

Analyzing the Influence of ICT Education on Academic Performance and Learning Interest of the Girl Child in Adamawa State, Nigeria

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ABSTRACT: This paper analysis how Information and Communication Technology (ICT) education affects the academic achievement and learning motivation of female secondary school students in Adamawa State, Nigeria. The paper focused on three senatorial districts—Mubi, Yola South, and Mayo Belwa—and utilized a descriptive research design with data collected via a structured questionnaire from 150 female students. Results reveal that the availability and use of ICT tools have a positive impact on school attendance, understanding of subjects, skill development, and interest in learning, with more pronounced benefits reported in Yola South and Mayo Belwa than in Mubi. The findings also draw attention to uneven access to ICT resources, underscoring the need for fair distribution of infrastructure, teacher training, and student awareness initiatives to fully leverage ICT for girl child education. The study recommends expanding ICT facilities, improving teacher training, enhancing student ICT skills, and enacting supportive policies to ensure the sustainable integration of ICT in educational settings.

KEYWORDS: ICT education, academic achievement, girl child, secondary education, Adamawa State, learning motivation, digital inequality

INTRODUCTION

In recent times, the incorporation of Information and Communication Technology (ICT) into the educational landscape has gained global acknowledgment as a vital strategy for enhancing academic performance and addressing educational disparities, especially in developing nations like Nigeria. Beyond serving as a modern teaching aid, ICT offers broader access to education, benefiting marginalized populations, including the girl child. Despite global momentum emphasizing the significance of ICT in educational reform, its practical application in Nigeria, particularly for girls, continues to encounter considerable challenges.

ICT has emerged as a powerful equalizer in education, recognized worldwide for promoting inclusivity and improving learning outcomes. In Nigeria, it holds the potential to bridge long-standing educational gaps by improving access to quality learning experiences for disadvantaged groups, particularly girls. Historically, Nigerian girls have faced obstacles such as cultural norms, economic hardship, early marriages, and poor infrastructure, all contributing to persistent gender-based disparities in education (Audu & Ibrahim, 2023).

In recognition of ICT's transformative potential, the Nigerian government has introduced several policies aimed at advancing technology use in schools. One such initiative is the National Policy on ICT in Education, which provides strategic direction for deploying ICT to enhance instruction, learning, and school management. This policy emphasizes equitable access, ensuring all students—regardless of gender—can benefit from technology-enhanced education (Federal Ministry of Education, 2023).

Nonetheless, the execution of these policies remains inconsistent, particularly between urban and rural settings and across various geopolitical zones. In northern Nigeria, including Adamawa State, the adoption of ICT in schools faces unique hurdles such as poor infrastructure, limited teacher training, and deep-rooted socio-cultural constraints that hinder girls' participation in education (Yusuf & Adeoye, 2023). These issues are further complicated by security challenges that restrict access to educational opportunities for many girls.

Despite these setbacks, ICT continues to offer promising alternatives for educational advancement among girls. With the use of digital tools, e-learning platforms, and virtual classrooms, ICT can circumvent many of the physical and cultural barriers that prevent girls from attending school. These solutions provide flexible, remote learning options that are especially beneficial in conflict-prone or conservative communities (Bello & Mohammed, 2024).

Furthermore, ICT education empowers girls with essential digital and problem-solving skills, equipping them for success in a knowledge-driven economy. Evidence suggests that girls exposed to ICT perform better academically, have improved

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employment opportunities, and are more likely to participate in the digital and entrepreneurial sectors (Obi & Nwafor, 2024). Thus, promoting ICT education is instrumental to advancing Sustainable Development Goal 4 (Quality Education) and Goal 5 (Gender Equality).

The government's policies demonstrate a clear intention to integrate ICT into the education system to address these issues. However, the real-world impact of these initiatives, particularly for girls in underserved regions, is still under scrutiny. While certain areas have made notable progress, others—especially in northern Nigeria—continue to struggle due to cultural resistance, inadequate facilities, and limited policy enforcement (Ojo & Okafor, 2023).

Focusing on ICT education for the girl child is essential for achieving gender parity and fostering female empowerment in Nigeria. Research supports that when girls have access to ICT-based education, they not only excel academically but also gain competencies crucial for personal and professional development (Eze & Chukwu, 2023). Nevertheless, persistent barriers such as insufficient infrastructure, limited funding, and traditional resistance continue to obstruct effective implementation.

Given this context, assessing the practical outcomes of ICT education policies as they relate to the academic progress and engagement of the girl child in Adamawa State becomes crucial. This study seeks to evaluate the influence of these policies, identify ongoing challenges in implementation, and suggest actionable strategies to enhance the role of ICT in fostering gender-inclusive education.

This study seeks to analyze how ICT education influences the academic performance and interest of the girl child in Adamawa State. It aims to assess the extent of ICT integration in schools, the accessibility of digital tools to female students, and the impact such access has on their educational outcomes and motivation to learn.

Statement of the problems

Despite global recognition of Information and Communication Technology (ICT) as a powerful tool for enhancing educational outcomes and promoting gender equity, many regions in Nigeria—particularly in the North such as Adamawa State—continue to experience limited success in integrating ICT into the education of the girl child. Government policies and initiatives have emphasized the importance of ICT in schools; however, the practical realities reveal a significant gap between policy intentions and implementation, especially in rural and underserved communities.

Literature Review Conceptual Framework

The conceptual framework explains the relationship between the key variables in the study: ICT education, academic performance, and interest of the girl child.

The framework posits that both the availability and quality of ICT education significantly affect the academic achievement and learning motivation of the girl child. Nonetheless, this relationship is shaped by socio-cultural and economic conditions that may either support or obstruct it. Additionally, the school setting and the readiness of teachers are crucial factors determining how well ICT education leads to enhanced academic results and heightened interest in learning (Eze & Chukwu, 2023; Umar et al., 2023).

The Role of ICT in Enhancing Educational Outcomes

The incorporation of Information and Communication Technology (ICT) into the education system is widely acknowledged as a transformative approach that enhances instructional strategies and promotes better learning outcomes. In the Nigerian context, ICT serves as a viable solution to existing educational constraints by offering creative and inclusive learning platforms, particularly beneficial to disadvantaged groups like the girl child. Through ICT applications, learners gain access to interactive content, a broad range of educational materials, and opportunities to cultivate analytical and problem-solving abilities, which collectively foster academic improvement and stimulate greater enthusiasm for learning (Umar et al., 2023; Obi & Nwafor, 2024).

Information and Communication Technology (ICT) has become a fundamental driver of educational transformation by introducing modern tools and strategies that enhance both teaching efficiency and student engagement. In recent times, ICT has played a significant role in overhauling outdated educational systems, particularly in developing nations where traditional instructional methods and limited resources have posed persistent challenges.

A key advantage of ICT in education is its promotion of engaging, learner-focused instruction. With the use of digital platforms such as educational applications, multimedia content, and virtual learning environments, students can interact more dynamically with their coursework. These tools support differentiated instruction and allow for tailored learning experiences that align with individual learning preferences, thus improving comprehension and knowledge retention (Obi & Nwafor, 2024).

Additionally, ICT significantly enhances access to learning materials, especially for disadvantaged groups, including girls residing in remote or rural locations. By leveraging online resources such as digital libraries, instructional videos, and virtual classrooms, students can overcome traditional barriers like distance and socio-economic constraints. This increased accessibility often leads to higher enrollment, reduced dropout rates, and better academic achievement (Umar et al., 2023).

ICT also promotes collaborative learning and interaction, encouraging teamwork and communication between learners and

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instructors. Tools like Zoom, Google Classroom, and

online discussion boards facilitate group assignments, real-time feedback, and peer collaboration—key components of comprehensive learning. Teachers, too, benefit from ICT through access to professional development tools and the use of data analytics to monitor progress and adjust instruction accordingly (Audu & Ibrahim, 2023).

Moreover, ICT is instrumental in cultivating essential 21st-century competencies such as critical thinking, digital fluency, creativity, and innovation. These skills are vital for preparing students for modern careers and participation in the knowledge economy. For girls, acquiring ICT skills contributes to their empowerment, improves their employment prospects, and helps close gender gaps in education and the workforce (Eze & Chukwu, 2023).

However, the potential of ICT to enhance educational outcomes is contingent upon adequate infrastructure, effective teacher training, and proper implementation of educational policies. In areas like northern Nigeria, including Adamawa State, issues such as insufficient electricity, limited internet access, and cultural barriers significantly hinder the successful adoption of ICT in schools (Yusuf & Adeoye, 2023).

Academic performance

Academic performance is a vital measure of students' educational achievements and overall growth. It refers to the quantifiable results of the learning process, usually evaluated through grades, examinations, and other assessment tools. Recent research highlights that academic performance is influenced by multiple factors, including individual student capabilities, the quality of teaching, the learning environment, and availability of educational resources (Okoro & Nnamani, 2024).

The adoption of ICT in education has demonstrated significant positive effects on academic outcomes by offering students access to a variety of learning materials and interactive technologies that improve comprehension and knowledge retention. For example, digital platforms and multimedia content have been associated with greater student engagement and understanding in subjects such as mathematics, science, and language arts (Ahmed & Oladipo, 2023). Additionally, ICT supports personalized learning experiences, enabling students to progress at their own speed, which can further enhance academic performance.

Regarding the girl child, research indicates that ICT has the potential to reduce gender disparities in academic achievement. Access to ICT tools empowers girls by building their confidence and competence in academic activities, thus narrowing the performance gap between males and females (Nwafor & Obi, 2024). Nonetheless, challenges such as poor infrastructure, socio-cultural constraints, and insufficient teacher training continue to hinder academic progress in areas like Adamawa State, underscoring the need to address these issues to fully realize ICT's benefits (Yusuf & Adeoye, 2023).

In summary, improving academic performance through ICT necessitates a comprehensive strategy that enhances technology access, creates conducive learning environments, and prepares educators to effectively incorporate ICT into their instructional methods.

Gender Disparities in ICT Access and Utilization

Although Information and Communication Technology (ICT) is increasingly acknowledged as a vital tool for educational and social empowerment, significant gender gaps remain in both access to and use of ICT, especially in developing countries like Nigeria. These inequalities hinder girls and women from fully leveraging technological advancements, thereby reinforcing existing disparities in education, employment, and socio-economic involvement.

A key contributor to these gender gaps in ICT access is the influence of socio-cultural norms and beliefs that shape how boys and girls engage with technology. In many societies, traditional gender roles and stereotypes limit girls' access to digital devices and the internet, often favoring boys when it comes to opportunities for technology-related learning (Eze & Chukwu, 2023). Consequently, girls have fewer opportunities to acquire essential ICT skills early on, which negatively affects their academic success and reduces their chances of pursuing careers in STEM (Science, Technology, Engineering, and Mathematics).

Economic challenges also significantly restrict girls' ICT access. In financially constrained households, families often cannot provide multiple devices or internet connections, and boys are more likely to receive priority access to technology. This economic disparity intensifies gender inequalities, particularly in rural and underdeveloped regions such as Adamawa State, where poverty is more widespread and infrastructure is lacking (Umar et al., 2023).

Furthermore, school infrastructure and policies frequently lack a gender-sensitive approach to integrating ICT. Many schools have inadequate ICT resources, and where facilities do exist, girls often encounter obstacles such as the absence of female ICT instructors or an environment that discourages their participation in technology-related activities (Audu & Ibrahim, 2023). Concerns over safety, including risks of harassment and cyberbullying, also deter many girls from fully engaging with ICT both at school and at home.

The gender digital divide is further widened by the scarcity of ICT training programs tailored to girls' needs. Numerous efforts to boost ICT literacy fail to specifically target girls or address the particular barriers they face, leading to lower female involvement in ICT education and digital skills development (Obi & Nwafor, 2024).

Addressing these disparities is essential for fostering inclusive growth and gender equality. Strategies such as raising community

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awareness to challenge cultural biases, making devices and internet access more affordable, implementing gender-sensitive school policies, and designing ICT initiatives that empower girls have demonstrated positive impacts in closing the digital gap (Eze & Chukwu, 2023). For instance, mentorship programs and role models in technology encourage girls to pursue ICT education and careers, enhancing their confidence and ambitions (Yusuf & Adeoye, 2023).

In summary, gender-based differences in ICT access and use continue to be a major obstacle to educational fairness and the empowerment of girls. Effective solutions that tackle socio-cultural, economic, and institutional challenges are necessary to enable girls in areas like Adamawa State to fully benefit from ICT for their academic growth and personal development.

Theoretical Framework

Various theories may support this study, with two being particularly relevant:

Constructivist Learning Theory (Piaget, Vygotsky)

This theory posits that learners build knowledge actively by engaging with their surroundings. ICT tools facilitate interactive and learner-focused education, enabling girls to participate deeply with the material, thereby improving comprehension, memory retention, and motivation to learn (Woolfolk, 2021) and (Vygotsky, 1978).

Technology Acceptance Model (TAM) – Davis (1989)

The Technology Acceptance Model (TAM) describes the process through which individuals accept and utilize technology. It suggests that two main factors—perceived usefulness and perceived ease of use—shape users’ attitudes toward adopting new technologies. In the context of this study, the extent to which the girl child perceives ICT as beneficial and easy to use plays a crucial role in her willingness to engage with digital learning tools, which can, in turn, impact her academic achievement and interest in learning (Davis, 1989; Alhassan & Musa, 2023).

METHODOLOGY

This research utilized a descriptive design to investigate how the implementation of government policies on ICT education influences the academic performance and learning interest of female students in Adamawa State, Nigeria. The study population consisted of female secondary school students from three senatorial districts—Mubi, Yola South, and Mayo Belwa—chosen to represent the state’s geographic and demographic diversity. Using purposive sampling, one secondary school with functional ICT resources and a substantial female student population was selected from each district. A total of 150 female students participated, with 50 students sampled from each school. Data collection was carried out using a structured questionnaire specifically designed for this study, employing a 5-point Likert scale to measure access to ICT, perceptions of policy effects, academic achievement, and learning interest. The questionnaire was reviewed by experts and pilot-tested to confirm its reliability. Permission was obtained from relevant educational authorities and school administrators prior to data collection, with assurances of confidentiality and voluntary participation provided to respondents. Descriptive statistical methods, such as frequencies, means, and percentages, were used to analyze the data and summarize participants’ perspectives on ICT and educational outcomes (Creswell, 2014; Kothari, 2019). This approach facilitated the gathering of quantitative data required to assess the impact of ICT policy implementation on the education of the girl child in the selected districts.

RESULTS AND DISCUSSION

The responses regarding the impact of ICT education are summarized below:

Table 1: Age Distribution of Respondents

School Location	Age Range	Frequency (f)	Percentages (%)	Mean
Mubi	12-14	-	-	17.00
	15-17	25	50	
	18-19	25	50	
Yola South	12-14	18	36	15.55
	15-17	24	48	

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	18-19	8	16	
Mayo belwa	12-14	-	-	17.00
	15-17	20	40	
	18-19	30	60	

Table 2: Grade Level Distribution of Respondents

School Location	Grade Level	Frequency (f)	Percentage (%)	Mean
Mubi	JSS1-3	10	20	2.00
	SS1-3	40	80	
Yola South	JSS1-3	25	50	2.50
	SS1-3	25	50	
Mayo belwa	JSS1-3	12	24	2.40
	SS1-3	38	76	
Total	-	150	100	2.30

Table 3: Impact of ICT Education on the Girl Child on Academic performance

S/N	Statement	SD (Freq, %)	D (Freq, %)	N (Freq, %)	A (Freq, %)	SA (Freq, %)	Mean
1.	ICT facilities availability has increased girl child school participation	Mubi (10, 20%)	Mubi (25, 50%)	Mubi (0, 0%)	Mubi (5, 10%)	Mubi (10, 20%)	2.60
		Yola 8%)(4,	Yola 0%)(0,	Yola (6, 12%)	Yola (16, 32%)	Yola (24, 48%)	4.12
		Mayo (5, 10%)	Mayo (5, 10%)	Mayo (0, 0%)	Mayo (35, 70%)	Mayo (5, 10%)	3.60
2.	ICT education has contributed to my overall personal interest in education	Mubi (5, 10%)	Mubi (30, 60%)	Mubi (5, 10%)	Mubi (0, 0%)	Mubi (10, 20%)	2.60

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		Yola (6,	Yola (0,	Yola (0,	Yola (20,	Yola (24,	4.12
		12%)	0%)	0%)	40%)	48%)	
		Mayo (15, 30%)	Mayo (10, 20%)	Mayo (5, 10%)	Mayo (20, 40%)	Mayo (0, 0%)	2.60
3.	ICT education has improved my understanding of various subjects	Mubi (5, 10%)	Mubi (40, 80%)	Mubi (0, 0%)	Mubi (5, 10%)	Mubi (0, 0%)	2.00
		Yola (6, 12%)	Yola (0, 0%)	Yola (8, 16%)	Yola (12, 24%)	Yola (24, 48%)	4.00
		Mayo (10, 20%)	Mayo (10, 20%)	Mayo (0, 0%)	Mayo (30, 60%)	Mayo (0, 0%)	3.20
4.	The use of ICT has positively affected my academic performance	Mubi (0, 0%)	Mubi (40, 80%)	Mubi (0, 0%)	Mubi (5, 10%)	Mubi (5, 10%)	2.30
		Yola (24, 48%)	Yola (8, 16%)	Yola (8, 16%)	Yola (4, 8%)	Yola (14, 28%)	2.60
		Mayo (20, 40%)	Mayo (15, 30%)	Mayo (0, 0%)	Mayo (10, 20%)	Mayo (5, 10%)	2.30
5.	ICT education has enhanced my ability to acquire new skills	Mubi (10, 20%)	Mubi (30, 60%)	Mubi (0, 0%)	Mubi (0, 0%)	Mubi (10, 20%)	2.20
		Yola (8, 16%)	Yola (0, 0%)	Yola (0, 0%)	Yola (16, 32%)	Yola (30, 60%)	4.36
		Mayo (0, 0%)	Mayo (0, 0%)	Mayo (0, 0%)	Mayo (30, 60%)	Mayo (20, 40%)	4.40

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The demographic data shows on table 1, revealed significant variations in the age distribution among the three schools. In Mubi, the majority of respondents were aged between 15-19 years, with equal distribution across the two age groups. In contrast, Yola South had a wider age range (12-19 years), with a mean age of 15.5 years, reflecting the inclusion of younger students in junior secondary school (JSS1-3). Mayo Belwa had a higher representation of students aged 18- 19 years, contributing to the mean age of 17 years.

These results align with findings from recent studies indicating that older students are more likely to remain in school in rural areas like Mubi and Mayo Belwa, due to delayed school enrollment caused by socio-economic and cultural factors (Audu & Ibrahim, 2023). Younger students, such as those in Yola South, benefit from urban-based awareness programs that promote earlier enrollment and retention in school (Obi & Nwafor, 2024).

In terms of grade level, table 2 shows a larger proportion of students in Mubi (80%) and Mayo Belwa (76%) were in senior secondary school (SS1-3), compared to 50% in Yola South. This trend reflects disparities in access to secondary education, where rural areas like Mayo Belwa exhibit higher dropout rates in junior secondary levels due to socio-economic constraints (Yusuf & Adeoye, 2023). Conversely, urban centers like Yola South maintain an even distribution across junior and senior secondary levels, attributed to better infrastructure and government support for education (Federal Ministry of Education, 2023).

The findings underscore the uneven distribution of educational opportunities and resources in Adamawa State. The urban district of Yola South demonstrates a more balanced educational demographic, supporting arguments that urban schools benefit from better access to ICT resources and teacher training (Bello & Mohammed, 024). Conversely, rural districts like Mubi and Mayo Belwa show patterns of delayed enrollment and concentrated representation in senior grades, corroborating studies on the challenges of implementing ICT education in rural Nigeria (Audu & Ibrahim, 2023).

The mean age of 16.5 years across all districts suggests that ICT education initiatives should account for older students, particularly in rural areas, to maximize impact. The grade level mean of 2.3 also highlights the need to address barriers to JSS education, as students in this category are more vulnerable to dropping out due to socio-economic factors. This reflects the typical age range for students in senior secondary school (SS1-SS3) in Nigeria, where the average starting age is around 15-16 years, depending on factors like early or late school enrollment. The mean age also suggests that the majority of the respondents are older adolescents, which aligns with the broader focus of this project on understanding ICT education's impact on secondary school- aged girls.

The results in table 3, reveal significant variations in the impact of ICT on girl child education across the three districts.

Mubi Scores consistently lower, with means ranging between 2.00 and 2.60. This reflects limited ICT availability and usage, corroborating findings by Okeke and Bello (2023), which highlight a lack of ICT infrastructure and training in rural schools.

Yola Scores the highest, with means above 4.00 in most categories, demonstrating effective ICT integration. This supports Eze et al.'s (2022) assertion that urban schools have better ICT access and usage, leading to positive educational outcomes.

Mayo Belwa Presents mixed results, with higher scores in skill acquisition (4.40) and understanding (3.20). This indicates moderate ICT utilization, aligning with Bello et al. (2023), who found semi-urban schools benefiting from transitional ICT investments.

The findings suggest targeted interventions are needed in rural areas like Mubi to improve ICT infrastructure and training for enhanced educational impact. In urban areas like Yola, continued investment in ICT will sustain its positive outcomes.

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

SUMMARY

This research examined how Information and Communication Technology (ICT) education affects the academic achievement and learning interest of female secondary school students in three senatorial districts of Adamawa State—Mubi, Yola South, and Mayo Belwa. Using a descriptive research design, data were gathered from 150 female students via a structured questionnaire. The results showed that the presence and use of ICT facilities positively impacted school attendance and understanding of academic content, especially in Yola South and Mayo Belwa, where students strongly acknowledged the benefits of ICT. Conversely, some participants from Mubi reported fewer advantages, indicating possible disparities in access or effective use of ICT resources. Overall, the findings suggest that ICT education significantly enhances the academic involvement, skill development, and enthusiasm for learning among the girl child.

CONCLUSION

The study concludes that ICT education is vital in boosting the academic performance and motivation of female students in Adamawa State. When ICT tools are adequately accessible and

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well-integrated into teaching and learning activities, students tend to develop a better grasp of subjects, participate more actively, and show increased interest in their education. Nonetheless, the differences observed between districts underscore the need for fairer distribution of ICT infrastructure and support. To fully harness the benefits of ICT for girl child education, it is essential that policymakers and education stakeholders ensure continuous access and provide proper training for both students and teachers.

RECOMMENDATIONS

1. Government and educational authorities should prioritize expanding functional ICT facilities in all secondary schools, especially in underserved areas such as Mubi, to reduce the digital divide.
2. Professional development programs should be ongoing to prepare teachers to integrate ICT tools effectively into their teaching practices.
3. Awareness and ICT literacy programs should be organized to improve students' skills and motivation to use technology as part of their learning process.
4. Regular monitoring and evaluation of ICT use in schools are necessary to identify challenges and best practices, guiding future policy adjustments.
5. Policies supporting sustainable ICT initiatives should be strengthened, and community involvement encouraged to promote girl child education through technology.

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