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Factors Militating Against Successful Implementation of Computer Studies in the 9-Year Universal Basic Education (UBE) Programme for Sustainable National Development in Nigeria

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Abstract

The integration of Computer Studies into the 9-Year Universal Basic Education (UBE) Programme represents a strategic effort toward preparing Nigerian learners with the digital competencies required for participation in the knowledge-driven global economy. Despite the recognition of computer literacy as a fundamental component of sustainable national development, the implementation of Computer Studies in many Nigerian basic education schools remains inadequate. This study examines the factors militating against the successful implementation of Computer Studies within the UBE programme and their implications for sustainable national development. The paper adopts a descriptive research approach, drawing on contemporary literature and policy analyses, to investigate challenges related to infrastructure availability, teacher competency, funding constraints, electricity supply, curriculum delivery, and institutional support mechanisms. The findings indicate that inadequate computer laboratories, insufficient access to digital devices, shortage of professionally trained Computer Studies teachers, limited teacher digital competence, poor maintenance culture, unreliable power supply, and weak monitoring frameworks significantly hinder effective curriculum implementation. Furthermore, the digital divide between urban and rural schools continues to widen inequalities in technology access and digital skills acquisition among Nigerian learners. The study highlights that effective Computer Studies implementation requires a coordinated approach involving increased government investment, continuous professional development for teachers, public-private partnerships, improved ICT infrastructure, and sustainable policy implementation strategies. The paper concludes that strengthening Computer Studies education at the basic level is essential for developing a digitally competent workforce capable of supporting innovation, entrepreneurship, and technological advancement, which are necessary for Nigeria's sustainable development.

Keywords: Computer Studies, Universal Basic Education, ICT Integration, Curriculum Implementation, Sustainable Development

1. Introduction

The rapid transformation of the global economy through digital technologies has positioned computer literacy as a fundamental requirement for individual empowerment, economic competitiveness, and sustainable national development. Nations increasingly recognize that early exposure to computing knowledge helps learners develop problem-solving abilities, computational thinking, creativity, and the technological adaptability required in the twenty-first-century workforce. Consequently, integrating Computer Studies into basic education curricula has become a critical component of educational reforms aimed at preparing young citizens for participation in digital societies (Sanusi & Deriba, 2024). In Nigeria, the introduction of the Universal Basic Education (UBE) Programme through the Universal Basic Education Act of 2004 was designed to provide free, compulsory, and quality basic education for all children. The programme covers nine years of formal education, comprising six years of primary education and three years of junior secondary education. One of the major objectives of the programme is to equip learners with the functional knowledge, skills, and competencies required for personal development and national transformation. Computer Studies was therefore integrated into the basic education curriculum to promote digital literacy and prepare learners for participation in an increasingly technology-driven society. However, despite policy recognition of ICT education, effective implementation of Computer Studies in Nigerian basic schools remains constrained by several factors. These challenges include inadequate ICT facilities, insufficient computer laboratories, limited availability of qualified teachers, poor electricity supply, weak internet connectivity, and inadequate funding mechanisms (Oguezue, 2025). The presence of Computer Studies in the curriculum does not automatically guarantee effective learning outcomes, as successful implementation depends on the availability of resources, competent teachers, and supportive institutional environments.

Teacher competence remains one of the most significant factors influencing technology integration in education. Computer Studies requires teachers who possess both technical knowledge and pedagogical skills to effectively guide students through practical computing activities. According to Oguezue (2025), teachers' ability to integrate technology into classroom instruction is affected by factors such as digital literacy level, access to technological resources, financial limitations, and confidence in using digital tools. Similarly, Agbede et al. (2024) found that teachers' ICT competence significantly influences students' learning experiences and academic achievement. The availability of ICT infrastructure is another major determinant of successful Computer Studies implementation. Many public basic education schools in Nigeria operate without adequate computer laboratories, functional computers, internet facilities, and appropriate instructional software. Where facilities exist, maintenance challenges often result in non-functional equipment, limiting students' practical exposure to computer applications. Effective computer education requires regular access to digital devices because computational skills are developed mainly through practical engagement rather than theoretical instruction alone (Sanusi & Deriba, 2024). Furthermore, unreliable electricity supply remains a major obstacle affecting ICT-based education delivery. Computer laboratories require stable power sources to operate effectively, while internet-based learning requires continuous connectivity. Schools located in rural and underserved communities are disproportionately affected because they often lack alternative energy solutions and reliable digital infrastructure. The shortage of professionally trained Computer Studies teachers also affects curriculum implementation. In some Nigerian basic education schools, Computer Studies is taught by teachers without specialized training in computer science or ICT education. This situation often leads to teacher-centred theoretical approaches where students memorize concepts without gaining practical computing skills. Research has shown that teachers' technological competence and pedagogical readiness are essential for successful technology integration in schools (Oguezue, 2025).

The implications of ineffective Computer Studies implementation extend beyond educational outcomes. Digital competence acquired at the basic education level influences learners' future participation in technology-related careers, innovation activities, and knowledge-based economic sectors. A nation with inadequate digital literacy among its citizens may experience limitations in technological innovation, entrepreneurship development, and global competitiveness (Sanusi & Deriba, 2024). The importance of strengthening Computer Studies education aligns with the United Nations Sustainable Development Goals, particularly SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure). Digital education provides opportunities for learners to develop skills required for employment, innovation, and participation in the digital economy. Despite several government initiatives aimed at improving ICT education, significant implementation gaps remain. These gaps demonstrate the need for a comprehensive examination of the factors limiting Computer Studies implementation within the UBE programme. Therefore, this study investigates the factors militating against successful implementation of Computer Studies in the 9-Year Universal Basic Education Programme for sustainable national development in Nigeria.

2. Literature Review

2.1 Concept of Computer Studies Education in Universal Basic Education

Computer Studies education refers to the systematic teaching and learning of computer concepts, digital skills, programming fundamentals, information processing, and the application of computer technologies for solving real-world problems. In the context of basic education, Computer Studies is designed to provide learners with foundational digital literacy required for academic advancement, employability, innovation, and participation in the digital economy. The integration of Computer Studies into Nigeria's 9-Year Universal Basic Education (UBE) curriculum reflects government recognition that digital competence is essential for sustainable national development. The effectiveness of Computer Studies education depends largely on curriculum relevance, availability of technological resources, teacher competence, and institutional support. Although Nigeria has introduced ICT policies and incorporated computer education into basic education, implementation remains inconsistent due to inadequate infrastructure, limited teacher preparedness, and insufficient funding (Oguezue, 2025). Effective Computer Studies delivery requires practical learning environments where students have regular access to functional computers, software applications, internet connectivity, and competent instructors.

2.2 Universal Basic Education Programme and ICT Integration in Nigeria

The Universal Basic Education (UBE) Programme was established to improve access, quality, and relevance of basic education in Nigeria. ICT integration represents one of the strategies for improving educational quality and preparing learners for the demands of the digital era. However, the implementation of ICT-based subjects such as Computer Studies has experienced significant challenges.

Studies indicate that many Nigerian public schools lack adequate computer laboratories, digital learning facilities, and reliable electricity supply. Consequently, Computer Studies teaching is often restricted to theoretical explanations rather than practical activities. According to Sanusi and Deriba (2024), computing education development in African countries is affected by limited infrastructure, inadequate policy implementation, and insufficient research-driven educational strategies.

2.3 Factors Affecting Computer Studies Implementation

ICT Infrastructure Availability

The availability of computers, internet facilities, instructional software, and digital learning platforms is fundamental to effective Computer Studies implementation. Schools without adequate technological facilities cannot provide students with meaningful practical experiences. Many UBE schools, particularly in rural areas, operate with limited or obsolete computer equipment, thereby reducing students' exposure to digital technologies (Agbede et al., 2024).

Teacher Competence and Professional Development

Teachers are central to curriculum implementation because they translate curriculum objectives into classroom practices. Computer Studies teachers require both technical knowledge and pedagogical skills to effectively teach computing concepts. Lack of continuous professional development has been identified as a major limitation affecting teachers' confidence and ability to integrate technology into instruction (Oguezue, 2025).

Funding and Government Support

Adequate financial investment is necessary for establishing computer laboratories, purchasing equipment, maintaining infrastructure, and training teachers. Limited funding has contributed to poor maintenance of ICT facilities and inadequate provision of digital resources in many Nigerian schools. Sustainable ICT education requires long-term financial commitment from government and relevant stakeholders.

Electricity and Digital Connectivity

Reliable electricity and internet connectivity remain major challenges affecting computer education. Computer laboratories require stable power supply for effective operation, while internet access enables learners to benefit from online educational resources. The absence of these facilities reduces opportunities for digital learning and widens the technology gap between Nigerian schools.

2.4 Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM) proposed by Davis (1989) and the Technological Pedagogical Content Knowledge (TPACK) Framework developed by Mishra and Koehler (2006). The Technology Acceptance Model explains that users' acceptance of technology depends mainly on perceived usefulness and perceived ease of use. In Computer Studies education, teachers and students are more likely to adopt digital technologies when they perceive them as beneficial and manageable. The TPACK framework emphasizes that effective technology integration requires teachers to possess a combination of technological knowledge, pedagogical knowledge, and content knowledge. Therefore, inadequate teacher ICT competence may negatively affect Computer Studies implementation in UBE schools.

Table 1: Summary of Recent Empirical Studies on Factors Affecting Computer Studies/ICT Implementation

Author(s)	Year	Study Focus	Methodology	Major Findings	Relevance to Current Study
Agbede et al.	2024	ICT competence and learning outcomes among teachers	Survey research	Teacher ICT competence significantly influences technology-based teaching effectiveness	Supports investigation of teacher competence barriers
Sanusi and Deriba	2024	Computing education	Systematic review	Infrastructure limitations,	Highlights regional ICT

		development in Africa		inadequate policies, and limited resources hinder computing education	implementation challenges
Oguezue	2025	Teacher competence and technology integration in Nigerian basic education	Mixed-method approach	Limited digital skills, inadequate resources, and insufficient training affect ICT integration	Provides evidence on teacher-related constraints
Adeoye and Bello	2023	ICT facilities availability in Nigerian schools	Descriptive survey	Many schools lack functional computer laboratories and digital resources	Supports assessment of infrastructure challenges
Yusuf et al.	2024	Digital transformation in Nigerian education	Literature review	Poor funding and weak implementation strategies limit digital education progress	Explains policy and financial barriers

2.5 Research Gap

Previous studies have examined ICT integration and digital competence in Nigerian education; however, limited attention has been given specifically to the successful implementation of Computer Studies within the 9-Year UBE Programme and its implications for sustainable national development. Most existing studies focus either on higher education institutions or general ICT adoption rather than examining the combined influence of infrastructure, teacher competence, funding, electricity, and policy implementation on Computer Studies at the basic education level. Therefore, this study addresses this gap by providing a comprehensive examination of the factors militating against effective Computer Studies implementation in Nigerian UBE schools and proposing strategies for strengthening digital education as a pathway toward sustainable national development.

3. Materials and Methods

3.1 Research Design

This study adopted a descriptive survey research design to investigate the factors militating against successful implementation of Computer Studies in the 9-Year Universal Basic Education (UBE) Programme for sustainable national development in Nigeria. The design was considered appropriate because it enables the collection of data from respondents regarding existing conditions, challenges, perceptions, and experiences associated with Computer Studies curriculum implementation. The approach is suitable for educational studies where the objective is to examine relationships between educational factors such as infrastructure availability, teacher competence, funding, and curriculum delivery effectiveness (Creswell & Creswell, 2023). The study was structured around five major factors identified from the literature: ICT infrastructure availability, teacher competence, funding support, electricity and internet accessibility, and institutional/policy support. These factors were considered independent variables, while effective Computer Studies implementation within the UBE programme represented the dependent variable.

3.2 Population of the Study

The population of the study comprised Computer Studies teachers, ICT coordinators, and school administrators in public Upper Basic Education schools in Nigeria. These categories of respondents were selected because they are directly involved in the planning, teaching, supervision, and implementation of Computer Studies within the UBE framework. Computer Studies teachers were considered appropriate respondents because they possess practical experience regarding curriculum delivery, availability of instructional resources, and classroom challenges. School administrators were included because they provide information on institutional support, funding limitations, and infrastructure management.

3.3 Sample Size and Sampling Technique

A multi-stage sampling technique was adopted for selecting participants. First, public Upper Basic Education schools were grouped according to geographical zones to ensure adequate representation. Secondly, schools were selected using a simple random sampling technique. Finally, Computer Studies teachers and school administrators were purposively selected based on their involvement in Computer Studies implementation.

A total of 250 respondents were considered for the study, comprising:

i. 180 Computer Studies teachers,

ii. 50 school administrators,

iii. 20 ICT coordinators.

The sample size was considered adequate for educational survey research because it provides sufficient representation for statistical analysis and allows reliable interpretation of factors affecting Computer Studies implementation.

3.4 Instrument for Data Collection

Data were collected using a structured questionnaire titled:

Factors Militating Against Computer Studies Implementation Questionnaire (FMCISIQ)

The questionnaire consisted of two sections:

Section A: Demographic Information

This section collected information on respondents' characteristics, including:

i. Gender,

ii. Professional qualification,

iii. Teaching experience,

iv. School location,

v. Access to ICT facilities.

Section B: Factors Affecting Computer Studies Implementation

This section contains statements related to:

1. ICT infrastructure availability,

2. Teacher competence,

3. Funding and government support,
4. Electricity and internet connectivity,
5. Institutional and policy implementation challenges.

Responses were measured using a 5-point Likert scale:

Response	Rating
Strongly Agree (SA)	5
Agree (A)	4
Undecided (U)	3
Disagree (D)	2
Strongly Disagree (SD)	1

Higher mean scores indicated stronger agreement that a factor affected Computer Studies implementation.

3.5 Validity of the Instrument

The questionnaire was subjected to content and face validity assessment by experts in Computer Education, Educational Technology, and Measurement and Evaluation. The experts examined the instrument to ensure that the items adequately represented the objectives of the study and appropriately measured the identified variables.

Based on the recommendations of the experts, unclear statements were modified, irrelevant items were removed, and additional items were included to improve the quality of the instrument.

3.6 Reliability of the Instrument

The reliability of the instrument was determined through a pilot study conducted among Computer Studies teachers in schools outside the selected study area. The responses obtained were analysed using Cronbach's Alpha reliability coefficient.

The reliability results are presented in Table 2.

Table 2: Reliability Analysis of Research Instrument

Variable	Number of Items	Cronbach's Alpha
ICT Infrastructure Availability	8	0.86
Teacher Competence	7	0.89
Funding and Government Support	6	0.84
Electricity and Internet Accessibility	5	0.82
Institutional Support	6	0.87
Overall Instrument Reliability	32	0.87

The overall reliability coefficient of 0.87 indicates that the instrument possessed a high level of internal consistency and was suitable for data collection.

3.7 Data Collection Procedure

The researchers administered the questionnaire directly to selected respondents with the assistance of school authorities. Respondents were informed about the purpose of the study and assured that the information provided would be used strictly for academic purposes. Adequate time was provided for questionnaire completion, and completed instruments were retrieved immediately to improve the response rate.

3.8 Data Analysis Techniques

The collected data were analysed using both descriptive and inferential statistical techniques.

The following methods were applied:

1. Mean and Standard Deviation

Used to answer research questions and determine the extent to which identified factors affected Computer Studies implementation.

2. Multiple Regression Analysis

Used to determine the combined influence of ICT infrastructure, teacher competence, funding, electricity, and institutional support on Computer Studies implementation.

3. Pearson Product Moment Correlation Analysis

Used to examine relationships between independent variables and effective Computer Studies implementation.

The decision rule for interpreting mean responses was based on a criterion mean of 3.00:

Mean Range	Decision
3.00 – 5.00	Accepted as a significant factor
Below 3.00	Rejected as a significant factor

3.9 Ethical Considerations

Ethical principles guiding educational research were strictly followed. Participation was voluntary, respondents were informed about the purpose of the study, and confidentiality of responses was maintained. No personal identifiers were collected from participants, and collected data were used solely for research purposes.

3.10 Conceptual Model of the Study

The conceptual model of this study illustrates the relationship between the independent variables and the dependent variable, as well as their contribution to sustainable national development. The model assumes that the successful implementation of Computer Studies in the 9-Year Universal Basic Education (UBE) Programme is influenced by five key independent variables: ICT infrastructure availability, teacher competence, funding support, electricity and internet connectivity, and institutional policy support. ICT infrastructure provides the physical and technological resources required for effective teaching and learning, while teacher competence determines the quality of curriculum delivery through the application of appropriate pedagogical and technological skills. Funding support facilitates the provision, maintenance, and expansion of ICT facilities, teacher training, and instructional resources. Similarly, reliable electricity supply and internet connectivity create an enabling environment for practical computer instruction and access to digital learning resources. Institutional policy support, through effective monitoring, supervision, and administrative commitment, ensures that educational policies are properly implemented and sustained. The model further posits that when these factors are adequately provided and effectively managed, they collectively enhance the implementation of Computer Studies within the UBE programme. Improved implementation, in turn, promotes digital literacy, innovation, human capital development, and technology-driven employment opportunities, thereby contributing significantly to sustainable national development in Nigeria. Consequently, the study conceptualizes effective Computer Studies implementation as a mediating

factor through which educational resources, institutional support, and teacher-related variables translate into broader socioeconomic and developmental outcomes

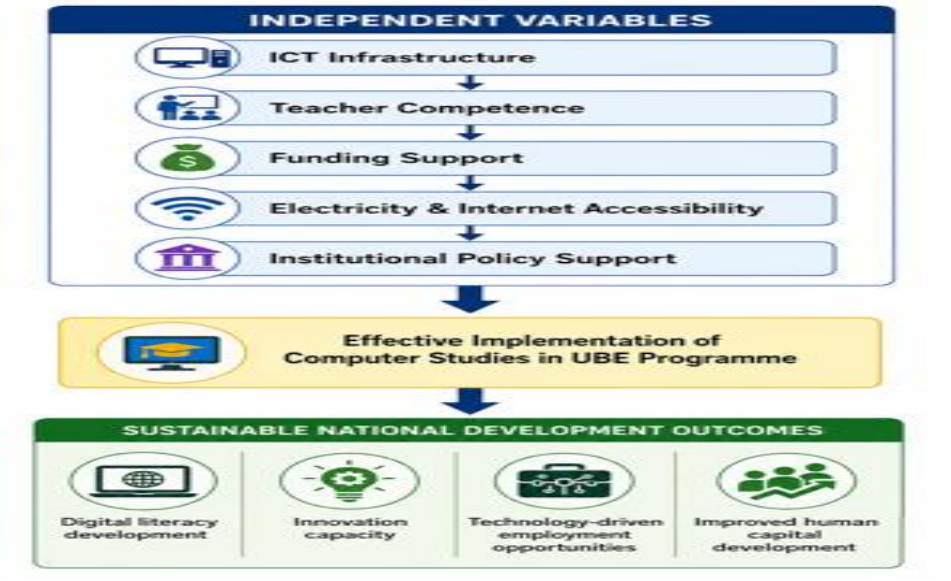

Figure 1: Conceptual Model of the Study

4. Results

This section presents the findings of the study on the factors militating against successful implementation of Computer Studies in the 9-Year Universal Basic Education (UBE) Programme for sustainable national development in Nigeria. Data collected through the questionnaire were analysed using descriptive and inferential statistics. The results are presented according to the research objectives.

4.1 Response Rate and Demographic Characteristics of Respondents

A total of 250 questionnaires were administered to Computer Studies teachers, ICT coordinators, and school administrators. Out of the distributed questionnaires, 238 were properly completed and returned, representing a response rate of 95.2%, which was considered adequate for analysis.

Table 3: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	142	59.7
	Female	96	40.3
Professional Status	Computer Studies Teachers	171	71.8
	ICT Coordinators	19	8.0
	School Administrators	48	20.2
Teaching Experience	Below 5 years	52	21.8
	5–10 years	96	40.3
	Above 10 years	90	37.9
School Location	Urban	128	53.8
	Rural	110	46.2

The demographic distribution indicates that the respondents possessed adequate professional experience and were directly involved in Computer Studies implementation. Therefore, their responses were considered appropriate for assessing factors affecting the programme.

4.2 Research Question One

To what extent does ICT infrastructure availability affect the implementation of Computer Studies in Nigerian UBE schools?

Table 4: ICT Infrastructure Availability and Computer Studies Implementation

Item	Mean ($\bar{X}$)	Std. Deviation	Decision
Inadequate number of computers affects practical Computer Studies teaching	4.42	0.71	Accepted
Many schools lack functional computer laboratories	4.36	0.76	Accepted
Limited internet access reduces students' exposure to digital learning	4.21	0.82	Accepted
Lack of educational software affects effective teaching	4.08	0.91	Accepted
Poor maintenance of ICT facilities affects sustainability	4.39	0.73	Accepted
Overall Mean	4.29	0.79	Accepted

The result indicates that inadequate ICT infrastructure is a major factor affecting Computer Studies implementation. The overall mean score of 4.29 exceeded the criterion mean of 3.00, indicating that respondents strongly agreed that inadequate computers, laboratories, internet facilities, and maintenance systems hinder effective Computer Studies delivery.

4.3 Research Question Two

How does teacher competence influence effective implementation of Computer Studies?

Table 5: Teacher Competence as a Factor Affecting Computer Studies Implementation

Item	Mean ($\bar{X}$)	Std. Deviation	Decision
Lack of professionally trained Computer Studies teachers affects implementation	4.31	0.75	Accepted
Limited ICT training reduces teachers' confidence	4.27	0.81	Accepted
Teachers require continuous professional development in ICT	4.48	0.66	Accepted
Some teachers rely mainly on theoretical teaching methods	4.18	0.89	Accepted
Low digital skills limit effective classroom technology use	4.34	0.72	Accepted
Overall Mean	4.32	0.77	Accepted

The findings reveal that teacher competence significantly affects Computer Studies implementation. The overall mean of 4.32 indicates that inadequate teacher preparation, insufficient ICT training, and limited digital competence constitute serious barriers to effective Computer Studies education.

4.4 Research Question Three

What is the influence of funding and government support on Computer Studies implementation?

Table 6: Funding and Government Support

Item	Mean ($\bar{X}$)	Std. Deviation	Decision
Insufficient funding affects provision of ICT facilities	4.46	0.69	Accepted
Budget allocation for ICT education is inadequate	4.28	0.78	Accepted
Poor funding affects maintenance of computer equipment	4.41	0.74	Accepted
Limited government support affects ICT expansion	4.25	0.85	Accepted
Public-private partnership in ICT education is inadequate	4.17	0.92	Accepted
Overall Mean	4.31	0.80	Accepted

The result shows that inadequate funding remains a significant obstacle to Computer Studies implementation. Respondents agreed that limited financial resources affect infrastructure development, equipment maintenance, and sustainability of ICT initiatives.

4.5 Research Question Four

What environmental and institutional factors hinder Computer Studies implementation?

Table 7: Environmental and Institutional Challenges

Item	Mean ($\bar{X}$)	Std. Deviation	Decision
Unstable electricity supply affects computer laboratory activities	4.53	0.63	Accepted
Poor internet connectivity limits digital learning	4.38	0.72	Accepted
Weak monitoring of ICT policies affects implementation	4.19	0.86	Accepted
Lack of technical support affects equipment maintenance	4.32	0.77	Accepted
Rural schools experience greater ICT challenges	4.45	0.68	Accepted
Overall Mean	4.37	0.73	Accepted

The findings indicate that electricity instability, poor connectivity, inadequate technical support, and weak monitoring mechanisms significantly affect Computer Studies implementation, especially in rural UBE schools.

4.6 Regression Analysis of Factors Influencing Computer Studies Implementation

A multiple regression analysis was conducted to determine the combined contribution of ICT infrastructure, teacher competence, funding, electricity/connectivity, and institutional support to Computer Studies implementation.

Table 8: Multiple Regression Analysis

Predictor Variable	Beta (β)	t-value	Sig.
ICT Infrastructure	0.31	5.84	0.001
Teacher Competence	0.35	6.42	0.000
Funding Support	0.24	4.71	0.002
Electricity & Connectivity	0.27	5.13	0.001
Institutional Support	0.19	3.86	0.004

Model Summary:

$R = 0.79$

$R^2 = 0.62$

Adjusted $R^2 = 0.61$

F-value = 74.36

Significance level = $p < 0.05$

The regression results indicate that the identified factors collectively explained 62% of the variation in Computer Studies implementation effectiveness. Teacher competence recorded the strongest predictive influence (β = 0.35), followed by ICT infrastructure (β = 0.31), electricity/connectivity (β = 0.27), funding support (β = 0.24), and institutional support (β = 0.19).

4.7 Summary of Major Findings

The major findings of the study are summarized as follows:

1. ICT infrastructure deficiency is a major barrier affecting Computer Studies implementation in UBE schools.

2. Teacher competence and professional development limitations significantly influence the quality of Computer Studies delivery.

3. Inadequate funding reduces the availability, maintenance, and sustainability of ICT facilities.

4. Electricity instability and poor internet connectivity restrict practical computer learning.

5. Weak institutional support and monitoring mechanisms reduce the effectiveness of ICT education policies.

6. Improving Computer Studies implementation requires simultaneous improvement in infrastructure, teacher capacity, funding, and policy execution.

5. Discussion of Findings

This study examined the factors militating against successful implementation of Computer Studies in the 9-Year Universal Basic Education (UBE) Programme for sustainable national development in Nigeria. The findings revealed that inadequate ICT infrastructure, insufficient teacher competence, inadequate funding, unstable electricity supply, poor connectivity, and weak institutional support are major factors limiting effective Computer Studies delivery. The results are discussed in relation to existing literature and their implications for educational development and national sustainability.

5.1 Influence of ICT Infrastructure on Computer Studies Implementation

The findings revealed that inadequate ICT infrastructure significantly affects Computer Studies implementation in Nigerian UBE schools. Respondents identified insufficient computers, inadequate computer laboratories, limited internet facilities, obsolete equipment, and poor maintenance culture as major constraints. The overall mean score of 4.29 indicates that infrastructure deficiency remains one of the strongest barriers affecting practical computer education. This finding agrees with Adeyemi and Awe (2026), who reported that scarcity of ICT resources, including computers, internet facilities, projectors, and functional ICT laboratories, creates significant obstacles to effective curriculum delivery in Nigerian upper basic schools. Their study emphasized that technology integration cannot succeed without adequate infrastructure support. Similarly, Ifionu et al. (2024) observed that the implementation of Computer Studies curriculum in Upper Basic Education schools in Anambra State was limited due to inadequate learning facilities and insufficient opportunities for students to engage in practical computer activities. This confirms that the availability of ICT facilities is fundamental to transforming Computer Studies from theoretical instruction into competency-based learning. The implication is that government and education stakeholders must prioritize investment in sustainable ICT infrastructure. Providing computers without maintenance

plans, technical support, and reliable connectivity may not produce meaningful improvement in digital education outcomes.

5.2 Effect of Teacher Competence on Computer Studies Implementation

The findings indicated that teacher competence was the strongest predictor of effective Computer Studies implementation, with a regression coefficient of $\beta = 0.35$. This suggests that teachers' knowledge, confidence, and ability to integrate technology into classroom activities significantly determine the success of Computer Studies education. This result supports Oguezue (2025), who found that technology integration among Nigerian upper-basic teachers is influenced by teachers' digital competence, experience, and access to professional development opportunities. The study emphasized that teachers require continuous training to effectively apply technology-based teaching approaches. Furthermore, Agbede et al. (2024) reported that ICT competence among teachers significantly affects students' learning experiences and academic achievement. Teachers with stronger ICT skills are more capable of creating interactive learning environments and improving students' engagement with digital tools. The finding highlights the importance of moving beyond one-time ICT training programmes toward continuous professional development. Effective Computer Studies teachers require updated knowledge of programming, digital tools, cybersecurity awareness, artificial intelligence applications, and modern instructional technologies.

5.3 Influence of Funding and Government Support

The study revealed that inadequate funding significantly affects Computer Studies implementation. Respondents agreed that insufficient financial allocation affects procurement of computers, establishment of laboratories, maintenance of equipment, and teacher training programmes. The finding reflects the broader challenge of educational technology financing in developing countries, where ICT initiatives often experience sustainability problems due to inadequate long-term funding mechanisms. Although Nigeria has introduced several ICT-related educational policies, implementation outcomes remain limited when financial commitments do not match policy objectives. Recent educational development initiatives in Nigeria have continued to emphasize the importance of strengthening infrastructure, teacher support, and learning outcomes through increased investment in basic education. For example, national education improvement programmes have identified infrastructure enhancement and teacher development as important components of improving public education quality. Therefore, sustainable Computer Studies implementation requires dedicated budgetary provisions rather than dependence on temporary projects or donor-supported interventions.

5.4 Effect of Electricity Supply and Internet Connectivity

The findings showed that electricity instability and poor internet connectivity are major environmental barriers affecting Computer Studies implementation. The overall mean score of 4.37 indicates that respondents considered these factors highly significant. Computer education requires continuous access to electricity for operating computers, networking devices, and digital learning platforms. In many Nigerian schools, especially rural schools, unreliable electricity prevents regular practical sessions and reduces students' exposure to digital technologies. The findings support the argument by Sanusi and Deriba (2024) that computing education development in African educational systems is constrained by infrastructure limitations, unequal technology access, and challenges associated with digital inclusion. Without reliable electricity and connectivity, students may only learn computer concepts theoretically, limiting their ability to acquire practical digital skills required in modern workplaces.

5.5 Institutional Support and Policy Implementation Challenges

The study found that weak institutional support and ineffective monitoring mechanisms also contribute to poor Computer Studies implementation. Although ICT education has been incorporated into national education frameworks, gaps remain between policy formulation and actual implementation at the school level. Effective implementation requires cooperation among government agencies, school administrators, teachers, parents, and private sector organizations. School administrators must provide leadership by ensuring proper utilization and maintenance of ICT facilities, while government agencies must monitor compliance with ICT education policies. The finding supports the view that curriculum implementation is not solely dependent on curriculum design but also on administrative commitment, resource availability, and monitoring effectiveness.

5.6 Implications for Sustainable National Development

The challenges identified in this study have significant implications for Nigeria's sustainable development goals. Computer Studies education at the basic level serves as the foundation for developing future professionals in computing, artificial intelligence, cybersecurity, engineering, digital entrepreneurship, and other technology-driven sectors. Poor implementation of Computer Studies may contribute to continued digital inequality and limit Nigeria's ability to develop a knowledge-based economy. Conversely, strengthening digital education can improve human capital development, innovation capacity, youth employability, and national competitiveness. The findings therefore suggest that improving Computer Studies education should be considered a strategic national development priority rather than merely a curriculum requirement.

5.7 Summary of Discussion

The discussion demonstrates that successful Computer Studies implementation within the UBE programme requires a coordinated approach involving:

1. Adequate ICT infrastructure and maintenance systems.
2. Continuous professional development for Computer Studies teachers.
3. Sustainable funding mechanisms.
4. Reliable electricity and internet connectivity.
5. Strong institutional leadership and policy monitoring.

The study confirms that technology education cannot succeed through curriculum reform alone; it requires an enabling ecosystem where teachers, infrastructure, policies, and resources work together toward achieving sustainable digital education.

6. Conclusion and Recommendations

6.1 Conclusion

This study examined the factors militating against successful implementation of Computer Studies in the 9-Year Universal Basic Education (UBE) Programme for sustainable national development in Nigeria. The findings established that although Computer Studies has been recognized as an important component of basic education aimed at developing digital literacy and technological competence among learners, its implementation remains inadequate due to multiple interconnected challenges. The study revealed that

inadequate ICT infrastructure is one of the major constraints affecting effective Computer Studies delivery. Many UBE schools lack functional computer laboratories, sufficient computers, internet connectivity, and relevant digital learning resources. As a result, students often receive theoretical knowledge of computing without adequate practical exposure, limiting the development of essential digital skills required in the modern economy. The study also established that teacher competence plays a critical role in determining the effectiveness of Computer Studies implementation. The findings showed that inadequate numbers of professionally trained Computer Studies teachers, limited ICT skills, and insufficient opportunities for continuous professional development negatively affect curriculum delivery. Since teachers serve as the primary agents of curriculum implementation, improving their technological and pedagogical competencies is essential for achieving meaningful ICT education outcomes.

Inadequate funding, unstable electricity supply, poor internet connectivity, weak technical support, and ineffective monitoring mechanisms were identified as significant barriers. These challenges demonstrate that successful Computer Studies implementation requires more than curriculum inclusion; it requires a supportive ecosystem involving infrastructure development, financial commitment, teacher preparation, and effective educational governance. The findings have important implications for sustainable national development. In the contemporary digital economy, nations require citizens with strong technological capabilities to drive innovation, entrepreneurship, scientific advancement, and economic growth. Failure to provide quality Computer Studies education at the basic level may increase digital inequality and reduce Nigeria's capacity to compete in the global knowledge economy. Therefore, improving Computer Studies implementation within the UBE programme should be considered a strategic investment in human capital development. A comprehensive approach involving government agencies, educational institutions, private sector organizations, and communities is required to transform Computer Studies from a theoretical subject into a practical platform for developing future digital professionals.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Improvement of ICT Infrastructure in UBE Schools

The Federal and State Governments, through relevant education agencies such as the Universal Basic Education Commission (UBEC), should prioritize the establishment and upgrading of computer laboratories in all UBE schools. Schools should be equipped with adequate computers, networking facilities, internet connectivity, and modern instructional software to support practical Computer Studies learning.

Additionally, ICT infrastructure projects should include maintenance plans, technical support services, and equipment replacement strategies to ensure long-term sustainability.

2. Continuous Professional Development for Computer Studies Teachers

Regular training programmes should be organized for Computer Studies teachers to improve their technical skills and pedagogical competence. Professional development should cover emerging areas such as:

i. Programming and computational thinking,

ii. Artificial intelligence fundamentals,

iii. Cybersecurity awareness,

iv. Digital learning platforms,

v. Educational software applications,

vi. ICT-based teaching methods.

Teacher training institutions and educational technology centres should collaborate to provide continuous capacity-building programmes rather than occasional workshops.

3. Increased and Sustainable Funding for ICT Education

Government should provide dedicated funding for Computer Studies implementation within the UBE programme. Budget allocations should cover:

i. Procurement of computers and ICT devices,

ii. Internet subscription,

iii. Laboratory development,

iv. Equipment maintenance,

v. Teacher training,

vi. Technical support.

Furthermore, public-private partnerships should be encouraged to complement government funding and expand digital learning opportunities.

4. Provision of Reliable Electricity and Connectivity Solutions

Since electricity and internet access are fundamental requirements for computer education, government and stakeholders should explore alternative energy solutions such as solar-powered computer laboratories, especially in rural and underserved communities. Improving broadband connectivity in schools should also be prioritized to enable access to digital educational resources and online learning platforms.

5. Strengthening Monitoring and Evaluation Mechanisms

Educational authorities should establish effective monitoring systems to assess the implementation of Computer Studies curriculum across UBE schools. Regular inspections should evaluate:

i. Availability and functionality of ICT facilities,

ii. Teacher competence levels,

iii. Quality of curriculum delivery,

iv. Utilization of digital resources.

Data obtained from monitoring activities should guide policy decisions and resource allocation.

6. Development of Context-Specific Digital Education Policies

Future ICT education policies should consider differences between urban and rural schools. Strategies should be designed based on local conditions, including infrastructure availability, teacher distribution, electricity challenges, and community needs. A one-size-fits-all approach may not effectively address the diverse challenges experienced across Nigerian basic education institutions.

7. Promotion of Public-Private Partnerships

Government should encourage collaboration with technology companies, non-governmental organizations, and educational technology providers to support Computer Studies education. Such partnerships can contribute through:

i. Donation of ICT equipment,

ii. Teacher training initiatives,

iii. Development of educational software,

iv. Internet support programmes.

8. Integration of Practical and Future-Oriented Computing Skills

The Computer Studies curriculum should be continuously reviewed to reflect emerging technological trends. Beyond basic computer operations, learners should gradually be introduced to:

i. Coding,

ii. Robotics,

iii. Artificial intelligence concepts,

iv. Data literacy,

v. Digital citizenship,

vi. Cybersecurity awareness.

This will ensure that Nigerian learners acquire skills relevant to future employment opportunities and national innovation needs.

Contribution to Knowledge

This study contributes to existing literature by providing an integrated framework explaining how infrastructure, teacher competence, funding, environmental conditions, and institutional support collectively influence Computer Studies implementation within the Nigerian UBE programme. Unlike studies that examine isolated ICT challenges, this research presents a comprehensive perspective linking Computer Studies implementation barriers with sustainable national development outcomes.

Limitations of the Study

The study was limited to factors affecting Computer Studies implementation within the UBE programme and relied primarily on responses from teachers and school administrators. Future studies may include students, policymakers, and private-sector technology stakeholders to provide broader perspectives.

Future Research Directions

Future research should investigate:

The effectiveness of artificial intelligence-supported learning in Nigerian basic education.

The impact of solar-powered digital classrooms on rural Computer Studies implementation.

Comparative analysis of ICT education implementation between Nigerian states.

Long-term effects of Computer Studies competence on students' employability and innovation capacity.

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