Innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu state, Nigeria

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Abstract
Innovation-driven educational technology plays an important role in promoting equitable learning outcomes, particularly in rural schools where educational disparities remain prevalent. However, many rural public secondary schools in Enugu State, Nigeria, face challenges such as limited access to innovative educational technologies, inadequate teachers' technological competence, and insufficient technology-supported instructional practices. This study examined the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State. Guided by a correlational research design and Walberg's Theory of Educational Productivity, the study involved 512 senior secondary school students selected through a multistage sampling procedure from a population of 5,120 students across 138 rural public secondary schools. Data were collected using the Innovation-Driven Educational Technology Questionnaire (IDETQ) and the Equitable Learning Outcomes Questionnaire (ELOQ), with Cronbach's alpha reliability coefficients of 0.85 and 0.86, respectively. Pearson Product Moment Correlation was used for data analysis at the 0.05 significance level. The findings revealed significant positive relationships between access to innovative educational technologies, teachers' technological competence, technology-supported instructional practices, and equitable learning outcomes. The study concludes that innovation-driven educational technology is a key factor in promoting equitable learning outcomes in rural secondary schools. It recommends increased investment in innovative educational technologies, continuous teacher professional development in digital pedagogies, and strengthened technology-supported instructional practices to improve equitable learning outcomes.

1. Introduction

Education remains a fundamental instrument for national development, social transformation and economic advancement. In the twenty-first century, educational systems worldwide are increasingly embracing innovation-driven educational technology as a means of improving teaching effectiveness, expanding access to knowledge and improving students' learning outcomes. Innovation-driven educational technology refers to the purposeful integration of modern digital tools, platforms and technological innovations such as computers, tablets, interactive multimedia, artificial intelligence applications, virtual learning environments, educational software and internet-based resources into teaching and learning processes. These technologies have transformed traditional classroom practices by promoting learner-centered instruction, collaborative learning, critical thinking, creativity and problem-solving skills required in the digital age (Ikegbusi et al., 2026a). Consequently, governments, educational institutions and development agencies across the globe continue to invest substantially in educational technology to improve the quality, accessibility and inclusiveness of education systems (Manafa & Ikegbusi, 2025; Li & Wang, 2021).

The growing emphasis on educational technology is closely linked to the pursuit of equitable learning outcomes among students regardless of geographical location, socioeconomic status or educational background. Equitable learning outcomes refer to the provision of fair and inclusive learning opportunities that enable all students to achieve their academic potential irrespective of existing social or environmental disadvantages (Ikegbusi et al., 2026c). Research has shown that when innovative technologies are effectively integrated into educational practices, students demonstrate improved academic achievement, enhanced motivation, greater engagement and stronger digital literacy competencies necessary for lifelong learning and workforce participation (Ikegbusi, 2025; Oyeleye & Olumorin, 2025). Educational technology also facilitates differentiated instruction, personalized learning experiences and access to diverse learning resources, thereby reducing barriers to learning and promoting educational equity.

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Globally, innovation-driven educational technology has become a strategic response to educational inequalities, particularly in underserved and rural communities. International organizations have emphasized that digital innovation can bridge educational gaps by extending learning opportunities beyond traditional classroom boundaries and providing learners with access to quality educational resources regardless of location. However, the benefits of educational technology are often unevenly distributed due to disparities in infrastructure, internet connectivity, electricity supply, availability of digital devices and teachers' technological competencies. These disparities have contributed to a persistent digital divide between urban and rural schools, thereby limiting the realization of equitable learning outcomes among students in disadvantaged communities (UNESCO, 2023). Evidence from rural educational settings indicates that inadequate technological infrastructure and limited digital access continue to constrain students' participation in technology-enhanced learning and reduce opportunities for academic advancement.

In Nigeria, educational policies increasingly recognize the importance of technological innovation in achieving quality education and preparing students for participation in a knowledge-based economy. Ikegbusi (2026) affirmed that the integration of Information and Communication Technology (ICT) into secondary education has been promoted through various governmental initiatives aimed at enhancing teaching and learning processes. Despite these efforts, significant inequalities persist between urban and rural schools in terms of access to educational technologies, utilization of digital resources and technological readiness. Studies have revealed that many rural secondary schools continue to face challenges such as inadequate ICT facilities, poor internet connectivity, unstable electricity supply, insufficient funding and limited teacher preparedness for technology integration (Modeme & Adeogun, 2021; Wordu, 2020). These challenges often hinder the effective implementation of innovation-driven educational technologies and reduce their potential impact on students' learning outcomes.

The situation appears particularly evident in rural public secondary schools in Enugu State, where educational opportunities are frequently constrained by infrastructural limitations and inadequate technological resources. Although technological innovations have transformed educational practices globally, many rural schools in Nigeria continue to experience difficulties in accessing and utilizing digital learning tools effectively (UNESCO, 2023). Existing evidence suggests that rural communities face challenges associated with insufficient ICT infrastructure, limited access to internet services and inadequate support for technology-based instruction. These conditions may restrict students' exposure to innovative learning experiences and contribute to disparities in educational achievement between rural and urban learners (Ikegbusi et al., 2026c). Consequently, students in rural schools may be disadvantaged in acquiring digital competencies and academic skills required for success in contemporary society (Tondeur et al., 2020).

Given the increasing importance of technology-driven education and the persistent concern for educational equity, there remains insufficient empirical evidence on the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools. Addressing this knowledge gap is essential for informing educational policy, guiding resource allocation and promoting effective technology integration strategies capable of enhancing learning opportunities for all students. Accordingly, this study examined the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria.

Statement of the Problem: Equitable learning outcomes are expected to ensure that all students, irrespective of their geographical location or socio-economic background, have fair opportunities to acquire the knowledge, skills and competencies necessary for academic success and lifelong learning. In rural public secondary schools in Enugu State, however, this expectation appears difficult to achieve as disparities in learning opportunities and educational outcomes continue to exist. Many students in these schools seem to have limited access to quality digital learning experiences, resulting in unequal opportunities to develop essential digital competencies and benefit from technology-enhanced instruction. The observed disparities may be associated with inadequate access to innovation-driven educational technologies, insufficient teacher competence in technology integration and limited adoption of technology-supported instructional practices. These challenges are likely to restrict students' engagement with innovative learning resources and reduce their opportunities to achieve equitable learning outcomes compared with their counterparts in better-resourced schools. Although previous studies have examined educational technology adoption, ICT integration and the digital divide in different educational contexts, there remains limited empirical evidence on the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State. This knowledge gap limits the availability of context-specific evidence needed to inform educational policies and interventions aimed at promoting digital inclusion and equitable learning opportunities. It was against this background that this study examined the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria.

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Purpose of the Study: The main purpose of this study was to examine the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria. Specifically, the study:

a. Examined the relationship between access to innovative educational technologies and equitable learning outcomes in rural public secondary schools in Enugu State.
b. Determined the relationship between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State.
c. Assessed the relationship between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State.

Scope of the Study: The geographical scope of this study covered all the 138 rural public secondary schools in Enugu State, Nigeria. The content scope specifically focused on examining the relationship between innovation-driven educational technology and equitable learning outcomes in these schools. In particular, the study examined access to innovative educational technologies, teachers' technological competence and technology-supported instructional practices in relation to equitable learning outcomes in rural public secondary schools in Enugu State.

Significance of the Study: This study was anchored on the Theory of Educational Productivity propounded by Walberg (1981), which posits that students' learning outcomes are influenced by environmental and instructional factors that facilitate effective learning. The study extended the theory to innovation-driven educational environments by providing empirical evidence on how innovative educational technologies, teachers' technological competence and technology-supported instructional practices contribute to equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria. Consequently, the study contributed to the growing body of knowledge on educational technology, digital inclusion and educational equity in developing countries.

Practically, the findings of the study provided useful information for policymakers, educational planners, school administrators, teachers and development partners on the role of innovation-driven educational technology in promoting equitable learning outcomes. The study also provided evidence for the formulation of policies and interventions aimed at improving technological infrastructure, strengthening teachers' digital competencies and enhancing technology-supported teaching practices in rural schools. Ultimately, the findings could support efforts toward achieving inclusive, equitable and quality education for all learners.

Research Questions: The study was guided by the following research questions: (1) What relationship exists between access to innovative educational technologies and equitable learning outcomes in rural public secondary schools in Enugu State? (2) What relationship exists between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State? and (3) What relationship exists between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State?

Hypotheses: The following null hypotheses were tested: (1) There is no significant relationship between access to innovative educational technologies and equitable learning outcomes in rural public secondary schools in Enugu State, (2) there is no significant relationship between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State, and (3) there is no significant relationship between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State.

2. Literature Review

2.1. Innovation-Driven Educational Technology

Innovation-driven educational technology refers to the integration and application of innovative digital tools, platforms and technology-based instructional approaches to enhance teaching, learning and educational effectiveness. It encompasses the use of emerging technologies such as computers, tablets, learning management systems, artificial intelligence applications, interactive multimedia, virtual learning environments and internet-based educational resources to facilitate meaningful learning experiences. In contemporary education, innovation-driven educational technology has become a critical component of quality education because it promotes students' engagement, collaboration, creativity, critical thinking and digital literacy skills necessary for success in the twenty-first century (UNESCO, 2023). Educational institutions across the world increasingly adopt innovative technologies to improve instructional delivery, expand access to learning resources and promote equitable educational opportunities for all learners. In the Nigerian educational system, the integration of information and communication technologies has continued to improve teaching effectiveness, facilitate access to educational resources and support innovative instructional delivery (Ikegbusi, 2016). Recent studies further indicate that the integration of artificial intelligence and other emerging

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technologies into educational processes enhances teaching effectiveness, institutional management, employability competencies and learners' preparedness for the digital age (Ikegbusi et al., 2026a; Ikegbusi et al., 2026d; Onyiorah, 2025, Onyiorah, 2026).

Innovation-driven educational technology is a multidimensional concept that can be operationalized through three key sub-variables: access to innovative educational technologies, teachers' technological competence and technology-supported instructional practices. These dimensions collectively determine the extent to which technology innovations can contribute to improved and equitable learning outcomes. Access to innovative educational technologies ensures that students have opportunities to utilize modern digital tools and learning resources; teachers' technological competence enables educators to effectively integrate technology into teaching and learning processes; while technology-supported instructional practices facilitate active, interactive and learner-centered educational experiences (Ikegbusi, 2025). Examining these dimensions provides a comprehensive understanding of how innovation-driven educational technology can enhance educational quality and equity, particularly in rural school settings. This multidimensional perspective is consistent with findings that equitable access to educational technology, effective utilization of artificial intelligence and innovative classroom practices significantly enhance students' learning outcomes and instructional effectiveness (Ikegbusi et al., 2026a; Ikegbusi et al., 2026c).

2.2. Access to Innovative Educational Technologies

Access to innovative educational technologies refers to the availability and utilization of modern digital tools, devices and learning platforms that support teaching and learning. Such technologies include computers, tablets, interactive whiteboards, educational software, virtual learning environments and internet-based resources. Adequate access enables students to participate in technology-enhanced learning, develop digital competencies and engage with diverse educational materials. Studies have shown that schools with greater access to innovative technologies tend to provide richer learning experiences and improved academic opportunities for students (Olanrewaju et al., 2021). However, rural schools often face challenges related to inadequate technological infrastructure and limited access to digital resources, which may restrict students' educational opportunities. Supporting this position, Ikegbusi et al. (2026c) established that equitable access to educational technology significantly predicts students' learning outcomes in rural public secondary schools, while Ikegbusi (2016) emphasized that the effective use of computers and the internet expands educational opportunities and improves instructional delivery.

2.3. Teachers' Technological Competence

Teachers' technological competence refers to the knowledge, skills and ability of teachers to effectively utilize and integrate technology into instructional activities. Technologically competent teachers can select appropriate digital tools, design technology-enhanced learning activities and guide students in the effective use of educational technologies. Research indicates that teachers' competence in technology integration is a significant factor in the successful implementation of educational innovations and improved student learning experiences (Tondeur et al., 2020). Furthermore, continuous professional development and digital skills training improve teachers' capacity to utilize innovative technologies effectively in the classroom. Similarly, Oguejiofor and Onyiorah (2021) observed that teachers' effective utilization of internet technologies enhances instructional delivery, while Onyiorah (2021) maintained that innovative instructional strategies improve teaching effectiveness and students' participation in classroom learning. Likewise, teachers' adoption of innovative classroom management approaches has also been associated with improved students' academic performance (Ikegbusi, 2025).

2.4. Technology-Supported Instructional Practices

Technology-supported instructional practices refer to the use of digital technologies to facilitate teaching and learning through interactive, collaborative and student-centered approaches. These practices include the use of multimedia presentations, online learning platforms, virtual discussions, digital assessments and technology-based collaborative activities. Such instructional practices promote active students' participation and increased engagement in the learning process. Scherer et al. (2021) stated that effective technology-supported instructional practices contribute to improved learning experiences and better educational outcomes by creating flexible and inclusive learning environments. In addition, technology-supported and distance learning approaches provide learners with flexible access to educational opportunities and improve instructional effectiveness, particularly during periods of educational disruption (Onyiorah, 2022). Recent evidence also suggests that artificial intelligence applications can further strengthen instructional delivery, educational supervision and administrative effectiveness in schools (Ikegbusi et al., 2026a; Ikegbusi et al., 2026d). In rural schools, the adoption of these practices can help bridge educational gaps and enhance opportunities for equitable learning outcomes among students.

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2.5. Equitable Learning Outcomes

Equitable learning outcomes refer to the fair acquisition of knowledge, skills and competencies by all students regardless of their socio-economic status, geographical location or background. Innovation-driven educational technology promotes equitable learning outcomes by providing learners with access to diverse educational resources, interactive learning experiences and opportunities to develop digital skills. This position is supported by Ikegbusi et al (2026c), who found that equitable access to educational technology significantly predicts students' learning outcomes in rural public secondary schools. Students who have access to innovative educational technologies, are taught by technologically competent teachers and participate in technology-supported instructional activities tend to demonstrate higher academic achievement, greater learning engagement and improved digital competence (Olanrewaju et al., 2021). Conversely, limited access to educational technologies may contribute to disparities in learning opportunities and educational achievement, particularly among students in rural schools. Furthermore, teachers' technological competence and effective technology-supported instructional practices enhance students' learning experiences by fostering critical thinking, creativity and problem-solving skills (Tondeur et al., 2020). In addition, the acquisition of artificial intelligence competencies and digital skills prepares learners for future educational and workplace demands, thereby strengthening equitable learning outcomes (Onyiorah, 2025; Ikegbusi et al., 2026d).

Moreover, innovative classroom practices adopted by teachers have been shown to improve students' academic performance, emphasizing the importance of innovation in achieving equitable learning outcomes (Ikegbusi, 2025; Onyiorah, 2021; Ikegbusi et al., 2026a). Furthermore, the effective utilization of ICT enhances transparency and communication within educational institutions, creating an enabling environment for improved teaching and learning (Ikegbusi et al., 2025). Similarly, integrating learners' local knowledge and cultural experiences into technology-supported instruction can enhance students' engagement, participation and inclusive learning outcomes, particularly in diverse educational settings (Ikegbusi et al., 2026b).

2.6. Theoretical Foundation: Theory of Educational Productivity

This study was anchored on the Theory of Educational Productivity propounded by Walberg (1981). The theory posits that students' learning outcomes are influenced by environmental and instructional factors that shape learning experiences. In this study, innovation-driven educational technology, particularly access to innovative educational technologies, teachers' technological competence and technology-supported instructional practices, represents key instructional factors that can enhance equitable learning outcomes. The theory therefore provides a suitable framework for explaining the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria.

2.7. Synthesis and Research Gap

Previous studies have shown that educational technology enhances students' academic achievement, engagement and digital competence (UNESCO, 2023). Similarly, teachers' technological competence has been identified as a critical factor in effective technology integration and improved learning experiences (Tondeur et al., 2020). However, existing studies have largely focused on ICT integration and digital access in general educational contexts, with limited attention to innovation-driven educational technology and equitable learning outcomes in rural public secondary schools. Consequently, empirical evidence on the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State remains limited. This study therefore addressed this gap by examining the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria.

3. Method

A correlational research design was adopted to examine the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria. This design is suitable for assessing the strength and direction of naturally occurring relationships between variables without manipulation (Ikegbusi, 2022). The study specifically examined how the sub-dimensions of innovation-driven educational technology, namely access to innovative educational technologies, teachers' technological competence and technology-supported instructional practices, relate to equitable learning outcomes among students.

The population of the study comprised 5.120 senior secondary school students drawn from 138 rural public secondary schools in Enugu State, Nigeria. The students constituted the sole and primary respondents, as the study focused on innovation-driven educational technology and its relationship with equitable learning outcomes. A multi-stage sampling procedure was adopted for the study. In the first stage, 42 rural public secondary schools were purposively selected from the 138 schools based on evidence of technology-related challenges and rural location. In the second stage, 21 schools were randomly selected from the 42 purposively identified schools to ensure representativeness. In the third stage, proportional sampling was used to determine

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the number of students selected from each school, resulting in a total sample of 512 senior secondary school students drawn across the selected schools. Finally, simple random sampling technique was used to select the individual student respondents within each school. This sampling approach, according to Obi et al (2022), ensured adequate representation of students across rural school contexts while maintaining methodological rigor and minimizing selection bias in capturing students' experiences of innovation-driven educational technology and equitable learning outcomes.

Data for the study were collected using two researcher-developed instruments: The Innovation-Driven Educational Technology Questionnaire (IDETQ) and the Equitable Learning Outcomes Questionnaire (ELOQ). The Innovation-Driven Educational Technology Questionnaire (IDETQ) was designed to measure innovation-driven educational technology in rural public secondary schools. The instrument comprised 30 items distributed across three sub-scales: Access to Innovative Educational Technologies (10 items), Teachers' Technological Competence (10 items), and Technology-Supported Instructional Practices (10 items). The Access to Innovative Educational Technologies sub-scale measured students' access to modern digital tools and learning technologies, while the Teachers' Technological Competence sub-scale assessed students' perceptions of teachers' ability to integrate technology into teaching and learning. The Technology-Supported Instructional Practices sub-scale measured students' perceptions of the use of technology to support instructional activities and enhance learning. Responses were rated on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1).

The Equitable Learning Outcomes Questionnaire (ELOQ) was administered to students to measure equitable learning outcomes in terms of academic achievement, learning engagement and digital competence. The instrument consisted of 20 items rated on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). Both instruments were validated by experts in Educational Technology and Measurement and Evaluation at Nnamdi Azikiwe University, Awka, Anambra State, Nigeria, to ensure clarity, content validity and contextual relevance.

A trial test was conducted to determine the reliability of the research instruments using 30 senior secondary school students drawn from rural public secondary schools in Anambra State, which is outside the study area. The pilot study was carried out to ensure the clarity, consistency and suitability of the items before the main study. The internal consistency of the instruments was determined using Cronbach's Alpha coefficient. The results for the Innovation-Driven Educational Technology Questionnaire (IDETQ) indicated reliability coefficients for its sub-scales as follows: Access to Innovative Educational Technologies ($\alpha = 0.85$), Teachers' Technological Competence ($\alpha = 0.83$) and Technology-Supported Instructional Practices ($\alpha = 0.87$), with an overall reliability coefficient of 0.85. The Equitable Learning Outcomes Questionnaire (ELOQ) recorded a reliability coefficient of 0.86. Since all the reliability coefficients exceeded the recommended minimum threshold of 0.70, the instruments were considered to possess good internal consistency and were therefore regarded as reliable for the study (Hair et al., 2022).

Data were analyzed using the Pearson Product Moment Correlation Coefficient (PPMCC) to determine the relationship between innovation-driven educational technology and equitable learning outcomes in rural public secondary schools. Specifically, the relationships between Access to Innovative Educational Technologies, Teachers' Technological Competence, Technology-Supported Instructional Practices and Equitable Learning Outcomes were determined independently. The hypotheses were tested using the associated p-values at a 0.05 level of significance. A p-value less than 0.05 was considered statistically significant and led to the rejection of the null hypothesis, while a p-value greater than 0.05 resulted in the acceptance of the null hypothesis.

4. Results and Discussion

4.1. Result

Research Question 1: What relationship exists between access to innovative educational technologies and equitable learning outcomes in rural public secondary schools in Enugu State?

Table 1 shown a Pearson r on access to innovative educational technologies and equitable learning outcomes in Rural Public Secondary Schools in Enugu State

Table 1. Pearson r on Access to Innovative Educational Technologies and Equitable Learning Outcomes

Correlations				
		Access to Innovative Educational Technologies	Equitable Learning Outcomes	Remark
Access to Innovative Educational Technologies	Pearson Correlation	1	0.79**	Strong Positive Relationship
	N	512	512	

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Correlations				
		Access to Innovative Educational Technologies	Equitable Learning Outcomes	Remark
Equitable Learning Outcomes	Pearson Correlation	0.79**	1	
**. Correlation is significant at the 0.05 level (2-tailed).				

The results in Table 1 showed that access to innovative educational technologies has a positive relationship with equitable learning outcomes among students in rural public secondary schools in Enugu State. The Pearson correlation coefficient (r = 0.79) indicated a strong positive relationship between access to innovative educational technologies and equitable learning outcomes. This implied that students who have greater access to innovative educational technologies are more likely to experience improved and equitable learning outcomes.

Research Question 2: What relationship exists between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State?

Table 2 shown a Pearson r on teachers' technological competence and equitable learning outcomes in Rural Public Secondary Schools in Enugu State.

Table 2. Pearson r on Teachers' Technological Competence and Equitable Learning Outcomes.

Correlations				
		Teachers' Technological Competence	Equitable Learning Outcomes	Remark
Teachers' Technological Competence	Pearson Correlation	1	0.84**	Strong Positive Relationship
	N	512	512	
Equitable Learning Outcomes	Pearson Correlation	0.84**	1	
**. Correlation is significant at the 0.05 level (2-tailed).				

The results in Table 2 of the Pearson's correlation coefficient (r) indicated that teachers' technological competence has a positive relationship with equitable learning outcomes among students in rural public secondary schools in Enugu State. The Pearson's correlation coefficient (r = 0.84) showed that there is a strong positive relationship between teachers' technological competence and equitable learning outcomes. This suggested that schools with technologically competent teachers are more likely to provide students with equitable learning opportunities and improved learning outcomes.

Research Question 3: What relationship exists between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State?

Table 3 shown a Pearson r on technology-supported instructional practices and equitable Learning outcomes in Rural Public Secondary Schools in Enugu State

Table 3. Pearson r on Technology-Supported Instructional Practices and Equitable Learning Outcomes.

Correlations				
		Technology-Supported Instructional Practices	Equitable Learning Outcomes	Remark
Technology-Supported Instructional Practices	Pearson Correlation	1	0.81**	Strong Positive Relationship
	N	512	512	
Equitable Learning Outcomes	Pearson Correlation	0.81**	1	
**. Correlation is significant at the 0.05 level (2-tailed).				

The results in Table 3 of the Pearson's correlation coefficient (r) indicated that technology-supported instructional practices have a positive relationship with equitable learning outcomes among students in rural public secondary schools in Enugu State. The Pearson's correlation coefficient (r = 0.81) showed that there is a strong positive relationship between technology-supported instructional practices and equitable learning outcomes. This submitted that schools that effectively utilize technology-supported instructional practices are more likely to promote equitable learning outcomes among students.

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Hypothesis 1: There is no significant relationship between access to innovative educational technologies and equitable learning outcomes in rural public secondary schools in Enugu State. Table 4 shown a test of significance of Pearson product moment correlation coefficient on the relationship between access to innovative educational technologies and equitable learning outcomes in Rural Public Secondary Schools in Enugu State.

Table 4. Test of Significance of Pearson Product Moment Correlation Coefficient on the Relationship between Access to Innovative Educational Technologies and Equitable Learning Outcomes

Correlations				
		Access to Innovative Educational Technologies	Equitable Learning Outcomes	Decision
Access to Innovative Educational Technologies	Pearson Correlation	1	0.79**	
	Sig. (2-tailed)		0.00	Significant
	N	512	512	
Equitable Learning Outcomes	Pearson Correlation	0.79**	1	
	Sig. (2-tailed)	0.00		
	N	512	512	
**. Correlation is significant at the 0.05 level (2-tailed).				

The result of the test of significance of Pearson Product Moment Correlation Coefficient from Table 4 showed a significant relationship between access to innovative educational technologies and equitable learning outcomes in rural public secondary schools in Enugu State with r = 0.79**, n = 512 and p-value = 0.00. Since the p-value (0.00) is less than 0.05, the null hypothesis was rejected and the alternative hypothesis accepted. This finding indicates that access to innovative educational technologies is significantly related to equitable learning outcomes among students in rural public secondary schools in Enugu State.

Hypothesis 2: There is no significant relationship between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State. Table 5 shown a test of significance of Pearson product moment correlation coefficient on the relationship between teachers' technological competence and equitable learning outcomes in Rural Public Secondary Schools in Enugu State.

Table 5. Test of Significance of Pearson Product Moment Correlation Coefficient on the Relationship between Teachers' Technological Competence and Equitable Learning Outcomes

Correlations				
		Teachers' Technological Competence	Equitable Learning Outcomes	Decision
Teachers' Technological Competence	Pearson Correlation	1	0.84**	
	Sig. (2-tailed)		0.00	significant
	N	512	512	
Equitable Learning Outcomes	Pearson Correlation	0.84**	1	
	Sig. (2-tailed)	0.00		
	N	512	512	
**. Correlation is significant at the 0.05 level (2-tailed).				

The result of the test of significance of Pearson Product Moment Correlation Coefficient from Table 5 showed a significant relationship between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State with r = 0.84**, n = 512 and p-value = 0.00. Since the p-value (0.00) is less than 0.05, the null hypothesis was rejected and the alternative hypothesis accepted. This finding indicates that teachers' technological competence is significantly related to equitable learning outcomes among students in rural public secondary schools in Enugu State.

Hypothesis 3: There is no significant relationship between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State. Table 6 shown a test of significance of Pearson product moment correlation coefficient on the relationship between technology-supported instructional practices and equitable learning outcomes in Rural Public Secondary Schools in Enugu State.

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Table 6. Test of Significance of Pearson Product Moment Correlation Coefficient on the Relationship between Technology-Supported Instructional Practices and Equitable Learning Outcomes.

Correlations				
		Technology-Supported Instructional Practices	Equitable Learning Outcomes	Decision
Technology-Supported Instructional Practices	Pearson Correlation	1	0.81**	
	Sig. (2-tailed)		0.00	Significant
	N	512	512	
Equitable Learning Outcomes	Pearson Correlation	0.81**	1	
	Sig. (2-tailed)	0.00		
	N	512	512	

**. Correlation is significant at the 0.05 level (2-tailed).

The result of the test of significance of Pearson Product Moment Correlation Coefficient from Table 6 showed a significant relationship between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State with r = 0.81**, n = 512 and p-value = 0.00. Since the p-value (0.00) is less than 0.05, the null hypothesis was rejected and the alternative hypothesis accepted. This finding indicated that technology-supported instructional practices are significantly related to equitable learning outcomes among students in rural public secondary schools in Enugu State.

4.2. Discussion of Findings

The study established that access to innovative educational technologies has a significant positive relationship with equitable learning outcomes in rural public secondary schools in Enugu State. This implied that students who have greater access to innovative educational technologies are more likely to experience improved academic achievement, learning engagement and digital competence. The finding is consistent with the Theory of Educational Productivity propounded by Walberg (1981), which emphasized that learning outcomes are influenced by the quality of instructional resources and learning environments available to students. The finding supports the study of UNESCO (2023), which reported that access to educational technologies enhances learning opportunities and promotes educational equity. However, the finding disagrees with Aina and Olaniyi (2022), who found that access to technology alone may not significantly improve learning outcomes where infrastructural and pedagogical challenges persist.

The study also revealed a significant positive relationship between teachers' technological competence and equitable learning outcomes in rural public secondary schools in Enugu State. This indicated that students taught by technologically competent teachers are more likely to benefit from equitable learning opportunities and improved educational outcomes. The finding agreed with the Theory of Educational Productivity (Walberg, 1981), which identified instructional quality as a major determinant of students' learning outcomes. The teachers' technological competence enhances effective technology integration and students' learning (Tondeur et al., 2020). However, the finding contradicts the study of Mhlanga and Moloi (2023), which found that teachers' technological competence alone may not guarantee improved learning outcomes in schools with inadequate technological infrastructure.

Furthermore, the study established a significant positive relationship between technology-supported instructional practices and equitable learning outcomes in rural public secondary schools in Enugu State. This suggests that the effective integration of technology into instructional activities promotes students' engagement, academic achievement and digital competence. The finding is consistent with the Theory of Educational Productivity (Walberg, 1981), which posits that effective instructional practices contribute significantly to improved learning outcomes. Technology-supported instructional practices enhance students' learning experiences and academic performance (Scherer et al., 2021). Technology-based instructional practices may yield limited results where students lack adequate digital literacy and technological support (Aina & Olaniyi, 2022). The findings accentuate the importance of innovation-driven educational technology in promoting equitable learning outcomes among students in rural public secondary schools.

5. Conclusion

The study concluded that innovation-driven educational technology is significantly related to equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria. Specifically, access to innovative educational technologies, teachers' technological competence and technology-supported instructional practices were positively related to equitable learning outcomes. Consistent with Walberg's (1981) Theory of Educational Productivity, the findings highlighted the importance of innovative technologies and effective instructional practices in promoting equitable learning outcomes among students in rural schools.

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Educational Implications: The findings of this study implied that innovation-driven educational technology is crucial for promoting equitable learning outcomes in rural public secondary schools. Specifically, improved access to innovative educational technologies, enhanced teachers' technological competence and effective technology-supported instructional practices can foster students' academic achievement, learning engagement and digital competence. The findings further suggested the need for sustained investment in educational technologies, continuous teacher professional development and the integration of innovative instructional practices to promote educational equity and improve learning outcomes in rural school settings.

Recommendations: Government and education stakeholders should provide rural public secondary schools with adequate access to innovative educational technologies to enhance equitable learning opportunities and improve students' learning outcomes; Education authorities should organize regular capacity-building programmes for teachers to strengthen their technological competence and promote the effective integration of innovative technologies into classroom instruction; School administrators should encourage and support the adoption of technology-supported instructional practices to enhance students' engagement, digital competence and equitable learning outcomes in rural public secondary schools.

Contributions to Knowledge: The study contributed to knowledge by establishing that innovation-driven educational technology is significantly related to equitable learning outcomes in rural public secondary schools in Enugu State, Nigeria. It specifically revealed that access to innovative educational technologies, teachers' technological competence and technology-supported instructional practices are positively related to equitable learning outcomes. The study also identified teachers' technological competence as having the strongest relationship with equitable learning outcomes.

Author Contributions

All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

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Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/ or publication of this article.

Data Availability

The datasets generated during and/ or analysed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

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