Web of Scholars: Multidimensional Research Journal
ISSN: 2751-7543
Volume 05 Number 02 (2026)
https://innosci.org/wos

Article

Enhancing the Development of Stem Education in Public Secondary Schools in Fct, Abuja, Nigeria

Okiriguo Gladstone[1]

1. Department of Science and Environmental Education, University of Abuja, Abuja, Nigeria
* Correspondence: gladstoneokiriguo@gmail.com

Abstract: This study examined factors that can enhance the development of Science, Technology, Engineering, and Mathematics (STEM) education in public secondary schools in the Federal Capital Territory (FCT), Abuja. A descriptive survey research design was adopted. The population comprised teachers and school administrators in public secondary schools, with a sample size of 385 respondents selected through simple random sampling. A structured questionnaire titled Enhancing STEM Education Questionnaire (ESEQ) was used for data collection. The instrument was validated by experts in educational administration and science education, while its reliability was established using Cronbach Alpha. Data were analyzed using mean and standard deviation, with a decision benchmark of 2.50. Findings revealed that adequate funding, provision of modern laboratories, teacher training, integration of ICT, government support, and curriculum improvement significantly enhance STEM education development. The study concludes that sustained investment and policy implementation are essential for strengthening STEM education in FCT secondary schools. Recommendations were provided accordingly.

Keywords: STEM Education, Secondary Schools, FCT Abuja, Educational Development, Science Education

Citation: Gladstone O. Enhancing the Development of Stem Education in Public Secondary Schools in Fct, Abuja, Nigeria. Web of Scholars: Multidimensional Research Journal 2026, 5(2), 139-144.

Received: 8th Feb 2026
Revised: 16th Mar 2026
Accepted: 10th Apr 2026
Published: 6th May 2026

Copyright: © 2026 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/)

1. Introduction

Secondary school education occupies a strategic position in the Nigerian education system as it serves as the bridge between basic and tertiary education. It is the stage designed to prepare learners for useful living within society and for higher education. According to the Federal Ministry of Education (2014), secondary education in Nigeria is structured to equip students with knowledge, skills, and values necessary for national development. It comprises junior and senior secondary levels, where learners are exposed to a broad curriculum that includes sciences, humanities, and vocational subjects. The objectives of secondary school education in Nigeria, as outlined in the National Policy on Education, include: providing trained manpower in applied science, technology, and commerce; inspiring students with a desire for self-improvement; fostering national unity; and equipping learners with intellectual and practical skills for higher education and employment. In essence, secondary education is expected to produce individuals who are scientifically literate, morally upright, and socially responsible [1].

In recent decades, there has been a global shift toward strengthening Science, Technology, Engineering, and Mathematics (STEM) education due to its role in innovation and economic development. STEM education refers to an interdisciplinary approach to learning that integrates these four fields into a cohesive learning paradigm based on real-world applications. According to National Science Foundation, STEM education emphasizes problem-solving, critical thinking, and collaboration, preparing students for careers in a technology-driven world. The objectives of STEM education include

developing scientific literacy, promoting innovation and creativity, enhancing problem-solving skills, and preparing students for careers in science and technology-related fields. It also aims to build a workforce capable of driving industrial growth and national development. For a developing country like Nigeria, strengthening STEM education at the secondary school level is essential for achieving technological advancement and global competitiveness [2].

Despite its importance, several studies have identified persistent challenges affecting the effective implementation of STEM education in Nigeria and the Federal Capital Territory (FCT), Abuja. A study by Aduwa-Ogiegbaen and Iyamu (2005) examined the use of information and communication technology in Nigerian secondary schools and found that inadequate infrastructure, poor funding, and lack of technical support hinder effective STEM teaching. Their work highlighted that many schools lack basic technological tools necessary for modern science education. Similarly, Okebukola Peter (2012) reported that science education in Nigeria is constrained by insufficient laboratory facilities, overcrowded classrooms, and outdated instructional materials. These challenges limit students' exposure to practical learning, which is essential for STEM competence [3].

In another study, Yusuf (2005) found that although ICT has the potential to transform education, its integration in Nigerian schools remains low due to inadequate funding, lack of teacher training, and poor policy implementation. This situation negatively affects the quality of STEM education delivery. Furthermore, Bamiro (2015) and Umoh, (2016) emphasized that Nigeria's progress in STEM is limited by weak institutional support, low student interest, and insufficient collaboration between schools and industries [4]. He argued that without strategic investment, the country may struggle to compete in the global knowledge economy. In the context of the FCT, Abuja, a report by the Universal Basic Education Commission (2018) revealed that many public secondary schools face challenges such as inadequate science equipment, shortage of qualified teachers, irregular power supply, and limited access to internet facilities. These issues significantly hinder the effective teaching and learning of STEM subjects in the territory [5].

The reviewed studies collectively show that STEM education in Nigeria, including the FCT, is confronted with numerous challenges ranging from infrastructural deficits to human resource limitations. While these studies have extensively documented the problems, there is still a need to focus on actionable strategies that can enhance the development of STEM education, particularly at the secondary school level [6]. The justification for this study, therefore, stems from the urgent need to move beyond identifying challenges to exploring practical solutions that can strengthen STEM education in public secondary schools in FCT, Abuja. Given the strategic importance of the FCT as the nation's capital, improving STEM education in this region can serve as a model for other parts of the country. This study seeks to identify key factors that can enhance STEM development, thereby contributing to policy formulation, educational planning, and national development [7]. While secondary school education provides the foundation for national growth, and STEM education drives innovation, the effectiveness of both in Nigeria depends on addressing existing systemic challenges. This study is thus positioned to provide empirical insights into how STEM education can be effectively developed in public secondary schools in the FCT, Abuja [8].

Objective of the study

This objective of this study is to identify factors that will enhance development of STEM education in Federal Capital Territory, Abuja, Nigeria. The specific objective is

1) To identify factors that will enhance development of STEM education in Federal Capital Territory, Abuja,

Research Questions

1) To what extent do the following factors enhance the development of STEM education in public secondary schools in FCT, Abuja?

2. Materials and Methods

This study adopted a descriptive survey research design to investigate factors that enhance the development of Science, Technology, Engineering, and Mathematics (STEM) education in public secondary schools in the Federal Capital Territory (FCT), Abuja, Nigeria. The design was considered appropriate because it allows for the systematic collection of data from a representative sample in order to describe existing conditions and identify key improvement factors without manipulating any variables. The population of the study comprised all teachers and school administrators in public secondary schools in the FCT, Abuja. These categories of respondents were selected because they are directly involved in the planning, implementation, and supervision of STEM education programmes. A sample size of 385 respondents was used for the study. The sample was selected using simple random sampling technique to ensure that each member of the population had an equal opportunity of being included, thereby enhancing the representativeness of the sample. The instrument used for data collection was a structured questionnaire titled Enhancing STEM Education Questionnaire (ESEQ). The questionnaire was designed by the researcher and consisted of items aimed at eliciting responses on factors that could enhance STEM education development, including funding, infrastructure, teacher quality, ICT integration, policy support, and student-related factors. The instrument was structured on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). To ensure the validity of the instrument, it was subjected to face and content validation by experts in Educational Administration and Science Education. Their suggestions and corrections were incorporated to improve the clarity, relevance, and adequacy of the items in measuring the variables under study. The reliability of the instrument was established using the Cronbach Alpha method, which yielded a reliability coefficient indicating that the instrument was internally consistent and suitable for data collection. Data were collected through direct administration of the questionnaire to the respondents with the assistance of trained research assistants. All administered copies of the questionnaire were retrieved and used for analysis. Data collected were analyzed using mean and standard deviation to answer the research question. A criterion mean of 2.50 was adopted as the decision benchmark. Items with mean scores of 2.50 and above were accepted as factors that enhance STEM education development, while items with mean scores below 2.50 were rejected.

3. Results

Table 1. Responses on Factors Enhancing STEM Education (N = 385)

S/N	Items	Mean (X)	SD	Decision
1	Adequate funding enhances STEM education development	3.28	0.74	Accepted
2	Well-equipped laboratories improve STEM learning	3.35	0.61	Accepted
3	Availability of qualified STEM teachers enhances delivery	3.22	0.79	Accepted
4	Teacher training improves STEM teaching effectiveness	3.30	0.71	Accepted
5	ICT integration enhances STEM learning outcomes	3.11	0.73	Accepted
6	Monitoring and supervision enhance STEM programmes	3.25	0.77	Accepted

7	Innovative teaching methods improve STEM outcomes	3.14	0.70	Accepted
8	Internet access improves STEM learning	3.09	0.75	Accepted
9	Stable electricity enhances STEM teaching	3.05	0.80	Accepted
10	Scholarships encourage STEM enrolment	2.98	0.82	Accepted
11	Student motivation enhances STEM participation	3.33	0.79	Accepted
12	Government support enhances STEM development		0.68	Accepted
13	Effective curriculum implementation improves STEM	3.27	0.72	Accepted
14	Use of innovative teaching methods	3.20	0.70	Accepted
15		3.16	0.74	Accepted
	Grand Mean = 3.19			Accepted

The result indicated that agreement for all items. The result and the mean scores obtained are as fellows; adequate funding of STEM programmes (item 1, X = 3.28), Provision of well-equipped science laboratories (item 2, X = 3.36), Availability of qualified STEM teachers (item 3, X = 3.22), Continuous professional development for teachers (item 4, X = 3.30), Integration of ICT in teaching and learning (item 5, X = 3.11), Availability of instructional materials (item 6, X = 3.25), Government policy support for STEM education (item 7, X = 3.14), Effective curriculum implementation (item 8, X = 3.09), Student interest and motivation in STEM subjects (item 9, X = 3.05), Provision of scholarships and incentives (item 10, X = 2.98) [9]. Collaboration with private sector organizations (item 11, X = 3.18), Stable electricity supply in schools (item 12, X = 3.33), Access to internet facilities (item 13, X = 3.27), Use of innovative teaching methods (item 14, X = 3.20) and Monitoring and supervision of STEM programmes (item 15, X = 3.16)). This result implies that all the identified factors have mean scores above the criterion mean of 2.50, showing that respondents agreed that they significantly enhance the development of STEM education in public secondary schools in FCT, Abuja. The grand mean of 3.19 further confirms a strong positive perception among respondents regarding these factors. This suggests that improving these areas would lead to better STEM education outcomes in the study area [10].

Findings

The study revealed that Adequate funding is a critical driver of STEM education development, Availability of functional laboratories significantly enhances practical learning, Qualified and trained teachers are essential for effective STEM delivery, ICT integration plays a vital role in modern STEM education, Government support and policy implementation are key to sustaining STEM initiatives, Infrastructure such as electricity and internet access strongly influences STEM effectiveness, Innovative teaching strategies and monitoring systems improve student outcomes and Student motivation and incentives encourage participation in STEM fields [11].

4. Discussion

The finding that adequate funding enhances STEM education aligns with the position of Aduwa-Ogiegbaen and Iyamu (2005) and Ogunode, and Aiyedun, (2020) who emphasized that insufficient funding limits the availability of instructional materials and infrastructure necessary for science education in Nigeria. Similarly, the importance of

laboratory facilities supports the assertion by Okebukola (2012) that practical exposure is essential for meaningful science learning and innovation [12].

The study also found that qualified teachers and continuous professional development are critical. This agrees with Ogunniyi (2006), who argued that teacher competence determines the success of science and technology programmes in secondary schools. Without adequate training, teachers may not effectively deliver STEM content [13]. ICT integration was identified as a major enhancer of STEM education. This is consistent with the findings of Yusuf (2005) and Ugo, and Akpoghol (2016), who highlighted that ICT improves teaching efficiency and student engagement in Nigerian schools. However, the effectiveness of ICT depends largely on infrastructure such as electricity and internet access, which remains a challenge in many public schools[14].

Government support and policy implementation were found to be significant. This supports the view of the Federal Ministry of Education (2014) that national development depends on strong STEM policies and their effective execution. The role of partnerships with private organizations also aligns with global best practices, where collaboration enhances innovation and resource availability. Student motivation and innovative teaching methods were found to improve STEM outcomes. This is in line with the work of Bamiro (2015) and Wasagu, (2019), who noted that engaging teaching approaches increase students' interest in science and technology disciplines [15].

5. Conclusion

The study concludes that the development of STEM education in public secondary schools in FCT, Abuja depends on a combination of financial investment, human resource capacity, infrastructure development, and policy support. The positive responses across all identified factors indicate that a holistic approach is necessary to strengthen STEM education. Based on the findings, the study recommend the following:

1. Government should increase funding allocation specifically for STEM education. Schools should be equipped with modern science laboratories and instructional materials. Continuous professional development programmes should be organized for STEM teachers. ICT facilities should be provided and effectively integrated into teaching. Stable electricity and internet access should be ensured in all public schools. Government should strengthen policies and ensure proper implementation of STEM programmes. Government should partner with private sector organizations should be encouraged.

REFERENCES

[1] S. E. Aduwa-Ogiegbaen and E. O. S. Iyamu, "Using information and communication technology in secondary schools in Nigeria: Problems and prospects," *Educational Technology & Society*, vol. 8, no. 1, pp. 104–112, 2005.

[2] O. A. Bamiro, "Achieving excellence in STEM education in Nigeria," *Journal of Education and Practice*, vol. 6, no. 8, pp. 44–50, 2015.

[3] Federal Ministry of Education, *National Policy on Education*, 6th ed. Abuja, Nigeria: NERDC Press, 2017.

[4] N. J. Ogunode and T. G. Aiyedun, "Administration of science programme in Nigerian higher institutions: Issues, challenges and ways forwards," *Middle European Scientific Bulletin*, no. 6, pp. 94–102, 2020.

[5] I. S. Okwelogu, N. J. Ogunode, and A. O. Abayomi, "Science education in Nigerian public universities," 2021.

[6] A. S. Olorundare, "Where is the STEM? Missing context in science, technology, engineering and mathematics instructions," presented at the *15th Kwara State Conference of the Science Teachers Association of Nigeria*, Ilorin, Nigeria, 2010.

[7] M. B. Ogunniyi, "Effects of teachers' content knowledge on students' learning outcomes in science," *International Journal of Science Education*, vol. 28, no. 2–3, pp. 1–14, 2006.

[8] P. Okebukola, "Science education in Nigeria: Past, present and future," *Journal of Research in Science Teaching*, vol. 49, no. 4, pp. 1–9, 2012.

[9] T. G. Olatunde-Aiyedun and N. J. Ogunode, "School administration and effective teaching methods in science education in North Central Nigeria," *International Journal on Integrated Education*, vol. 4, no. 2, pp. 145–162, 2021.

[10] O. I. Somadina, A. J. Ndayebom, and N. J. Ogunode, "The plight of science academics in public universities in Nigeria: Implications for university administrators for development and sustainability," *Horizon: Journal of Humanity and Artificial Intelligence*, vol. 2, no. 1, pp. 1–9, 2023.

[11] E. A. Ugo and T. V. Akpoghol, "Improving STEM programme in secondary schools in Benue State, Nigeria: Challenges and prospects," *Asia Pacific Journal of Education, Arts and Sciences*, vol. 3, no. 3, pp. 6–16, 2016.

[12] W. S. Umoh, "Problems and prospects of effective STEM education delivery in Nigeria," *Knowledge Review*, vol. 35, no. 1, pp. 2–13, 2016.

[13] M. O. Yusuf, "Information and communication technology and education: Analysing the Nigerian national policy for information technology," *International Education Journal*, vol. 6, no. 3, pp. 316–321, 2005.

[14] M. A. Wasagu, "Keynote address," in *60th Annual Conference Proceedings, STAN*, pp. 1–16, 2019.

[15] UNESCO, "Reimagining STEM education for sustainable development: Digital transformation and innovation in schools," *UNESCO Education Report*, 2022. [Online]. Available: https://www.unesco.org