

## MITIGATING FACTORS AGAINST EFFECTIVE DELIVERY OF COMPUTER SCIENCE EDUCATION IN SECONDARY SCHOOLS IN IJEBU-ODE LOCAL GOVERNMENT AREA, OGUN STATE, NIGERIA

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### Abstract

*This study investigated mitigating factors against effective delivery of computer science education in secondary schools in Ijebu-Ode Local Government, Ogun State. A descriptive survey research design was adopted for the study. The population for the study comprised all seventy-eight (78) computer science teachers across all the secondary schools in Ijebu-Ode. Due to a relatively manageable number of participants, the entire population was used for the study. A structured questionnaire was used as an instrument for data collection. Cronbach's Alpha reliability technique was used to establish the internal consistency of the instrument, and a reliability coefficient of 0.79 was obtained. Data was analyzed using descriptive statistics of mean and standard deviation, and regression analysis. The findings revealed that multiple challenges, such as a lack of functional computers, inadequate funding, and irregular power supply, impede the effective delivery of Computer Science education. Also, teacher qualifications and pedagogical competence significantly influence the effective teaching of computer science to a great extent. In addition, the availability and utilization of instructional materials affect the delivery of computer science education to a great extent. It was concluded that effective delivery of computer science education requires a comprehensive approach that addresses infrastructural inadequacies, enhances teacher capacity, and ensures consistent provision and utilization of instructional materials. It is therefore recommended that the government should equip schools with functional computer laboratories, sufficient computers, and internet connectivity to facilitate practical learning and reduce infrastructural challenges.*

**Keywords:** Mitigating, factors, Effective, delivery, Computer Science

### INTRODUCTION

In today's rapidly evolving digital era, the ability to understand and apply computer science concepts has become a fundamental component of modern education. Computer science education provides learners with the

cognitive tools required for computational thinking, problem-solving, innovation, and participation in the knowledge-driven global economy (Gao and Hew, 2022). Across the world, nations are integrating computer science and information and communication technology (ICT) into school curricula to

enhance students' creativity, employability, and competitiveness in digital industries. In Nigeria, the Federal Government's National Policy on Information and Communication Technology in Education underscores the need to use ICT to improve teaching, learning, and educational management at all levels (Ibrahim, Aliyu, and Ahmad, 2024). However, despite this policy framework, the effective delivery of computer science education in many secondary schools remains hindered by multiple systemic challenges that require urgent attention.

The delivery of computer science education refers to the extent to which teaching and learning processes, resources, and infrastructure are effectively utilised to achieve curriculum objectives and develop students' digital competencies (Ohaire-Udebu and Chukwuemeka, 2024). According to Ezeh (2020), the success of computer science delivery depends largely on the availability of trained teachers, adequate instructional resources, conducive learning environments, and appropriate pedagogical practices. In the Nigerian context, several studies have observed a persistent gap between national policy intentions and the actual practice of computer science education in secondary schools (Oladimeji et al., 2018). According to Echegu and Special (2024), many schools continue to teach computer studies theoretically without providing sufficient opportunities for students to engage in hands-on computer experiences. This deficiency undermines students' ability to apply computing knowledge and discourages interest in technology-related careers.

Empirical evidence across Nigeria and specifically in the South-West geopolitical zone indicates that the effective delivery of computer science education is constrained by a combination of infrastructural, human, and institutional factors. A study by Nannim and Yushau (2020) identified inadequate computer facilities, unreliable power supply, poor

Internet connectivity, and limited access to modern software as major obstacles to ICT instruction in secondary schools. Similarly, Dike and Salisu (2015) observed that many computer laboratories are either under-equipped or non-functional due to a lack of maintenance and insufficient funding. The scarcity of qualified computer science teachers is another key challenge. According to Almdahem (2024), most teachers who handle computer studies in secondary schools are not adequately trained in computer science pedagogy or programming concepts, leading to ineffective instruction dominated by rote learning. Furthermore, many schools lack structured professional development programmes to enhance teachers' digital competence and confidence (Iga, Anik, and Ishartiwi 2025).

The situation in Ogun State, and specifically in Ijebu-Ode Local Government Area, reflects these national challenges. Research by Akinyemi, Amaechi, and Etoh (2022) on ICT integration in Ogun State schools revealed that the majority of public secondary schools operate with outdated computer systems, insufficient laboratory space, and minimal access to digital teaching aids. Power instability further limits the frequency of practical computer lessons. Additionally, school administrators face financial constraints that hinder the procurement of ICT equipment, maintenance of existing facilities, and support for teacher training (Issa et al., 2023). Consequently, the teaching of computer science in most secondary schools in Ijebu-Ode remains largely theoretical, thereby limiting students' exposure to real-life technological applications.

Beyond material deficiencies, pedagogical and curriculum-related issues also impede the effective delivery of Computer Science education. The curriculum is often rigid, emphasizing theoretical knowledge over practical skill acquisition (Fergusson, 2022).

Assessment practices seldom test problem-solving or programming competencies, but rather focus on recall-based examinations. The lack of innovative teaching approaches such as project-based learning, coding clubs, and peer-assisted practice further constrains students' engagement and creative learning (Salam et al., 2016). Moreover, inconsistent supervision and policy implementation at the school level have led to disparities in resource allocation, teacher motivation, and instructional quality across schools in Ogun State (Agbajeola and Hassan, 2023).

Scholars have therefore emphasized the need to identify and strengthen mitigating factors that can reduce these barriers and enhance the quality of Computer Science delivery in Nigerian schools. Such mitigating factors may include teacher professional development, community and industry partnerships, improved school management practices, government funding interventions, and innovative low-cost ICT solutions (Osemeike et al., 2024). For instance, partnerships with local ICT firms can provide mentorship opportunities and equipment donations, while government training initiatives can help upgrade teachers' pedagogical and technical skills. At the same time, internal school policies that promote regular maintenance of computer facilities, digital literacy awareness among students, and equitable access to learning resources can significantly improve delivery outcomes (Taqa, 2025). Given these considerations, the present study seeks to investigate the mitigating factors against effective delivery of computer science education in secondary schools in Ijebu-Ode LGA, Ogun State.

### **Statement of the Problem**

Computer Science education plays a vital role in developing digital competencies essential for participation in the modern, technology-driven world. In Nigeria, government policy emphasizes the integration of computer literacy

and computational skills into secondary school curricula to prepare learners for global competitiveness. However, despite these policy initiatives, the delivery of Computer Science education in secondary schools remains largely ineffective and inconsistent.

Across many schools, instruction in Computer Science is dominated by theory, with little or no access to functional laboratories, digital facilities, or reliable electricity. Many teachers assigned to teach the subject lack adequate training, technical expertise, and pedagogical skills necessary for effective delivery. Professional development programmes for teachers are irregular and poorly supported, resulting in low confidence, minimal use of innovative instructional strategies, and limited student engagement. Consequently, students often leave secondary school with weak practical computing skills and poor readiness for tertiary education or technology-related careers.

Furthermore, the absence of adequate supervision, monitoring, and collaboration with ICT stakeholders has also limited the effectiveness of instructional delivery. These challenges are worsened by insufficient facilities, poor maintenance culture, and inadequate technical support. Therefore, this study investigates the mitigating factors against effective delivery of Computer Science education in secondary schools in Ijebu-Ode Local Government Area, Ogun State.

### **Research Objectives**

1. To identify the mitigating factors hindering the effective delivery of Computer Science education in selected secondary schools.
2. To examine how teacher qualification and pedagogical competence influence the effective teaching of Computer Science in secondary schools.

3. To find out the extent to which availability and utilization of instructional materials affect the delivery of Computer Science education.

### Research Questions

1. What are the mitigating factors hindering the effective delivery of Computer Science education in selected secondary schools?
2. In what ways do teacher qualifications and pedagogical competence influence the effective teaching of Computer Science in secondary schools?
3. To what extent do the availability and utilization of instructional materials affect the delivery of Computer Science education?

## LITERATURE REVIEW

### Concept of Computer Science Education

Computer Science Education is the scholarly and practical field concerned with teaching and learning the principles, practices, and social implications of computing. Computer Science Education has emerged as a cornerstone of modern educational systems and a critical driver of technological, social, and economic advancement in the 21st century. It encompasses the systematic study of algorithms, computational thinking, programming, data structures, hardware systems, networking, artificial intelligence, and the ethical implications of computing. The concept of Computer Science Education is rooted in the understanding that computer science is not merely about learning to use computers but about developing the skills to design, analyze, and apply computational solutions to complex problems (Gao and Hew 2022).

According to the Association for Computing Machinery (ACM, 2021), Computer Science Education is concerned with the principles of

computation, programming languages, data processing, and system design that underpin information technologies. It extends beyond coding or digital literacy to include logical reasoning, abstraction, problem-solving, and algorithmic thinking (Mills et al., 2024). Kushwaha, Kushwaha, and Ahmad (2024) emphasized that the purpose of computer science is to enable learners to become creators, not just consumers, of technology, equipping them with the skills to innovate and adapt to emerging digital realities. In the school context, computer science Education provides students with a foundation for understanding how digital systems work and how they influence society. It integrates theoretical knowledge with practical applications such as programming, robotics, and database management (Mir et al., 2020). Asmara (2020) noted that effective computer science education develops not only computational competencies but also critical thinking, creativity, and collaborative problem-solving skills.

### Pedagogical Approaches in Computer Science Education

Effective Computer Science Education relies on pedagogical strategies that emphasize active learning, hands-on experience, and project-based instruction. Research by Sezer and Namukas (2021) highlights the importance of integrating computational thinking through engaging, real-world problem contexts. Approaches such as *pair programming*, *problem-based learning*, and *flipped classroom* models have been shown to improve student engagement and retention in computer science (Chis et al., 2018). Moreover, constructivist theories by Piaget and Papert form the basis for teaching computer science, emphasizing learning by doing and discovery learning. Papert's (1980) "constructionism" theory, which promotes learning through building tangible computational artifacts, remains influential in computer science education

today, particularly in robotics and coding education.

### **Factors against the Effective Delivery of Computer Science Education**

The effective delivery of Computer Science Education is vital for equipping students with essential technological competencies, computational thinking, and digital literacy skills required in the 21st-century knowledge economy. However, numerous studies have documented persistent challenges and limiting factors that hinder its successful implementation, particularly in developing contexts such as Nigeria.

***Inadequate Infrastructure and Technological Facilities:*** One of the most critical impediments to effective Computer Science Education is the lack of adequate infrastructure. This includes insufficient functional computer laboratories, inadequate internet connectivity, unstable electricity supply, and obsolete computer hardware and software. (Oguejiofor & Obiakor, 2022) observed that many secondary schools in Nigeria lack the basic computer facilities required to facilitate practical instruction, leading to a situation where Computer Science is taught theoretically rather than practically. Similarly, Olugbade (2022) reported that inadequate access to modern ICT tools such as projectors, simulation software, and multimedia devices limits students' hands-on experience and reduces the effectiveness of computer-based learning. The absence of a reliable power supply and internet access further compounds the problem, especially in rural areas where digital infrastructure is underdeveloped (Chukwunonso, 2024).

***Shortage of Qualified and Competent Teachers:*** Teacher qualification and pedagogical competence are pivotal to the effective teaching of Computer Science. However, there is a notable shortage of professionally trained Computer Science

educators in many schools. Many of the teachers assigned to teach the subject are either unqualified or come from unrelated disciplines with limited computing background (Guiaselon et al., 2022). Also, Temirkhanova, Abildinova, and Karaca (2024) emphasized that effective Computer Science instruction requires teachers who possess both technical and pedagogical knowledge and an integration of computer literacy, programming proficiency, and instructional design skills. Inadequate teacher preparation and professional development programs have also been identified as major obstacles. Without well-trained teachers capable of integrating digital tools and applying learner-centered methods, students' understanding of core computer concepts remains shallow, reducing their readiness for higher-level computing tasks.

***Poor Funding and Resource Allocation:*** Funding inadequacy remains a chronic issue that affects educational delivery in general and Computer Science Education in particular. The cost of establishing and maintaining computer laboratories, acquiring up-to-date software, and training teachers is relatively high. Consequently, many schools, especially public ones, are unable to sustain effective Computer Science programs (Nkasiobi, 2022). Fajoyegbe et al. (2024) asserted that limited budgetary allocation to education constrains the provision of ICT facilities, maintenance of existing equipment, and implementation of innovative teaching strategies.

***Curriculum Deficiencies and Implementation Gaps:*** Another major factor hindering effective delivery of Computer Science Education is the inadequacy of the curriculum and poor implementation strategies. According to Hussain and Phulpoto, (2024) designed a curriculum that aims to promote practical computer literacy is often too broad, outdated, or misaligned with modern technological realities. As reported by Hutson et al (2022),

many schools continue to use obsolete syllabi that emphasize theoretical computer studies rather than modern computing concepts such as programming, artificial intelligence, and data analytics. Furthermore, inadequate supervision and monitoring by curriculum implementers lead to inconsistencies in teaching standards across schools.

### ***Pedagogical Challenges and Instructional***

**Methods:** Pedagogical limitations constitute another significant barrier. Traditional teacher-centered methods, which emphasize rote memorization and lecture delivery, dominate the teaching of Computer Science in many schools. This approach discourages active learning and prevents students from developing practical problem-solving and computational thinking skills (Çela, Fonkam, and Potluri 2024). Effective Computer Science Education requires experiential learning approaches such as project-based, inquiry-based, and collaborative learning (Dema and Choden, 2024). However, due to large class sizes, inadequate facilities, and insufficient teacher training, these learner-centered strategies are rarely implemented (Donkoh and Amoakwah, 2024). In many cases, computer lessons are reduced to theory due to the unavailability of computers for each student, defeating the purpose of the subject.

## **METHODOLOGY**

The study adopted a descriptive survey research design. The study was conducted in the Ijebu-

Ode Local Government Area of Ogun State. The population for this study comprised all seventy-eight (78) computer science teachers across all the registered public and private secondary schools in Ijebu-Ode, Ogun State. Due to the relatively manageable number of participants, the entire population was used for the study. A structured questionnaire that comprised 30 items, rated on a 5-point Likert scale (Strongly agree, agree, disagree, strongly disagree, and undecided), was used as an instrument for data collection. Validity of the instrument was carried out by experts to ensure appropriate vocabulary and sentence structure of the items are suitable for the intended purposes. Reliability of the instrument was established by administering 10 copies of the instrument to respondents outside the study area. Cronbach's Alpha reliability technique was used to establish the internal consistency of the instrument, and a reliability coefficient of 0.79 was obtained. The questionnaire was administered by the researcher with the support of a research assistant. Data was analyzed using descriptive statistics of mean and standard deviation. In taking decision, any mean value above 3.00 was considered agreed, while any value below 3.00 was considered disagreed.

## **DATA ANALYSIS AND RESULTS**

**Research Question 1:** What are the mitigating factors hindering the effective delivery of Computer Science education in selected secondary schools?

**Table 1:** Mean responses on mitigating factors hindering the effective delivery of Computer Science education in selected secondary schools

| S/N | ITEMS                                                                                        | MEAN | SD   |
|-----|----------------------------------------------------------------------------------------------|------|------|
| 1   | Lack of functional computer laboratories hinders the effective teaching of Computer Science. | 4.58 | 0.62 |
| 2   | Inadequate funding limits the availability of essential ICT resources for teaching.          | 4.30 | 0.79 |
| 3   | Irregular power supply affects the smooth delivery of Computer Science lessons.              | 4.02 | 0.88 |

|                     |                                                                                                    |             |      |
|---------------------|----------------------------------------------------------------------------------------------------|-------------|------|
| 4                   | Overcrowded classrooms make it difficult for students to have hands-on computer practice.          | 3.67        | 0.80 |
| 5                   | Poor internet connectivity reduces students' ability to learn computer-based concepts effectively. | 4.10        | 0.81 |
| 6                   | Limited access to modern teaching software and applications affects lesson quality.                | 3.80        | 0.86 |
| 7                   | Frequent breakdown of school computers disrupts the teaching process.                              | 3.56        | 0.89 |
| 8                   | Lack of administrative support discourages teachers from implementing ICT-based instruction.       | 3.40        | 0.92 |
| 9                   | The poor maintenance culture of ICT facilities negatively impacts Computer Science teaching.       | 3.63        | 0.88 |
| 10                  | Inadequate government supervision and monitoring affect the quality of Computer Science delivery.  | 3.18        | 0.92 |
| <b>Average mean</b> |                                                                                                    | <b>3.83</b> |      |

Table 1 presents the mean responses on major mitigating factors hindering the effective delivery of computer science education in secondary schools in Ijebu-Ode LGA. All the 10 items have their mean scores ranging between 3.18 and 4.53, while the standard deviation value ranges between 0.62 and 0.92, respectively. Findings revealed that a lack of functional computers, inadequate funding, irregular power supply, overcrowded classrooms, poor internet connectivity, among others, are mitigating factors hindering the effective delivery of computer science

education in secondary schools. However, with an average mean score of ( $\bar{x} = 3.83$ ), respondents agreed that multiple challenges impede the effective delivery of Computer Science education. The low standard deviation for all the items indicates that the respondents are homogeneous in their responses.

**Research Question 2:** In what ways do teacher qualifications and pedagogical competence influence the effective teaching of Computer Science in secondary schools?

**Table 2:** Mean responses on ways in which teacher qualifications and pedagogical competence influence the effective teaching of Computer Science in secondary schools

| S/N | ITEMS                                                                                           | MEAN | SD   |
|-----|-------------------------------------------------------------------------------------------------|------|------|
| 1   | Teachers with professional training in Computer Science deliver lessons more effectively.       | 4.60 | 0.60 |
| 2   | Teachers' mastery of programming languages improves students' understanding of coding concepts. | 4.30 | 0.79 |
| 3   | Teachers' pedagogical skills determine how well students grasp complex computer topics.         | 4.13 | 0.84 |
| 4   | Continuous professional development enhances teachers' teaching competence in Computer Science. | 3.97 | 0.89 |
| 5   | Teachers who integrate modern teaching methods make Computer Science lessons more engaging.     | 3.74 | 0.91 |
| 6   | Lack of qualified Computer Science teachers reduces students' interest in the subject.          | 3.84 | 0.95 |
| 7   | Teachers with ICT certifications are more effective in practical computer instruction.          | 3.90 | 0.90 |

|                     |                                                                                                  |             |      |
|---------------------|--------------------------------------------------------------------------------------------------|-------------|------|
| 8                   | Effective classroom management skills contribute to better Computer Science learning outcomes.   | 4.02        | 0.82 |
| 9                   | Teachers' attitudes towards technology influence students' motivation to learn Computer Science. | 3.94        | 0.88 |
| 10                  | Pedagogically competent teachers adapt lessons to suit different student learning styles.        | 3.98        | 0.86 |
| <b>Average mean</b> |                                                                                                  | <b>3.95</b> |      |

Table 2 presents mean responses on ways in which teacher qualification and pedagogical competence influence the effective teaching of computer science in secondary schools in Ijebu-Ode LGA. All the 10 items have their mean score ranging between 3.74 and 4.60, while the standard deviation values range between 0.60 and 0.95, respectively. The results revealed that teachers with professional training in computer science deliver lessons more effectively, teachers' mastery of programming languages improves students' understanding of coding concepts, and continuous professional development enhances teachers' teaching competence in computer science, among others, are ways in which teacher qualification and

pedagogical competence influence the effective teaching of computer science in secondary schools. However, the average mean of ( $\bar{x} = 3.95$ ) implies strong agreement among respondents that teacher qualifications and pedagogical competence significantly influence the effective teaching of computer science to a great extent. The respondents were found to be homogeneous in their responses.

**Research Question 3:** To what extent do the availability and utilization of instructional materials affect the delivery of Computer Science education?

**Table 2:** Mean responses on the extent of availability and utilization of instructional materials affect the

| S/N                 | ITEMS                                                                                                            | MEAN        | SD   |
|---------------------|------------------------------------------------------------------------------------------------------------------|-------------|------|
| 1                   | Adequate instructional materials enhance students' participation during Computer Science lessons.                | 4.36        | 0.73 |
| 2                   | Lack of instructional materials hinders practical demonstrations in Computer Science.                            | 4.06        | 0.84 |
| 3                   | Availability of multimedia resources improves students' comprehension of abstract computer concepts.             | 4.10        | 0.80 |
| 4                   | Teachers make effective use of available instructional materials during Computer Science teaching.               | 3.95        | 0.88 |
| 5                   | Well-equipped computer labs enhance hands-on learning experiences for students.                                  | 4.10        | 0.80 |
| 6                   | Access to instructional software improves students' performance in Computer Science.                             | 3.93        | 0.90 |
| 7                   | Teachers who creatively improvise teaching aids improve lesson effectiveness.                                    | 3.70        | 0.94 |
| 8                   | Lack of audio-visual resources reduces students' engagement during Computer Science lessons.                     | 3.52        | 0.97 |
| 9                   | Regular updating of instructional materials improves the quality of instruction.                                 | 3.98        | 0.87 |
| 10                  | Proper utilization of instructional materials contributes to students' academic achievement in Computer Science. | 4.13        | 0.77 |
| <b>Average mean</b> |                                                                                                                  | <b>3.98</b> |      |

delivery of Computer Science Education

Table 3 presents the mean responses on the extent to which availability and utilization of instructional materials affect the delivery of computer science education in Ijebu-Ode LGA. All the 10 items have mean scores ranging between 3.70 and 4.36, while the standard deviation value ranges between 0.73 and 0.97, respectively. The result revealed that adequate instructional materials enhance students' participation during computer science lessons, a lack of instructional materials hinders practical demonstrations in computer science, and the availability of multimedia resources improves students' comprehension of abstract computer concepts, among others. However, with an average mean of ( $\bar{x} = 3.98$ ), the result indicates that availability and utilization of instructional materials affect the delivery of computer science education to a great extent. The low standard deviation for all the items indicates that the respondents are homogeneous in their responses.

## DISCUSSION OF FINDINGS

The findings revealed that multiple challenges impede the effective delivery of computer science education. This aligns with earlier studies that identified a range of systemic, infrastructural, and pedagogical issues affecting effective computer science instruction. In Nigeria, several studies have highlighted that inadequate facilities, erratic electricity supply, limited funding, and lack of qualified teachers remain key obstacles to effective computer science education (Nannim and Yushau 2020). Osadebe and Ojukonsin (2018) also emphasized that computing teachers globally face constraints such as insufficient hardware, lack of professional support, and limited access to reliable learning resources. In Nigeria, similar issues prevail; schools often lack functional computer laboratories, qualified computer teachers, and sufficient instructional time for practical sessions (Odo & Odo, 2014).

These deficiencies have direct implications for teaching effectiveness, particularly in a subject like computer science that depends heavily on hands-on practical experience. This finding, therefore, underscores that for computer science education to be effectively delivered, the enabling environment comprising infrastructure, power supply, administrative support, and teacher capacity must be strengthened (Nyongesa & Otieno, 2023). Without addressing these systemic barriers, even qualified teachers may find it difficult to deliver the curriculum effectively, thereby limiting students' learning outcomes and skill acquisition.

The findings also revealed that teacher qualifications and pedagogical competence significantly influence the effective teaching of Computer Science. This is consistent with empirical evidence in both local and international contexts. Studies have shown that the competence, academic background, and pedagogical preparedness of teachers directly affect instructional quality and students' achievement in technical and computer-based subjects (Nannim and Yushau, 2020). In the same vein, Ngbarabara (2019) revealed that many computer science teachers in secondary and tertiary institutions lack adequate pedagogical training, leading to ineffective teaching practices. Similarly, Ukwetang et al. (2025) found that teachers with higher qualifications and specialized training in Computer Science demonstrate better instructional delivery, classroom management, and use of technology-enhanced learning resources.

Furthermore, Ma et al. (2025) emphasized that Computer Science teacher self-efficacy, covering content knowledge, instructional design, and classroom management, significantly predicts teaching effectiveness.

Teachers with strong pedagogical content knowledge are more likely to integrate project-based learning, algorithmic thinking, and problem-solving approaches in Computer Science instruction.

Findings also revealed that the availability and utilization of instructional materials affect the delivery of Computer Science education to a great extent, which is strongly corroborated by several empirical studies. In Nigeria, Williams (2024) reported that the non-availability of relevant instructional materials, such as computers, projectors, and instructional software, constitutes a major barrier to effective teaching of Computer Science. In addition, teachers' limited competence in using available materials further reduces instructional effectiveness (Bawa, 2016). Instructional materials significantly enhance students' understanding of abstract Computer Science concepts when effectively utilized. Similarly, Orji & Perumal (2024) observed that the integration of instructional aids in Computer Science classes improves student engagement, self-efficacy, and practical skill development. However, mere availability of instructional materials is not sufficient; effective utilization is crucial. As noted by Okonkwo (2022), many teachers either underutilize or fail to integrate available materials due to a lack of training or motivation. Consequently, the pedagogical impact of those resources remains limited. Therefore, institutions must not only provide adequate facilities but also train teachers in the innovative and efficient use of available instructional tools.

This finding thus aligns with the broader view that the provision and proper use of instructional materials are indispensable to achieving effective computer science education, especially in developing countries where resource gaps are pronounced.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

The study concluded that the effective delivery of computer science education in secondary schools is significantly hindered by a combination of infrastructural, human, and instructional challenges. The study emphasizes that the effective delivery of computer science education in Ijebu-Ode requires a comprehensive approach that addresses infrastructural inadequacies, enhances teacher capacity, and ensures consistent provision and utilization of instructional materials. By prioritizing these areas, educational stakeholders and policymakers can foster a more conducive environment for technology-driven learning, thereby equipping students with the digital competencies necessary for success in the modern world.

### Recommendation

1. The government should equip schools with functional computer laboratories, sufficient computers, internet connectivity, and updated software to facilitate practical learning and reduce infrastructural challenges that impede effective Computer Science instruction.
2. Recruitment and deployment of computer science teachers should prioritize relevant academic qualifications and technical expertise.
3. School authorities should ensure that teaching and learning materials, such as computers, software, projectors, and teaching aids, are not only available but actively integrated into lesson delivery to enhance student engagement and practical skill acquisition.
4. School administrators and educational authorities should establish systems to monitor and support the use of instructional resources and teaching practices.

5. School authorities should create an enabling environment for learning by managing class sizes, scheduling adequate practical sessions, and ensuring a stable electricity supply.

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