
**TEACHER PREPAREDNESS AND PROFESSIONAL DEVELOPMENT
FOR THE EFFECTIVE INTEGRATION OF DIGITAL PEDAGOGIES IN
SMART CLASSROOMS IN PUBLIC SECONDARY SCHOOLS IN
EBONYI STATE, NIGERIA**

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Article Received: 10 April 2026, Article Revised: 30 April 2026, Published on: 20 May 2026

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DOI: <https://doi-doi.org/101555/ijarp.9814>

ABSTRACT

This study examined level of teacher preparedness and professional development for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State, Nigeria. Two research questions and two null hypotheses guided the study. The study adopted a descriptive survey research design. The population of the study comprised 67,213 teachers of junior and senior secondary schools in Ebonyi State, Nigeria. The sample of 398 teachers were drawn using Taro Yamane formula while stratified sampling technique was used for sample distribution. A structured questionnaire titled “Teacher Preparedness and Digital Pedagogy Questionnaire (TPDPQ)” was used for data collection. The instrument was validated by experts in Educational Technology and Measurement and Evaluation, while measures of internal consistency reliability was established using Cronbach Alpha method which yielded an index of 0.76. Data was collected during the teachers’ verification exercise where all the teachers in Ebonyi State were in attendance. Data collected were analysed using mean and standard deviation to answer research questions, while t-test of independent sample was used to test hypotheses at 0.05 level of significance. Findings revealed that teachers demonstrated low levels of preparedness in terms of digital competence, and low utilisation

of digital pedagogies due to inadequate professional development opportunities. The study further found that access to training programmes, institutional support, and availability of digital infrastructure significantly influenced teachers' effectiveness in smart classroom environments. Based on these findings, recommendations and suggestions for further studies were made therein.

KEYWORDS: *Teacher, Preparedness, Professional Development, Effective Integration, Smart Schools, Public Secondary Schools.*

Background to the Study

Education is widely recognized as an important instrument for national development, human capital formation, and socio-economic transformation. In the twenty-first century, rapid technological advancement and globalization have transformed educational systems across the world. Traditional teacher-centred instructional methods are gradually being replaced with learner-centred and technology-driven approaches that promote creativity, collaboration, communication, critical thinking, and problem-solving skills among learners. According to UNESCO (2023), educational institutions increasingly adopt digital learning technologies to improve instructional effectiveness, enhance students' engagement, and prepare learners for participation in the digital economy. This growing integration of technology into education has led to the emergence of digital pedagogies and smart classrooms in contemporary educational systems.

Digital pedagogies could refer to the integration of digital technologies and innovative instructional strategies into teaching and learning processes to improve instructional delivery and learning experiences. They involve the use of computers, multimedia systems, online learning platforms, artificial intelligence tools, and internet resources to facilitate active, collaborative, learner-centred, and interactive learning. Ojetunde and Ramnarain (2023) noted that digital pedagogies could support the development of twenty-first-century skills by improving students' participation and conceptual understanding. Similarly, El-Hamamsy, Bruno and Chessel-Lazzarotto (2023) observed that digital pedagogies enhance personalized learning and instructional flexibility. Consequently, teachers are no longer seen merely as transmitters of knowledge but as facilitators and guides who support students' active participation in learning. This requires that teachers must have full knowledge and use of these digital resources for effective teaching and learning in schools.

The effective implementation digital pedagogies therefore requires technologically supportive learning environments known as smart classrooms. Smart classrooms are technology-enhanced learning environments equipped with facilities such as computers, multimedia projectors, interactive whiteboards, internet connectivity, virtual learning platforms, and educational software that support interactive and collaborative learning. Cheng (2024) explained that smart classrooms create flexible and learner-centred educational environments that improve instructional delivery and students' engagement. Similarly, Amimi, Benlahmar and Labriji (2022) stated that smart classrooms facilitate collaborative learning, digital assessment, and personalized learning experiences through advanced educational technologies. The effectiveness of smart classrooms, however, could largely depends on teachers' preparation in utilizing digital pedagogies effectively. Teacher preparedness therefore becomes an important issue in contemporary education.

Teacher preparedness refers to the extent to which teachers possess the knowledge, skills, attitudes, confidence, and competencies required for effective instructional delivery in technology-enhanced learning environments. Darling-Hammond, Flook, Cook-Harvey, Barron and Osher (2020) explained that teacher preparedness in the digital age includes technological competence, creativity, adaptability, and the ability to integrate digital tools into teaching effectively. Similarly, Koehler, Mishra and Cain (2017) emphasized that effective teaching in the digital era requires Technological Pedagogical Content Knowledge (TPACK), which combines technological, pedagogical, and subject content knowledge. Despite the growing importance of educational technologies, many teachers still experience difficulties integrating digital tools into classroom instruction because of inadequate preparedness and insufficient technological competence. Closely related to teacher preparedness is professional development.

Professional development refers to organized activities such as workshops, seminars, conferences, mentoring programmes, in-service training, and online learning opportunities designed to improve teachers' knowledge, instructional skills, and professional effectiveness. Guskey (2021) noted that professional development improves teachers' instructional practices and ability to adapt to educational innovations. Teachers who participate regularly in technology-oriented professional development programmes are more likely to develop competence and confidence in utilizing digital technologies effectively. The importance of professional development became more evident during the COVID-19 pandemic when many

teachers struggled with online instruction because they lacked adequate technological competence and professional training in digital teaching. UNESCO (2023) therefore emphasized that continuous teacher professional development is critical for strengthening digital learning systems and ensuring educational continuity.

In Nigeria, the integration of digital pedagogies and smart classroom technologies into secondary school education has become increasingly important due to the growing demand for digital literacy and technological competence. Although the government has introduced ICT-related educational policies, the implementation of digital learning initiatives in many public secondary schools remains inadequate because of poor electricity supply, insufficient technological facilities, poor internet connectivity, inadequate funding, and limited teacher competence in digital instruction. In Ebonyi State, many public secondary schools still experience inadequate technological infrastructure, limited access to smart classroom facilities, and insufficient teacher training opportunities. Consequently, many teachers encounter difficulties utilizing digital technologies effectively for classroom instruction. Without adequate teacher preparedness and continuous professional development, the effective integration of digital pedagogies in smart classrooms may remain difficult in public secondary schools in Ebonyi State. It is against this background that this study seeks to investigate teacher preparedness and professional development for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State, Nigeria.

Statement of the Problem

The emergence of digital technologies in education has transformed the teaching and learning process across the world, leading to the adoption of digital pedagogies and smart classroom practices in secondary schools. Digital pedagogies involve the use of technological tools, online resources, multimedia applications, virtual learning platforms, and interactive instructional strategies to improve students' engagement, achievement, collaboration, and critical thinking. In Nigeria, government and educational stakeholders have continued to advocate for the integration of smart classrooms in public secondary schools in order to align the educational system with global technological trends and the demands of the twenty-first century. Despite these efforts, effective integration of digital pedagogies in smart classrooms largely depends on the preparedness and professional competence of teachers who are expected to utilize these technologies in instructional delivery. Teachers are required to possess adequate digital literacy skills, pedagogical knowledge, technical competence, and

continuous professional development in order to effectively implement technology-driven teaching practices in schools.

However, observations and reports have shown that many teachers in public secondary schools in Ebonyi State appear inadequately prepared for the effective integration of digital pedagogies in smart classrooms. Some teachers still rely heavily on traditional teaching methods due to insufficient digital competence, lack of training opportunities, poor access to professional development programmes, inadequate technical support, and limited exposure to emerging educational technologies. In some schools where smart classroom facilities are available, teachers may not effectively utilize them for instructional purposes, thereby limiting the realization of the intended educational benefits. This situation could negatively affect students' learning experiences, classroom interaction, creativity, and academic achievement in the digital age. It therefore becomes necessary to investigate teacher preparedness and professional development for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State, Nigeria.

Purposes of the Study

The main study was to investigate teacher preparedness and professional development for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State, Nigeria. Specifically, the study sought to:

1. Determine the level of teachers' preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.
2. Examine the extent of professional development opportunities available to teachers for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

Scope of the Study

The study covered the level of teacher preparedness and professional development for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State, Nigeria. The content scope of the study covered the level of teachers' preparedness and professional development opportunities available for teachers the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State. The subject scope covered rural and urban public secondary school teachers in Ebonyi State.

Research Questions

The following research questions guided the study

1. What is the level of teachers' preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State?
2. To what extent are professional development opportunities available to teachers for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance to guide the study.

H0₁: There is no significant difference between rural and urban teachers on the level of teachers' preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

H0₂: There is no significant difference between rural and urban teachers on professional development opportunities available to teachers for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

METHODOLOGY

The study adopted a descriptive survey research design. Descriptive survey research design is a type of research design used to collect data from a population in order to describe existing conditions, opinions, attitudes, behaviours, and characteristics of a group without manipulating any variable. According to Creswell and Creswell (2023), descriptive survey design enables researchers to obtain quantitative descriptions of trends, perceptions, and practices within a population through the use of questionnaires and other data collection instruments. Similarly, Nworgu (2024) defined descriptive survey research design as a systematic method of gathering information from a representative sample of a population for the purpose of describing and interpreting prevailing conditions and practices in educational settings. The design was also suitable for the present study because it involved collecting data from a sample of teachers in public junior and senior secondary schools in Ebonyi State through the use of questionnaire without manipulating any of the study variables. The study was guided by two research questions and two null hypotheses. The population of the study comprised 67,213 teachers in public junior and senior secondary schools in Ebonyi State. A sample size of 398 teachers (208 urban and 190 rural) was drawn using the Taro Yamane

formula, while stratified sampling technique was employed to ensure proper representation of teachers from rural and urban secondary schools in the State.

Data for the study were collected using a structured questionnaire titled “Teacher Preparedness and Digital Pedagogy Questionnaire (TPDPQ).” The instrument was validated by experts in Educational Technology and Measurement and Evaluation to ensure content and face validity. The reliability of the instrument was established using Cronbach Alpha method, which yielded a reliability coefficient of 0.76, indicating that the instrument was reliable for the study. Data collection was carried out during the teachers’ verification exercise where teachers across Ebonyi State were in attendance. The data collected were analyzed using mean and standard deviation to answer the research questions, while t-test of independent sample was used to test the null hypotheses at 0.05 level of significance.

RESULTS

The data collected through questionnaire were analyzed based on the two research questions and two null hypotheses that guided the study. Mean and standard deviation were used to answer the research questions, while t-test of independent sample was used to test the hypotheses at 0.05 level of significance.

Research Question One: What is the level of teachers’ preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State?

Table 1: Mean Ratings and Standard Deviation on the Level of Teachers’ Preparedness for the Effective Integration of Digital Pedagogies in Smart Classrooms.

S/N	Items on Teachers’ Preparedness	Mean	SD	Decision
1	Ability to use computers for instructional delivery	2.41	0.81	Low Extent
2	Competence in the use of multimedia instructional tools	2.38	0.76	Low Extent
3	Ability to utilize online learning platforms	2.35	0.85	Low Extent
4	Ability to integrate digital resources into lesson delivery	2.40	0.79	Low Extent
5	Skills in digital classroom management	2.31	0.83	Low Extent
6	Competence in technology-based assessment	2.28	0.88	Low Extent
7	Ability to use smart classroom technologies effectively	2.37	0.80	Low Extent
8	Confidence in using digital pedagogies for teaching	2.44	0.77	Low Extent
	Grand Mean	2.38	0.81	Low Extent

Data presented in **Table 1** shows that the respondents indicated that teachers’ preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State is to a low extent, with a grand mean score of 2.38. This implies that

teachers lack adequate competencies in the use of computers, multimedia tools, online learning platforms, and smart classroom technologies.

Research Question Two: To what extent are professional development opportunities available to teachers for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State?

Table 2: Mean Ratings and Standard Deviation on Professional Development Opportunities Available to Teachers.

S/N	Items on Professional Development Opportunities	Mean	SD	Decision
9	Availability of ICT training workshops for teachers	2.34	0.91	Low Extent
10	Access to seminars on digital pedagogies	2.29	0.88	Low Extent
11	Opportunities for online professional courses	2.26	0.94	Low Extent
12	Availability of mentoring programmes on technology integration	2.22	0.90	Low Extent
13	Participation in conferences on smart classroom instruction	2.18	0.96	Low Extent
14	Availability of in-service training on educational technologies	2.31	0.87	Low Extent
15	Access to collaborative learning opportunities	2.25	0.89	Low Extent
16	Government support for teachers’ digital training	2.17	0.98	Low Extent
	Grand Mean	2.25	0.92	Low Extent

The analysis of data in Table 2 indicates that professional development opportunities available to teachers for the effective integration of digital pedagogies in smart classrooms were available to a low extent, with a grand mean of 2.25 with the standard deviation score of 0.92.

Testing of Hypotheses

H0₁: There is no significant difference between rural and urban teachers on the level of teachers’ preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

Table 3: T-Test Analysis of Rural and Urban Teachers on Teachers’ Preparedness.

Location	N	Mean	SD	df	t-cal	p-value	Decision
Urban Teachers	208	2.41	0.78	396	1.42	0.156	Not Significant
Rural Teachers	190	2.35	0.83				

Data in Table 3 shows that the calculated p-value of 0.156 is greater than the 0.05 level of significance. Therefore, the null hypothesis was not rejected. This implies that there is no significant difference between rural and urban teachers on the level of teachers’ preparedness

for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

H0₂: There is no significant difference between rural and urban teachers on professional development opportunities available to teachers for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

Table 4: T-Test Analysis of Rural and Urban Teachers on Professional Development Opportunities.

Location	N	Mean	SD	df	t-cal	p-value	Decision
Urban Teachers	208	2.68	0.87	396	1.31	0.191	Not Significant
Rural Teachers	190	2.55	0.93				

Data in Table 4 reveals that the calculated p-value of 0.191 is greater than the 0.05 level of significance. Therefore, the null hypothesis was not rejected. This indicates that there is no significant difference between rural and urban teachers on professional development opportunities available for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State.

DISCUSSION OF FINDINGS

The findings of this study revealed that teachers' preparedness for the effective integration of digital pedagogies in smart classrooms in public secondary schools in Ebonyi State is to a low extent. This implies that many teachers lack adequate competence, confidence, and practical skills required for the effective use of digital tools such as computers, multimedia devices, online learning platforms, and smart classroom technologies. This finding is consistent with Ayanwale (2024), who observed that many teachers in developing countries still struggle with the application of Fourth Industrial Revolution technologies due to inadequate training and limited exposure to digital instructional practices. It also aligns with Chukwu (2024), who reported that teachers in Nigerian public secondary schools demonstrate low digital readiness due to insufficient professional support and weak technological infrastructure. The implication of this finding is that the successful implementation of digital pedagogies in smart classrooms may be hindered if teachers are not adequately prepared to handle technology-driven instruction.

The low level of teacher preparedness may be attributed to inadequate pre-service and in-service training in ICT integration, lack of regular exposure to digital teaching tools, and limited access to functional smart classroom facilities. It may also reflect a gap in continuous professional development programmes that are specifically tailored toward digital pedagogy integration. In practical terms, teachers who are not well-prepared are likely to continue relying on traditional chalk-and-talk methods, thereby limiting students' exposure to interactive, collaborative, and learner-centred learning experiences that are essential in the 21st century. The result of the null hypothesis one stated that there is no significant difference between rural and urban teachers on the level of teachers' preparedness for the effective integration of digital pedagogies in smart classrooms. The result of the t-test analysis revealed no significant difference between rural and urban teachers. This implies that both rural and urban teachers in Ebonyi State share similar levels of low preparedness for digital pedagogy integration. The finding suggests that the challenge of inadequate teacher preparedness is a general issue across locations and not restricted to either rural or urban school environments. This may be due to uniform teacher training systems, similar curriculum exposure, and common constraints such as limited ICT infrastructure and professional development opportunities across the state.

The finding of the study showed that professional development opportunities available to teachers for the integration of digital pedagogies in smart classrooms are to a low extent. This indicates that teachers have limited access to ICT training workshops, seminars, online courses, mentoring programmes, conferences, and government-supported digital training initiatives. This finding is in agreement with Guskey (2021), who emphasized that meaningful professional development is critical for improving teachers' instructional effectiveness and technological competence. It also supports UNESCO (2023), which stressed that continuous teacher training is essential for sustaining digital transformation in education systems. The implication is that without adequate professional development, teachers may lack the capacity to adapt to emerging educational technologies and innovations. The inadequacy of professional development opportunities may be linked to poor funding of education, lack of structured ICT training programmes, and insufficient policy implementation at the school and state levels. It may also reflect weak institutional support for teacher capacity building in digital pedagogy. This situation further worsens the gap between educational policy expectations and classroom realities in public secondary schools in Ebonyi State.

The test of null hypothesis 2 revealed that there is no significant difference between rural and urban teachers on professional development opportunities available for the integration of digital pedagogies in smart classrooms. This indicates that teachers, regardless of location, experience similar levels of limited access to professional development programmes. The implication is that professional development deficiencies are systemic and affect both rural and urban secondary schools equally. This finding further confirms that the challenge is not geographical but institutional and policy-related.

CONCLUSION

Based on the findings, the study concludes that teachers in public secondary schools in Ebonyi State have low preparedness for the effective integration of digital pedagogies in smart classrooms, and professional development opportunities available to them are also inadequate. In addition, there is no significant difference between rural and urban teachers in both preparedness and access to professional development opportunities. This indicates that the challenge is widespread and systemic, requiring urgent attention to improve teacher capacity and enhance digital pedagogy implementation in secondary education.

Recommendations

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

1. The Ebonyi State Ministry of Education should organize regular and compulsory ICT-based training programmes, workshops, and hands-on practical sessions for secondary school teachers to improve their preparedness for integrating digital pedagogies in smart classrooms.
2. Government and school administrators should strengthen continuous professional development systems by providing structured, well-funded, and accessible training opportunities such as online courses, mentoring programmes, and in-service training focused on digital pedagogy and smart classroom instruction.

Educational Implications of the Study

The findings of this study have significant implications for teaching and learning in public secondary schools. First, the low level of teacher preparedness implies that students may not be fully exposed to modern digital learning experiences, thereby limiting the development of critical 21st-century skills such as creativity, collaboration, and digital literacy. Second, the

inadequacy of professional development opportunities suggests that teachers may continue to rely on outdated instructional methods, reducing the effectiveness of classroom instruction in a technology-driven educational environment.

In addition, the absence of significant differences between rural and urban teachers indicates that interventions should be implemented uniformly across all schools in Ebonyi State rather than focusing on specific locations. Finally, the study underscored the urgent need for policy makers, education stakeholders, and school administrators to prioritize teacher capacity building as a key strategy for successful digital transformation in education. Without sustained investment in teacher preparedness and professional development, the implementation of smart classroom initiatives and digital pedagogies may remain largely ineffective in the state.

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