

INSTITUTIONAL SUPPORT, TEACHER PREPAREDNESS, AND UTILIZATION OF SMART CLASSROOM TECHNOLOGIES IN PUBLIC UNIVERSITIES IN RIVERS STATE, NIGERIA

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Abstract

The study investigated institutional support, teacher preparedness, and utilization of smart classroom technologies in public universities in Rivers State, Nigeria. Two (2) research questions and two (2) corresponding hypotheses guided the study. The study adopted a correlational research design. The population of the study comprised 5,200 academic staff from public universities in Rivers State, while a sample size of 371 respondents was selected through the stratified random sampling technique. Data were collected using a structured questionnaire titled Institutional Support, Teacher Preparedness and Smart Classroom Technology Utilization Questionnaire (ISTPSCUQ). The instrument was validated by experts in educational management and measurement and evaluation. The Cronbach Alpha reliability method was used to determine the reliability of the instrument, yielding a reliability index of 0.85, which indicated high internal consistency. Data collected were analyzed using Pearson Product Moment Correlation (PPMC). The findings revealed that institutional support significantly relates to the utilization of smart classroom technologies in public universities. The study further showed that teacher preparedness significantly relates to the effective utilization of smart classroom technologies among lecturers. The study recommended increased provision of digital infrastructure, regular ICT training programmes, improved institutional technological support systems, enhanced internet connectivity, periodic professional development programmes, and sustainable funding for smart classroom technologies. The study concluded that institutional support and teacher preparedness are critical determinants of the effective utilization of smart classroom technologies in public universities in Rivers State, Nigeria.

Keywords: Institutional support, teacher preparedness, smart classroom technologies, digital instructional practices, technology utilization

Introduction

The contemporary university system is experiencing a noticeable transformation driven by the expanding influence of digital technology on teaching, learning, research, and academic communication. Across the world, higher education institutions are gradually redefining classroom practices through the integration of smart classroom technologies that support flexible, interactive, and student-focused learning experiences. Traditional lecture-driven instructional methods, once considered sufficient for university education, are increasingly giving way to technology-enhanced learning environments where digital tools facilitate collaboration, critical inquiry, real-time interaction, and access to global academic resources. This transition has altered not only the methods through which knowledge is delivered, but also the expectations placed on universities and academic staff within the twenty-first-century learning environment. As observed by Bond et al. (2021), the increasing dependence on digital instructional systems has reshaped the nature of classroom participation and instructional communication across higher education institutions globally. Similarly, Afolabi, Olatunji, and Adeyemi (2023) noted that universities in Nigeria are gradually embracing technology-supported instructional

systems in response to global educational realities and the growing demand for digital learning competencies.

Smart classroom technologies have emerged as one of the defining features of modern higher education systems. These technologies include interactive smart boards, learning management systems, multimedia instructional devices, artificial intelligence-supported teaching applications, cloud-based collaborative platforms, virtual learning environments, digital assessment systems, and video conferencing tools designed to enrich instructional delivery and improve students' academic engagement. Their relevance within universities continues to grow because they create opportunities for blended learning, virtual collaboration, personalized instruction, and improved access to educational content beyond the limitations of the conventional classroom. Hence, Howard et al. (2021) stated that, smart instructional technologies support interactive learning environments that encourage active participation, collaborative learning, and flexible academic engagement among students. Edeh, Ezeh and Ugwuanyi (2022) explained that the increasing introduction of e-learning systems and multimedia instructional facilities in public universities reflects the growing recognition of digital technologies as important tools for improving teaching effectiveness and learning outcomes.

The global expansion of educational technologies has been accelerated by technological innovation, globalization, and changing patterns of knowledge production. Universities in countries such as the United States, China, the United Kingdom, Canada, Australia, and Singapore have invested substantially in smart learning environments aimed at strengthening teaching effectiveness and institutional competitiveness. In many of these institutions, lecturers now rely on digital presentation systems, virtual laboratories, online discussion platforms, and artificial intelligence-driven instructional applications to improve classroom communication and students' learning experiences. Rapanta et al. (2020) argued that the COVID-19 pandemic further revealed the strategic importance of digital preparedness within universities, particularly as institutions with stronger technological infrastructure adjusted more effectively to remote and blended learning systems. In support of this position, Mpungose (2021) observed that universities with established digital learning structures demonstrated greater academic continuity during periods of educational disruption than institutions with weak technological systems. the adoption of smart classroom technologies reflects a broader shift toward innovation-driven education.

Modern students are increasingly exposed to digital communication systems in their daily lives, and this reality has influenced their expectations regarding classroom learning experiences. Many university students now prefer learning environments that encourage interaction, multimedia engagement, collaborative participation, and flexible access to instructional materials. Consequently, universities are under growing pressure to modernize their instructional systems in ways that align with emerging digital realities and contemporary labour market expectations. Howard et al. (2021) maintained that universities that fail to embrace digital instructional transformation may struggle to remain globally competitive in the modern innovation-oriented economy, Nwafor and Ololube (2020) explained that students in many Nigerian universities increasingly demand technologically responsive learning environments capable of supporting flexible and practical academic experiences.

Notwithstanding the growing availability of smart classroom technologies in higher education institutions, effective utilization among lecturers remains uneven and inconsistent, particularly within many developing countries. In several universities, technological facilities are installed but are either underutilized or utilized below

expectation due to institutional and human-related constraints. The presence of digital tools alone does not automatically translate into effective technology integration within classroom instruction. Successful utilization often depends on the existence of supportive institutional conditions and lecturers who possess the competence and confidence required to apply such technologies meaningfully in teaching activities. Scherer et al. (2021) emphasized that lecturers' technological readiness and institutional support systems significantly influence the extent to which digital instructional technologies are integrated into classroom practices. Similarly, Okoye and Nwafor (2021) reported that many Nigerian university lecturers still encounter challenges relating to digital adaptation, institutional support, and technology utilization despite the increasing availability of educational technologies within universities.

Institutional support refers to the extent to which university management creates enabling conditions that encourage lecturers to adopt and effectively utilize smart classroom technologies within instructional practices. Universities that prioritize digital transformation often provide adequate infrastructure, internet connectivity, technical support systems, staff development opportunities, administrative encouragement, and policy frameworks that support technology integration. Institutional support reflects the practical commitment of university authorities toward improving digital teaching and learning environments. Tondeur, et al (2021) explained that institutional support contributes significantly to lecturers' willingness to integrate educational technologies into classroom instruction because supportive environments reduce operational barriers and improve technological confidence. In the Nigerian context, Ibrahim and Yusuf (2022) observed that public universities with stronger administrative support and ICT investment tend to experience higher levels of technology integration among academic staff. One important aspect of institutional support is the provision of digital infrastructure.

Smart classroom technologies depend heavily on the availability of functional technological facilities such as interactive boards, multimedia projectors, high-speed internet services, virtual learning platforms, wireless communication systems, digital laboratories, and electronic libraries. Where such facilities are adequate and accessible, lecturers are more likely to experiment with innovative instructional approaches that support active learning and students' participation. Castro (2019) argued that universities with poor technological infrastructure frequently struggle to sustain effective blended learning and technology-supported instruction because lecturers and students encounter persistent operational difficulties. Adebayo and Abdulrahman (2021) noted that infrastructural inadequacies remain one of the major barriers affecting effective smart classroom utilization in many Nigerian public universities. Problems such as unstable electricity supply, limited internet access, inadequate digital facilities, and poor maintenance culture continue to affect technology integration within instructional environments.

Technical support services also remain central to effective smart classroom utilization. The operation of digital instructional technologies requires technical expertise capable of assisting lecturers during classroom delivery and technological troubleshooting. Lecturers may experience software malfunction, internet connectivity failure, hardware complications, or operational challenges during instructional activities. In such situations, the availability of responsive ICT support personnel becomes essential for sustaining lecturers' confidence and uninterrupted classroom interaction. Scherer et al. (2021) noted that inadequate technical assistance often contributes to lecturers' resistance toward educational technology utilization because many academic staff fear technological embarrassment and classroom disruption arising from operational failures.

Administrative and policy support equally influence the successful integration of smart classroom technologies within universities. University management shapes technology adoption through funding decisions, staff development programmes, institutional regulations, strategic planning, and policy implementation. Administrative support may involve organizing technology-focused workshops, sponsoring ICT training, encouraging blended learning practices, rewarding innovative teaching approaches, and allocating financial resources for technological maintenance and expansion. Almaiah, et al (2020), educational institutions that demonstrate strong administrative commitment toward technology integration often experience improved acceptance and utilization of digital learning systems among lecturers. Within Nigerian universities, Owan and Agunwa (2021) argued that weak institutional policies and inconsistent administrative support continue to limit sustainable implementation of educational technologies in public tertiary institutions. Teacher preparedness constitutes another critical factor influencing the utilization of smart classroom technologies in higher education institutions. Teacher preparedness refers to the degree to which lecturers possess the technological knowledge, instructional competence, confidence, and professional readiness required for effective digital teaching. Modern classroom instruction increasingly demands lecturers who can integrate technological tools into lesson delivery, facilitate virtual interaction, manage online learning environments, and utilize multimedia resources to improve students' understanding. Falloon (2020) maintained that digital competence has become an essential professional requirement for university lecturers because technology-supported learning environments demand flexible and technologically responsive instructional practices. In support of this view, Adeyemi and Oke (2022) stressed that lecturers' preparedness for digital instruction significantly influences the quality of technology-supported teaching and students' learning experiences in Nigerian universities.

Digital literacy competence represents a major aspect of teacher preparedness in the contemporary university environment. Digital literacy extends beyond the basic ability to operate computers. It involves the capacity to access, evaluate, organize, create, and communicate information effectively using digital technologies. Lecturers with strong digital literacy competence are often better positioned to utilize virtual learning platforms, electronic instructional materials, online collaborative applications, and digital assessment tools within classroom instruction. Ifenthaler and Yau (2020) articulated that, digitally competent lecturers tend to demonstrate greater instructional flexibility and innovation in technology-enhanced learning environments. Similarly, Ugwuanyi and Okeke (2021) found that lecturers with higher digital literacy skills were more likely to integrate smart technologies effectively into teaching activities within Nigerian universities.

Technical competency training in smart technologies equally contributes to lecturers' preparedness for digital instruction. Technology integration within higher education requires continuous learning because digital instructional systems continue to transform swiftly. Workshops, seminars, conferences, ICT capacity-building programmes, and capacity development activities provide lecturers with opportunities to acquire practical technological skills and improve their confidence in utilizing smart classroom technologies. König, et al (2020) observed that lecturers who participate regularly in technology-oriented training programmes often demonstrate stronger competence and greater willingness to integrate digital tools into classroom teaching. Technological readiness and confidence further shape lecturers' utilization of smart classroom technologies. Some lecturers remain reluctant to embrace digital instructional systems because they perceive technological tools as complex, stressful, or time-consuming. Others fear operational mistakes during classroom delivery or struggle to adapt to rapidly

changing technological environments. Positive attitudes toward technology and confidence in digital competence therefore play significant roles in determining lecturers' willingness to integrate smart technologies into instructional activities. Teo et al. (2019) emphasized that lecturers' behavioural intention toward educational technology is strongly influenced by their technological confidence and perceptions regarding the usefulness of digital instructional systems. Obasi and Nnamani (2022) observed that fear of technological failure and low digital confidence continue to discourage some lecturers in Nigerian public universities from embracing smart instructional technologies fully.

Utilization refers to the practical and consistent application of digital instructional tools and technological systems by lecturers to improve classroom teaching, students' engagement, collaborative learning, and instructional delivery. Smart classroom technology utilization can manifest through interactive digital instruction, technology-integrated classroom engagement, and virtual or blended learning practices. Hrastinski (2021) explained that blended learning environments encourage more flexible and participatory learning experiences by combining face-to-face classroom interaction with online instructional activities. Similarly, Yusuf and Bello (2020) noted that technology-integrated instruction improves classroom engagement and supports collaborative learning among university students in Nigeria.

Within the African context, universities are increasingly embracing digital learning systems as part of wider educational modernization efforts. Several higher education institutions across South Africa, Kenya, Ghana, Rwanda, and Egypt have introduced online learning platforms, digital classrooms, and electronic instructional systems aimed at improving academic delivery and institutional relevance. Nevertheless, the pace and effectiveness of smart classroom technology integration across many African universities remain constrained by infrastructural deficits, unstable electricity supply, inadequate internet services, insufficient ICT funding, and limited technological training opportunities for academic staff. Mpungose (2021) observed that these challenges continue to affect the sustainability of digital transformation initiatives within African universities. In the same direction, Aina and Ojo (2022) reported that many African public universities still struggle with technological inequality and inconsistent digital learning implementation.

The integration of smart classroom technologies into university education has gained increasing attention due to the growing demand for technology-driven learning systems and globally competitive educational standards. Public universities are gradually introducing e-learning platforms, virtual learning systems, digital libraries, and multimedia instructional facilities to improve teaching effectiveness and academic accessibility. However, the extent of effective utilization among lecturers remains a major concern. Edeh et al. (2022) identified unstable internet connectivity, irregular electricity supply, inadequate institutional funding, poor maintenance culture, insufficient technical support services, and low digital competence among lecturers as persistent barriers affecting smart classroom technology utilization in Nigerian universities. Although some universities in the state have introduced digital learning platforms, ICT centres, smart instructional devices, and blended learning initiatives, effective utilization among lecturers remains inconsistent across faculties and departments. In several instances lecturers continue to rely heavily on traditional teaching methods despite the growing presence of digital instructional facilities. Some academic staff experience difficulties adapting to modern technological systems due to inadequate training opportunities and low technological confidence. Institutional challenges such as insufficient funding, poor internet accessibility, inadequate technical assistance, irregular electricity supply, and weak

administrative support continue to hinder effective technology integration within classroom instruction.

The growing transformation within higher education has reshaped teaching and learning across universities worldwide. Universities have increasingly moved beyond traditional classroom practices toward technology-supported instructional systems that improve academic interaction, flexibility, and students' learning experiences. This transition has become particularly important in the twenty-first-century knowledge economy, where digital competence, innovation, and technological adaptability are essential elements of quality university education. As universities respond to these realities, attention has shifted toward the conditions that make smart classroom technology utilization effective and sustainable. Among these conditions, institutional support remains one of the most influential factors shaping the successful integration of smart classroom technologies into university teaching and learning.

Institutional support refers to the practical, administrative, and technological assistance provided by university authorities to facilitate the effective utilization of educational technologies among lecturers and students. It reflects the commitment of university management to create an enabling environment for digital learning through adequate infrastructure, responsive technical systems, ICT investment, policy direction, maintenance culture, and leadership support. Tondeur et al. (2021) explained that institutional conditions strongly influence lecturers' readiness and confidence in adopting technology-supported instructional practices within higher education. Smart classroom technologies depend largely on the availability of internet-enabled classrooms, interactive smart boards, learning management systems, multimedia projectors, electronic libraries, wireless communication networks, virtual learning platforms, digital laboratories, and cloud-based educational applications. These facilities enable lecturers to diversify instructional methods through multimedia presentations, online discussions, virtual simulations, collaborative learning activities, and digital assessment systems. Bond et al. (2021) observed that institutions with stronger digital infrastructure demonstrate greater capacity for technology-supported teaching and academic continuity. Universities have increasingly established ICT centres, virtual learning systems, and expanded internet connectivity to modernize instructional delivery. Despite these efforts, infrastructural limitations such as unstable internet connectivity, inadequate multimedia facilities, overcrowded computer laboratories, and irregular electricity supply continue to weaken smart classroom utilization, particularly in public universities where financial constraints and growing student populations place pressure on technological resources. Edeh et al. (2022) maintained that these infrastructural inadequacies remain persistent challenges affecting digital learning implementation in Nigerian universities.

Technical support services constitute another fundamental component of institutional support. Smart classroom technologies often involve software malfunctions, internet failures, hardware damage, and system configuration challenges that require professional ICT assistance. Scherer et al. (2021) argued that lecturers are more willing to integrate educational technologies when technical support systems are reliable and responsive. In many Rivers State universities, delays in repairing faulty devices, weak technical supervision, and inadequate operational guidance discourage lecturers from relying consistently on digital instructional systems. Afolabi et al. (2023) found that the availability of technical support significantly influences lecturers' adoption and sustained use of educational technologies.

Administrative and policy support also determine the extent to which smart classroom technologies are effectively utilized. Through policy formulation, strategic

planning, staff development programmes, funding priorities, and digital learning initiatives, university administrators shape institutional attitudes toward educational technology. Howard et al. (2021) emphasized that sustainable technology integration depends heavily on institutional leadership and policy commitment. Likewise, institutional investment in educational technology through procurement, maintenance of digital facilities, software licensing, internet services, and ICT training strengthens smart classroom utilization. Rapanta et al. (2020) noted that universities with sustained technological investment demonstrate stronger adaptability and instructional resilience. However, funding challenges continue to limit ICT expansion, software maintenance, internet stability, and access to modern instructional technologies in many Nigerian public universities, including those in Rivers State. Leadership commitment further strengthens institutional support by promoting ICT development, blended learning, resource allocation, and innovation in teaching. Hrastinski (2021) explained that contemporary higher education increasingly depends on institutional flexibility and leadership responsiveness toward technology-enhanced learning. When university management demonstrates genuine commitment to digital learning, lecturers are more likely to embrace technology-integrated instruction.

The utilization of smart classroom technologies is reflected through interactive digital instruction, technology-integrated classroom engagement, and virtual or blended learning practices. These approaches employ multimedia resources, virtual demonstrations, online educational platforms, digital communication tools, collaborative learning, online discussions, digital assignments, and immediate academic feedback to improve teaching effectiveness, students' participation, and academic flexibility. Collectively, these instructional dimensions represent the practical application of smart classroom technologies within contemporary university education.

Teacher preparedness has become a fundamental requirement for the effective utilization of smart classroom technologies in higher education. The widespread growth of digital learning in universities has transformed how lecturers perform their teaching responsibilities. University teaching is no longer limited to traditional face-to-face instruction but increasingly relies on technology-driven learning systems that demand technological competence, instructional flexibility, and confidence in integrating digital tools into classroom practice. As universities continue adopting smart classroom technologies, teacher preparedness has become central to effective technology utilization. The availability of technological facilities alone does not guarantee meaningful digital instruction; rather, the preparedness of lecturers largely determines the success of technology integration.

Teacher preparedness refers to the extent to which lecturers possess the technological knowledge, digital skills, instructional readiness, adaptability, and confidence required to integrate smart classroom technologies into teaching and learning. It reflects lecturers' ability to operate digital instructional systems, manage online learning environments, utilize multimedia teaching applications, and adapt pedagogical approaches to emerging technological realities. Prepared lecturers are generally more willing to adopt innovative instructional methods that enhance students' engagement and participation, whereas those with limited technological preparedness may avoid digital instructional practices even when facilities are available. Falloon (2020) emphasized that digital competence has become an essential component of teaching professionalism because contemporary educational environments increasingly depend on technology-supported interaction.

Digital literacy competence remains one of the most important dimensions of teacher preparedness. It extends beyond basic computer use to include the ability to locate, evaluate, create, communicate, and manage information using digital technologies within educational contexts. Digitally competent lecturers effectively utilize virtual learning systems, online academic resources, cloud-based communication platforms, multimedia applications, and electronic assessment tools to create interactive and student-centred learning experiences. Instefjord and Munthe (2020) maintained that lecturers with strong digital literacy demonstrate greater effectiveness in technology-integrated instruction. However, disparities in digital competence remain evident across public universities in Rivers State, where some lecturers confidently integrate multimedia resources and virtual learning platforms, while others continue relying on conventional teaching methods because of limited technological exposure. Oguguo et al. (2021) observed that inadequate digital competence continues to hinder educational technology utilization in many Nigerian universities.

Capacity-building programmes and ICT training also strengthen teacher preparedness by improving technological competence and instructional adaptability. These programmes expose lecturers to emerging educational applications, virtual learning systems, online assessment platforms, collaborative digital tools, and innovative teaching strategies. Such staff development enhances lecturers' confidence and practical understanding of smart classroom technologies. According to König et al. (2020), lecturers who participate regularly in ICT-related capacity-building programmes are more prepared for online teaching and blended learning. Nevertheless, funding limitations and irregular staff development opportunities in many Rivers State public universities reduce lecturers' preparedness for digital instructional delivery.

Technological readiness further influences smart classroom utilization. It reflects lecturers' willingness, openness, and positive attitudes toward adopting educational technologies. Lecturers who demonstrate technological readiness are more likely to embrace interactive instructional approaches, virtual learning environments, and blended learning systems. Teo et al. (2019) explained that lecturers' perceptions of the usefulness and accessibility of educational technologies significantly influence their readiness to adopt digital instructional practices. Differences in previous technological exposure, institutional support, and individual perceptions often account for varying levels of readiness among lecturers.

Confidence in digital teaching equally strengthens teacher preparedness. Confident lecturers are more willing to facilitate virtual discussions, organize online academic activities, utilize multimedia instructional resources, and engage students through technology-supported teaching methods. Trust and Whalen (2020) noted that lecturers with stronger confidence in educational technology adapted more effectively to virtual learning systems. Confidence is influenced by ICT experience, institutional support, and opportunities for practical engagement with educational technologies. Adaptability to emerging educational technologies is another essential aspect of teacher preparedness. As educational technologies continue to evolve, lecturers who remain open to innovation are better positioned to integrate new digital applications into classroom practice. Redecker (2020) argued that adaptability is increasingly necessary because digital transformation requires educators to adjust continuously to changing technological and instructional demands. Adaptable lecturers are therefore more capable of sustaining effective smart classroom utilization despite institutional limitations.

Overall, teacher preparedness significantly influences smart classroom technology utilization because lecturers who possess adequate digital literacy, ICT training,

technological readiness, instructional confidence, and adaptability are better equipped to integrate technology meaningfully into classroom instruction. Such preparedness strengthens interactive digital learning, enhances students' participation, and supports flexible learning environments that respond to contemporary educational realities. Therefore, teacher preparedness remains a fundamental requirement for the successful utilization of smart classroom technologies in public universities, as the effectiveness of educational technologies depends not only on digital infrastructure but also on the competence and readiness of lecturers responsible for technology-supported instruction (Adebayo & Abdulrahman, 2021).

Having established the importance of Teacher Preparedness and Smart Technology Utilization, it is necessary to examine the concept of smart classroom technologies in higher education. The growing impact of digital transformation has significantly reshaped the delivery of university instruction globally. Universities are increasingly moving away from conventional teaching methods toward more flexible, interactive, and technology-supported learning systems capable of responding to contemporary educational demands. This shift reflects the recognition that modern higher education must equip students with technological competence, innovation, and collaborative problem-solving skills required in digitally driven societies. Consequently, smart classroom technologies have become indispensable components of instructional delivery within higher education institutions.

Smart classroom technologies refer to digital instructional systems and technology-based learning tools designed to improve teaching effectiveness, classroom interaction, student engagement, and academic flexibility through the integration of information and communication technologies into educational processes. These technologies create learning environments where lecturers and students interact, collaborate, exchange educational resources, and participate in instructional activities using multimedia systems and digital communication platforms. Huang et al. (2019) described smart classroom technologies as intelligent educational systems that support collaborative learning, real-time interaction, personalized instruction, and flexible academic participation in contemporary educational environments.

The concept extends beyond the simple use of computers during classroom instruction. It involves integrating interconnected technological systems that transform the learning experience through virtual learning platforms, interactive smart boards, multimedia instructional devices, digital assessment tools, cloud-based learning applications, artificial intelligence-supported educational technologies, online communication systems, and virtual collaboration platforms. Collectively, these technologies promote innovative teaching approaches that encourage active learning, academic interaction, and student participation beyond traditional classroom boundaries. Various smart classroom technologies are utilized across higher education institutions. Learning management systems such as Moodle, Blackboard, Canvas, and Google Classroom enable lecturers to upload course materials, facilitate online discussions, administer assessments, and monitor students' academic activities digitally. Video conferencing platforms, including Zoom, Microsoft Teams, and Google Meet, support virtual classroom interaction and remote learning, while multimedia systems such as digital projectors, smart boards, audiovisual devices, and simulation software enhance classroom communication and students' understanding of academic concepts. Alenezi (2020) explained that the increasing availability of educational technologies has transformed university teaching by improving instructional flexibility and expanding students' access to academic resources.

Digital teaching tools also play a significant role within smart classroom environments. Electronic presentation applications, online testing systems, educational mobile applications, digital content creation software, and collaborative academic platforms enable lecturers to deliver engaging instruction while supporting online assignment submission, collaborative learning, virtual interaction, and immediate instructional feedback. Their use increased considerably within Nigerian universities following the expansion of online and blended learning during the COVID-19 pandemic, thereby strengthening institutional awareness of educational technologies. Interactive learning systems constitute another important component of smart classroom technologies. They encourage students' participation through digital platforms, multimedia instructional environments, virtual discussions, collaborative assignments, electronic feedback mechanisms, and real-time classroom interaction. Martín-Gutiérrez et al. (2021) maintained that interactive learning technologies improve students' motivation, participation, and classroom engagement by creating learner-centred educational experiences that enhance instructional effectiveness.

Blended learning has also become increasingly important within contemporary higher education. By combining face-to-face classroom interaction with online instructional activities, lecturers extend learning beyond physical classrooms through virtual discussions, recorded lectures, online academic resources, and digital assessments. The COVID-19 pandemic further accelerated the adoption of blended learning within Nigerian public universities. Educational innovation and smart instructional design similarly demonstrate the growing importance of smart classroom technologies. Smart teaching integrates innovative instructional approaches with technology to improve learning experiences, collaborative participation, critical thinking, and instructional flexibility while encouraging lecturers to move beyond teacher-centred methods toward more interactive, student-focused instruction. Consequently, smart classroom technologies support both technological advancement and instructional transformation within higher education institutions (Ekanem & Esu, 2023). Many universities have introduced virtual learning systems, ICT-supported classrooms, electronic libraries, and blended learning initiatives to improve instructional delivery. However, utilization continues to vary across faculties because of unstable internet connectivity, inadequate technological facilities, irregular electricity supply, and differences in lecturers' digital preparedness. Despite these constraints, awareness of educational technologies continues to increase as universities strive to improve instructional quality and align with global digital learning trends. Smart classroom technologies have therefore become indispensable in higher education because they promote interactive learning, instructional flexibility, collaborative engagement, and innovative teaching practices. Universities that successfully integrate these technologies into instructional processes are better positioned to enhance students' learning experiences and prepare graduates for participation in modern knowledge-driven societies (Castro, 2019).

The study is anchored on the Diffusion of Innovation Theory developed by Everett Rogers in 2003. The theory explains how new ideas, practices, and technologies are introduced, accepted, and utilized within an organization or social system over time. Rogers argued that the adoption of innovation depends largely on communication channels, institutional structure, social influence, and the willingness of individuals to embrace change. Within the context of public universities in Rivers State, the theory provides a useful explanation for how smart classroom technologies can be adopted and integrated into teaching and learning processes through adequate institutional support and teacher preparedness. The relevance of this theory to the present study lies in its emphasis

on organizational encouragement, access to technological facilities, and users' competence in determining the successful utilization of innovation. Smart classroom technologies cannot achieve meaningful educational outcomes where universities lack stable digital infrastructure, administrative commitment, technical assistance, and continuous staff development programmes. Similarly, lecturers who possess digital literacy skills and positive attitudes toward technological innovation are more likely to utilize smart classroom tools effectively in instructional delivery (Alenezi, 2021). The theory further suggests that institutional culture significantly shapes lecturers' acceptance or rejection of educational technologies in higher institutions. Diffusion of Innovation Theory is therefore best suited for this study because it clearly explains the interrelated relationship between institutional support, teacher preparedness, and the utilization of smart classroom technologies in public universities in Rivers State, Nigeria

In many public universities in Rivers State, inadequate digital infrastructure, weak internet connectivity, poor technical assistance, insufficient institutional support mechanisms, irregular professional training opportunities, and low digital competence among some lecturers continue to affect technology-based instruction. Consequently, the inability to effectively utilize smart classroom technologies may weaken instructional quality, reduce students' academic engagement, limit innovation in teaching practices, and affect the development of future-ready graduates required in a digitally driven society. There is therefore a growing concern that without adequate institutional support and proper teacher preparedness, the goals of smart classroom technology integration in public universities may remain difficult to achieve. Providing stable digital infrastructure, consistent technical support services, and regular professional ICT training may strengthen lecturers' readiness and improve technology-integrated teaching practices. It remains certain that institutional support and teacher preparedness significantly influence the utilization of smart classroom technologies in public universities in Rivers State. It is against this background that this study examines institutional support, teacher preparedness, and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.

Statement of the Problem

The integration of smart classroom technologies into university education has increasingly become a major priority in higher education systems across the world. Public universities are gradually investing in digital instructional facilities such as learning management systems, multimedia teaching devices, virtual learning platforms, interactive smart boards, and online collaborative technologies to improve teaching effectiveness and students' learning experiences. In Nigeria, particularly within public universities in Rivers State, efforts have also been made toward introducing digital learning systems and technology-driven instructional practices. Despite these growing investments and policy expectations, the practical utilization of smart classroom technologies among lecturers still appears limited and inconsistent. Observable realities within many public universities reveal that several lecturers continue to rely heavily on conventional lecture methods with minimal integration of digital instructional technologies during classroom teaching. In some cases, virtual learning platforms provided by universities are underutilized, while interactive digital teaching practices capable of improving students' engagement and collaborative learning remain inadequate. The mere availability of technological facilities does not automatically guarantee effective utilization among lecturers. The challenge appears more connected to institutional conditions and the preparedness of lecturers to utilize such technologies confidently and effectively.

Purpose of the Study

The aim of this study was to examine the relationship between institutional support, teacher preparedness, and utilization of smart classroom technologies in public universities in Rivers State, Nigeria. The study specifically sought to examine

1. the relationship between institutional support and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.
2. the relationship between teacher preparedness and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.

Research Questions

The following research questions guided the study:

1. What is the relationship between institutional support and utilization of smart classroom technologies in public universities in Rivers State, Nigeria?
2. What is the relationship between teacher preparedness and utilization of smart classroom technologies in public universities in Rivers State, Nigeria?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between institutional support and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.
2. There is no significant relationship between teacher preparedness and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.

Methods

The study adopted a correlational research design to examine the relationship between institutional support, teacher preparedness, and utilization of smart classroom technologies in public universities in Rivers State, Nigeria. A correlational design was considered appropriate because the study sought to determine the extent and direction of the relationship among the variables without manipulating them. According to Nworgu (2015), correlational research design is suitable for studies that investigate existing relationships among variables as they naturally occur within a population. The design therefore enabled the researchers to determine how institutional support and teacher preparedness relate to the utilization of smart classroom technologies in public universities in Rivers State, Nigeria. The population of the study comprised 5,200 academic staff from the three public universities in Rivers State, namely University of Port Harcourt, Rivers State University, and Ignatius Ajuru University of Education. (Offices of the registrars of the universities, 2025.) The sample size for the study consisted of 371 respondents. The sample size was determined using the Taro Yamane formula for sample size determination at a 0.05 level of tolerance. $n = \frac{N}{1 + N(e)^2}$ Where: (n) = sample size (N) = population size (e) = level of significance Substituting the values into the formula: $n = \frac{5200}{1 + 5200(0.05)^2} = \frac{5200}{14} \approx 371$ Thus, the computed sample size of 371 respondents was adopted for the study. A stratified proportionate random sampling technique was employed to ensure adequate representation of academic staff across the three public universities. The technique also ensured fairness and proportional representation of the different categories of respondents included in the study. Instrument used for data collection was a structured questionnaire titled *Institutional Support, Teacher Preparedness and Smart Classroom Technology Utilization Questionnaire (ISTPSCUQ)*. The questionnaire was developed by the researchers based on the objectives of the study and related literature reviewed. The instrument was structured using a four-point Likert rating scale comprising: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The questionnaire items were designed to obtain relevant information on

institutional support, teacher preparedness, and utilization of smart classroom technologies in public universities in Rivers State, Nigeria. The instrument was subjected to face and content validation by two experts in Educational Management, Measurement and Evaluation, and ICT/Educational Technology. The validators examined the instrument for clarity, relevance, appropriateness of language, and alignment with the objectives and research questions of the study. Their observations and recommendations guided the modification and improvement of the instrument before the final administration. reliability of the instrument was established using the Cronbach Alpha method to determine the internal consistency of the questionnaire items. The instrument was trial-tested using respondents outside the study area but with similar characteristics to the study population. The analysis yielded an overall reliability coefficient of 0.85, indicating that the instrument possessed a high level of reliability and was suitable for data collection. Data collected for the study were analyzed using Pearson Product Moment Correlation (PPMC) to answer the research questions and determine the relationship among the variables. The hypotheses were tested at a 0.05 level of significance.

Results and Discussion

Table 4.1: Correlation Matrix of the Relationship Between Institutional Support and Utilization of Smart Classroom Technologies

Variables	Utilization of Smart Classroom Technologies	Institutional Support
Utilization of Smart Classroom Technologies	Pearson Correlation = 1 Sig. (2-tailed) N = 371	
Institutional Support	Pearson Correlation = .768 Sig. (2-tailed) = .004 N = 371	1

Table 4.1 revealed the relationship between institutional support and utilization of smart classroom technologies in public universities in Rivers State, Nigeria. The result showed a Pearson Product Moment Correlation coefficient (r) value of 0.768 with a corresponding probability value of 0.004 at 371 degrees of freedom. The positive correlation coefficient indicated a strong positive relationship between institutional support and utilization of smart classroom technologies. This implies that improved institutional support through the provision of digital infrastructure, technical assistance, administrative encouragement, and technology-based resources enhances the effective utilization of smart classroom technologies among academic staff. Since the probability value of 0.004 is less than the 0.05 level of significance, the null hypothesis was rejected. Therefore, there is a significant relationship between institutional support and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.

Table 4.2: Correlation Matrix of the Relationship Between Teacher Preparedness and Utilization of Smart Classroom Technologies

Variables	Utilization of Smart Classroom Technologies	Teacher Preparedness
Utilization of Smart Classroom Technologies	Pearson Correlation = 1 Sig. (2-tailed) N = 371	
Teacher Preparedness	Pearson Correlation = .734	1

Sig. (2-tailed) = .006
N = 371

Table 4.2 presented the relationship between teacher preparedness and utilization of smart classroom technologies in public universities in Rivers State, Nigeria. The analysis revealed a Pearson Product Moment Correlation coefficient (r) value of 0.734 and a corresponding probability value of 0.006 with 371 respondents. The positive correlation coefficient indicated a strong positive relationship between teacher preparedness and utilization of smart classroom technologies. This finding suggests that lecturers who possess adequate digital competence, technological training, and instructional technology skills are more likely to effectively utilize smart classroom technologies in teaching and learning processes. Since the probability value of 0.006 is less than the 0.05 level of significance, the null hypothesis was rejected. Therefore, there is a significant relationship between teacher preparedness and utilization of smart classroom technologies in public universities in Rivers State, Nigeria.

Conclusion

The study concluded that institutional support and teacher preparedness are critical determinants in the effective utilization of smart classroom technologies in public universities in Rivers State, Nigeria. The findings revealed that the availability of digital infrastructure, functional technical support services, and supportive administrative policies significantly enhance lecturers' adoption of interactive and technology-driven instructional practices. The study further established that lecturers who possess adequate digital literacy competence, professional technological training, and confidence in using educational technologies demonstrate greater commitment toward virtual learning, blended instructional delivery, and interactive classroom engagement. The study also showed that inadequate institutional investment, insufficient ICT support systems, poor internet connectivity, and low technological preparedness among some lecturers continue to hinder effective smart classroom implementation in many public universities. Consequently, the study affirmed that sustainable digital transformation in university education cannot be achieved without consistent institutional commitment and continuous teacher capacity development. The integration of smart classroom technologies therefore requires a deliberate combination of infrastructural support, policy implementation, technological training, and continuous professional development programmes capable of improving lecturers' readiness for future-oriented instructional practices in contemporary higher education environments.

Recommendations

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

1. University management should provide adequate digital infrastructure to support smart classroom teaching and learning.
2. Government should increase funding for smart classroom technologies in public universities.
3. University administrators should formulate policies that encourage technology-integrated instructional practices.
4. Lecturers should be encouraged to participate in digital literacy and ICT competency training programmes.
5. Universities should promote blended and virtual learning practices across academic programmes.

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