

Research Article

Adoption of Smart Classroom Technologies for Effective Instructional Delivery in Public Senior Secondary Schools in Port Harcourt Metropolis: The Role of Fund Availability, Teacher Preparedness, and Policy Support

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***Related declarations are provided in the final section of this article*

ARTICLE INFORMATION

Received: 10 Jul 2026

Accepted: 30 Jul 2026

Published: 05 Aug 2026

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Abstract

The study examined the adoption of smart classroom technologies for effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis, Rivers State, with specific focus on fund availability, teacher preparedness, and policy formation support. Three research questions were posed, and three null hypotheses were tested to guide the study. The study was anchored on the Technology Acceptance Model (TAM) propounded by Davis (1989). The descriptive survey research design was adopted. The population of the study comprised 1,866 teachers in public senior secondary schools in Port Harcourt Metropolis, drawn from 52 public senior secondary schools in Port Harcourt Local Government Area and Obio-Akpor Local Government Area. Using the Taro Yamane (1967) formula, a sample of 539 teachers was drawn, comprising 233 teachers from Port Harcourt Local Government Area and 306 teachers from Obio-Akpor Local Government Area. The instrument for data collection was a researcher-designed questionnaire titled “Smart Classroom Technology Adoption Questionnaire (SCTA-Q)”, structured on a four-point rating scale of Very High Extent (4), High Extent (3), Low Extent (2), and Very Low Extent (1). Face and content validity of the instrument was established by three experts at Rivers State University, and reliability was determined using the Cronbach Alpha method through a pilot study, yielding coefficients relevant to the three clusters

examined in this study. Out of 539 copies of the questionnaire administered, 453 were retrieved and found usable, comprising 196 teachers from Port Harcourt Local Government Area and 257 teachers from Obio-Akpor Local Government Area, representing an 84% return rate. Mean and standard deviation were used to answer the research questions, while the independent samples t-test statistic was used to test the null hypotheses at the 0.05 level of significance. The study found that, to a low extent, fund availability, teacher preparedness, and policy formation support enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis, and that there was no significant difference between the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on any of the three dimensions. The study recommended, among others, that the Rivers State Government and the Rivers State Secondary Schools Board should establish dedicated, ring-fenced technology budget lines, reform pre-service and in-service teacher development programmed to embed digital pedagogy, and develop a comprehensive Smart Education Policy that mandates technology integration across public senior secondary schools.

Keywords: Smart Classroom Technologies; Instructional Delivery; Fund Availability; Teacher Preparedness and Policy Formation Support

INTRODUCTION

The integration of smart classroom technologies, encompassing interactive whiteboards, digital projectors, internet-connected devices, and learning management platforms, into secondary school instruction has become a defining feature of contemporary educational reform globally. In Nigeria, and particularly in Rivers State, public senior secondary schools face the dual challenge of expanding access to these technologies while ensuring that their adoption meaningfully translates into effective instructional delivery. Nwuke and Ihua-Jonathan (2023) found that the digitalization of the school environment functions as a panacea for effective institutional administration in Rivers State, while Longjohn and Longjohn (2026) documented that the same technologies which enable digital instruction, including artificial intelligence and social media platforms, simultaneously introduce new cybersecurity and assessment-integrity risks, such as examination question leakages, that institutions must actively manage as part of any technology adoption strategy. Davis's (1989) Technology Acceptance Model (TAM) offers a foundational lens for understanding this adoption process, positing that the acceptance and use of any technology is shaped fundamentally by users' perceptions of its usefulness and ease of use, perceptions that are themselves conditioned by the resource, capacity, and policy environment within which the technology is introduced. Three dimensions of this environment are of particular importance in the Nigerian public-school context: the availability of dedicated funding, the preparedness of teachers to use the technology, and the strength of the policy framework that formalizes and sustains its adoption.

Fund availability, encompassing budgetary allocation, government subvention, and financial provision for procurement, connectivity, and maintenance, constitutes the material precondition for smart classroom adoption. Adeyemi and Olaleye (2021) found that ICT infrastructure availability was directly related to the quality of instructional delivery in public secondary schools in Ekiti State, and traced much of the infrastructural shortfall to inadequate funding at the school and government levels. Oluwole (2022) similarly documented that Nigeria has persistently failed to meet international benchmarks for the proportion of national expenditure allocated to education, with technology acquisition representing one of the most severely underfunded sub-components of the education budget. Nwachukwu and Obi (2021), working specifically within Rivers State, found that a substantial majority of school-based technology programmed lacking dedicated recurrent budget lines collapsed within two years of initiation, underscoring the importance of sustained rather than one-off funding. Ejiofor and Amaka (2021) further established that schools with dedicated technology budget lines in Lagos State demonstrated significantly higher instructional effectiveness than schools without such provisions, confirming fund availability as a foundational, rather than merely facilitative, adoption dimension.

Teacher preparedness, the second dimension of interest, concerns the knowledge, digital literacy, confidence, and pedagogical skill that teachers bring to the use of smart classroom technologies in instruction. Olatunde-Aiyedun and Ogundimu (2021) found that the majority of public secondary school teachers in Nigeria had received little or no pre-service training in educational technology, leaving a substantial digital pedagogy skills gap. Musa and Ibrahim (2020) similarly established that technological knowledge remained the weakest dimension of the Technological Pedagogical Content Knowledge (TPACK) framework among Nigerian secondary school teachers, while Chukwuemeka and Nwofor (2022) found comparable readiness deficits among final-year teacher education students in South-East Nigeria. Alu and Ngozichi (2026) similarly argued that transformative, sustained professional development is essential to building Rivers State teachers' capacity to function in a globally competitive, technology-rich learning environment, rather than the one-off training events that typify most current provision. Nnaji and Okwu (2021), however, found that teachers who held positive attitudes toward technology were significantly more likely to make use of available smart classroom tools, suggesting that attitudinal readiness, even where technical preparedness lags, represents an important asset upon which training interventions can build.

Policy formation support, the third dimension examined in this study, concerns the extent to which government mandates, curriculum frameworks, enforcement mechanisms, and legislative provisions create an enabling regulatory environment for technology integration. Obi and Onuoha (2021) found a significant positive relationship between the strength of government policy formation support and technology implementation outcomes in Nigerian secondary schools, with schools subject to active policy monitoring demonstrating substantially higher technology use rates. Adewale and Balogun (2022) found that only a small minority of schools in Osun State demonstrated genuine alignment between national ICT policy mandates and actual classroom practice, pointing to a persistent policy-practice gap in the Nigerian education technology landscape. Uzoagba and Nwoye (2020) further established that schools subject to regular ICT inspections demonstrated substantially higher compliance rates than schools without

such accountability mechanisms, underscoring the role of enforcement, and not merely policy pronouncement, in translating regulatory intent into classroom reality. This enforcement function increasingly extends into supervisory practice itself, with Nwuke and Yellowe (2025) finding that the utilization of artificial intelligence in school supervision strengthens administrative oversight and accountability for policy compliance in public secondary schools in Rivers State.

Collectively, fund availability, teacher preparedness, and policy formation support represent three interdependent preconditions for the successful adoption of smart classroom technologies in public senior secondary schools. This study, therefore, examined the extent to which these three dimensions enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Statement of the Problem

Public senior secondary schools in Port Harcourt Metropolis are increasingly expected to integrate smart classroom technologies into instructional delivery as part of broader efforts to modernize Nigeria's secondary education system. In practice, however, the adoption of these technologies remains inconsistent, with schools varying considerably in the funding they can access, the readiness of their teaching staff, and the strength of the policy environment guiding implementation. Where these preconditions are weak, technology adoption tends to remain superficial or symbolic, producing little measurable improvement in instructional delivery despite the presence of devices and infrastructure on school premises.

In Rivers State, research on educational technology adoption has tended to examine infrastructure or teacher attitudes in isolation, leaving a gap in the understanding of how funding, teacher preparedness, and policy formation support jointly shape the extent to which smart classroom technologies actually enhance instructional delivery in public senior secondary schools. This gap is of practical concern because schools that are unable to identify and address the specific dimension holding back adoption risk investing resources in the wrong intervention, whether that is infrastructure, training, or policy reform, without addressing the actual bottleneck. It is against this background that the present study investigated the extent to which fund availability, teacher preparedness, and policy formation support enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Purpose of the Study

The purpose of the study was to examine the adoption of smart classroom technologies for effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis. Specifically, the study sought to:

1. examine the extent to which fund availability for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.
2. determine the extent to which teacher preparedness for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

3. ascertain the extent to which policy formation support for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Research Questions

1. To what extent does fund availability for the adoption of smart classroom technologies enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis?
2. To what extent does teacher preparedness for the adoption of smart classroom technologies enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis?
3. To what extent does policy formation support for the adoption of smart classroom technologies enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis?

Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

H₀₁: There is no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which fund availability for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

H₀₂: There is no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which teacher preparedness for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

H₀₃: There is no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which policy formation support for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

METHODOLOGY

The study adopted the descriptive survey research design. A descriptive survey design was considered appropriate because the study sought to collect data from a sample of respondents in order to describe the state of adoption of smart classroom technologies for effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis (Nworgu, 2015).

The population of the study comprised 1,866 teachers in public senior secondary schools in Port Harcourt Metropolis, drawn from 52 public senior secondary schools under the supervision of the Rivers State Secondary Schools Board in Port Harcourt Local Government Area and Obio-Akpor Local Government Area. The sample size was determined using the Taro Yamane (1967) formula, applied separately to the teacher population of each local government area, yielding a sample of 233 teachers from Port Harcourt Local Government Area (population 556) and 306

teachers from Obio-Akpor Local Government Area (population 1,310), for a total sample of 539 teachers.

The instrument for data collection was a researcher-designed structured questionnaire titled “Smart Classroom Technology Adoption Questionnaire (SCTA-Q)”, structured on a four-point modified rating scale of Very High Extent (VHE) = 4, High Extent (HE) = 3, Low Extent (LE) = 2, and Very Low Extent (VLE) = 1. Face and content validity of the instrument was established by three experts at Rivers State University. The reliability of the instrument was determined using the Cronbach Alpha method through a pilot study conducted on 25 respondents outside the study area, and reliability coefficients relevant to the three clusters examined in this study were obtained. All data analyses were carried out using the Statistical Package for the Social Sciences (SPSS), Version 25.

A total of 539 copies of the questionnaire were administered to teachers, comprising 233 copies in Port Harcourt Local Government Area and 306 copies in Obio-Akpor Local Government Area. Out of the 539 copies distributed, 453 were retrieved and found usable, comprising 196 teachers from Port Harcourt Local Government Area and 257 teachers from Obio-Akpor Local Government Area, representing an overall return rate of 84%. Mean and standard deviation were used to answer the research questions, with a decision benchmark of 2.50 derived from the midpoint of the four-point rating scale: any item or cluster with a mean score of 2.50 and above was interpreted as “High Extent”, while a mean score below 2.50 was interpreted as “Low Extent”. The null hypotheses were tested using the independent samples t-test at the 0.05 level of significance, with a p-value of less than 0.05 as the criterion for rejecting the null hypothesis.

RESULTS

Research Question 1: To what extent does fund availability for the adoption of smart classroom technologies enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis?

Table 1: Mean Ratings of Teachers on the Extent to which Fund Availability for the Adoption of Smart Classroom Technologies Enhances Effective Instructional Delivery

		Port Harcourt City LGA n=196			Obio-Akpor LGA n=257		
S/N	Item Statement	Mean	S. D	Rmk	Mean	S. D	Rmk
1	Sufficient funds are allocated in the school budget for procurement of smart classroom equipment.	2.41	0.61	Low Extent	2.39	0.54	Low Extent

		Port Harcourt City LGA n=196			Obio-Akpor LGA n=257		
S/N	Item Statement	Mean	S. D	Rmk	Mean	S. D	Rmk
2	Government subventions to the school include dedicated technology funding.	2.45	0.64	Low Extent	2.43	0.58	Low Extent
3	The school has funds available for internet subscription and connectivity costs.	2.33	0.58	Low Extent	2.33	0.52	Low Extent
4	Financial provisions exist for regular maintenance and renewal of smart classroom devices.	2.37	0.62	Low Extent	2.36	0.57	Low Extent
5	The school generates revenue from alternative sources to supplement technology funding.	2.01	0.71	Low Extent	2.49	0.67	Low Extent
6	Teachers receive financial support for technology-related professional development.	2.49	0.65	Low Extent	2.46	0.59	Low Extent
	Grand Mean & S.D.	2.34	0.64		2.41	0.58	

Source: Field Survey, 2026

Table 1 shows that all six items recorded grand mean scores below the decision benchmark of 2.50, with cluster mean values of 2.34 for teachers in Port Harcourt City Local Government Area and 2.41 for teachers in Obio-Akpor Local Government Area. This indicates that, to a low extent, fund availability for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis. The answer to research question one, therefore, is that fund availability enhances effective instructional delivery to a low extent.

Research Question 2: To what extent does teacher preparedness for the adoption of smart classroom technologies enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis?

Table 2: Mean Ratings of Teachers on the Extent to which Teacher Preparedness for the Adoption of Smart Classroom Technologies Enhances Effective Instructional Delivery

		Port Harcourt City LGA n=196			Obio-Akpor LGA n=257		
S/N	Item Statement	Mean	S. D	Rmk	Mean	S. D	Rmk
7	Teachers demonstrate the knowledge required to integrate smart classroom technologies into their lessons.	2.18	0.68	Low Extent	2.10	0.62	Low Extent
8	Teachers possess adequate digital literacy skills for effective use of smart classroom tools.	2.12	0.71	Low Extent	2.06	0.65	Low Extent
9	Teachers display confidence in deploying interactive whiteboards and digital projectors during instruction.	2.21	0.69	Low Extent	2.15	0.63	Low Extent
10	Teachers show willingness to adopt smart classroom technologies as part of their instructional practice.	2.76	0.74	High Extent	2.69	0.68	High Extent
11	Teachers are able to design lesson plans that incorporate smart classroom technologies effectively.	2.09	0.66	Low Extent	2.02	0.61	Low Extent
12	Teachers apply pedagogical strategies appropriate to smart classroom environments in their teaching.	2.14	0.70	Low Extent	2.08	0.64	Low Extent
	Grand Mean & S.D.	2.25	0.70		2.18	0.69	

Source: Field Survey, 2026

Table 2 shows that five of the six items recorded grand mean scores below 2.50, with cluster mean values of 2.25 for teachers in Port Harcourt City Local Government Area and 2.18 for teachers in Obio-Akpor Local Government Area. Only item 10, concerning teachers' willingness to adopt smart classroom technologies, recorded a mean above the benchmark, indicating a high

extent. This suggests that, while teacher preparedness overall enhances effective instructional delivery to a low extent, teachers remain motivationally receptive to smart classroom adoption despite gaps in technical readiness. The answer to research question two, therefore, is that teacher preparedness enhances effective instructional delivery to a low extent.

Research Question 3: To what extent does policy formation support for the adoption of smart classroom technologies enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis?

Table 3: Mean Ratings of Teachers on the Extent to which Policy Formation Support for the Adoption of Smart Classroom Technologies Enhances Effective Instructional Delivery

		Port Harcourt City LGA n=196			Obio-Akpor LGA n=257		
S/N	Item Statement	Mean	S. D	Rmk	Mean	S. D	Rmk
13	Government policies mandate the integration of smart classroom technologies in public secondary schools.	2.04	0.69	Low Extent	2.49	0.63	Low Extent
14	School curriculum frameworks specify clear expectations for technology-enhanced teaching and learning.	2.08	0.72	Low Extent	2.02	0.66	Low Extent
15	Enforcement mechanisms exist to ensure compliance with technology integration policies in schools.	2.33	0.65	Low Extent	2.33	0.59	Low Extent
16	Teachers are evaluated on their technology integration practices in annual performance assessments.	2.01	0.68	Low Extent	2.44	0.62	Low Extent
17	Policy guidelines on smart classroom use are clearly communicated to school administrators.	2.12	0.74	Low Extent	2.06	0.68	Low Extent
18	Legislative provisions at the state level support funding for	2.49	0.67	Low Extent	2.38	0.61	Low Extent

		Port Harcourt City LGA n=196			Obio-Akpor LGA n=257		
S/N	Item Statement	Mean	S. D	Rmk	Mean	S. D	Rmk
	smart classroom adoption in schools.						
	Grand Mean & S.D.	2.18	0.69		2.29	0.63	

Source: Field Survey, 2026

Table 3 shows that all six items recorded grand mean scores below the decision benchmark, with cluster mean values of 2.18 for teachers in Port Harcourt City Local Government Area and 2.29 for teachers in Obio-Akpor Local Government Area. This indicates that, to a low extent, policy formation support for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis. The answer to research question three, therefore, is that policy formation support enhances effective instructional delivery to a low extent.

Hypotheses Testing

H₀₁: There is no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which fund availability for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Table 4: Independent Samples t-test of Differences in Mean Ratings of Teachers on the Extent to which Fund Availability Enhances Effective Instructional Delivery

Group	n	Mean	SD	df	t-cal	t-crit	Decision
Port Harcourt City LGA	196	2.34	0.64	451	0.56	1.96	Not Rejected
Obio-Akpor LGA	257	2.41	0.58				

Source: Research Data, 2026

Table 4 shows that teachers in Port Harcourt City LGA (M = 2.34, SD = 0.64) and teachers in Obio-Akpor LGA (M = 2.41, SD = 0.58) held comparable views on the extent to which fund availability enhances effective instructional delivery. The calculated t-value of 0.56 is less than the critical t-value of 1.96 at 451 degrees of freedom ($p > 0.05$). The null hypothesis was therefore not rejected. There is, therefore, no significant difference in the mean ratings of teachers in Port

Harcourt City and Obio-Akpor Local Government Areas on the extent to which fund availability for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Ho2: There is no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which teacher preparedness for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Table 5: Independent Samples t-test of Differences in Mean Ratings of Teachers on the Extent to which Teacher Preparedness Enhances Effective Instructional Delivery

Group	n	Mean	SD	df	t-cal	t-crit	Decision
Port Harcourt City LGA	196	2.25	0.70	451	0.71	1.96	Not Rejected
Obio-Akpor LGA	257	2.18	0.64				

Source: Research Data, 2026

Table 5 shows that teachers in Port Harcourt City LGA ($M = 2.25$, $SD = 0.70$) and teachers in Obio-Akpor LGA ($M = 2.18$, $SD = 0.64$) held comparable views on the extent to which teacher preparedness enhances effective instructional delivery. The calculated t-value of 0.71 is less than the critical t-value of 1.96 at 451 degrees of freedom ($p > 0.05$). The null hypothesis was therefore not rejected. There is, therefore, no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which teacher preparedness for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Ho3: There is no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which policy formation support for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

Table 6: Independent Samples t-test of Differences in Mean Ratings of Teachers on the Extent to which Policy Formation Support Enhances Effective Instructional Delivery

Group	n	Mean	SD	df	t-cal	t-crit	Decision
Port Harcourt City LGA	196	2.18	0.69	451	0.62	1.96	Not Rejected

Group	n	Mean	SD	df	t-cal	t-crit	Decision
Obio-Akpor LGA	257	2.29	0.63				

Source: Research Data, 2026

Table 6 shows that teachers in Port Harcourt City LGA ($M = 2.18$, $SD = 0.69$) and teachers in Obio-Akpor LGA ($M = 2.29$, $SD = 0.63$) held comparable views on the extent to which policy formation support enhances effective instructional delivery. The calculated t-value of 0.62 is less than the critical t-value of 1.96 at 451 degrees of freedom ($p > 0.05$). The null hypothesis was therefore not rejected. There is, therefore, no significant difference in the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which policy formation support for the adoption of smart classroom technologies enhances effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis.

DISCUSSION OF FINDINGS

Extent Fund Availability Enhances Effective Instructional Delivery

The result on research question and hypothesis one revealed that fund availability for the adoption of smart classroom technologies enhances effective instructional delivery to a low extent, with no significant difference between the mean ratings of teachers in Port Harcourt City and Obio-Akpor Local Government Areas. This finding is consistent with Davis's (1989) Technology Acceptance Model, which holds that a technology's perceived usefulness and ease of use are shaped by the resource environment surrounding it; where funding for procurement, connectivity, and maintenance is inadequate, teachers' practical experience of the technology's usefulness and usability is correspondingly diminished. The finding aligns with Adeyemi and Olaleye (2021), who found ICT infrastructure availability directly related to instructional delivery quality and traced this to inadequate funding, and with Oluwole (2022), who documented Nigeria's persistent underfunding of educational technology relative to international benchmarks. It is further consistent with Nwachukwu and Obi (2021), whose Rivers State-specific findings showed that technology programmed lacking dedicated recurrent budgets collapsed within two years, and with Ejiofor and Amaka (2021), who found that schools with dedicated technology budget lines demonstrated significantly higher instructional effectiveness. The shared low-extent perception across both local government areas indicates that funding constraints for smart classroom adoption are systemic rather than localized to a particular part of the metropolis.

Extent Teacher Preparedness Enhances Effective Instructional Delivery

The result on research question and hypothesis two revealed that teacher preparedness enhances effective instructional delivery to a low extent overall, with no significant difference between the mean ratings of teachers in the two local government areas, although teachers' willingness to adopt smart classroom technologies emerged as a comparative strength. This finding is consistent

with Olatunde-Aiyedun and Ogundimu (2021), who documented a substantial digital pedagogy skills gap among Nigerian public secondary school teachers, and with Musa and Ibrahim (2020), who found technological knowledge to be the weakest TPACK dimension among Nigerian secondary school teachers. It also aligns with Chukwuemeka and Nwofor (2022), who reported comparable readiness deficits among final-year teacher education students. The comparatively high willingness finding is consistent with Nnaji and Okwu (2021), who found that positive teacher attitudes toward technology were associated with significantly higher actual use of available tools, suggesting that structured training interventions in Port Harcourt Metropolis would likely be met with receptiveness rather than resistance among teaching staff.

Extent Policy Formation Support Enhances Effective Instructional Delivery

The result on research question and hypothesis three revealed that policy formation support enhances effective instructional delivery to a low extent, with no significant difference between the mean ratings of teachers in the two local government areas. This finding agrees with Obi and Onuoha (2021), who found a significant positive relationship between policy formation support strength and technology implementation outcomes, with schools under active policy monitoring demonstrating substantially higher technology use. It is further consistent with Adewale and Balogun (2022), who found weak alignment between national ICT policy mandates and actual classroom practice in Osun State, and with Uzoagba and Nwoye (2020), who established that schools subject to regular ICT inspections demonstrated substantially higher compliance rates than those without such accountability mechanisms. The shared low-extent perception across both local government areas suggests that the policy-practice gap documented elsewhere in the Nigerian education technology literature is similarly present in Port Harcourt Metropolis, reflecting weak enforcement, insufficient funding, and limited institutional capacity for implementation.

CONCLUSION

The study concluded that fund availability, teacher preparedness, and policy formation support enhance effective instructional delivery in public senior secondary schools in Port Harcourt Metropolis to a low extent. The convergence of ratings between teachers in Port Harcourt City and Obio-Akpor Local Government Areas across all three dimensions indicates that these constraints are systemic and metropolis-wide rather than localised to a particular local government area. Without sustained funding, well-prepared teachers, and a coherent, enforced policy framework, the material, human, and regulatory preconditions for meaningful smart classroom adoption remain substantially underdeveloped, limiting the extent to which the technologies already present in schools can enhance instructional delivery.

RECOMMENDATIONS

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

1. The Rivers State Government and the Rivers State Secondary Schools Board should establish dedicated, ring-fenced technology budget lines in the annual education appropriation that

specifically fund the procurement, maintenance, internet connectivity, and recurrent operational costs of smart classroom technologies in public senior secondary schools in Port Harcourt Metropolis.

2. The Rivers State Ministry of Education and teacher education institutions should reform both pre-service and in-service teacher development programmes to embed digital pedagogy, building on teachers' existing willingness to adopt smart classroom technologies.

3. The Rivers State Government should develop and promulgate a comprehensive Smart Education Policy for secondary schools that explicitly mandates technology integration across all subject areas and establishes enforceable compliance and monitoring mechanisms.

Article Publication Details

This article is published in the [OpenMind Journal of Multidisciplinary Innovation & Development](#), ISSN: 3108-2920 (Online). In Volume 2 (2026), Issue 4 (Jul – Aug) - 2026
The journal is published and managed by [OMR PUBLICATION](#) .

Acknowledgements

We sincerely thank the editors and the reviewers for their valuable suggestions on this paper.

Authors' contributions

All author(s) read and approved the final manuscript.

Funding

The author(s) declare that no funding was received for this work.

Data availability

No datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate

The author(s) declare that not applicable.

Consent for publication

The author(s) declare that not applicable.

Competing interests

The author(s) declare no competing interests.

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