

ENHANCING HUMAN DEVELOPMENT THROUGH DIGITAL PEDAGOGIES AND SMART CLASSROOMS FOR EFFECTIVE LEARNING AND EDUCATIONAL MANAGEMENT IN THE UNIVERSITY OF NIGERIA, NSUKKA: UNDERGRADUATES' PERSPECTIVES

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Abstract

The study investigated undergraduates' perspectives on enhancing human development through digital pedagogies and smart classrooms for effective learning and educational management in the University of Nigeria, Nsukka. Five research questions guided the study. The study adopted a descriptive survey research design and was conducted at the University of Nigeria, Nsukka, Enugu State, Nigeria. The population comprised 32,480 undergraduate students during the 2025/2026 academic session. A sample size of 368 respondents was selected using a multistage sampling technique involving stratified and simple random sampling techniques. Data were collected using a researcher-developed instrument titled Digital Pedagogies and Smart Classrooms Questionnaire (DPSCQ). The instrument was face-validated by three experts from the Faculty of Education, University of Nigeria, Nsukka. Two of the experts were from the Department of Counselling and Human Development, while the third expert was from the Department of Continuing Education and Development Studies. The reliability of the instrument was established using the Cronbach Alpha reliability method, which yielded a reliability coefficient of 0.88. Mean and standard deviation were used for data analysis, while a criterion mean of 2.50 served as the decision rule for accepting or rejecting items. The findings revealed that digital pedagogies and smart classrooms contributed significantly to human development, effective learning, and educational management among undergraduates. The findings further revealed that inadequate internet connectivity, irregular power supply, inadequate digital infrastructure, and limited access to digital devices constituted major challenges affecting utilization. The study recommended among others that university management should provide adequate digital infrastructure, stable internet connectivity, and continuous digital capacity-building programmes for students and lecturers to enhance the effective utilization of digital pedagogies and smart classrooms.

Keywords: Human development, Digital Pedagogies, Smart Classrooms, Effective Learning, Educational Management

Introduction

Education occupies a strategic position in the development of individuals and societies because it provides the knowledge, skills, values, attitudes, and competencies required for personal growth, social transformation, economic productivity, and sustainable national development. In the contemporary digital era, the role of education has expanded beyond the traditional transmission of knowledge to include the development of learners who are innovative, technologically competent, adaptable, collaborative, and capable of functioning effectively within an increasingly interconnected global society. Consequently, educational institutions, particularly universities, are under growing pressure to adopt innovative approaches that enhance teaching, learning, research, and institutional management. The rapid advancement of digital technologies has created opportunities for

educational systems to redesign learning environments and administrative processes in ways that support human development and improve educational outcomes.

Human development has continued to attract global attention because of its significance in improving the quality of life and expanding opportunities for individuals to achieve their full potential. The United Nations Development Programme (UNDP, 2024) views human development as a process of enlarging people's choices and capabilities to enable them to live productive, healthy, knowledgeable, and fulfilling lives. Within the educational context, human development encompasses the acquisition of intellectual abilities, critical thinking skills, digital competencies, creativity, communication skills, leadership capacities, emotional intelligence, and problem-solving abilities necessary for active participation in society. Universities play a crucial role in this process because they serve as centres for knowledge creation, innovation, talent development, and human capital formation. The effectiveness of universities in achieving these goals increasingly depends on their capacity to integrate digital technologies into instructional and managerial practices.

The emergence of digital technologies has transformed educational systems across the world and has significantly altered the way knowledge is created, accessed, shared, and utilized. Educational institutions are increasingly adopting technology-enhanced learning approaches that support flexible, interactive, learner-centred, and collaborative learning experiences. These developments have led to the growing prominence of digital pedagogies as essential components of contemporary educational practice. Digital pedagogies involve the purposeful application of digital technologies, online resources, virtual learning environments, multimedia tools, learning management systems, mobile applications, artificial intelligence technologies, and other digital innovations to facilitate effective teaching and learning. According to Redecker (2017), digital pedagogies enable educators to create engaging learning experiences that foster collaboration, creativity, critical thinking, communication, and lifelong learning. The integration of digital pedagogies has therefore become an important strategy for preparing learners to thrive in digitally driven societies and economies.

Recent developments in educational technology have also contributed to the emergence of smart classrooms as innovative learning environments designed to support twenty-first-century education. Smart classrooms incorporate advanced technological infrastructure, including interactive whiteboards, internet-enabled devices, multimedia systems, digital learning platforms, cloud-based resources, virtual communication tools, and intelligent instructional technologies that facilitate interactive and personalized learning experiences. UNESCO (2023) noted that smart learning environments can enhance learners' engagement, improve access to educational resources, promote collaboration, and strengthen educational effectiveness when implemented appropriately. Smart classrooms represent a shift from traditional teacher-centred instructional models toward more learner-centred, participatory, and technology-driven approaches that encourage active knowledge construction and meaningful learning. The increasing relevance of digital pedagogies and smart classrooms is closely associated with the ongoing digital transformation occurring across educational systems worldwide. The Organisation for Economic Co-operation and Development (OECD, 2023) observed that digital transformation has become a defining feature of modern education because it enables institutions to improve educational delivery, administrative efficiency, and learner outcomes. Universities across Europe, North America, Asia, and Oceania have invested substantially in digital infrastructures and smart learning environments to enhance educational quality and institutional competitiveness. These investments reflect the recognition that digital technologies are no longer optional tools but essential components of effective educational systems.

The outbreak of the COVID-19 pandemic further accelerated the adoption of digital pedagogies and smart classroom technologies across the globe. The pandemic disrupted conventional face-to-face educational activities and compelled educational institutions to rely heavily on digital platforms to sustain teaching and learning; Crawford et al. (2020) reported that universities in different parts of the world rapidly transitioned to technology-supported learning systems in response to the educational challenges created by the pandemic. Similarly, Hodges, Moore, Lockee, Trust and Bond (2020) observed that emergency remote teaching highlighted both the importance and the limitations of digital technologies in education. The experiences gained during the pandemic demonstrated that technology-enhanced educational systems possess significant potential for ensuring educational continuity, improving accessibility, and supporting learner development during periods of disruption.

Importantly, empirical evidence from various parts of the world continues to demonstrate the contributions of digital pedagogies and smart classrooms to educational effectiveness and human development. Bond, Bedenlier, Marín and Händel (2021), in a comprehensive review of technology-enhanced learning studies, found that digital learning environments positively influenced students' engagement, motivation, participation, and academic performance. Martin, Sun and Westine (2020) similarly reported that online and technology-supported instructional practices contributed significantly to learners' achievement, collaboration, and satisfaction. Crompton and Burke (2023) further observed that digital technologies facilitate the development of higher-order thinking skills, creativity, innovation, communication competencies, and problem-solving abilities that are essential for personal and professional success in contemporary society. Further, the growing integration of artificial intelligence, learning analytics, adaptive learning systems, virtual reality, augmented reality, and cloud computing technologies into educational environments has further expanded the possibilities of digital pedagogies and smart classrooms. According to Holmes, Bialik and Fadel (2019), artificial intelligence technologies have the potential to personalize learning experiences, support learners' diverse needs, and improve educational decision-making. Likewise, Luckin (2018) argued that intelligent technologies can enhance learners' cognitive development and support educational institutions in achieving improved learning outcomes. These innovations demonstrate the evolving nature of digital pedagogies and their increasing importance in contemporary higher education.

In the African context, higher education institutions have increasingly embraced digital technologies to address challenges related to access, quality, equity, and relevance. The expansion of internet connectivity, mobile technologies, and digital learning platforms has created new opportunities for universities to enhance educational delivery and learner participation. Czerniewicz et al. (2020), in a study conducted in South Africa, found that digital learning environments played significant roles in sustaining learning activities and supporting student engagement during periods of educational disruption. Mpungose (2021) similarly reported that digital technologies improved access to educational resources and facilitated flexible learning opportunities among university students. However, the implementation of digital pedagogies and smart classrooms across many African countries continues to be constrained by inadequate technological infrastructure, unreliable internet services, limited funding, insufficient digital competencies, and persistent inequalities in access to technology.

Within Nigeria, digital transformation has become an important aspect of educational development, particularly within tertiary institutions. The Federal Republic of Nigeria (2013) emphasized the integration of information and communication technology into education as a means of improving educational quality and achieving national development objectives. Nigerian universities have increasingly adopted digital technologies to support teaching,

learning, research, and administrative functions. Following the COVID-19 pandemic, many institutions intensified efforts to utilize online learning platforms, virtual communication systems, digital libraries, electronic records management systems, and learning management systems to facilitate educational activities. Recent empirical studies in Nigeria provide evidence regarding the benefits of digital technologies in higher education. Owan, Ekpe and Ibor (2022) reported that digital learning technologies improved students' access to learning materials, enhanced classroom interaction, and strengthened learning experiences. Adarkwah (2021) observed that digital platforms facilitated learning continuity and improved students' academic engagement during educational disruptions. Similarly, Yusuf and Onasanya (2023) found that technology-supported instructional approaches contributed positively to students' digital literacy, academic participation, and independent learning capabilities. These findings suggest that digital pedagogies and smart classrooms possess considerable potential for enhancing learners' educational experiences and supporting human development within Nigerian universities.

Interestingly, apart from improving learning experiences, digital pedagogies and smart classrooms contribute significantly to educational management. Educational management encompasses the planning, organization, coordination, supervision, evaluation, and control of educational resources and activities for the achievement of institutional goals. Contemporary universities increasingly rely on digital technologies for student admissions, academic records management, communication, resource allocation, instructional supervision, quality assurance, monitoring, evaluation, and strategic decision-making. OECD (2023) emphasized that digital transformation enables educational institutions to improve efficiency, transparency, accountability, and responsiveness. Consequently, the adoption of smart technologies has implications not only for instructional effectiveness but also for the overall management and performance of educational institutions. The current situation in contemporary higher education indicates a gradual transition from traditional educational models toward digitally driven ecosystems characterized by technology-enhanced learning, data-informed decision-making, intelligent learning systems, and smart educational environments. Universities around the world are investing in digital infrastructures, artificial intelligence applications, virtual laboratories, learning analytics systems, cloud-based educational services, and smart classroom technologies to improve learning outcomes and institutional effectiveness. These developments suggest that digital pedagogies and smart classrooms have become central components of modern educational reform and innovation.

Notwithstanding the increasing body of literature on educational technology, several gaps remain evident. Existing international studies have largely focused on online learning effectiveness, technology acceptance, student engagement, academic achievement, and digital competence. African studies have concentrated mainly on technological access, infrastructure challenges, digital inequalities, and the impact of emergency remote teaching. In Nigeria, much of the available literature has examined technology adoption, information and communication technology utilization, digital literacy, and online learning experiences among students and lecturers. Comparatively fewer studies have investigated digital pedagogies and smart classrooms within the broader framework of human development and educational management. More importantly, there is limited evidence regarding how undergraduates perceive the contributions of digital pedagogies and smart classrooms to their intellectual growth, skill development, learning experiences, and the effectiveness of educational management within Nigerian universities.

Furthermore, available studies have predominantly focused on lecturers, administrators, institutional readiness, technological challenges, and technology adoption processes, with relatively less attention devoted to students' perspectives as direct beneficiaries of educational innovations. Understanding undergraduates' perspectives is

particularly important because students interact directly with digital pedagogies and smart classroom technologies and are therefore well positioned to provide valuable insights regarding their effectiveness, relevance, opportunities, and limitations. Such insights are essential for informing policy formulation, institutional planning, resource allocation, and continuous improvement in higher education. At the University of Nigeria, Nsukka, efforts have been made to integrate various digital technologies into teaching, learning, and educational administration. These efforts include the utilization of internet-based learning resources, online communication platforms, digital academic management systems, virtual learning environments, and technology-supported instructional practices. Nevertheless, questions remain regarding the extent to which these initiatives contribute to human development, effective learning, and educational management from the perspectives of undergraduates. Given the growing importance of digital transformation in higher education and the limited empirical evidence available within this context, there is a need for a focused investigation into undergraduates' perspectives on digital pedagogies and smart classrooms.

Therefore, it is against this backdrop that this study seeks to examine undergraduates' perspectives on enhancing human development through digital pedagogies and smart classrooms for effective learning and educational management at the University of Nigeria, Nsukka. The findings are expected to contribute to the growing body of knowledge on digital transformation in higher education and provide evidence-based insights for improving educational policies, practices, and management strategies aimed at promoting human development in Nigerian universities.

Statement of the Problem

The integration of digital pedagogies and smart classroom technologies has become an important strategy for enhancing human development, improving learning experiences, and strengthening educational management in higher education institutions. Universities are expected to provide technology-enabled learning environments that foster critical thinking, creativity, collaboration, digital literacy, problem-solving abilities, and other competencies required for effective participation in the contemporary knowledge society. Through the effective utilization of digital pedagogies and smart classrooms, undergraduates are expected to have improved access to learning resources, enhanced engagement in instructional activities, greater opportunities for independent learning, and increased acquisition of twenty-first-century skills. Similarly, educational management is expected to benefit from improved communication, efficient academic administration, effective monitoring of educational activities, and timely decision-making and better utilization of institutional resources. Ideally, the adoption of digital pedagogies and smart classrooms should create interactive, learner-centred, and technologically enriched educational environments that support both academic excellence and holistic human development. Undergraduates should be able to access digital learning resources with ease, participate actively in technology-supported instructional activities, collaborate effectively with peers and lecturers, and develop the competencies required for academic success and lifelong learning. Educational administrators should also be able to leverage digital technologies to improve the planning, coordination, supervision, and evaluation of academic programmes and institutional activities. Consequently, universities that effectively integrate digital pedagogies and smart classroom technologies are expected to experience improved learning outcomes, enhanced student development, and greater institutional effectiveness.

However, observations in many higher education institutions suggest that the realization of these expectations may not be fully achieved. Despite the increasing availability of digital technologies within university environments, concerns persist regarding the adequacy, accessibility, utilization, and effectiveness of digital pedagogies and smart classroom facilities. Issues such as inconsistent use of technology-supported instructional

approaches, inadequate digital infrastructure, limited access to smart classroom facilities, disparities in digital competence, unstable internet connectivity, and varying levels of students' engagement with digital learning resources may hinder the achievement of desired educational outcomes. These challenges have the potential to affect undergraduates' learning experiences, limit opportunities for skill acquisition and personal development, and reduce the effectiveness of educational management practices. Furthermore, while universities continue to invest resources in digital transformation initiatives, there appears to be insufficient evidence regarding how undergraduates perceive the contribution of digital pedagogies and smart classrooms to their human development, learning experiences, and the effectiveness of educational management. Since undergraduates constitute the primary beneficiaries of educational innovations, their perspectives are essential for assessing whether digital pedagogies and smart classroom technologies are achieving their intended objectives. Without adequate understanding of students' experiences and perceptions, efforts aimed at improving technology-enhanced learning and educational management may not adequately address existing needs and challenges.

Therefore, the problem of this study, therefore, is the lack of sufficient empirical evidence on undergraduates' perspectives regarding the extent to which digital pedagogies and smart classrooms contribute to human development, effective learning, and educational management at the University of Nigeria, Nsukka. This situation creates uncertainty about the effectiveness of existing digital educational practices and highlights the need for an investigation capable of providing evidence-based insights for improving technology-enhanced teaching, learning, and educational management within the university.

Purpose of the Study

The purpose of this study was to examine undergraduates' perspectives on enhancing human development through digital pedagogies and smart classrooms for effective learning and educational management at the University of Nigeria, Nsukka. Specifically, the study sought to:

1. determine undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to human development at the University of Nigeria, Nsukka;
2. ascertain undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to effective learning at the University of Nigeria, Nsukka;
3. examine undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to educational management at the University of Nigeria, Nsukka;
4. identify the challenges affecting the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka; and
5. determine strategies for improving the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka.

Research Questions

The following research questions guided the study:

1. What are undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to human development at the University of Nigeria, Nsukka?
2. What are undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to effective learning at the University of Nigeria, Nsukka?
3. What are undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to educational management at the University of Nigeria, Nsukka?
4. What challenges affect the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka?

5. What strategies can improve the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka?

Methods

The study adopted a descriptive survey research design. The study was carried out at the University of Nigeria, Nsukka, Enugu State, Nigeria. The University of Nigeria, Nsukka is one of the foremost federal universities in Nigeria and consists of several faculties and departments with a large undergraduate student population. The institution has continued to integrate digital technologies into teaching, learning, and educational management through the use of digital learning resources, online platforms, and technology-supported instructional practices. The population of the study comprised all undergraduate students of the University of Nigeria, Nsukka during the 2025/2026 academic session. The population was estimated at 32,480 undergraduate students obtained from the Academic Planning Unit of the University. A sample size of 368 undergraduates was used for the study. The sample size was determined using the sample size determination table developed by Krejcie and Morgan (1970). A multistage sampling technique involving stratified and simple random sampling techniques was employed in selecting the respondents. First, faculties were stratified, after which respondents were proportionately selected from the various faculties through simple random sampling. The instrument used for data collection was a researcher-developed questionnaire titled Digital Pedagogies and Smart Classrooms Questionnaire (DPSCQ). The instrument consisted of two sections. Section A sought information on the respondents' demographic characteristics, while Section B contained 50 items structured on a four-point rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The items were designed to elicit information on the contribution of digital pedagogies and smart classrooms to human development, effective learning, educational management, challenges affecting utilization, and strategies for improvement.

The instrument was face-validated by three experts from the Faculty of Education, University of Nigeria, Nsukka. Two of the experts were from the Department of Counselling and Human Development, while the third expert was from the Department of Continuing Education and Development Studies. Their comments, observations, and suggestions guided the modification of the instrument before the final administration. The reliability of the instrument was established through a pilot study involving 30 undergraduate students from a university outside the study area but with similar characteristics to the respondents. The data obtained were analyzed using the Cronbach Alpha reliability method, which yielded an overall reliability coefficient of 0.88, indicating that the instrument was reliable for the study. The researchers administered the instrument directly to the respondents with the assistance of two trained research assistants. Out of the 368 copies of the questionnaire distributed, all were properly completed and retrieved, representing a return rate of 100 percent. Data collected were analyzed using mean and standard deviation to answer the research questions. Mean was used to determine the respondents' ratings, while standard deviation was used to ascertain the extent of variation in their responses. The decision rule was based on the real limits of numbers as follows: 3.50–4.00 = Strongly Agree (SA); 2.50–3.49 = Agree (A); 1.50–2.49 = Disagree (D); and 1.00–1.49 = Strongly Disagree (SD). Any item with a mean score of 2.50 and above was regarded as agreed, while any item with a mean score below 2.50 was regarded as disagreed.

Results

Research Question One: What are undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to human development at the University of Nigeria, Nsukka?

Table 1: Mean Ratings of Undergraduates on the Contribution of Digital Pedagogies and Smart Classrooms to Human Development at the University of Nigeria, Nsukka

S/N	Item Statement	$\bar{X}$	SD	Decision
1	Digital pedagogies and smart classrooms enhance digital literacy among undergraduates.	3.52	0.71	A
2	Digital pedagogies and smart classrooms improve critical thinking skills among undergraduates.	3.47	0.76	A
3	Digital pedagogies and smart classrooms promote creativity and innovation among undergraduates.	3.43	0.79	A
4	Digital pedagogies and smart classrooms enhance problem-solving skills among undergraduates.	3.38	0.82	A
5	Digital pedagogies and smart classrooms improve communication skills among undergraduates.	3.45	0.75	A
6	Digital pedagogies and smart classrooms encourage self-directed learning among undergraduates.	3.50	0.73	A
7	Digital pedagogies and smart classrooms improve adaptability to technological changes.	3.41	0.80	A
8	Digital pedagogies and smart classrooms promote lifelong learning competencies among undergraduates.	3.46	0.77	A
9	Digital pedagogies and smart classrooms enhance access to information and knowledge resources.	3.58	0.69	A
10	Digital pedagogies and smart classrooms support intellectual growth among undergraduates.	3.49	0.74	A
Grand Mean ($\bar{X}_g$)		3.47	0.76	A

Key: $\bar{X}$ = Mean; SD = Standard Deviation; $\bar{X}_g$ = Grand Mean; A = Agree.

The data presented in Table 1 revealed that the respondents agreed that digital pedagogies and smart classrooms contribute to human development at the University of Nigeria, Nsukka. This is evident from the item mean ratings which ranged from $\bar{X} = 3.38$ to $\bar{X} = 3.58$, all exceeding the criterion mean of $\bar{X}_c = 2.50$. The overall grand mean of $\bar{X}_g = 3.47$ with a standard deviation of $SD = 0.76$ indicates that the respondents generally agreed that digital pedagogies and smart classrooms enhance digital literacy, critical thinking, creativity, problem-solving skills, communication skills, self-directed learning, adaptability, lifelong learning competencies, access to information, and intellectual growth among undergraduates. The relatively low standard deviations further suggest a high level of consensus among the respondents.

Research Question Two: What are undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to effective learning at the University of Nigeria, Nsukka?

Table 2: Mean Ratings of Undergraduates on the Contribution of Digital Pedagogies and Smart Classrooms to Effective Learning at the University of Nigeria, Nsukka

S/N	Item Statement	$\bar{X}$	SD	Decision
11	Digital pedagogies and smart classrooms enhance students' active participation during learning activities.	3.54	0.70	A
12	Digital pedagogies and smart classrooms improve students' understanding of course contents.	3.48	0.75	A
13	Digital pedagogies and smart classrooms facilitate collaborative learning among students.	3.44	0.78	A
14	Digital pedagogies and smart classrooms improve students' academic engagement.	3.50	0.73	A

15	Digital pedagogies and smart classrooms promote interactive learning experiences.	3.57	0.68	A
16	Digital pedagogies and smart classrooms enhance access to diverse learning materials.	3.60	0.66	A
17	Digital pedagogies and smart classrooms improve students' motivation to learn.	3.41	0.80	A
18	Digital pedagogies and smart classrooms facilitate flexible learning opportunities.	3.55	0.71	A
19	Digital pedagogies and smart classrooms improve knowledge retention among students.	3.39	0.82	A
20	Digital pedagogies and smart classrooms enhance overall learning effectiveness.	3.53	0.72	A
Grand Mean ($\bar{X}_g$)		3.50	0.74	A

Key: $\bar{X}$ = Mean; SD = Standard Deviation; $\bar{X}_g$ = Grand Mean; A = Agree.

The data presented in Table 2 revealed that the respondents agreed that digital pedagogies and smart classrooms contribute to effective learning at the University of Nigeria, Nsukka. This is evidenced by the item mean ratings which ranged from $\bar{X} = 3.39$ to $\bar{X} = 3.60$, all exceeding the criterion mean of $\bar{X}_c = 2.50$. The grand mean of $\bar{X}_g = 3.50$ and standard deviation of $SD = 0.74$ indicate overall agreement among the respondents that digital pedagogies and smart classrooms enhance effective learning. Specifically, the respondents agreed that digital pedagogies and smart classrooms promote active participation, improve understanding of course contents, facilitate collaborative and interactive learning, enhance academic engagement, provide access to diverse learning resources, increase learning motivation, support flexible learning opportunities, improve knowledge retention, and enhance overall learning effectiveness. The relatively small standard deviations indicate that the respondents shared similar views regarding the contribution of digital pedagogies and smart classrooms to effective learning.

Research Question Three: What are undergraduates' perspectives on the contribution of digital pedagogies and smart classrooms to educational management at the University of Nigeria, Nsukka?

Table 3: Mean Ratings of Undergraduates on the Contribution of Digital Pedagogies and Smart Classrooms to Educational Management at the University of Nigeria, Nsukka

S/N	Item Statement	$\bar{X}$	SD	Decision
21	Digital pedagogies and smart classrooms facilitate effective communication between students and lecturers.	3.51	0.72	A
22	Digital pedagogies and smart classrooms improve access to academic information and institutional updates.	3.56	0.68	A
23	Digital pedagogies and smart classrooms support effective management of teaching and learning activities.	3.48	0.75	A
24	Digital pedagogies and smart classrooms facilitate timely dissemination of academic information.	3.53	0.71	A
25	Digital pedagogies and smart classrooms enhance monitoring of students' academic progress.	3.42	0.79	A
26	Digital pedagogies and smart classrooms improve coordination of academic programmes and activities.	3.46	0.76	A
27	Digital pedagogies and smart classrooms promote transparency in academic administration.	3.37	0.83	A
28	Digital pedagogies and smart classrooms facilitate efficient	3.49	0.74	A

	management of students' academic records.			
29	Digital pedagogies and smart classrooms support effective decision-making in educational administration.	3.40	0.81	A
30	Digital pedagogies and smart classrooms enhance the overall effectiveness of educational management.	3.54	0.70	A
Grand Mean ($\bar{X}_g$)		3.48	0.75	A

Key: $\bar{X}$ = Mean; SD = Standard Deviation; $\bar{X}_g$ = Grand Mean; A = Agree.

The data presented in Table 3 revealed that the respondents agreed that digital pedagogies and smart classrooms contribute to educational management at the University of Nigeria, Nsukka. This is evident from the item mean ratings, which ranged from $\bar{X} = 3.37$ to $\bar{X} = 3.56$, all above the criterion mean of $\bar{X}_c = 2.50$. The grand mean of $\bar{X}_g = 3.48$ with a standard deviation of $SD = 0.75$ indicates overall agreement among the respondents. Specifically, the respondents agreed that digital pedagogies and smart classrooms facilitate effective communication, improve access to academic information, support the management of teaching and learning activities, enhance monitoring of students' academic progress, improve coordination of academic programmes, promote transparency in academic administration, facilitate management of academic records, support decision-making processes, and enhance the overall effectiveness of educational management. The low standard deviation values indicate a high degree of consistency in the respondents' ratings.

Research Question Four: What challenges affect the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka?

Table 4: Mean Ratings of Undergraduates on the Challenges Affecting the Utilization of Digital Pedagogies and Smart Classrooms at the University of Nigeria, Nsukka

S/N	Item Statement	$\bar{X}$	SD	Decision
31	Inadequate internet connectivity affects the utilization of digital pedagogies and smart classrooms.	3.62	0.65	A
32	Irregular power supply affects the utilization of digital pedagogies and smart classrooms.	3.71	0.58	A
33	Inadequate digital infrastructure affects the utilization of digital pedagogies and smart classrooms.	3.55	0.69	A
34	Limited access to digital devices affects the utilization of digital pedagogies and smart classrooms.	3.43	0.77	A
35	Inadequate technical support services affect the utilization of digital pedagogies and smart classrooms.	3.49	0.74	A
36	Insufficient digital competencies among users affect the utilization of digital pedagogies and smart classrooms.	3.38	0.81	A
37	High cost of internet data affects the utilization of digital pedagogies and smart classrooms.	3.67	0.61	A
38	Inadequate funding affects the utilization of digital pedagogies and smart classrooms.	3.58	0.68	A
39	Poor maintenance of digital facilities affects the utilization of digital pedagogies and smart classrooms.	3.46	0.76	A
40	Limited availability of smart classroom facilities affects the utilization of digital pedagogies and smart classrooms.	3.52	0.72	A
Grand Mean ($\bar{X}_g$)		3.54	0.70	A

Key: $\bar{X}$ = Mean; SD = Standard Deviation; $\bar{X}_g$ = Grand Mean; A = Agree.

The data presented in Table 4 revealed that the respondents agreed that several challenges affect the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka. This is evidenced by the item mean ratings ranging from $\bar{X} = 3.38$ to $\bar{X} =$

3.71, all exceeding the criterion mean of $\bar{X}_c = 2.50$. The grand mean of $\bar{X}_g = 3.54$ and standard deviation of $SD = 0.70$ indicate overall agreement among the respondents regarding the existence of these challenges. Specifically, the respondents agreed that inadequate internet connectivity, irregular power supply, inadequate digital infrastructure, limited access to digital devices, inadequate technical support services, insufficient digital competencies, high cost of internet data, inadequate funding, poor maintenance of digital facilities, and limited availability of smart classroom facilities constitute major challenges affecting the effective utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka. The relatively low standard deviation values suggest a high level of consensus among the respondents.

Research Question Five: What strategies can improve the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka?

Table 5: Mean Ratings of Undergraduates on the Strategies for Improving the Utilization of Digital Pedagogies and Smart Classrooms at the University of Nigeria, Nsukka

S/N	Item Statement	$\bar{X}$	SD	Decision
41	Provision of reliable internet services can improve the utilization of digital pedagogies and smart classrooms.	3.73	0.57	A
42	Provision of stable power supply can improve the utilization of digital pedagogies and smart classrooms.	3.78	0.53	A
43	Regular upgrading of digital infrastructure can improve the utilization of digital pedagogies and smart classrooms.	3.64	0.64	A
44	Increased access to digital devices can improve the utilization of digital pedagogies and smart classrooms.	3.56	0.71	A
45	Provision of adequate technical support services can improve the utilization of digital pedagogies and smart classrooms.	3.60	0.68	A
46	Regular digital literacy training for students can improve the utilization of digital pedagogies and smart classrooms.	3.52	0.74	A
47	Regular capacity-building programmes for lecturers can improve the utilization of digital pedagogies and smart classrooms.	3.58	0.69	A
48	Increased funding for educational technology can improve the utilization of digital pedagogies and smart classrooms.	3.67	0.62	A
49	Proper maintenance of digital facilities can improve the utilization of digital pedagogies and smart classrooms.	3.61	0.66	A
50	Expansion of smart classroom facilities across faculties can improve the utilization of digital pedagogies and smart classrooms.	3.69	0.60	A
Grand Mean ($\bar{X}_g$)		3.64	0.64	A

Key: $\bar{X}$ = Mean; SD = Standard Deviation; $\bar{X}_g$ = Grand Mean; A = Agree.

The data presented in Table 5 revealed that the respondents agreed that several strategies can improve the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka. This is evident from the item mean ratings, which ranged from $\bar{X} = 3.52$ to $\bar{X} = 3.78$, all exceeding the criterion mean of $\bar{X}_c = 2.50$. The grand mean of $\bar{X}_g = 3.64$ with a standard deviation of $SD = 0.64$ indicates overall agreement among the respondents on the identified strategies. Specifically, the respondents agreed that the provision of reliable internet services, stable power supply, regular upgrading of digital infrastructure, increased access to digital devices, adequate technical support services, digital literacy training for students, capacity-building programmes for lecturers, increased funding

for educational technology, proper maintenance of digital facilities, and expansion of smart classroom facilities across faculties can significantly improve the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka. The relatively low standard deviation values indicate a high degree of uniformity in the respondents' views regarding the strategies for improvement.

Discussion

The findings of the study revealed that undergraduates agreed that digital pedagogies and smart classrooms contribute significantly to human development at the University of Nigeria, Nsukka. The respondents acknowledged that digital pedagogies and smart classrooms enhance digital literacy, critical thinking, creativity, problem-solving abilities, communication skills, self-directed learning, adaptability, lifelong learning competencies, access to information, and intellectual growth. This finding underscores the growing role of technology-enhanced learning environments in developing the knowledge, skills, and competencies required for effective participation in the digital society. The finding is consistent with the position of the United Nations Development Programme (2024), which emphasized that human development involves expanding individuals' capabilities and opportunities to achieve their full potential. The finding also supports the assertion that digital technologies promote intellectual growth and foster competencies necessary for lifelong learning and sustainable development. Similarly, Crompton and Burke (2023) reported that emerging digital technologies in higher education contribute to the development of higher-order thinking skills, creativity, innovation, and problem-solving abilities among learners. The finding further aligns with Holmes, Bialik and Fadel (2019), who maintained that technology-enhanced educational environments support learners' cognitive development and acquisition of future-ready competencies.

The study further revealed that digital pedagogies and smart classrooms contribute positively to effective learning at the University of Nigeria, Nsukka. The respondents agreed that digital pedagogies and smart classrooms enhance active participation, improve understanding of course contents, facilitate collaborative learning, increase academic engagement, promote interactive learning experiences, improve access to learning resources, support flexible learning opportunities, enhance motivation, improve knowledge retention, and strengthen overall learning effectiveness. This finding suggests that technology-enhanced instructional approaches provide learners with opportunities to engage actively in the learning process and access educational resources beyond the conventional classroom setting. The finding corroborates the report of Bond, Bedenlier, Marín and Händel (2021), who found that technology-enhanced learning environments positively influence students' behavioural, emotional, and cognitive engagement. The finding also agrees with Martin, Sun and Westine (2020), who reported that digital instructional practices enhance learners' participation, collaboration, satisfaction, and academic achievement. Similarly, Owan, Ekpe and Ibor (2022) found that digital learning technologies improved students' learning experiences and access to academic resources in higher education institutions. The finding further supports the position of UNESCO (2023), which emphasized that technology can improve educational quality, learner engagement, and access to educational opportunities when effectively integrated into teaching and learning processes. Consequently, the result demonstrates that digital pedagogies and smart classrooms are valuable tools for enhancing learning effectiveness in higher education.

The findings also showed that digital pedagogies and smart classrooms contribute positively to educational management at the University of Nigeria, Nsukka. The respondents agreed that digital technologies facilitate communication between students and lecturers, improve access to academic information, support the management of teaching and learning

activities, enhance monitoring of students' academic progress, improve coordination of academic programmes, promote transparency in administration, facilitate records management, support decision-making, and enhance overall educational management effectiveness. This finding highlights the importance of digital transformation in improving administrative efficiency and institutional effectiveness within higher education. The finding is in line with the Organisation for Economic Co-operation and Development (2023), which noted that digital technologies improve organizational efficiency, transparency, accountability, and service delivery in educational institutions. The finding also supports the provisions of the Federal Republic of Nigeria (2013), which recognized information and communication technology as a critical instrument for improving educational administration and management. Furthermore, the finding aligns with UNESCO (2023), which emphasized that digital technologies can strengthen educational systems through improved communication, information management, and institutional coordination. The implication is that digital pedagogies and smart classrooms not only enhance instructional delivery but also contribute significantly to effective educational management.

The study further revealed that several challenges affect the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka. The respondents identified inadequate internet connectivity, irregular power supply, inadequate digital infrastructure, limited access to digital devices, insufficient technical support services, inadequate digital competencies, high cost of internet data, inadequate funding, poor maintenance of facilities, and limited availability of smart classroom facilities as major constraints. This finding suggests that despite the recognized benefits of digital pedagogies and smart classrooms, significant barriers continue to hinder their effective utilization within higher education institutions. The finding is consistent with Czerniewicz et al. (2020), who reported that technological inequalities, inadequate infrastructure, and unequal access to digital resources remain major challenges confronting technology-enhanced learning in many educational institutions. The finding also agrees with Mpungose (2021), who identified infrastructural limitations, digital skill deficiencies, and technological access challenges as obstacles to effective digital learning in African universities. Similarly, Hodges, Moore, Lockee, Trust and Bond (2020) noted that the rapid adoption of digital technologies during educational disruptions exposed significant infrastructural and technological challenges affecting effective implementation. The finding therefore indicates that the successful utilization of digital pedagogies and smart classrooms requires substantial investment in technological infrastructure, digital resources, and institutional support systems.

The study additionally revealed that several strategies can improve the utilization of digital pedagogies and smart classrooms at the University of Nigeria, Nsukka. The respondents agreed that reliable internet services, stable power supply, regular upgrading of digital infrastructure, increased access to digital devices, adequate technical support services, digital literacy training for students, capacity-building programmes for lecturers, increased funding, proper maintenance of facilities, and expansion of smart classroom facilities are necessary for improving utilization. This finding suggests that addressing infrastructural, technical, financial, and capacity-related challenges is essential for maximizing the benefits of digital pedagogies and smart classrooms. The finding supports the recommendations of UNESCO (2023), which emphasized the need for adequate infrastructure, institutional support, digital skills development, and equitable access to technology for successful digital transformation in education. The finding also aligns with OECD (2023), which advocated sustained investment in digital ecosystems, technological infrastructure, and human capacity development to improve educational effectiveness. Furthermore, Redecker (2017) emphasized the importance of developing digital competencies among both educators and learners to enhance the successful integration of digital technologies into educational

practices. Therefore, the implementation of these strategies may significantly improve the utilization of digital pedagogies and smart classrooms and strengthen their contribution to human development, effective learning, and educational management within higher education institutions. Generally, the findings of this study demonstrate that digital pedagogies and smart classrooms possess considerable potential for promoting human development, enhancing learning effectiveness, and improving educational management at the University of Nigeria, Nsukka. However, the realization of these benefits depends largely on the availability of adequate infrastructure, supportive policies, sustainable funding, technical support services, and continuous capacity development for users. Addressing the identified challenges and implementing the suggested improvement strategies would enhance the effectiveness of digital pedagogies and smart classrooms and contribute meaningfully to the digital transformation of higher education in Nigeria.

Educational Implications of the Study

The findings of this study have important implications for higher education institutions. The positive contributions of digital pedagogies and smart classrooms to human development, effective learning, and educational management suggest the need for universities to strengthen technology-enhanced teaching and learning practices. The identified challenges indicate that adequate infrastructure, stable internet services, reliable power supply, and digital competence development are essential for maximizing the benefits of digital transformation in higher education. The findings also highlight the importance of sustained investment in smart classroom facilities and digital technologies to improve educational quality and institutional effectiveness.

Conclusion

Based on the findings of the study, it was concluded that digital pedagogies and smart classrooms contribute significantly to human development, effective learning, and educational management at the University of Nigeria, Nsukka. The study further concluded that although several challenges hinder the effective utilization of digital pedagogies and smart classrooms, appropriate strategies such as improved infrastructure, stable internet connectivity, regular capacity development, adequate funding, and effective maintenance of digital facilities can enhance their utilization and effectiveness. Therefore, digital pedagogies and smart classrooms remain valuable tools for promoting quality education and improving educational management in higher education institutions.

Recommendations

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

1. The University management should provide reliable internet connectivity to enhance the effective utilization of digital pedagogies and smart classrooms by undergraduates and lecturers.
2. The University management and relevant stakeholders should ensure the provision of stable power supply to support uninterrupted use of digital technologies for teaching, learning, and educational management.
3. sStudents and lecturers should be provided with regular digital literacy and capacity-building programmes to enhance their competencies in the utilization of digital pedagogies and smart classroom technologies.
4. The University management should establish effective technical support and maintenance systems to ensure the sustainability and optimal functioning of digital facilities and smart classrooms.

5. Government and educational stakeholders should provide adequate funding and policy support for the expansion and effective integration of digital pedagogies and smart classrooms in higher education institutions.

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