manzo	2.90	.894
Cluster Mean	2.72	

Source: Field Survey, 2025

Table 1 revealed that cluster mean was 2.72 which was also greater than the bench mark mean value 2.50. This implied that office lens, notability, dragon microphone, sound note, study-blue,

google-drive, pinterest, coursera, google-dou and manzo were among digital learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria.

Research Question 2: What are the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria?

Table 2: Descriptive statistics on the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria

Items	Mean	SD
Promoting lifelong learning.	2.89	.901
Supporting inclusive education.	2.90	.895
Facilitating research and innovation.	2.58	.933
Improving learning outcomes.	2.94	.906
Enhancing collaboration and communication.	2.72	.854
Improving assessment and monitoring.	2.68	.904
Fostering sustainable development.	2.54	.884
Enhancing teaching and learning.	3.02	.724
Expanding access to education.	3.18	.718
Cluster Mean	2.83	

Source: Field Survey, 2025

Table 2 showed that cluster mean was 2.83 which was also greater than the bench mark mean value 2.50. This implied that lifelong learning, inclusive education, research and innovation, learning outcomes., collaboration and communication, assessment and monitoring, sustainable

development, teaching and learning and access to education were among the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria. 3

H₀1: There is no significant relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning.

Table 3: Relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning

Variables	Mean	SD	df	r-value	p-value
Attainment of sustainable development goal 4	56.951	24.044			
Digital learning	24.893	15.933	228	.893	.002

Source: Field Survey, 2025

Table 3, showed that there was significant relationship between the independent variable and the dependent variable in the order of ($r = 0.893$, $p < .05$). On this premise, null hypothesis was rejected and the researcher concluded that there was significant relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning.

The purpose of this study was to examined digital learning and the attainment of sustainable development goal 4 (SDG-4) among university students in Nigeria. For that reason, this section provided discussion of findings.

The findings of the study showed that office lens, notability, dragon microphone, sound note, study-blue, google-drive, Pinterest, Coursera, google-dou and Manzo were among digital

learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria. These findings were in agreement with Ezepe et al. (2024) found that office lens, notability, dragon microphone mobile devices (smartphones, laptops, tablets) google-drive, pinterest were among digital learning tools for the attainment of sustainable development goal 4.

The findings of the study further indicated that lifelong learning, inclusive education, research and innovation, learning outcomes., collaboration and communication, assessment and monitoring, sustainable development, teaching and learning and access to education were among the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria. These findings were in consonant with Okechukwu and Adeime (2024) findings of the study revealed, among others, that digitalisation of secondary education, which brings about change in learners' behaviour that will drive sustainable development depends largely on the ways principals manage the available digital learning facilities and harness the teachers towards integrating technological devices in the teaching-learning process. Uche et al. (2023) found that ICT offers a range of fundamental and methodological contributions that empower sustainability through various tools and more generic models. These technologies are fundamental enabler of economic prosperity, recently identified among the main facilitators for the three pillars of sustainable development: social, economic and environmental are the principal enablers of the SDGs 2030. Meanwhile, some causes of low ICT applications in Nigeria School system are epileptic power supply, inadequate ICT facilities, inadequate manpower.

Finally, the findings of the study depicted that there was significant relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning. These findings were in agreement with Daniel (2021) results indicate that digital transformation potentially enhances the attainment of SDGs 4, but this is mediated by the level of stakeholder commitment and e-governance performance. Onyam and Chukwu (2022) revealed that the poor state of Nigeria's

economy is a factor that is responsible for digital illiteracy in Nigeria; the state of infrastructures such as ICTs and digital literacy skills is a serious impediment to digital literacy in Nigeria; inadequate funding of libraries in Nigeria is affecting provision of ICTs and encouraging digital illiteracy, library services are very significant in digital literacy and sustainable development in Nigeria. Inadequate access to computer and internet connectivity could undermine digital literacy and sustainable development in Nigeria.

Conclusion

Having assessed sustainable development goal 4 (quality education) through digital learning among undergraduates, the following conclusions were drawn based on the findings of the study that office lens, notability, dragon microphone, sound note, study-blue, google-drive, pinterest, coursera, google-dou and manzo were among digital learning tools needed for the attainment of sustainable development goal 4 (quality education) in Nigeria. Lifelong learning, inclusive education, research and innovation, learning outcomes., collaboration and communication, assessment and monitoring, sustainable development, teaching and learning and access to education were among the benefits of digital learning towards the attainment of sustainable development goal 4 (quality education) in Nigeria and that there was significant relationship between the attainment of sustainable development goal 4 (quality education) and applicability of digital learning.

Recommendations

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

1. Ogun State Ministry of Education should formulate policies that will guide digitalisation process, and also ensure that all the public universities are equipped with digital learning facilities.
2. Federal and State Governments in Nigeria should show seriousness in addressing the infrastructural problems impeding digital literacy and sustainable development in Nigeria.
3. Federal and State Governments in Nigeria should partner with the private sector in

ensuring that the necessary infrastructures that will facilitate digital learning and sustainable development are provided.

- 4 . The private sector should assist Universities libraries with ICT facilities that will enable them acquire ICT literacy skills and enhance digital learning for sustainable development in Nigeria.
- 5 . Part of the recommendation is the adoption of a multi-disciplinary approach to development-oriented digital transformation interventions for SDGs 4 in Nigeria, through a process of effective stakeholder engagement and transparent institutional signaling.

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