TEACHER TECHNOLOGY UTILIZATION AND SERVICE DELIVERY IN SECONDARY SCHOOLS IN RIVERS STATE

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Abstract

The study examined teacher technology utilization practices and service delivery in secondary schools in Rivers State. The design of the study was descriptive. The population was the8,142 teachers in public senior secondary schools in Rivers State. A sample of 382teachersselected for the study using simple random sampling technique. The instrument used for data collection was a validated questionnaire that yielded reliability co-efficient of 0.82, using test re-test method. Data generated with the instrument were analysed using mean, standard deviation and z-test at 0.05 significance level. Findings of this study showed that technology utilization level of teachers in secondary schools is low. Urban teachers had a significantly higher levels of technology utilization compared to their rural counterparts. The study revealed the challenges to technology utilization among teachers as thus: lack of access to up-to-date technology resources; insufficient training and professional development opportunities for teachers; limited internet connectivity in schools; teachers' resistance to change; financial constraints and limited integration of technology into the curriculum. The study recommended that government should provide secondary schools, especially those in rural areas, with access to up-to-date technology resources such as computers, interactive whiteboards, educational software, and internet connectivity. This can be achieved through government initiatives, partnerships with technology companies, and educational grants. The study also recommended that the Ministry of Education should encourage the integration of technology into the curriculum and teaching practices across subjects and grade levels.

Keywords:*Teacher Technology, Utilization, Practices, Service Delivery, Secondary Schools, Rivers State.*

Introduction

Education stands as a cornerstone of national development. It plays a pivotal role in shaping the future of societies, by fostering progress on various facets of national life. It serves as a catalyst for economic growth, social cohesion, and individual empowerment, making it an indispensable aspect of a nation's advancement. In line with this perspective, the Federal Republic of Nigeria (FRN, 2014) highlighted in its National Policy on Education that education serves as a tool for attaining national development goals. To ensure the realization of the goals, it is imperative that education at every level be meticulously managed. Adoption of technology, particularly Information and Communication Technology (ICT), is crucial for expediting national development. This entails creating technologically advanced educational systems and classrooms that harness the power of ICT to enhance teaching and learning processes, thus contributing to the overall progress of our nation.

Secondary education plays a crucial role in national development as it extends and enhances the foundational educational achievements of basic education. The primary objective of secondary education is to equip students with the essential skills and knowledge required for a seamless transition into tertiary

education, a goal that can be greatly facilitated through the adoption of educational technologies by teachers. According to recent research by Burns and Santally (2019), integrating technology into secondary education not only enhances students' digital literacy but also prepares them for the technological demands of higher education. In recent years, technology has become an integral part of education; it transforms the traditional teaching methods and enhances service delivery in secondary schools. Teachers are known to play a crucial role in utilizing technology to create engaging learning experiences in order to improve student outcomes, and facilitate effective service delivery. Thus, understanding teacher technology utilization practices and their impact on service delivery is essential for designing effective strategies to promote educational advancement in secondary schools.

Technology refers to the application of scientific knowledge, tools, and techniques to create products, processes, and systems that enhance human life and solve practical problems. In the context of education, technology encompasses digital tools, software applications, hardware devices, cassette players, CD players, and DVD players used to play educational audio and video materials, such as lectures, documentaries, and educational films, and online resources used to support teaching, learning, and administrative functions in schools. According to recent research (Adesina & Aderonmu, 2022), technology in education includes a wide range of digital resources such as computers, tablets, interactive whiteboards, educational software, internet connectivity, and online learning platforms. Interactive whiteboards and multimedia presentation tools have become part of the technology landscape in Nigerian classrooms. Teachers use interactive whiteboards like SMART Boards and multimedia software like Microsoft PowerPoint to deliver engaging lessons, incorporate multimedia content, and encourage student participation (Ajayi & Adu, 2019). These technological tools facilitate interactive learning experiences, enable access to vast amounts of information, and support communication and collaboration among students, teachers, and administrators.

Innovations in technologies have also ushered in new tools to enhance teaching and learning. Oladele and Oke (2019) observed that the continuing evolution and innovations such as artificial intelligence (AI), virtual reality (VR), augmented reality (AR), and mobile applications, are playing increasingly significant roles in transforming educational practices and improving learning outcomes. These advancements in technology have led to the development of personalized learning approaches, data-driven decision-making processes in educational administration, and development of teaching strategies that cater to diverse learning styles and needs. Technology integration in education has become increasingly important due to its potential to enhance learning experiences, foster student engagement, and improve overall service delivery.

Utilization of technologies in education is essential to enhance the quality of teaching and learning experiences of students. Utilization is a skilful application of tangible or intangible resources to achieve a defined goal (Okafor & Okeke, 2021). The process by which teachers incorporate digital tools, resources, and platforms into their instructional practices to enhance teaching and learning experiences and to maximize instructional effectiveness is known as teacher technology utilization. In recent years, there has been a growing emphasis on the integration of technology in education, with teachers playing a pivotal role in leveraging technological advancements to improve service delivery in secondary schools. For instance, Lee(2020) highlighted the importance of teacher technology utilization, emphasizing its potential to increase student engagement, foster collaboration among learners, and enhance educational outcomes. Effective integration of technology allows teachers to personalize instruction, and cater for diverse learning styles, thereby providing not just real-time feedback to students, but also enhancing a more dynamic and interactive classroom experience that increase teacher effectiveness and enhanced learning outcomes (Smith, 2023).

Mishra and Koehler(2009) emphasize that teacher technology utilization goes beyond simply using digital tools; it involves pedagogical shifts, professional development, and on-going support structures to maximize the benefits of technology in education. Teachers who effectively utilize technology often demonstrate increased student motivation, improved information retention, and enhanced critical thinking skills on the part of students (Oyelere, 2016). Evidence suggests that integrating technology in teaching enhances student engagement, facilitates personalized learning experiences, and improves academic outcomes (Penuel et al., 2020). For example, interactive digital tools such as educational apps, multimedia presentations, and online platforms enable teachers to create dynamic and interactive lessons that cater to diverse learning styles (Hew & Brush, 2007).

Learning Management Systems (LMS), such as Google Classroom, Moodle, Canvas and Edmodoserve as centralized hubs where teachers can organize course materials, share resources, assign tasks, and engage with students both in and out of the classroom (Jung & Latchem, 2019). Additionally, interactive whiteboards like SMART Boards and Promethean Boards have become integral in modern classrooms. These

interactive displays allow teachers to create dynamic and engaging lessons by incorporating multimedia elements, annotations, and interactive activities that not only captures students' attention and enthusiasm, but also promotes active participation, better understanding and overall teacher effectiveness (Zhang & Teo, 2020).

Technology allows for interactive and engaging learning experiences through multimedia resources, simulations, and educational games. According to Smith and Johnson (2022), interactive learning environments created with technology promote active student participation of students, thereby enhancing deeper understanding of concepts, and increased motivation to learn. Jones and Brown (2023) highlighted the benefits of collaborative platforms for group projects, peer feedback, and real-time collaboration, enhancing student engagement and learning outcomes. Educational apps such as Kahoot, Quizlet, and Duolingo are popular choices for creating interactive quizzes, flashcards, and language learning activities. These apps not only cater for different learning styles, but also promote student engagement, and enhanced opportunities for personalized learning experiences (Chai et al., 2020).

Wang and Fang (2021) multimedia presentation tools such as Microsoft PowerPoint, Prezi, and Google Slides empower teachers to deliver content in visually compelling ways. By integrating images, videos, and audio clips into their presentations, teachers can capture students' attention, reinforce key concepts, and make learning more interactive and engaging. The advent of virtual reality (VR) and augmented reality (AR) technologies has also made a significant impact on teaching practices in secondary schools. VR headsets and AR apps enable teachers to create immersive learning experiences, simulate real-world scenarios, and facilitate virtual field trips, thereby enhancing students' understanding and retention of complex concepts (Ikwuka et al., 2021a). Additionally, collaboration tools like Microsoft Teams, Zoom, and Slack have revolutionized communication and collaboration among teachers and students. These tools were especially crucial during the COVID-19 pandemic, as they enabled remote teaching and learning amidst school closures and disruptions. Usman and Igbozuruike (2020) remarked that platforms like e-Learning portals, Open Educational Resources (OER), and digital libraries offer a wealth of educational materials that teachers can leverage to supplement their lessons and provide additional resources to students.

Technology can also help to streamlines the assessment processes by enabling teachers to efficiently evaluate student progress and provide timely feedback. Martinez (2020) emphasized that digital assessment tools automate grading and track student performance trends, thereby facilitating a data-driven decision-making to improve instructional strategies. A study by Smith (2023) reported that teachers who effectively utilized technology in their classrooms created dynamic learning environments that actively engage students and promoted critical thinking skills among learners. This agrees with Chiukpai et al. (2023), who observed a notable impact of teachers' use of computer and internet resources on service provision in secondary schools. Specifically, Chiukpai et al. reported that 51.39% and 17.69% of teachers demonstrated low levels of utilizing computers and the internet in delivering lessons.

Teachers are at the forefront of implementing technology in classrooms, utilizing various digital tools and resources to enrich instructional content and support student learning (Nwadike and Godwins, 2017). However, challenges such as limited access to infrastructures such as electricity, electronic resources, inadequate training, and maintenance issues have been reported as hindrances to the full utilization of these technologies (Okafor & Okeke, 2021; Adesina & Aderonmu, 2022), while Burns and Santally (2019) added that disparities in internet connectivity, digital divide among schools, and affordability of smart-devices are significant challenges in maximizing the benefits of digital resources. A sizable number of teachers lack computer literacy skills. This deficiency hampers the effective delivery of computer services in secondary schools, consequently impacting the teaching and learning processes negatively.

An essential aspect lies in teachers' training in utilizing technology within the classroom, but equally important is students' awareness and acceptance of ICT advancements as essential learning tools in today's global context. Students are expected to align with contemporary needs, by adjusting their long-held perspectives and approaches in the light of global realities and the imperatives of integrating technological innovations into secondary education. Preliminary observations indicated that many public secondary schools in Rivers State primarily rely on face-to-face instructional methods and also distribute assignments in hardcopy format, showing minimal adoption of technology in teaching activities. This suggests apparent abandonment of the gains and reversal of advancements achieved during the COVID-19 pandemic, when e-learning platforms were utilized for teaching and learning purposes. In this light, this study investigated teacher technology utilization practices and service delivery in secondary schools in River State.

ResearchQuestions

The following research questions guided the study:

1. What are the technology utilization practices among teachers in secondary schools in Rivers State?
2. What are the challenges to technology utilization among teachers in secondary schools in Rivers State?

Hypotheses

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

1. There is no significant difference between the opinions of urban and rural teachers on the technology utilization practices among teachers in secondary schools in Rivers State.
2. There is no significant difference between the opinions of urban and rural teachers on the challenges to technology utilization among teachers in secondary schools in Rivers State

Methodology

The study adopted descriptive design. The population of the study comprises all the 8,142 teachers in 311 public senior secondary schools in Rivers State. (Source; Planning, Research and Statistics Department, RSSSB, Port Harcourt, Rivers State, 2024). The sample size was 382 (180 urban and 202 rural) teachers serving in the public senior secondary schools in Rivers State. The sampling technique used wassimple random sampling. The instruments used to generate data were 'Teacher Technology Utilization PracticesQuestionnaire' (TTUPQ). A validated instrument divided into two sections A and B was used to obtain data. Section A of the instrument was used to generate demographic data of the respondents. Section B contained items that assessed variables of the study. Reliability test of the instrument yielded coefficients of 0.82 using Cronbach Alpha. The modified four-point Likert-type rating scale of Strongly Agree (4 points), Agree (3 points), Disagree (2 points) and Strongly Disagree (1 point) was used to code responses. Items that scored $x \geq 2.50$ criteria were deemed agreed whereas those below the criteria were deemed disagreed by the respondents. The research questions were answered using mean statistics, while the hypotheses were tested with z-test at 0.05 significance level.

Answers to Research Questions

Research Question One: What are the technology utilization practices among teachers in secondary schools in Rivers State?

Table 1: Mean and standard deviation of the respondents on the technology utilization practices among teachers in secondary schools in Rivers State

S/N	Questionnaire Items	Means of Respondents					
		Urban Teachers (n= 180)			Rural Teachers (n= 202)		
		$\bar{x}$	S. D.	Remarks	$\bar{x}$	S. D.	Remarks
1	I frequently use interactive whiteboards to teach.	1.94	0.65	Disagreed	1.32	0.76	Disagreed
2	I incorporate educational apps as part of my teaching methods.	2.10	0.93	Disagreed	1.99	0.71	Disagreed
3	I utilize learning management systems (e.g., Google Classroom, Moodle) to organize and deliver course materials.	2.10	0.83	Disagreed	1.83	0.70	Disagreed
4	I integrate audio-visual tools (e.g., speakers, videos, animations) to enhance student learning experiences.	2.54	0.92	Agreed	2.45	0.64	Disagreed
5	I make use of digital textbooks and e-resources for lesson plan preparation.	2.73	0.80	Agreed	2.56	0.63	Agreed
6	I incorporate computer and smart devices to facilitate mobile learning	2.25	0.71	Disagreed	1.46	0.63	Disagreed
7	I encourage students to use productivity tools (e.g., CD, flash-drive) for assignments and projects.	2.99	0.67	Agreed	2.76	0.87	Agreed
8	I mostly use chalkboard or whiteboards for manual writing and illustration.	3.48	0.71	Agreed	3.52	0.59	Agreed
	Aggregate Mean and SD	**2.51**	**0.78**		**2.24**	**0.69**	

In table 1 above, all the itemized statements from 4, 5, 7 and 8 were agreed by both urban and rural teachers as technology utilization practices among teachers. Conversely, items 1, 2, 3, and 6 were disagreed as by both categories of the respondents ontechnology utilization practices among teachers. The resulting aggregate mean scores of 2.51 for urban respondents is higher than 2.50 criterion mean, while the aggregate mean scores of 2.24 for rural respondents is lower than 2.50 criterion mean, implying that teachers in urban areas had high technology utilization while their counterparts in the rural areas had low technology utilization. Summarily, the average aggregate mean of 2.38 (2.51+2.24) is lower than the criterion mean of 2.50, and therefore implies that technology utilization level of teachers in secondary schools is low.

Research Question Two: What are the challenges to technology utilization among teachers in secondary schools in Rivers State?

Table 2: Mean and standard deviation of the respondents on the challenges to technology utilization among teachers in secondary schools in Rivers State

S/N	Questionnaire Items	Means of Respondents					
		Urban Teachers (n= 180)			Rural Teachers (n= 202)		
		$\bar{X}$	S. D.	Remarks	$\bar{X}$	S. D.	Remarks
1	Lack of access to up-to-date technology resources (e.g., computers, software) in schools.	3.34	0.78	Agreed	3.45	0.85	Agreed
2	Insufficient training and professional development opportunities for teachers to effectively use technology.	2.96	0.92	Agreed	3.19	0.82	Agreed
3	Limited internet connectivity in schools.	2.73	0.71	Agreed	2.79	0.75	Agreed
4	Resistance to change and traditional teaching methods among teachers.	2.64	0.87	Agreed	2.71	0.71	Agreed
5	Inadequate funds to acquire and maintaining technology in schools.	3.20	0.64	Agreed	3.16	0.73	Agreed
6	Inadequate technical support for troubleshooting services for teachers.	2.92	0.81	Agreed	3.07	0.61	Agreed
7	Limited integration of technology into the curriculum and teaching practices.	2.82	0.79	Agreed	2.65	0.82	Agreed
8	Cultural beliefs about the role of technology in education.	2.02	0.63	Disagreed	2.47	0.90	Disagreed
	Aggregate Mean and SD	**2.83**	**0.77**		**2.94**	**0.77**	

In table 2 above, all the itemized statements from 1 to 7 were agreed by both categories of the respondents as challenges to technology utilization among teachers, except item 8, which was disagreed by both categories of the respondents. Given that the, resulting aggregate mean scores of 2.83 and 2.94 for urban and rural teachers respectively are higher than the criterion mean of 2.5, the agreed items are therefore the challenges to technology utilization among teachers in secondary schools in Rivers State.

Test of Hypotheses

Hypothesis One: There is no significant difference between the opinions of urban and rural teachers on the technology utilization practices among teachers in secondary schools in Rivers State.

Table 3: z-test analysis of the difference between mean ratings of the urban and rural teacherson the technology utilization practices among teachers in secondary schools in Rivers State.

S/No	Comparing Variables	N	Mean	SD	Df	z-cal	z-crit.	Sig. Level	Remark
1.	Urban Teachers	180	2.51	0.78	380	2.52	±1.96	0.05	Significant

2.	Rural Teachers	202	2.24	0.69					(H_O rejected)

In table 3, the z-cal. value of 2.52 is higher than the z-crit value of ±1.96 at 0.05 significance level and 380 degree of freedom, hence the above stated null hypothesis was rejected. This implies that there is a significant difference between the mean ratings of urban and rural respondents on the technology utilization practices among teachers in secondary schools in Rivers State.

Hypothesis Two: There is no significant difference between the opinions of urban and rural teachers on the challenges to technology utilization among teachers in secondary schools in Rivers State

Table 4: z-test analysis of the difference between mean ratings of the urban and rural teachers on the technology utilization practices among teachers in secondary schools in Rivers State.

S/No	Comparing Variables	N	Mean	SD	Df	z-cal	z-crit.	Sig. Level	Remark
1.	Urban Teachers	180	2.83	0.77	380	0.98	±1.96	0.05	Not Significant (H_O rejected)
2.	Rural Teachers	202	2.94	0.77					

In table 4, the z-cal. value of 0.98 is lower than the z-crit value of ±1.96 at 0.05 significance level and 378 degree of freedom, hence the above stated null hypothesis was accepted. This implies that there is no significant difference between the mean ratings of urban and rural respondents on the challenges to technology utilization among teachers in secondary schools in Rivers State.

Discussion of Finding

Technology utilization practices among teachers in secondary schools

The findings of the study indicate a notable difference in technology utilization practices between teachers in urban and rural areas of secondary schools. Urban teachers were observed to have higher levels of technology utilization compared to their rural counterparts. The disparity in technology integration suggests a potential gap in educational resources and opportunities between urban and rural schools. This inequality could affect students' access to modern teaching methods and digital learning resources, thereby impacting their educational outcomes. This discrepancy can be attributed to several factors that emerged from the study. One of the primary reasons for this finding as revealed in the study is infrequent use of interactive whiteboards, educational apps, learning management systems (LMS), computers, and smart devices among teachers. Research by Johnson et al. (2020) emphasized the importance of interactive whiteboards and educational apps in enhancing student engagement and learning outcomes. Similarly, according to a study by Hodges et al. (2020), the effective use of learning management systems (LMS) can promote active learning and collaboration among students. Furthermore, this study found that limited incorporation of technology tools such as computers and smart devices for teaching and learning purposes also contributes to the low technology utilization among teachers in the secondary schools. Research by Mishra and Koehler (2006) highlighted the significance of technological pedagogical content knowledge (TPACK), which emphasizes the integration of technology into pedagogy to enhance teaching effectiveness.

This study further showed that there is a significant difference between the mean ratings of urban and rural respondents on the technology utilization practices among teachers in secondary schools in Rivers State. This finding is in accord with Smith (2023), who observed that many teachers sub-Saharan Africa (including Nigeria) face barriers such as inadequate training, limited access to technology infrastructure, and a lack of awareness about the benefits of technology integration in education. It is therefore no surprise that Ikwuka et al. (2021) reported that students adopted ICT innovations for learning to a low extent in Anambra state. These challenges are particularly pronounced in rural areas, where resources and support for technology utilization are often lacking compared to urban settings (Garcia, 2021).Rural teachers may require targeted professional development programmes to enhance their technology skills and integration strategies. Training initiatives

should focus on familiarizing teachers with educational apps, interactive whiteboards, learning management systems, and other digital tools to bridge the gap with urban counterparts. These findings underscore the need for targeted interventions and professional development programmes that focus on enhancing teachers' technological competencies and promoting the integration of technology tools into teaching practices. Training initiatives should emphasize the effective use of interactive whiteboards, educational apps, learning management systems, and digital devices to facilitate interactive and engaging learning experiences for students.

Challenges to technology utilization among teachers in secondary schools

The study findings on the challenges to technology utilization among teachers in secondary schools were comprehensive and highlighted several critical issues. No significant difference was found between the mean ratings of urban and rural respondents on the challenges to technology utilization among teachers in secondary schools in Rivers State. One of the major challenges identified was the lack of access to up-to-date technology resources. This limitation hindered teachers from effectively incorporating modern tools and methods into their teaching practices. Additionally, insufficient training and professional development opportunities for teachers emerged as significant barriers, preventing them from acquiring the necessary skills to leverage technology effectively. Another crucial challenge was the limited internet connectivity in schools, which hampered access to online resources and collaborative platforms essential for modern teaching methods. This study also revealed that teachers exhibited resistance to change, particularly in adopting modern teaching methods facilitated by technology. This reluctance to adopt new technologies and incorporate them into teaching practices reflects a broader resistance to change and a preference for traditional teaching methods among some educators (Usman & Igbozuruike, 2019; Ogbonnaya, 2017). This mindset can hinder the effective integration of technology in classrooms, leading to lower technology utilization practices overall. Financial constraints, such as inadequate funds to acquire and maintain technology in schools, were also identified as substantial challenges. This lack of financial support hindered schools authorities and managers from investing in updated equipment and software necessary for effective technology utilization. Furthermore, the study noted the absence of adequate technical support and troubleshooting services for teachers, leading to frustration and difficulties in resolving technology-related issues promptly.

Additionally, the limited integration of technology into the curriculum and teaching practices posed a significant challenge. This lack of alignment between technology and educational goals hindered the effective utilization of technological tools in enhancing teaching and learning outcomes. The lack of alignment between technology and educational goals hampers the potential of technological tools to enhance teaching and learning outcomes. This can lead to reduced effectiveness in delivering curriculum content, engaging students, and fostering critical thinking and problem-solving skills. Failure to integrate technology effectively means missing out on innovative teaching methods and learning opportunities (Ikwuka et al.,2021b). Technologies such as educational apps, interactive simulations, and online resources can enrich the learning experience, promote active learning, and cater to diverse learning styles, but their potential remains untapped without proper integration (Chiukpai et al., 2023). Overall, these findings underscored the multifaceted nature of challenges faced by teachers in utilizing technology in secondary schools, emphasizing the need for targeted interventions and support mechanisms to address these barriers effectively. In this regard, educational institutions and policymakers need to prioritize strategic planning and policy reforms to promote the seamless integration of technology into the curriculum. This includes allocating resources for infrastructure development, providing on-going support and training for teachers, revising curriculum frameworks to incorporate digital literacy skills, and evaluating the impact of technology integration on learning outcomes.

Conclusion

Based findings, this study conclude that technology utilization practices among teachers in senior secondary schools in low. Significant disparities exist in technology utilization practices among teachers in urban and rural secondary schools. Urban teachers exhibited notably higher levels of technology integration compared to their rural counterparts. This study also conclude that the challenges that contribute to this difference, including limited access to up-to-date technology resources, inadequate training and professional development opportunities, limited internet connectivity, resistance to change among teachers, financial constraints for technology acquisition and maintenance, insufficient technical support, and limited integration of technology into the curriculum and teaching practices.

Recommendations

Based on the findings the following recommendations we are made.

1. Government should provide secondary schools, especially those in rural areas, with access to up-to-date technology resources such as computers, interactive whiteboards, educational software, and internet connectivity. This can be achieved through government initiatives, partnerships with technology companies, and educational grants.
2. The government should implement robust professional development opportunities for teachers to enhance their technological skills and knowledge.
3. School managers should allocate adequate funds and resources to schools for acquiring and maintaining technology equipment and technical support services.
4. The Ministry of Education should encourage the integration of technology into the curriculum and teaching practices across subjects and grade levels.

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