Assessing The Importance of ICT Specialization Among Senior Secondary Students in Kastina, Katsina Local Government

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Abstract— In the evolving landscape of education, the integration of Information and Communication Technology (ICT) has become increasingly significant, particularly in shaping the academic and vocational trajectories of senior secondary school students. Despite the recognized potential of ICT specialization, there exists a critical need to comprehensively assess its importance among senior secondary school students in Katsina, Katsina Local Government. Against this background, this study aims to assess the importance of Information and Communication Technology (ICT) specialization among senior secondary school students in Katsina, Katsina Local Government. Four research questions guided the study and three null hypotheses were formulated and tested at 0.05 level of significance. The research employed questionnaires for data collection and utilized frequency, percentage and T-test statistics for analysis. The findings reveal that a substantial proportion of students acknowledge the benefits of ICT specialization, encompassing enhanced digital skills (50%), improved career prospects (27.78%), and heightened problem-solving abilities (11.11%). Identified challenges comprise inadequate ICT infrastructure, limited technology access, a dearth of qualified teachers, financial constraints, and an outdated curriculum. The study emphasizes the positive impacts of ICT specialization on students, emphasizing its potential to elevate academic performance and career prospects. Additionally, the research proposes key practices to augment the effectiveness of ICT specialization.

Keywords— Academic Performance; Information and Communication Technology (ICT); Katsina Local Government; Senior Secondary School Students and Specialization

A. INTRODUCTION

The integration of Information and Communication Technology (ICT) into education is increasingly vital for preparing students to thrive in the digital age (Valverde-Berrocoso et al., 2022). In Nigeria, senior secondary schools recognize the importance of focusing on ICT and its impact on students' educational and vocational growth (Asuquo et al., 2022). ICT encompasses tools and techniques used to process and communicate data, including computers, the Internet, broadcasting technologies (such as radio and television), and telephones(Boruah, 2022). Its rapid development is reshaping various sectors including banking, health, defense, economy, oil and gas, and notably, education. According to Amutha, (2020), ICT is driving significant societal changes, particularly in education, offering both students and educators opportunities to personalize learning and teaching.

This transformation not only revolutionizes access to information but also alters learning paradigms due to the diverse tools and platforms available to secondary school students (Amutha, 2020). Embracing ICT specialization enables schools to create an immersive learning environment reflective of today's interconnected world, enhancing students' digital proficiency. This proficiency is crucial for navigating the complexities of the online realm and leveraging technology across disciplines. Moreover, ICT specialization equips students with essential digital skills and knowledge for success in the contemporary landscape. Understanding the perspectives of secondary students is crucial for policymakers and educators to enhance the effectiveness of ICT integration in senior secondary schools. This research will focus on assessing students' viewpoints, being the prim (Chen et al., 2021).

Nigeria, as a developing nation, acknowledges ICT's role in advancing socio-economic progress and has made significant efforts to infuse technology into its education system (Ogwuche & Elaigwu, 2022). The government has notably improved ICT infrastructure and connectivity across educational institutions, granting students access to digital technologies like computers, internet connectivity, and software applications (Ogwuche & Elaigwu, 2022).

In Katsina Local Government Area, ICT specialization among secondary school students holds paramount importance for academic success, career development, and overall well-being. However, challenges such as limited access to ICT resources, shortage of qualified ICT teachers, and lack of awareness regarding ICT's significance hinder students from fully benefiting from ICT education

Addressing these challenges involves providing adequate ICT resources to secondary schools, training more qualified ICT teachers, and raising awareness among parents and educators about the importance of ICT education. By taking these steps, every student in Katsina Local Government Area can have the opportunity to benefit from ICT education and develop the essential skills needed for success in the 21st-century economy.

B. AIM AND OBJECTIVES

The aim of this study is to accesses the importance of ICT specialization among senior secondary school students in Katsina local government, katsina. To achieve this, aim the following objective will be considered.

i. To identify the benefit of ICT specialization among senior secondary schools.
ii. To identify the challenges faced among senior secondary school student in ICT specialization.
iii. To assess the academic impact of ICT specialization among senior secondary school students.
iv. To propose recommendations for improving the effectiveness of ICT specialization programs in senior secondary schools.

C. RESEARCH QUESTIONS

The research questions for this study are:

i. What are the benefits of ICT specialization among secondary school students?
ii. What are the challenges of ICT specialization among secondary school students?
iii. What are the challenges of ICT specialization among secondary school students?
iv. What are the best practices to improve the effectiveness of ICT specialization among senior secondary school students?

D. LITERATURE REVIEW

The study of Atsuwe & Azande, (2020) explored how computer literacy impacts the academic performance of senior secondary school students studying computer science in Makurdi, Benue State, Nigeria. Their research, involving 60 randomly selected Senior Secondary School 3 students out of 1,200, found a significant positive link between computer literacy and academic achievements in computer science. They suggest promoting computer literacy by providing access to facilities, training teachers, integrating it into the curriculum, and initiating coding clubs to boost students' interest in technology.

As investigated by Ikwuakam et al., (2023) the use of Information and Communication Technology (ICT) among senior secondary school students in Katsina State. Their findings from six schools with 723 participants revealed that students were using ICT facilities but faced challenges limiting optimal utilization. They recommend improving training for students and efficient utilization of ICT facilities.

Lugard, (2023) explored how teachers' educational backgrounds and use of ICT resources affect secondary school students' math performance in Delta State. Analyzing 330 SS2 students from eight schools, they found that teachers' education backgrounds and utilization of ICT positively influenced students' math achievement, highlighting the importance of teachers with education backgrounds and effective ICT utilization in teaching. The study evaluates the use of ICT in teaching mathematics while the current study is assessing the knowledge of ICT specialization among students both study argue that teachers with background training in education and who utilize ICT facilities in teaching have a positive impact on students' academic achievement.

A study was conducted by Lei et al., (2021) which investigated secondary school students' awareness of ICT in Chennai, Tamil Nadu. Surveying 270 students, they found moderate awareness with slight differences among groups based on medium of instruction and school management. They suggested enhancing ICT awareness among students in Chennai.

Gnanamkonda et al., (2019) Explored ICT resource presence and usage in West Bengal's higher secondary schools. The study of 144 students found more accessible ICT resources in urban areas. They noted a gender disparity in ICT resource utilization and a limited correlation between ICT use and teaching timing, suggesting further research on ICT use in different educational levels and states.

(Isa Sulaiman et al., 2020) Focused on ICT utilization in Nigeria's secondary education system, identifying challenges in implementing ICT due to limited infrastructure and weak policies. The study recommends government intervention, deploying ICT-qualified teachers, and stabilizing electricity supply to schools to enhance ICT usage.

(Ngaji & Veronica, 2021) Investigated the impact of ICT competence on science teachers' instructional effectiveness in secondary schools in Cross River State, Nigeria. Finding low ICT competence among teachers, the study recommended training programs to improve science teachers' ICT skills, especially among female teachers.

(Gatama et al., 2022) Explored ICT resources' status and influence on academic performance in Kenyan public secondary schools. Highlighting low ICT investments and sub-optimal utilization, they recommended focusing on both resource adequacy and effective utilization to improve learning outcomes.

The study of Nwuke et al., (2021) investigated ICT resource presence and usage in Rivers State secondary schools, finding significant insufficiency. They suggested continuous training for staff, stable power supply, and increased investment in ICT for improved education.

(Amutha, 2020) Highlighted the profound impact of ICT on various facets of life, including education. Recognizing ICT's transformative potential, the study emphasized its seamless integration into formal education at all levels.

Policies and challenges in integrating ICT into teaching and learning processes in secondary schools in Cross River State, Nigeria was examined. Identifying challenges like inadequate infrastructure and policy gaps, they recommended including ICT education in public secondary school curricula (Ngbongha et al., 2020).

(Nsama et al., 2021)Studied ICT usage in teaching geography in Zambia's schools, finding limited device availability. They suggested adequate ICT resources and teacher training for effective ICT integration.

(Kerubo et al., 2020)Explored factors influencing ICT integration in secondary schools' resource planning in Mashuuru district, Kajiado County. They highlighted the importance of ICT infrastructure and personnel training for successful integration.

Hassan et al., (2023) investigated factors hindering computer and internet application usage in teaching computer science in Niger State. They found insufficient teacher skills and infrastructure, suggesting compulsory teacher training and government support for school infrastructure.

In the study of Eno, (2021), the impact of ICT in teaching physics in Anambra state, finding significantly better performance among students taught with ICT. They recommended encouraging teachers to use ICT in physics teaching for better learning outcomes.

(Gyaase et al., 2019) explored ICT integration in colleges of education in Ghana's Volta Region, highlighting its potential to support learner-centered pedagogy. They recommended strategies for identifying and using ICT in teaching.

The study of Aziz, (2021) analyzed ICT's impact on education quality in a Bangalore college, emphasizing the importance of proper ICT infrastructure for improved educational quality.

(Simulwi & Musonda, 2020) addressed challenges in investing in ICT infrastructure in Zambian secondary schools, highlighting issues like power outages and inadequate infrastructure. They suggested government strategies for ICT investment in schools.

(Oladokun et al., 2022)Explored the challenges faced in utilizing ICT in Nigerian secondary schools, emphasizing funding, comprehensive training, and stable power supply as crucial for effective ICT utilization.

(Kithungu et al., 2020) investigated ICT usage among computer teachers and students in Nsukka Education Zone, finding inadequate utilization in public secondary schools. They recommended improving ICT integration in education.

E. RESEARCH METHODS AND METHODOLOGY

This stage explained tools, techniques use in carrying out research and how the research is done.

The sample size was determined by the use of Krejcie and Morgan table (1970). The table shows the sample size required to achieve a desired confidence level and precision for a given population size, the total number of the students from the selected schools is 130, based on table the sample size for the study becomes 97. The data was collected through the use of questionnaire. 97 questionnaires were distributed to the 97 respondents through the use of simple radom sampling technique and utilized frequency, percentage and T-test statistics for analysis.

F. Data Analysis

The questionnaires were administered to 97 respondents, 90 responses were recovered, 3 were damaged during retrieval stage and 4 could not be reach. The following are the analysis of the research.

Research Question one: What are the benefits of ICT Specialization among secondary school students?

Table 1: What are the benefits of ICT Specialization among secondary school students?

S/N	Benefits of ICT specialization	Frequency	Percentage (%)
1	Improved Digital Skills	45	50
2	Better Career Opportunities	25	27.78
3	Enhanced Problem Solving	10	11.11
4	Increased Job Market Demand	8	8.89
5	Other (Specify)	2	2.22
	TOTAL	90	100

Source: Field Work, 2023

The table shows that among the surveyed participants, a significant percentage recognized the advantages of specializing in ICT. The most prominent benefit, cited by 50% of respondents, is the improvement of digital skills, underlining the practical value of ICT education. Additionally, 27.78% of participants believed that ICT specialization offers better career opportunities, emphasizing the potential for future employment prospects. Furthermore, 11.11% highlighted enhanced problem-solving skills as a positive outcome of ICT specialization. A smaller portion, 8.89%, noted the increased demand for ICT specialists in the job market. A minor percentage, 2.22%, had specific, individual benefits in mind, which they were open to specifying, indicating the diverse range of perceived advantages associated with ICT specialization.
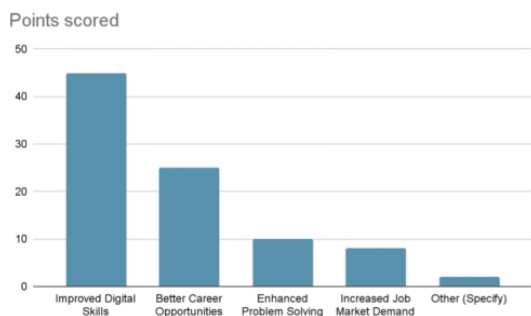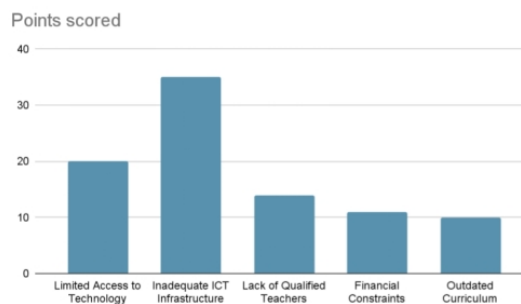
Fig.1.*Benefits of ICT specialization*

RESEARCH QUESTION TWO: WHAT ARE THE CHALLENGES OF ICT SPECIALIZATION AMONG SECONDARY SCHOOL STUDENTS?

TABLE 2. WHAT ARE THE CHALLENGES OF ICT SPECIALIZATION AMONG SECONDARY SCHOOL STUDENTS?

S/N	Challenges of ICT specialization	Frequency	Percentage (%)
1	Limited Access to Technology	20	22.22
2	Inadequate ICT Infrastructure	35	38.89
3	Lack of Qualified Teachers	14	15.56
4	Financial Constraints	11	12.22
5	Outdated Curriculum	10	11.11
	Total	90	100

Source: Field Work, 2023

The table 1.2 reveals challenges of ICT specialization faced by secondary school students. The most prominent challenge, with a frequency of 35 (38.89%), is the inadequate ICT infrastructure, indicating that a significant portion of the participants faced difficulties due to the lack of necessary technological resources and support in their educational environment. Limited access to technology is the second most common challenge, affecting 22.22% of the respondents. Furthermore, 15.56% highlighted the shortage of qualified teachers as a significant obstacle to effective ICT specialization, while 12.22% expressed concerns about financial constraints affecting their ICT education. An additional 11.11% found the curriculum outdated, emphasizing the need for keeping ICT course materials and content up to date to address contemporary challenges.

Fig.2. *Challenges of ICT specialization*

Research Question three: What are the impacts of ICT specialization among secondary school students?

Table3.: What are the impacts of ICT specialization among secondary school students?

S/N	Impacts of ICT specialization	Frequency	Percentage (%)
1	Improved Digital Skills	25	27.28
2	Better Career Opportunities	16	17.87
3	Enhanced Problem Solving Skills	17	18.89
4	Increased Job Market Demand	17	18.89
5	Improved Academic Performance	10	11.11
	Total	90	100

Source: Field Work, 2023

The table 1.3 focuses on the impacts of ICT specialization on secondary school students reflects the significant benefits of this specialization. Notably, 27.78% of respondents acknowledged that it led to improved digital skills, highlighting its practical and immediate value. Furthermore, 24.44% recognized the impact of ICT specialization on better career opportunities, underscoring its role in

enhancing future employment prospects. A considerable portion, 17.78%, associated ICT specialization with improved problem-solving skills, indicating its positive influence on critical thinking and analytical abilities. In addition, 18.89% acknowledged the increased job market demand for those with ICT specialization, signifying its relevance in the employment landscape. Finally, 11.11% noted improved academic performance as a positive outcome, suggesting that ICT specialization can enhance overall educational achievements.
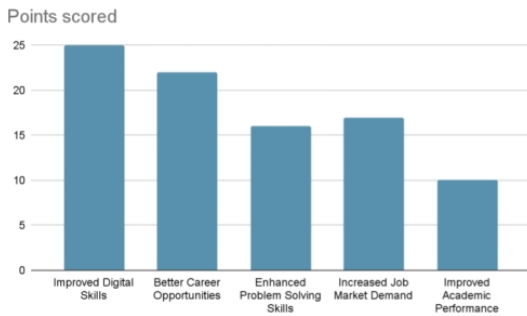

Fig 3. Impacts of ICT specialization

Research question Four: What are the best practices to improve the effectiveness of ICT specialization among senior secondary school students?

Table 4: What are the best practices to improve the effectiveness of ICT specialization among senior secondary school students?

S/N	Best practices to improve the effectiveness of ICT specialization	Frequency	Percentage (%
	Improved Digital Skills	20	22.22
	Better Career Opportunities	16	17.78
	Enhanced Problem Solving Skills	14	15.56
	Increased Job Market Demand	10	11.11
	Improved Academic Performance	30	33.33
	Total	90	100

The table 1.4 shows the best practices to enhance the effectiveness of ICT specialization among secondary school students demonstrates key strategies for optimizing the educational process. Significantly, 33.33% of respondents emphasized the importance of these practices in improving academic performance, indicating the potential for ICT specialization to enhance overall educational achievements. Furthermore, 22.22% recognized that these practices lead to the enhancement of digital skills, underscoring the practical and immediate value of such initiatives. Additionally, 17.78% associated these best practices with better career opportunities, highlighting their role in improving future employment prospects. A notable portion, 15.56%, identified the practices as conducive to enhanced problem-solving skills, emphasizing their positive influence on critical thinking and analytical abilities. Lastly, 11.11% acknowledged that the best practices contribute to increased job market demand for those with ICT specialization, reaffirming their relevance in the employment landscape.

G. DISCUSSION

The data presented highlights the advantages of ICT specialization among secondary school students, with 50% recognizing improved digital skills, 27.78% better career prospects, and 11.11% enhanced problem-solving abilities (International Society for Technology in Education [ISTE], 2016; National Centre for Education Evaluation and Regional Assistance [NCEE], 2018; University of California, Berkeley, 2019). Additionally, the demand for ICT specialists and individual benefits were acknowledged. Individual benefits may include increased earning potential, improved job satisfaction, and greater opportunities for career advancement. Challenges include inadequate ICT infrastructure (38.89%), limited access to technology (22.22%), a shortage of qualified teachers (15.56%), financial constraints (12.22%), and outdated curriculum (11.11%). These challenges can hinder students' ability to succeed in ICT specialization, but there are a number of best practices that schools can implement to address them (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2017; International Association for the Evaluation of Educational Achievement [IEA], 2022). ICT specialization's impacts were seen in improved digital skills (27.78%), better career prospects (24.44%), problem-solving skills (17.78%), job market demand (18.89%), and academic performance (11.11). This is consistent with research findings that have shown that ICT specialization can lead to a number of positive outcomes for students, including improved academic achievement, increased employment opportunities, and higher salaries (ISTE, 2016; NCEE, 2018; IEA, 2022). Key practices for effectiveness were recognized in improving academic performance (33.33%), digital skills (22.22%), better career opportunities (17.78%), enhanced problem-solving skills (15.56%), and increased job market demand (11.11). These best practices include investing in ICT infrastructure and resources, recruiting and training qualified ICT teachers, developing and implementing up-to-date ICT curricula, and adopting innovative teaching and learning approaches (IEA, 2022). The findings underscore the importance of ICT

specialization and the need for addressing challenges to optimize its benefits for students.
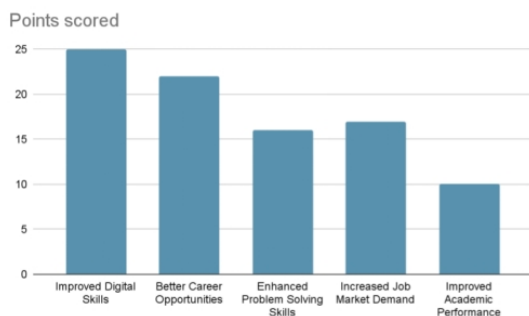

Fig 4. Best practices to improve the effectiveness of ICT specialization

HYPOTHESES

Hypothesis one: There is no significance difference on the mean response of the respondents on the benefits of ICT Specialization among secondary school students.

Table 5: t-test statistics of the respondents on the benefits of ICT Specialization among secondary school students

Respondents	Mean	Std. Dev.	df	Sig.	Decision
Male	4.58	.379	310	0.07	Supported
Female	4.42	.527			

The result revealed that the male has a mean (std. dev.) of 4.58 (.379) and the female have a mean (std. dev.) of 4.42 (.527) Since the P-value (0.07) is greater than the alpha value (0.05), this indicates that there is no evidence against the null hypothesis. Therefore, the hypothesis is accepted.

Hypothesis two: There is no significance difference on the mean response of the respondents on the challenges faced among senior secondary school student in ICT specialization.

Table 6: t-test statistics of the respondents on the challenges faced among senior secondary school student in ICT specialization.

Respondents	Mean	Std. Dev.	df	Sig.	Decision
Male	4.38	.319	310	0.15	Supported
Female	4.37	.317			

The result revealed that the male has a mean (std. dev.) of 4.38 (.319) and the female have a mean (std. dev.) of 4.37 (.317) Since the P-value (0.15) is greater than the alpha value (0.05), this indicates that there is no evidence against the null hypothesis. Therefore, the hypothesis is accepted.

Hypothesis three: There is no significance difference on the mean response of the respondents on the academic impact of ICT specialization among senior secondary school students.

Table 7: t-test statistics of the respondents on the challenges faced among senior secondary school student in ICT specialization.

Respondents	Mean	Std. Dev.	df	Sig.	Decision
Male	4.48	.312	310	0.22	Supported
Female	4.39	.311			

The result revealed that the male has a mean (std. dev.) of 4.48 (.312) and the female have a mean (std. dev.) of 4.39 (.311) Since the P-value (0.22) is greater than the alpha value (0.05), this indicates that there is no evidence against the null hypothesis. Therefore, the hypothesis is accepted.

F. SUMMARY

The aim of the study was to assess the importance of ICT specialization among senior secondary school students in katsina, katsina local government. The study utilized a quantitative approach, with a survey method used to collect data from two randomly selected private schools in Katsina local government. The study found that computer teachers lack the skills to operate computer hardware and internet applications, and they also lack the knowledge of how to integrate ICT into their teaching. The schools do not have the necessary infrastructure to support the use of ICT, such as computers, internet access, and software. Based on the findings, the study recommends that the government should organize compulsory computer training for teachers in secondary schools and provide schools with the necessary infrastructure to support the use of ICT. The study emphasizes the importance of investing in ICT infrastructure and resources, recruiting and training qualified ICT teachers, developing and implementing up-to-date ICT curricula, and adopting innovative teaching and learning approaches to improve academic performance, digital skills, better career opportunities, enhanced problem-solving skills, and increased job market demand. The study's findings and recommendations can be useful for policymakers, educators, and other stakeholders interested in improving ICT education and infrastructure in secondary schools.

H. CONCLUSION

In conclusion, this study underscores the critical significance of ICT education and infrastructure in secondary schools. It has revealed a concerning deficiency in computer teachers' operational skills related to computer hardware and internet applications, as well as their inadequate knowledge about integrating ICT into their teaching methods. Moreover, the study exposes a significant shortfall in essential infrastructure, including computers, internet access, and software within these educational institutions. As a result, the study strongly advocates for government intervention through the implementation of mandatory computer training programs for secondary school teachers and the provision of essential ICT infrastructure to facilitate its integration into the educational system. Ultimately, this research underscores the imperative need to invest in ICT infrastructure and resources, recruit and adequately train proficient ICT educators, develop and implement updated ICT curricula, and adopt innovative teaching methods. These measures can substantially enhance academic performance, digital skills, career prospects, problem-solving abilities, and increase the relevance of students in the competitive job market.

I. RECOMMENDATIONS

The following recommendations for future studies:

    i. The government and stakeholders should organize compulsory computer training for teachers in secondary schools to improve their skills in operating computer hardware and internet applications.

    ii. Policymakers and educators should prioritize investing in ICT infrastructure and resources to improve the quality of ICT education in secondary schools.

    iii. Schools should adopt innovative teaching and learning approaches to improve academic performance, digital skills, better career opportunities, enhanced problem-solving skills and increased job market demand.

    iv. Schools should develop and implement up-to-date ICT curricula to ensure that students are equipped with the necessary skills to succeed in the digital age.

    v. Schools should recruit and train qualified ICT teachers to ensure that students receive quality ICT education.

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