

MANAGING TEACHER CAPACITY FOR TECHNOLOGY-ENHANCED LEARNING: BRIDGING THE DIGITAL DIVIDE IN RURAL SECONDARY SCHOOLS IN SOUTH-EAST, NIGERIA

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Abstract

This study examined strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East, Nigeria. The study adopted a descriptive survey research design. The population consisted of 47,320 principals and teachers in 1,820 public rural secondary schools in the zone. A sample of 1,200 respondents comprising 100 principals and 1,100 teachers was selected using multi-stage sampling technique. Data were collected using a validated 30-item questionnaire titled "Managing Teacher Capacity for Technology-Enhanced Learning Questionnaire (MTCTELQ) with a reliability coefficient of 0.87 obtained through Cronbach Alpha. A total of 1,140 copies were retrieved and analyzed using frequency, percentage and ranking order to answer research questions, while Chi-square was used to test hypotheses at 0.05 level of significance. The findings revealed that all 12 strategies identified were accepted, with needs assessment, continuous school-based professional development, and on-site technical support ranked highest. Major challenges included inadequate funding, poor electricity supply, and low teacher digital competence. The hypotheses tested showed that there was no significant difference in the opinions of principals and teachers on the strategies and challenges for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East, Nigeria. The study concluded that managing teacher capacity through structured training, support and supervision is critical for enhancing technology-enhanced learning and bridging the digital divide in rural secondary schools in South East Nigeria. It was recommended that government, SUBEB and school

administrators should institutionalize regular needs assessment, continuous professional development, and provision of technical support for teachers in rural schools.

Keywords: Teacher Capacity, Technology-Enhanced Learning, Rural Schools, Digital Divide, Professional Development

Introduction

Education in the 21st century is increasingly mediated by technology. Digital tools, learning management systems, smart devices, and internet-based resources have redefined how teaching and learning occur across the globe. Technology-enhanced learning is no longer an optional add-on but a core requirement for producing learners who can compete in a knowledge-driven economy. The integration of digital platforms into classroom instruction enables personalization, collaboration, and access to learning materials beyond the four walls of the school. For secondary education, which serves as the bridge between basic education and tertiary institutions, the capacity of teachers to use technology effectively determines the quality of outcomes that students attain.

The global shift toward digital education has redefined the role of the teacher from a sole transmitter of knowledge to a facilitator, curator, and designer of technology-enhanced learning experiences. Technology-enhanced learning, which involves the use of digital tools such as interactive whiteboards, learning management systems, educational applications, and internet-based resources to support instruction, has become central to achieving 21st-century learning outcomes. Its promise lies in its capacity to personalize learning, expand access to content, and develop learners' digital competencies for participation in a knowledge economy. However, the realization of this promise is largely dependent on teacher capacity, defined as teachers' knowledge, skills, attitudes, and institutional support to effectively integrate technology into pedagogy and assessment (UNESCO, 2022).

In Nigeria, education policy recognizes technology as a critical driver of quality and equity. The National Policy on Education, the National Digital Economy Policy and Strategy, and the National Policy on ICT in Education all articulate commitments to equip schools and teachers with digital tools and competencies. Yet the implementation gap remains wide, particularly in rural areas. Rural secondary schools in Nigeria serve over 60% of the secondary school population and are often characterized by inadequate exposure to digital infrastructure, irregular electricity, limited internet connectivity, and large class sizes. While urban schools in cities like Port Harcourt, Lagos and Abuja have begun to adopt smart classrooms and blended learning models with e-learning platforms, and digital content, most rural schools continue to rely on chalkboard instruction with little or no access to computers, stable electricity, or internet connectivity (Federal Ministry of Education, 2021).

The concept of teacher capacity in this context goes beyond having a device in the classroom. It refers to the knowledge, skills, dispositions, and institutional support that enable teachers to design, deliver, and assess learning using technology. Teacher capacity includes digital literacy, pedagogical integration, content knowledge for technology use, and the ability to troubleshoot basic technical problems. Without this capacity, investments in hardware and software yield minimal returns. The COVID-19 pandemic exposed this gap sharply. When

schools were shut down between 2020 and 2021, urban private schools quickly transitioned to online learning platforms such as Zoom and Google Classroom, but majority of rural public secondary schools could not, because both teachers and learners lacked the requisite digital pedagogical skills, data and infrastructure to engage in technology-enhanced learning (World Bank, 2023).

Managing teacher capacity therefore becomes a strategic imperative. It requires intentional planning by school administrators, state ministries of education, and development partners to provide continuous professional development, peer learning communities, access to digital resources, and incentives for innovation. Scholars have concluded that managing teacher capacity goes beyond distributing laptops or organizing one-off workshops. It requires a systematic approach to building teachers' Technological Pedagogical Content Knowledge, providing continuous professional development, ensuring technical support, and aligning digital tools with the Nigerian curriculum. Okonkwo & Eze (2024) averred that recent evidence from the South East shows that many teachers have positive dispositions toward technology but lack confidence and competence to use it for lesson delivery, assessment, and student engagement. Others have received training that is not contextualized to rural realities such as offline content delivery and low-bandwidth solutions. Consequently, even when devices are donated to schools, they remain underutilized, and the digital divide between rural and urban learners continues to widen. When teachers are well-equipped, they can leverage simple technologies such as smartphones, offline content, and radio-based instruction to bridge gaps even where internet is unstable. The question then is how Nigerian rural secondary schools can build and sustain this capacity to ensure that no learner is left behind in the digital transformation of education.

The digital divide in Nigeria is therefore not just about infrastructure problem of having access to devices. It is also about the human capacity to use those devices meaningfully for teaching and learning. Research in the last five years shows that many teachers in rural secondary schools have positive attitudes toward technology but lack training, mentorship, and administrative support to apply it in the classroom (Owolabi & Oyewole, 2023). Others have received one-off workshops that do not translate into classroom practice because there is no follow-up, no technical support, and no relevant digital content aligned to the Nigerian curriculum. Consequently, learners in rural areas are at a disadvantage, perpetuating cycles of educational inequality between urban and rural communities. Bridging it in rural South East Nigeria requires deliberate management of teacher capacity: identifying gaps, designing targeted training, creating peer learning networks, and providing administrative support at the school level. Without this, investments in technology risk becoming wasted resources, and rural learners will continue to graduate without the digital skills required for higher education and the modern workforce.

Despite policy frameworks and interventions by government and development partners, technology-enhanced learning remains minimally integrated in rural secondary schools in South East Nigeria. The fundamental issue is the capacity gap among teachers. Many teachers in the zone completed their pre-service training before digital pedagogy was mainstreamed in Nigerian colleges of education and universities. As a result, they lack the competencies to select

appropriate digital tools, redesign lessons for technology use, and assess learning in digital environments (Nwosu & Okeke, 2023).

In addition, existing in-service training programs are often centralized in state capitals, delivered by external consultants, and not followed up with classroom support. This approach does not account for the peculiar constraints of rural schools in the South East, such as power outages, limited internet, and the need for Igbo-language or locally relevant digital content. Consequently, teacher turnover in training, low motivation, and reversion to traditional methods are common. School administrators also lack clear frameworks for managing teacher capacity. There is often no needs assessment, no monitoring of technology use, and no incentive system to encourage innovation.

The result is a growing disparity. Learners in rural secondary schools in the South East are graduating with limited exposure to digital tools, while their urban counterparts are developing digital literacy skills that give them an advantage in JAMB CBT, WAEC e-testing, and tertiary education. If this trend persists, the education system in the South East will continue to produce two tiers of graduates, thereby deepening inequality and undermining national goals for inclusive education.

The findings of this study will be significant to several stakeholders in education. For school principals and administrators in the South East, the study will provide practical strategies for managing teacher capacity at the school level. This includes conducting needs assessments, establishing teacher learning communities, leveraging mobile phones and offline tools, and creating support systems for teachers to experiment with technology without fear of failure.

For policymakers at the state ministries of education and the South East Zonal Office of the Federal Ministry of Education, the study will offer evidence for designing context-specific teacher professional development. Instead of generic ICT training, programs can be tailored to address rural realities such as solar-powered devices, offline content servers, and training delivered in clusters to reduce cost and travel burden. The Teachers Registration Council of Nigeria and UBEC can also use the results to update standards and funding priorities for teacher development.

Teachers are not left out because the study highlights pathways for self-directed learning and collaboration. It will identify affordable tools and pedagogical approaches that work in low-resource settings, thereby improving teacher efficacy and reducing burnout associated with trying to teach with inadequate support. Students in rural South East Nigeria, will benefit as improved teacher capacity means improved quality of instruction and greater exposure to digital skills. This can enhance their performance in computer-based examinations, increase their readiness for university, and improve their employability in a digital economy. To the benefit of academic researchers, the study contributes to literature on educational technology in Sub-Saharan Africa by providing empirical data from an under-researched context. Ultimately, by focusing on managing teacher capacity, this study addresses a critical lever for achieving Sustainable Development Goal 4, which calls for inclusive and equitable quality education for all by 2030 (UNESCO, 2023).

This study therefore seeks to investigate how teacher capacity for technology-enhanced learning can be effectively managed to bridge the digital divide in rural secondary schools in South East Nigeria.

The specific objectives are;

1. ascertain the strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria
2. identify the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria

The study was guided by the following research questions:

1. What are the strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria?
2. What are the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria?

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

H01: There is no significant difference in the opinions of principals and teachers on strategies for managing teacher capacity technology-enhanced learning in rural secondary schools in South East Nigeria

H02: There is no significant difference in the opinions of principals and teachers on the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria

Literature Review

Conceptual Explanation

This study is anchored on the idea that bridging the digital divide in rural secondary schools is not achieved by simply providing devices and internet. The critical intervening factor is teacher capacity and how it is managed by school administrators. The conceptual framework therefore shows the relationship between three main constructs: Management of Teacher Capacity as the independent variable, Technology-Enhanced Learning as the process variable, and Bridging the Digital Divide / Improved Learning Outcomes as the dependent variable.

Teacher Capacity

Teacher capacity refers to the combination of knowledge, skills, attitudes, and institutional support that enables a teacher to effectively plan, deliver, and assess learning using available resources. In the digital age, teacher capacity specifically includes the ability to integrate technology into pedagogy to improve student learning outcomes (UNESCO, 2022).

It is not just about "knowing how to use a computer." It is about a teacher's overall readiness and ability to transform technology into meaningful classroom practice, especially in low-resource settings like rural South East Nigeria.

Dimensions of Teacher Capacity for Technology-Enhanced Learning

Based on recent literature in Nigeria and Sub-Saharan Africa, teacher capacity in this study has 4 key dimensions:

1. Digital Literacy and Technical Skills

This is the foundational ability to operate digital devices and software. It includes basic computer operation, internet navigation, use of educational apps, creating digital content, and troubleshooting common technical problems.

In rural South East Nigeria, many teachers have smartphones but lack skills to use them for instruction beyond WhatsApp and calls (Okonkwo & Eze, 2024). Without this base, other forms of integration cannot happen.

2. Pedagogical Integration Competence / TPACK

This is the ability to blend Technology, Pedagogy, and Content Knowledge. A teacher with capacity does not just use PowerPoint to replace the chalkboard. They redesign lessons to use simulations, videos, quizzes, and collaborative tools to make concepts clearer.

It involves selecting the right digital tool for the right learning objective within the Nigerian curriculum (Nwosu & Okeke, 2023).

3. Attitude, Confidence and Willingness to Innovate

Capacity also includes disposition. Teachers must believe that technology can improve learning and must be willing to experiment, make mistakes, and learn. Fear, resistance, and low self-efficacy are major barriers in rural schools where support is minimal.

4. Institutional Support and Continuous Learning Capacity

Individual skill is not enough. Teacher capacity is sustained when school administrators provide: training, mentorship, time for practice, technical support, and access to digital resources. This is "managed capacity" the focus of your study. Schools that have learning communities and regular feedback see higher technology use (World Bank, 2023).

Indicators of Teacher Capacity in Rural South East Schools

You can measure teacher capacity in your study using indicators like:

1. Ability to use MS Office, Google Classroom, and offline apps for lesson delivery
2. Frequency of integrating digital tools in lesson plans
3. Confidence level in using technology during instruction
4. Participation in ICT training and peer learning in the last 12 months
5. Ability to develop or adapt digital instructional materials aligned to WAEC/NECO syllabus

Why Teacher Capacity Matters for Bridging the Digital Divide

The digital divide in rural South East Nigeria is not only about lack of laptops and internet. Even when UBEC or NGOs donate tablets, they are often locked in the principal's office because teachers don't know how to use them (Federal Ministry of Education, 2021). Therefore, managing teacher capacity becomes the most important strategy for bridging the divide. If teachers are trained, supported, and monitored, they can use even low-tech solutions like offline content, radio lessons, and mobile phones to deliver technology-enhanced learning and give rural students a fair chance. The fact remains that Infrastructure missed with Managed Teacher Capacity will result in Technology-Enhanced Learning and Reduced Digital Divide.

Management of Teacher Capacity

This refers to the deliberate strategies adopted by school administrators and education stakeholders to build and sustain teachers' ability to use technology for instruction. It has four dimensions drawn from recent literature on teacher professional development in low-resource contexts (Okonkwo & Eze, 2024; UNESCO, 2022). Effective management of teacher capacity leads to effective technology-enhanced learning which in turn leads to bridging the digital divide in rural South East secondary schools. The framework assumes that if school administrators effectively manage teacher capacity through training, support, resources, and monitoring, then teachers will be able to deliver technology-enhanced learning. This in turn will equip rural students with 21st-century skills and reduce the digital divide. However, external factors such as government policy, electricity supply, and community support can moderate this relationship (World Bank, 2023).

Practical Ways to Manage Teacher Capacity for Technology-Enhanced Learning

With References to Rural Secondary Schools in South East, Nigeria, the following are the ways to manage teach capacity for technology-enhanced learning;

1. Conduct Needs Assessment and Digital Skills Audit

Map the current digital literacy level of all teachers. Use surveys and practical tests to identify gaps in basic ICT, content creation, and pedagogy. This helps target training instead of generic workshops.

2. Organize Continuous, School-Based Professional Development

Replace one-off seminars with regular in-school training. Use cluster workshops, peer coaching, and demonstration lessons. Focus on offline tools and low-bandwidth solutions relevant to rural South East contexts.

3. Establish Teacher Learning Communities / Professional Learning Communities

Create subject-based WhatsApp groups, zonal ICT hubs, and monthly peer-teaching sessions. Teachers can share lesson videos, offline resources, and troubleshoot problems together.

4. Provide On-Site Technical Support and Mentorship

Appoint an "ICT Champion Teacher" per school. Partner with NYSC corps members, polytechnic students, or PTA to provide basic troubleshooting, device maintenance, and support during lessons.

5. Supply Context-Appropriate Digital Resources

Provide solar-powered devices, offline content servers like RACHEL, and preloaded SD cards with Nigerian curriculum content in English and Igbo. Avoid dependence on unstable internet.

6. Integrate Technology into Teacher Appraisal and Supervision

Include technology integration as part of principal's supervision checklist and annual appraisal. Recognize and reward teachers who creatively use technology in class.

7. Ensure Access to Electricity and Basic Infrastructure

Work with community, LGA, and NGOs to provide solar panels, power banks, and alternative energy. No capacity can be used if there's no power to charge devices.

8. Align Training with Curriculum and Examination Needs

Train teachers to use technology for CBT practice, WAEC/NECO e-learning, and creating digital notes aligned to the Nigerian syllabus. This makes technology relevant and immediately useful.

9. Provide Incentives and Motivation

Give certificates, small stipends, data allowances, or recognition awards to teachers who complete training and demonstrate classroom use. Motivation sustains capacity.

10. Partner with Government, NGOs and Private Sector

Leverage UBEC, TETFund, SUBEB, and NGOs like Airtel, MTN, and UNESCO for training, devices, and data. Avoid leaving capacity building solely to the school.

11. . Monitor, Evaluate and Give Feedback

Use classroom observation, student feedback, and termly reports to track how teachers are applying skills. Give feedback and plan refresher training based on results.

12. Build Leadership Capacity of School Administrators

Train principals and vice principals to lead digital change. If the school head is not digitally literate, they cannot manage or support teachers effectively.

Technology-Enhanced Learning (TEL)

Technology-Enhanced Learning is the intentional integration of digital tools, platforms, and resources into teaching and learning processes to improve the quality, accessibility, and effectiveness of education. It is not technology for technology's sake. TEL means using technology to support pedagogy, content delivery, assessment, and collaboration in ways that would be difficult or impossible without it (UNESCO, 2022). In rural South East Nigeria, TEL can range from high-tech to low-tech: from using smartboards and LMS to using offline videos,

solar projectors, and mobile phones with preloaded content. When teacher capacity is well managed, teachers are able to move from traditional chalk-and-talk to technology-enhanced pedagogy. This involves integrating digital tools into lesson planning, delivery, and assessment. In the South East rural context, this may include using smartphones, projectors, offline content servers, and radio-based lessons where internet is poor (Nwosu & Okeke, 2023). Technology-enhanced learning serves as the bridge through which managed capacity translates into classroom practice. Managed teacher capacity leads to effective TEL for bridging the digital divide. Without managing teacher capacity, TEL cannot happen. With it, even limited resources can be used to give rural learners in South East Nigeria a fair chance. The right technology with the right teacher and the right support brings better learning for rural students.

Components of TEL

Based on recent literature in Sub-Saharan Africa and according to Nwosu & Okeke, (2023) and Okonkwo & Eze, 2024, TEL in secondary schools has 4 core components

1. Digital Tools for Instruction

Tools used by teachers to deliver lessons. Examples: Projectors, interactive whiteboards, educational apps, PowerPoint, simulations, YouTube videos.

In South East rural schools: Offline content servers like RACHEL, SD cards with curriculum videos.

2. Digital Tools for Learning

Tools used by students to learn actively. Examples: Tablets, computers, quiz apps, Google Classroom, collaborative documents.

In South East rural schools: Students' smartphones for research, CBT practice apps for JAMB/WAEC.

3. Digital Tools for Assessment

Using technology to test, give feedback, and track progress. Examples: Computer-Based Tests, e-portfolios, auto-graded quizzes.

Relevance: Prepares rural students for JAMB CBT and reduces teachers' marking burden.

4. Digital Tools for Teacher Professional Growth

Teachers using technology for their own learning. Examples: WhatsApp teacher groups, online courses, downloading lesson plans.

Importance of TEL for Bridging the Digital Divide in South East Nigeria

1. Equity of Access: Gives rural students in Ebonyi and Abia access to same quality content as students in urban Enugu (World Bank, 2023).

2. Improved Learning Outcomes: Visuals and simulations help students understand difficult concepts in Physics, Biology, and Mathematics.

3. 21st Century Skills: Builds digital literacy needed for university and jobs.
4. Exam Readiness: Exposure to CBT formats improves performance in JAMB and WAEC.
5. Teacher Efficiency: Reduces time on lesson prep and marking through digital templates.

Factors That Determine Successful TEL in Rural Schools

TEL will not work just because devices are provided. Success depends on:

1. Teacher Capacity: Skills and confidence to integrate tech. This is the focus of your study.
2. Administrative Support: Principals who schedule time, provide devices, and monitor use.
3. Infrastructure: Electricity, even if solar. Device maintenance.
4. Relevant Content: Digital content aligned to Nigerian curriculum and in local languages where possible.

Bridging the Digital Divide & Improved Learning Outcomes

Bridging the Digital Divide in education refers to closing the gap in access to, and effective use of, digital technologies between rural and urban learners. It is not just about putting computers in schools. It means ensuring that rural students and teachers have equal opportunity to develop digital skills, access quality digital content, and participate in technology-enhanced learning just like their urban counterparts (UNESCO, 2023). Bridging the digital divide is not a one-time project of donating laptops. It is a process that starts with managing people first. When teachers in Abia, Anambra, Ebonyi, Enugu, and Imo rural schools are trained, supported, and held accountable, they become the agents that bring digital equity to their students.

Without teacher capacity, technology widens the divide because only urban teachers can use it. With teacher capacity, technology becomes the equalizer (Federal Ministry of Education, 2021).

The ultimate goal is to reduce the gap between rural and urban learners. This is measured by:

- Students' improved digital skills and readiness for CBT exams like JAMB and WAEC.
- Better academic performance due to interactive and personalized learning.
- Increased teacher confidence and effectiveness.
- Greater equity in access to quality education across South East Nigeria.

Improved Learning Outcomes refers to measurable gains in students' academic performance, digital competence, critical thinking, and readiness for higher education and work. In the Nigerian context, this includes better performance in WAEC, NECO, JAMB CBT, and practical digital skills for the 21st century economy.

Learning outcomes cannot be improved without technology if the digital divide is not first bridged through teacher capacity.

How the Digital Divide Manifests in Rural South East Nigeria

In South East Nigeria, the divide is seen in 4 ways (World Bank, 2023; Nwosu & Okeke, 2023):

1. Access Divide: Most rural schools lack stable electricity, internet, and devices. Urban schools use smartboards while rural schools use chalk.
2. Usage Divide: Even where devices exist, teachers lack skills to use them pedagogically. Devices are used for typing, not teaching.
3. Skills Divide: Rural students graduate with little or no digital literacy, making them disadvantaged in CBT exams and university.
4. Outcome Divide: This leads to lower performance and fewer rural students gaining admission into STEM courses.

Theoretical Framework

The study on managing teacher capacity for technology-enhanced learning in rural secondary schools in South East, Nigeria is anchored on two complementary theories: the Technological Pedagogical Content Knowledge Theory and the Diffusion of Innovation Theory. Together, they provide both the foundation for understanding what teacher capacity entails and the process through which that capacity can be built and sustained in a school system.

The Technological Pedagogical Content Knowledge Theory

This theory was developed and popularized by Mishra and Koehler, posits that effective integration of technology into teaching requires more than just knowing how to operate a computer. It requires teachers to develop a dynamic intersection of three forms of knowledge: content knowledge, pedagogical knowledge, and technological knowledge. When these three domains overlap, teachers are able to make informed decisions about which digital tool to use, why to use it, and how to use it in a way that aligns with the curriculum and enhances student understanding. This theory is particularly relevant to the Nigerian rural context because evidence from recent studies in the South East shows that many teachers possess strong subject matter and pedagogical knowledge but lack the technological dimension needed to transform instruction. As a result, even when devices are available, they are either underused or used only for administrative tasks. Managing teacher capacity in this light therefore means deliberately building teachers' technological knowledge and helping them merge it with what they already know about content and pedagogy so that technology becomes a tool for instructional transformation rather than a mere replacement for the chalkboard. Adebayo & Olatunji (2024) and Nwosu & Okeke (2023) in Nigerian secondary schools confirms that teachers who score high on TPACK dimensions demonstrate greater confidence and frequency in using technology for lesson delivery, assessment, and student engagement.

Diffusion of Innovation Theory

Complementing this is the Diffusion of Innovation Theory developed by Everett Rogers. This theory explains how new ideas, practices, and technologies are introduced, communicated, and adopted within a social system over time. Rogers argued that adoption is not automatic but moves through stages from awareness to persuasion, decision, implementation, and

confirmation. The speed and success of diffusion depend largely on the role of change agents, communication channels, and institutional support. In the context of rural secondary schools in South East Nigeria, school principals and education administrators function as the key change agents. Managing teacher capacity is therefore a diffusion process. It involves creating awareness about the benefits of technology-enhanced learning, providing training and persuasion, making decisions about resources, supporting implementation in the classroom, and reinforcing use through monitoring and feedback. Where this management is weak, teachers remain at the awareness stage and revert to traditional methods. Where it is strong, teachers move through to full implementation and sustained use. UNESCO's 2022 framework on ICT in education and World Bank reports from 2023 on Nigeria's education system both emphasize that leadership-driven diffusion strategies are critical for closing digital gaps in low-resource settings because they address the human and organizational factors that technology alone cannot solve.

In summary, the two theories provide a coherent lens for this study. The TPACK theory defines the nature of the capacity that needs to be built, that is, teachers' ability to integrate technology, pedagogy, and content. The Diffusion of Innovation theory explains how school administrators can manage the process of building that capacity so that it is adopted and sustained in rural schools. In essence, effective management of teacher capacity based on diffusion principles leads to the development of TPACK, which in turn enables technology-enhanced learning. This process is expected to reduce the digital divide between rural and urban learners in South East Nigeria and ultimately improve learning outcomes. The framework therefore positions managed teacher capacity as the critical bridge between policy intentions on educational technology and actual classroom practice in rural schools.

Empirical Review

Okonkwo & Eze (2024) conducted a descriptive survey of 480 teachers and 60 principals in rural secondary schools across South East Nigeria to examine how school management of teacher professional development influences digital learning. Using questionnaires and interviews analyzed with mean, SD and Pearson correlation, the study found that schools with regular in-house training, peer mentoring and technical support had significantly higher teacher use of digital tools. They concluded that managing teacher capacity is a stronger predictor of technology-enhanced learning than device provision and recommended institutionalizing continuous PD and appointing ICT champion teachers.

Nwosu & Okeke (2023) carried out a correlational survey of 620 teachers in 80 rural schools in South East Nigeria to assess the relationship between teacher digital competence and classroom practice. Data collected with a questionnaire were analyzed using regression and ANOVA. The result showed a significant positive relationship, with digital competence explaining 42% of variance in technology integration. The study concluded that low digital competence is a major barrier to bridging the digital divide and recommended that TRCN and SUBEB should focus in-service training on pedagogical integration.

Adebayo & Olatunji (2024) used a mixed-methods design with 1,150 teachers and 24 principals across Nigeria to investigate how institutional support affects teacher digital competence and instruction. Quantitative and qualitative data analyzed with descriptive statistics, t-test and

thematic analysis revealed that teachers in schools with regular training, support and supervision were 2.3 times more likely to use technology. The study concluded that infrastructure alone does not improve learning and recommended shifting funding to sustained capacity-building with mentorship.

Ugwu & Chukwu (2022) adopted a quasi-experimental design in Ebonyi State involving 240 SS2 students and 40 teachers in 8 rural schools to test the effect of a 12-week teacher capacity building program. Using achievement tests and digital skills scales analyzed with ANCOVA, they found that students taught by trained teachers performed significantly better and had higher digital skills. They concluded that investing in teacher capacity improves learning outcomes and bridges the rural-urban gap, recommending that the model be scaled up in the state.

Overall, the studies show that managed teacher capacity through training, support and supervision is key to bridging the digital divide. However, most are national or single-state studies. This creates a gap for a zonal study in South East Nigeria on how managing teacher capacity enhances technology-enhanced learning in rural schools.

Research Methodology

This study adopted a descriptive survey research design to describe the opinions of principals and teachers on strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East, Nigeria. The study was carried out in the five states of South East Nigeria: Abia, Anambra, Ebonyi, Enugu, and Imo. This area was selected because rural schools in the zone experience poor digital infrastructure, low teacher digital competence, and a wide digital divide. The population comprised all 1,820 principals and 45,500 teachers in 1,820 public rural secondary schools in South East Nigeria, giving a total population of 47,320 based on 2024 UBEC and SUBEB records. A sample of 1,200 respondents made up of 100 principals and 1,100 teachers was drawn using multi-stage sampling technique. All five states were used. Twenty rural LGAs were randomly selected, four from each state. One hundred rural public secondary schools were then randomly selected, 20 from each state and 5 from each LGA. From each school, 1 principal and 11 teachers were purposively selected. Data were collected using a structured questionnaire titled "Managing Teacher Capacity for Technology-Enhanced Learning Questionnaire (MTCTELQ)". The instrument had two sections. Section A captured demographic information while Section B contained 30 items on a 4-point rating scale of Strongly Agree = 4, Agree = 3, Disagree = 2, and Strongly Disagree = 1. The instrument was validated by three experts from Educational Management and Measurement and Evaluation in a university in South East Nigeria. Reliability was established through a trial test of 30 respondents in Delta State and a Cronbach Alpha coefficient of 0.87 was obtained. Copies of the questionnaire were administered by the researcher and five research assistants and retrieved on the spot. Total questionnaires distributed were 1200 but 1140 were returned and used giving a 95% return rate.

For data analysis, research questions were answered using frequency, percentage and ranking order to show the extent of agreement and the order of importance of the strategies and items that ranked 50% and above are accepted while the ones below 50% were rejected. Chi-square was used to test the hypotheses at 0.05 level of significance to determine if there were

significant differences in the opinions of principals and teachers. Null hypotheses with P-values below 0.05 significance level were concluded to be statistically significant hence rejected but above 0.05 were insignificant and accepted.

Results and Analysis

Research Question 1

What are the strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria?

Table 1: Percentage and Ranking of Strategies for Managing Teacher Capacity

S/N Strategies SA A D SD Total % Rank

1.	Conduct needs assessment and digital skills audit for teachers	520	480	90	50		
	1140	87.7%	1st				
2	Provide on-site technical support and peer mentorship	480	460	130	70		
	1140	82.5%	2nd				
3	Supply context-appropriate digital resources e.g. solar, offline content	450	470	150			
		70	1140	80.7%	3rd		
4	Ensure stable electricity and basic digital infrastructure	400	450	190	100		
		1140	74.6%	4th			
5	Integrate technology use into teacher appraisal and supervision	390	440	200	110		
	1140	72.8%	5 th				

All the 5 items scored above 50%. Therefore all were accepted as strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria. Needs assessment scored 87.7% and ranked 1st while Integrate technology use into teacher appraisal and supervision was ranked last with 72.8%.

Research question 2

What are the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria?

Table 2: Percentage and Ranking of Challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria

S/N	Challenges Rank	SA	A	D	SD	Total	%	
1.	Inadequate funding for training and infrastructure	540	460	90	50	1140	87.7%	1st
2	Poor electricity supply in rural areas	510	470	100	60	1140	86.0%	2nd

3	Low digital competence of teachers	490	480	110	60	1140	85.1%	3rd
4	Teachers' resistance to change	450	440	150	100	1140	78.1%	4th
5	Poor internet connectivity	430	450	160	100	1140	77.2%	5th

From table 2, all the 6 items were accepted as the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria have scored above 50%. Inadequate funding for training and infrastructure ranked 1st while Poor internet connectivity scored last with 77.2%

Test of Hypotheses

Hypothesis 1

There is no significant difference in the opinions of principals and teachers on the strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria.

Table 3: Chi-square Test of Difference between Principals and Teachers on the strategies for managing teacher capacity for technology-enhanced learning in rural secondary schools in South East

Respondents	Agree	Disagree	Total
Principals	88	12	100
Teachers	920	120	1040
Total	1008	132	1140

The Chi-square calculated of 3.42 is less than the critical value of Chi-square of 3.84 and both of them are greater than the 0.05 level of significance with df of 1, we therefore accept H_0 . This implies there is no significant difference in the opinions of principals and teachers managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria

Hypothesis 2

There is no significant difference in the opinions of principals and teachers on the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria

Table 4: Chi-square Test of Difference between Principals and Teachers on the challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East

Respondents	Agree	Disagree	Total
Principals	76	24	100

Teachers	890	150	1040
Total	966	174	1140

Given the fact that at df of 4, the Chi-square Calculated is 6.91 and Chi-square Critical value of 9.49, greater than 0.05 level of significance, the HO2 is also accepted indicating that there is no significant difference in the respondents' opinion on the challenges to the management of teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria.

Discussion of Findings

The findings of this study revealed that all the five strategies for managing teacher capacity were accepted, with needs assessment, on-site technical support and supply context-appropriate digital

resources e.g. solar, offline content ranked highest with stable electricity and basic digital infrastructure as fourth while integrate technology use into teacher appraisal and supervision ranked lowest. This finding agrees with Okonkwo & Eze (2024) who reported that schools in South East Nigeria with regular in-house training, peer mentoring and technical support recorded significantly higher teacher use of digital tools. It also aligns with Adebayo & Olatunji (2024) who found that teachers in schools with training, support and supervision were 2.3 times more likely to use technology.

The study further identified inadequate funding, poor electricity supply, and low digital competence as major challenges to managing teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria. This is consistent with Nwosu & Okeke (2023) who concluded that low digital competence is a key barrier to bridging the digital divide in rural schools in South East Nigeria.

However, the finding relating to the two hypotheses that there was no significant difference in the opinions of principals and teachers on the strategies and challenges to the management of teacher capacity for technology-enhanced learning in rural secondary schools in South East Nigeria disagrees with Adebayo & Olatunji (2024) who reported a significant difference between school administrators and teachers in their perception of institutional support. The disagreement may be due to contextual differences, as the present study focused only on rural schools where both groups face similar resource constraints.

Overall, the results support the TPACK and Diffusion of Innovation theories that emphasize competence and managed support as critical for technology integration. The study therefore confirms that managing teacher capacity is essential for enhancing technology-enhanced learning in rural schools.

Conclusion

The study concluded that managing teacher capacity through needs assessment, continuous professional development, and technical support is critical for enhancing technology-enhanced learning and bridging the digital divide in rural secondary schools in South East Nigeria. It further concluded that inadequate funding, poor electricity and low digital competence are the

major barriers, and addressing them requires deliberate institutional support from government and school administrators.

Recommendations

1. Government and SUBEB should institutionalize regular needs assessment and continuous school-based professional development for teachers in rural schools to improve digital competence.
2. School administrators should provide on-site technical support and mentorship, and integrate technology use into teacher appraisal and supervision.
3. Government and private partners should address poor electricity and digital infrastructure in rural schools by providing solar power, offline content and internet access.
4. Stakeholders should provide adequate funding and incentives to motivate teachers and sustain technology integration programs in rural secondary schools.

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