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Bridging the Gap: Identifying Key Factors Hindering the Implementation of Nigeria National Policy on Science and Technology Education in Secondary Schools in Anambra State

Okoye Maureen Chineta

Department of Comparative Education, Faculty of Education, Southwest University, Chongqing, China
Email: maureenchineta21@gmail.com

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Abstract

The goal of this research was to identify the major issues impeding the effective implementation of the Nigerian National Policy on Science and Technology Education (NPSTE) in Anambra State's secondary schools. The research population included all 262 secondary school science instructors in Anambra State. A descriptive survey was used and a total of 384 copies of questionnaire were administered but 148 were retrieved and properly filled. Cronbach's alpha was used to determine the instrument's dependability, and it produced a result of 0.82. To answer the study questions, the data were examined using frequency counts and straightforward percentages. To acquire deeper insights and provide more thorough replies to the study questions, mean values were also generated using Statistical Product and Service Solutions (SPSS) version 23. According to the survey, science instructors expressed unhappiness with a number of NPSTE implementation-related issues and believed that NPSTE was only moderately successful in encouraging female involvement in disciplines linked to science and technology. The research discovered several impediments that have a major negative influence on the efficient implementation of NPSTE in secondary schools and suggested several actions to address these issues based on the results.

Keywords

Science and Technology Education, Nigeria National Policy, Implementation, Teacher Training, Female Participation

1. Introduction

The education system of each nation, which is acknowledged as the cornerstone of all growth, lays the foundation for literacy, skill development, technical progression, and the capacity to utilise the state's natural resources. It is the biggest investment a country can make to quickly improve its human, political, social, and economic resources. According to Adamu et al. (2022), investing in education is a critical first step in raising individuals who can significantly advance their country. Education is changing, the old methods of education are no longer relevant to satisfy the needs of the constantly changing technological world of today (Osagie, 2015). New teaching techniques are now being used as a consequence of technological development. A staff with rigid and unchanging skill sets would struggle to compete in the dynamic global economy, where success depends on innovation, discovery, and adaptability. Using scientific research and using knowledge and skills from science and technology in practical settings are increasingly essential for economic success (Umar, 2019). Science and technology have altered businesses and altered economies to the point that they are now essential to contemporary society.

Advanced countries are ranking the creation of a knowledgeable and creative workforce via science and technology (ST) education as a result of their recognition of the transformational potential of ST (Thomas & Watters, 2015). According to Innocent (2016), the inclusion of these subjects in educational programmes in nations like Japan, France, Germany, Norway, China, Finland, the UK, the United States, and others has played a significant role in raising living standards and promoting technical and economic advancement. These nations have effectively used the power of science and technology to advance their economies and establish themselves as market leaders. As a consequence, these nations continue to see rising living standards and continuous economic and technical progress.

Similarly to this, the educational institutions of several African nations have recently undergone transformation. They understand the value of promoting economic development and expanding job prospects via science and technology education. They have thus implemented educational reforms to enhance scientific education in a variety of ways. Science and technology education has been given priority in some African nations, including Egypt, South Africa, Kenya, Tanzania, Ghana, and others (Chowdhury et al., 2020). In general, African nations have made progress in providing their citizens with the knowledge and skills required to engage in the global economy and promote sustainable development within their countries by placing a priority on science and technology education. These nations will be well-positioned to profit from a knowledge-based economy and tackle some of the most important issues, such as climate change, food insecurity, and poverty, as long as they continue to invest in science and technology education.

Igbaji et al. (2017) assert that the Nigerian government, like all other govern-

ments throughout the globe, recognises the critical role that ST education plays in fostering long-term economic development and social advancement. The National Policy on Science and Technology Education (NPSTE) was established by the Nigerian government to make use of the transformational power of science and technology. According to Adamu (2019), the NPSTE was created because it is a useful instrument for empowering the populace to combat poverty and unemployment. This strategy aims to improve the nation's science and technology education system by modifying it to meet the needs of a constantly changing global environment. The NPSTE acts as a model for overcoming the shortcomings of earlier educational programmes and developing an atmosphere that encourages creativity, critical thinking, and technical proficiency. Its innovative strategy is to transform the educational environment by sparking among the young of the country a love for science and technology, raising a generation of knowledgeable and forward-thinking people. Nigeria wants to provide its students with the information, abilities, and creative mindset they need to succeed in a world that is becoming more and more technologically advanced and competitive.

The foundation of every nation's progress is science and technology education, which fosters students' ardent interest in these fields. It develops students' critical thinking, problem-solving, and inventive talents while preparing them for employment. By educating students for professions in in-demand industries like technology, engineering, and healthcare, ST education plays a key role in fostering economic development (National Science Board, 2018). Furthermore, a strong system of science and technology education encourages research and development, improves educational standards, and strengthens partnerships between academic institutions and businesses, all of which result in technical improvements and higher living standards for the general public. Furthermore, it helped to connect Nigeria with 21st-century global trends by creating an atmosphere that promoted creativity, entrepreneurship, and technical breakthroughs.

The NPSTE was created to develop a thorough framework for science and technology education and to overcome the flaws in earlier educational systems. It includes a number of vital elements intended to provide a thorough environment for science and technology education. Reforming the curriculum, educating teachers, providing enough infrastructure and resources, promoting research and innovation, and raising public awareness and engagement in projects to promote science and technology education are some of these elements. However, despite its admirable vision and well-intended goals, the NPSTE's implementation has encountered considerable difficulties, leaving a gap between intended policy outcomes and actual results (Onimisi & Osasona, 2021). Decades after its establishment, the intended change and achievements have not yet completely materialised, leaving the country to struggle with structural obstacles that impede its progression in science and technology. The ongoing problem of insuffi-

cient money may be a significant barrier to the policy's implementation (Aina, 2022; Osarenren-Osaghae & Irabor, 2018; Ogunode, 2010). The education sector has had difficulty obtaining the necessary financial backing to successfully carry out the ambitious policy objectives. Due to insufficient investment in infrastructure, research facilities, and teacher training, it has been difficult to provide students with high-quality ST education (Chowdhury et al., 2020; Van Hanegham et al., 2015; Nadelson & Seifert, 2013).

Another thing that may have prevented the policy's smooth integration and implementation is the lack of coordination among the numerous stakeholders, including government agencies, educational institutions, businesses, and research organisations. The comprehensive goal of the policy cannot be realised due to overlapping roles, competing agendas, and a lack of synergy caused by a fragmented approach. Social and cultural viewpoints on science and technology might have added to the challenges (Xie et al., 2015). There is a dearth of students enrolling in science-related courses as a result of traditional beliefs that place other areas of study above science and technology. This has made it more difficult for the country to properly use its people resources and has caused a skills gap in many industries. Additionally, brain drain may continue to be a problem since competent workers often go for employment overseas owing to poor career prospects and insufficient funding for national projects in research and development. This study aims to identify the major factors that have hampered the effective implementation of NPSTE. Complex administrative procedures and bureaucratic obstacles may have also caused delays in policy implementation and decision-making (Osagie, 2015).

The study seeks to shed light on the underlying reasons for these obstacles and propose viable remedial measures through in-depth research and analysis. By fostering a thorough understanding of these issues, it is hoped that policymakers and stakeholders will be motivated to work together and find practical solutions, helping Nigeria move closer to a future where science and technology education can truly thrive and unleash its enormous potential for development and prosperity. By removing these barriers, Nigeria may achieve its goals of sustainable economic development, technical advancement, and social improvement as well as realise the full potential of its science and technology education system. The success of Nigeria's science and technology education policy is essential not just to the country's growth but also to its capacity to flourish in the international arena as the globe evolves towards a more technologically driven and linked future. In light of this, this paper investigates the main issues preventing the secondary schools in Anambra State from implementing the Nigeria National Policy on Science and Technology Education.

Statement of the Problem

NPSTE has been implemented in order to promote the teaching and study of scientific and technological subjects in educational settings. However, a number of problems exist that make it difficult to adopt this method successfully (Oni-

misi & Osasona, 2021), necessitating further study and attention. The persistent discrepancy between statutory objectives and real circumstances in the sphere of ST education is the problem that grabs people's attention (Nigerian Educational Research and Development Council, 2019). Despite the policy's high goals of improving science and technology education in Nigeria, there are distinct disparities in how it is being carried out and how it is having an impact in various educational institutions and regions of the country.

This matter merits scrutiny for a number of reasons. The appropriate implementation of the National Policy on Science and Technology Education is the primary factor determining Nigeria's socioeconomic progress. Science and technology have a big impact on global competitiveness, economic growth, and innovation. Therefore, it is essential to understand the challenges involved in carrying out this programme in order to properly use Nigeria's human resources in these vital sectors. Second, bridging the gaps in ST education is necessary to reduce the present skills mismatch and unemployment rates in Nigeria. Students who have access to up-to-date scientific and technological knowledge will be better prepared to adapt to the demands of a shifting job market and help the nation prosper.

Furthermore, analysing the challenges experienced in putting the policy into practice might provide light on the factors impeding effective science and technology teaching and learning. This understanding may have an impact on the development of targeted interventions, techniques, and reforms to enhance ST education at all levels, from primary to postsecondary. The issue of the discrepancy between policy objectives and on-the-ground realities in the running of the NPSTE in Nigeria is worth researching given its effects on the socioeconomic development of the country, the reduction of skills mismatch and unemployment rates, and the improvement of the teaching and learning of science and technology subjects. By examining this problem, we can create solutions that are founded on facts and would enhance ST education in Nigeria.

Purpose of the Study

The purpose of this study is to identify the key factors hindering the successful implementation of NPSTE.

Research Questions

The study was guided by the following questions:

- What are the views of teachers on the implementation of the NPSTE?
- What is the effectiveness level of NPSTE implementation in promoting and encouraging the participation of females in science and technology-related fields?
- What are the key factors hindering the successful implementation of NPSTE?

2. Literature Review

The NPSTE served as a framework for policy creation with the goal of advancing ST education in Nigeria. The goal of the strategy was to direct how science and technology education will be implemented and managed across the Nigerian

educational system. The goals are to encourage students to study ST subjects, to develop a solid scientific and technological foundation for national development, to improve the quality of science and technology education, to support research and innovation, and to advance gender equity and inclusivity in ST education. The effectiveness of the implementation of the NPSTE, the views of teachers regarding the implementation of NPSTE, and the key factors preventing the successful implementation of NPSTE are examined in this literature review.

Views of Teachers on the Implementation of NPSTE

Hala (2018) did research on the adoption and perception of science and technology education by teachers in the United Arab Emirates. Data were gathered using a mixed-methods approach, interviews, and a questionnaire designed to assess 144 science, maths, and technology teachers. The findings showed that most UAE instructors had a positive opinion of science and technology education and generally had more favourable attitudes and implemented STEM instruction more effectively than elementary school instructors. Margot & Kettler (2019) looked at teachers' perceptions on incorporating science and technology education in a similar research. Empirical publications that matched the research objectives and were written in English and published in an academic journal between 2000 and 2016 made up the study criteria. 25 publications were included in the study after quality review. Finding themes within the data required the application of thematic analysis. The results show that instructors value education in science and technology. The teachers thought that peer cooperation, high-quality curricula, district support, past experiences, and efficient professional development will all help them in their efforts to integrate science and technology teaching.

In 2022, Akram et al. (2022) inspected how to use ICT into teaching and learning practices. The study offers a succinct summary of the body of research on teachers' impressions of and experiences with ICT in the classroom. The research was conducted using a systematic review methodology, which included five stages: developing the study's questions, locating relevant previous research, choosing and assessing those studies, analysing and synthesising findings, and lastly applying and disclosing the findings. The findings of the data analysis were divided into two major groups: advantages and obstacles instructors perceived throughout the integration process. Content analysis was used to discover elements contributing to effective ICT integration in teaching-learning practices. The results show that instructors have good attitudes towards using technology in teaching and learning. They feel that using technology in the classroom helps them improve their instructional strategies, make learning engaging and participatory, and maintain student motivation.

In a related research, Murtala & Norazrena (2019) looked at teachers' opinions on how science and technology education was being implemented in Zamfara State, Nigeria. The questionnaire served as the data collecting tool, and 40 randomly chosen instructors were given 40 copies of the questionnaire. SPSS

was used to assess the data that had been gathered. The results of the study showed that instructors had a favourable opinion of the efforts being made to improve the standard of ST education. According to the study, the government should offer extensive on-the-go training, seminars, and workshops that keep up with technological advancements as well as more modern apparatus that will improve teachers' teaching activities.

Overall, the research demonstrated that teachers' attitudes towards science and technology education and its incorporation into teaching methods were favourable. Although there were some differences, secondary and middle school instructors often had more favourable opinions and better implementation than elementary school teachers. The research emphasised the value of cooperation, support, training, and access to high-quality resources in aiding the efficient application of ICT integration in the classroom and science and technology education.

Effectiveness of the Implementation of NPSTE

García-Ramos et al. (2022) examined stimulating female partaking in ST education in 2022. In order to discover any biases or discrepancies in gender representation in science and technology education programs, the researchers started by building a baseline of the student population. This process comprised collecting demographic information and particular metrics connected to admissions and graduations. The report made a number of recommendations on how to increase the low representation of women in engineering sectors, including making science and technology programmes more welcoming and inclusive of female students. Implementing initiatives to encourage young females to pursue engineering studies was part of the research. These events were probably planned to introduce and inspire female elementary, middle, and high school students to pursue careers in science and technology. To assess the efficacy of the suggested activities, the researchers created metrics, such as motivation, interest in science and technology subjects, and participation rates among female students before and after engaging in the events. The case study's findings revealed that both boys and girls took part in the suggested activities. It also shows that the participants, both boys and girls, maintained or increased their enthusiasm to pursue a career in science and technology.

In 2022, Lane et al. (2022) studied how female students felt about jobs in ST disciplines. 308 post-primary students in Ireland participated in a survey as part of a year-long study named "STEMChAT: Women as catalysts for change in STEM education". Data analysis gathered descriptive data, and used the Kruskal-Wallis H Test to analyse gender disparities in survey answers. Results showed that compared to male students, female students had much higher positive views towards science. Males, in contrast, responded substantially more positively to mathematics than did girls. Therefore, it can be said that both studies provide insightful information on gender representation and attitudes in science and technology education. While Lane et al.'s study sheds light on gender-specific differences in attitudes towards STEM subjects among post-primary students in Irel-

and, Garca-Ramos et al.'s study emphasises the importance of creating inclusive and supportive environments to attract and retain female students in science and technology fields.

Factors Hindering the Successful Implementation of NPSTE

In Bangladesh, Chowdhury et al. (2020) looked at what was driving the adoption of science and technology education. Data from the participants were gathered through focus groups and a semi-structured questionnaire. The results suggest that over 80% agreed that professional development, infrastructure, and resources are the most critical elements in implementing science and technology education in Bangladesh. Inadequate lab space for science, a lack of funding, a lack of teacher training, and big class sizes have all been named as key obstacles to adopting science and technology education. The report proposed that a viable science and technology education system be created and executed from basic to postsecondary levels, phase by phase.

In a similar vein, Ruparanganda (2016) examined how the Science technology and society (STS) idea was used in science tutoring in Zimbabwe. The sample included all of the science department heads in the schools, five pupils in form four, and fifteen schools from the Makoni District of Manicaland. Ninety people participated in total. Interviews, lesson observations, and questionnaires were used to gather the data. The findings indicate that there is a severe lack of science instructors and that half of the teachers are not familiar with the STS concept. Lack of resources, insufficient staff development opportunities, and poor scientific infrastructure have a significant negative influence on the execution of ST in the curriculum in schools.

In a different research, Kalama & Eseduwo (2020) looked at the growth of ST policy in Nigeria and its issues and difficulties. The research, which followed the elite thesis, got its information from secondary sources such as books, published journal articles, pieces from the world news media, newspapers, and the internet, among others. The study also used the descriptive research methodology; as a result, the qualitative approach was used. The findings indicated a lack of evenness in the formation of a ST development plan has impeded the development and utilisation of indigenous technology in Nigeria. Therefore, in order for Nigeria to compete advantageously on the global market, it is necessary to establish and execute an indigenous home-grown sustainable ST development strategy.

The difficulties in implementing scientific programmes in Secondary schools in Abuja, Nigeria, were explored by Ogunode & Jegede (2019). The questionnaire was the tool used to gather data, and the descriptive survey design was used. 140 respondents were chosen at random from the full population of science instructors in the FCT of Abuja using simple sampling techniques. Using the test-and-retest procedure, the instrument's dependability was ascertained. To investigate and evaluate the hypotheses, chi-square, simple percentage, and mean were utilised. Data and information were gathered and analysed, and the findings revealed that the majority of the sampled respondents concurred that

implementing a science programme in FCT Secondary Schools, Abuja, faced difficulties due to a lack of science teachers, funding, infrastructure, instructional materials, and planning. The researchers suggest that the government improve financing for scientific education in FCT in light of these results.

These studies provide light on the variables affecting how science and technology education and policy are implemented successfully in various situations. In order to promote good scientific education, they emphasise the significance of infrastructure, resources, professional development, and policy consistency. The findings also shed insight into the difficulties that educators and policymakers have when creating and putting into practice science and technology education programmes in diverse nations.

Theoretical Framework

The theoretical framework for this research was the Policy Implementation Theory. Eugene Bardach put out the hypothesis in 1977. The NPSTE is being implemented slowly in a few Anambra State secondary schools, and the Policy Implementation Theory offers a thorough framework for understanding why. This theory focuses on how policies are implemented, recognizing the obstacles and difficulties that could appear during implementation.

According to the Policy Implementation Theory, "attitudes and beliefs" are important variables influencing the implementation of policies. Regarding the NPSTE, teachers' opinions, attitudes, and convictions may greatly influence how committed they are to its implementation. Teachers' attitudes and support are crucial for a policy to be implemented successfully. Teachers may be less motivated to actively engage if they have unfavorable opinions about the policy or doubt its efficacy, which might pose problems for its implementation.

The Theory noted that "resources and capacity" are crucial for successful policy implementation. The number of funds provided to encourage female involvement in sectors connected to science and technology may have an impact on how successful the program is. For instance, the effect of the policy may be reduced if insufficient money or training is available to help female students. Additionally, a key component of effective implementation is the ability of schools to foster an atmosphere that is welcoming and encouraging for female students.

The theory also highlights a number of issues that may prevent a policy from being implemented successfully. These may consist of:

- A lack of clarity in the goals and directives of the policy, which causes uncertainty among stakeholders.
- A lack of financing and resources to support policy efforts.
- Opposition from educators, learners, or parents who could see the regulation as onerous or unnecessary.
- Insufficient opportunities for teachers to pursue professional development and execute the policy effectively.
- Administrative restrictions or roadblocks that impede the policy's advance-

ment.

In conclusion, Policy Implementation Theory offers a lens through which to examine the challenges the NPSTE faces in implementing in a few secondary schools in Anambra State. It emphasises how crucial good communication, optimistic attitudes, sufficient resources, and capacity development are for successful policy implementation. By adopting this theoretical framework, the researcher may better grasp the difficulties and possibilities in bridging the gap between policy purpose and actual implementation in the context of ST education in Nigeria.

3. Methodology

A descriptive survey research approach was used for the investigation. All of the science instructors in the 262 secondary schools in Anambra State made up the study's population. However, the researcher was unable to determine the precise number of science subject instructors in the state at the time of this investigation. Based on the advice of Fox et al. (2007) and Meyer (1979), the researcher chose to adapt 384 samples from a population with an unconstrained population range.

With the aid of research assistants, the researcher delivered 384 copies of the questionnaire to the instructors at the 262 secondary schools in Anambra State. After the data-collecting procedure, 148 copies of the questionnaire were located, and the replies were judged appropriate for the research. The sample for the research consisted of the 148 respondents who completed and returned the questionnaires. Based on the replies received, 148 of the 384 distributed questionnaires were used as a sample, which accurately reflects the study's participants. A summary of the research, including the topic of the study and its goals, was provided in the questionnaire's introduction section. Participants received guarantees on the privacy of their data to promote candid and open discussion. Part A asked the respondent questions about their demographics, whereas Part B's three items (research questions) were created specifically to gather information on the subject. Cronbach's alpha was used to assess the instrument's reliability, and the result was 0.82. The questionnaire was found to be trustworthy based on the obtained coefficient.

After the study's data were examined using frequency counts and straightforward percentages, the mean and standard deviation were determined using Statistical Product and Service Solutions (SPSS) version 23. The replies to the questionnaire were scored using a 4-point Likert-type scoring technique and a nominal scale. For research question 1, a mean score of 2.5 or less indicated an unfavorable perspective, while a mean score of 2.6 or more indicated a favorable view. Items were categorised as disagreeing if their mean score was below 2.5 and as agreeing if their mean score was 2.6 or above for research questions 2 and 3. The data were evaluated using descriptive statistics, such as frequency counts, sample percentages, and means. The outcomes are shown in the table

below.

Section A: Demographics (Bio-Data)

The gender breakdown of the study's respondents is shown in Table 1. Table 1 reveals that 95 (64%) of the science teachers were male and 53 (36%) were female. This implies that the majority of the science teachers were male.

Section B:

This section explains the study's outcomes based on the posed research questions. In Tables 2-4, the findings are shown.

Research Question 2: What are the views of teachers on the implementation of NPSTE?

The opinions of instructors about the NPSTE's implementation are shown in Table 2. The Table demonstrated that all of the mean values for items 1 through 5 are less than the criteria mean (2.5). In comparison to the criteria mean of 2.5, the overall average (Grand Mean) is lower at 2.1. This implies that, generally speaking, the instructors voiced unhappiness with the different NPSTE implementation elements. The lower mean values across the board further suggest that instructors have misgivings and worries regarding several NPSTE components.

Research Question 3: What is the level of effectiveness of NPSTE in promoting female participation in science and technology-related fields?

The success of the NPSTE (National Programme for Science and Technology Education) in encouraging female involvement in disciplines connected to science and technology is seen in Table 3. Except for item 1, which has a mean value of 2.6, the table demonstrated that all items 2 - 4 had mean values lower than the criteria mean (2.5). The respondents generally believe that NPSTE has a modest degree of success in fostering female involvement in disciplines connected to science and technology. The overall average (Grand Mean) of 2.4 is slightly below the criteria mean of 2.5. The positive answer to item 1 implies that NPSTE has significantly influenced female students' engagement in activities linked to science and technology, even if the scores for items 2 - 4 are below the criteria mean, suggesting some areas for improvement

Research Question 4: What are the key factors hindering the successful implementation of NPSTE?

The main issues preventing the proper implementation of NPSTE are listed in Table 4. Table 4 shows that all items, with the exception of item 6, with a mean score of 2.4, have mean values greater than the criterion mean of (2.5). Furthermore, the 3.0 grand mean exceeds the (2.5) criteria mean. Compared to the criteria

Table 1. Gender of the respondents.

Gender	Frequency	Percentage %
Male	95	64
Female	53	36
Total	**148**	**100**

Table 2. Views of teachers on the implementation of NPSTE.

S/N	Teachers' Views on the Implementation of NPSTE	SA	A	D	SD	Mean
1.	NPSTE has been effectively integrated into the curriculum	26	17	90	15	2.3
2.	NPSTE has positively impacted the overall teaching and learning experience	21	13	86	25	2.2
3.	The objectives and goals of NPSTE are clearly communicated and understood	10	19	113	6	2.2
4.	The training and support offered for implementing NPSTE are adequate	-	26	104	18	2.1
5.	The resources and materials provided under NPSTE are helpful for enhancing science and technology education	12	17	42	77	1.7
	Grand Mean					**2.1**

Note: SA (Strongly Agree), A (Agree), D (Disagree) and SD (Strongly Disagree).

Table 3. Level of effectiveness of NPSTE.

S/N	Level of Effectiveness of NPSTE	SA	A	D	SD	Mean
1.	Female students' participation in science and technology-related activities has increased due to NPSTE	40	28	62	20	2.6
2.	NPSTE has encouraged female students to take an interest in science and technology subjects	20	40	63	25	2.4
3.	Female students' confidence and engagement in science and technology subjects have improved because of NPSTE	21	33	66	28	2.3
4.	NPSTE provides sufficient support and resources specifically targeted at promoting female participation in science and technology fields	7	21	93	27	2.1
	Grand Mean					**2.4**

Note: SA (Strongly Agree), A (Agree), D (Disagree) and SD (Strongly Disagree).

Table 4. Key factors hindering the successful implementation of NPSTE.

S/N	Factors Hindering the Successful Implementation of NPSTE	SA	A	D	SD	Mean
1.	Insufficient funding and resources hinder the effective implementation of NPSTE.	61	72	15	-	3.3
2.	Lack of qualified teachers	56	70	18	4	3.2
3.	Teachers' lack of adequate training and professional development affects NPSTE's success	44	89	15	-	3.2
4.	Cultural biases against girls in NPSTE	38	89	18	3	3.1
5.	Bureaucratic hurdles and policy constraints hinder the successful implementation of NPSTE	31	93	17	7	3.0
6.	The resistance from students and parents toward NPSTE initiatives poses a challenge	9	54	72	13	2.4
	Grand Mean					**3.0**

Note: SA (Strongly Agree), A (Agree), D (Disagree) and SD (Strongly Disagree).

mean of 2.5, the overall average (Grand Mean) is greater at 3.0. This indicates that generally speaking, respondents agree that the stated concerns pose serious obstacles to the success of NPSTE projects.

4. Discussion

The research identified the major issues impeding the effective implementation of the NPSTE in secondary schools in Anambra State. One of the study questions found that instructors had indicated unhappiness with a number of NPSTE implementation-related issues. Regarding the significance of teachers' attitudes and beliefs in influencing policy implementation, the results of research question one is consistent with the ideas emphasized in the Policy Implementation Theory. They have issues with how NPSTE has been incorporated into the curriculum, how it has affected teaching and learning, how clear its aims and goals are, how adequate the training and support have been, and how useful the tools and materials have been. These results point out areas that need development in order to solve the issues and raise NPSTE's efficacy from the instructors' point of view. It's important to note that owing to changes in the educational setting, policy implementation, or research techniques between the two areas, the conclusions of this study may vary from those of earlier studies, such as Hala's study (Hala, 2018) in the UAE. The UAE's good impressions may not be consistent with Nigeria's results from the present survey. To encourage increased support and engagement in the effective implementation of NPSTE in secondary schools, policymakers and programme managers should carefully evaluate these particular difficulties experienced by Nigerian teachers.

The results of research question two, which show that respondents believe NPSTE is moderately effective in encouraging female participation in fields related to science and technology, are consistent with the ideas emphasized in the Policy Implementation Theory, particularly with regard to "resources and capacity" during policy implementation. The Policy Implementation Theory emphasizes that the amount of funding supplied to encourage female involvement in disciplines connected to science and technology may greatly impact the policy is success. The programme might be improved in several areas, such as by giving more focused encouragement and resources to boost female students' interest in and involvement in these fields. Overall, NPSTE is advancing the inclusion of persons of all genders in science and technology education. The results are consistent with those of García-Ramos et al. (2022), as both researches stressed the need of increasing gender diversity in science and technology education and the necessity for focused initiatives to increase female involvement. While the research contexts and particular treatments may vary (Garca-Ramos et al.'s study focused on engineering, while the NPSTE study examined science and technology education in Nigeria), they both share the ultimate objective of advancing gender inclusion in STEM areas.

The third research question concerned identifying obstacles to NPSTE projects' effectiveness. According to the results, respondents generally strongly agree that the identified factors, such as a lack of funding and resources, a shortage of qualified teachers, a lack of training and professional development opportunities for teachers, cultural biases against girls in NPSTE, and administrative obstacles and

policy restrictions, pose serious obstacles to NPSTE's effectiveness. These results are consistent with the ideas emphasized in the Policy Implementation Theory. The research question's three results support the existence of the many elements the theory suggests might obstruct a policy's effective implementation in the setting of NPSTE. The research of Chowdhury et al. (2020) and Ruparanganda (2016) are in agreement with these results.

5. Conclusion

The research looked at the challenges in implementing NPSTE in secondary schools in Anambra State. First, teachers expressed unhappiness with a number of NPSTE implementation-related issues. Secondly, the respondents believe that NPSTE is moderately effective in encouraging female participation in fields related to science and technology. This highlights the need of intensifying initiatives to promote girls' interest in STEM fields. Finally, the research identified important causes of the difficulties encountered in implementing NPSTE. These include a lack of financing and resources, a shortage of competent instructors, insufficient chances for educators to further their careers, societal prejudices against females in STEM fields, administrative roadblocks, and regulatory restraints.

The promotion of gender equality in science and technology fields, proper funding, extensive teacher training, elimination of cultural prejudices, and streamlining of administrative procedures are all necessary to increase the success of NPSTE. Stakeholders may work towards a more effective and successful implementation of NPSTE by addressing these issues and putting in place focused initiatives. This would result in a notable increase in science and technology instruction in secondary schools across Anambra State. Such initiatives will help provide a solid basis for the development of science and technology in the area and encourage students, particularly females, to take an active role in these subjects.

Recommendations

The researcher suggested, in light of the results, that

- The government should boost financing and resource allocation.
- Improve teachers' preparation and professional development, and finally.
- Implement gender-sensitive initiatives to encourage female involvement.

These suggestions are meant to address the issues with underfunded and under-resourced NPSTE, undertrained instructors, and cultural prejudices against females. Stakeholders may strive towards more effective and successful implementation of NPSTE in secondary schools in Anambra State by concentrating on teacher development, resource augmentation, and gender-sensitive measures. These initiatives will enhance ST education and contribute to the socioeconomic growth of the state and the country by developing a skilled and varied pool of future scientists, engineers, and innovators.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Adamu, A. (2019). *Implementation Guidelines for National Policy on Science and Technology Education*. https://education.gov.ng/wp-content/uploads/2020/09/Implementation-Guidelines-for-National-Policy-on-Science-and-Technology-Education.pdf

Adamu, M. M., Okereke, V. E., & Hamidu, L. A. J. (2022). Effective Maintenance of Physical Facilities in Secondary Schools Bauchi State, Nigeria. *Traektoriâ Nauki Path of Science, 8,* 2-3.

Aina, J. K. (2022). STEM Education in Nigeria: Development and Challenges. *Current Research in Language, Literature and Education, 3,* 53-60.

Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' Perceptions of Technology Integration in Teaching-Learning Practices: A Systematic Review. *Frontiers in Psychology, 13,* Article 920317. https://doi.org/10.3389/fpsyg.2022.920317

Chowdhury, S. A., Arefin, A. S., & Ahmed, F. (2020). Factors behind the Implementation of STEM Education in Bangladesh. *Journal of Physics, 1563,* Article 012064. https://doi.org/10.1088/1742-6596/1563/1/012064

Fox, M., Martin, P., & Green, G. (2007). *Doing Practitioner Research*. SAGE Publications, Ltd. https://doi.org/10.4135/9781849208994

García-Ramos, L., Peñabaena-Niebles, R., Camacho, A., Calle, M. G., & García-Barreneche, S. (2022). Promoting the Participation of Women in STEM: A Methodological View. In F. J. García-Peñalvo, A. García-Holgado, A. Dominguez, & J. Pascual (Eds.), *Women in STEM in Higher Education. Lecture Notes in Educational Technology* (pp. 99-125). Springer. https://doi.org/10.1007/978-981-19-1552-9_6

Hala, B. A. (2018). *Investigating Teachers' Perceptions and Implementation of STEM Education in the United Arab Emirates*. Master Dissertation, The British University. https://bspace.buid.ac.ae/bitstream/handle/1234/1163/2015101115.pdf;jsessionid=011BB7727A593322F45A73696321D260?sequence=1

Igbaji, C., Miswaru, B., & Sadiyya, A. S. (2017). Science Education and Nigeria National Development Effort: The Missing Link. *International Journal of Education and Evaluation, 5,* 46-56.

Innocent, O. (2016). Managing the Role of Science and Technology Education Programs in Promoting Enterprises for National Development in Nigeria. *International Journal of Scientific Research in Education, 9,* 97-104.

Kalama, J. T., & Eseduwo, F. S. (2020). Science and Technology Policy Development and Its Problems and Challenges in Nigeria. *International Journal of Strategic Research in Education, Technology and Humanities, 8,* 73-82. https://doi.org/10.48028/iiprds/ijsreth.v8.i1.07

Lane, C., Kaya-Capocci, S., Kelly, R., O'Connell, T., & Goos, M. (2022) Fascinating or Dull? Female Students' Attitudes towards STEM Subjects and Careers. *Frontiers in Psychology, 13,* Article 959972. https://doi.org/10.3389/fpsyg.2022.959972

Margot, K. C., & Kettler, T. (2019). Teachers' Perception of STEM Integration and Education: A Systematic Literature Review. *International Journal of STEM Education, 6,* Article No. 2. https://doi.org/10.1186/s40594-018-0151-2

Meyer, D. L. (1979). *Design and Evaluation of Social Impact Assessments*. Jossey-Bass.

Murtala, A., & Norazrena, A. S. (2019). Teachers' Perception on the Use of Technology in Teaching and Learning in Associate Schools Zamfara State, Nigeria. *Education, Sustainability and Society, 2,* 1-4.

Nadelson, L. S., & Seifert, A. (2013). Perceptions Engagement and Practices of Teachers Seeking Professional Development in Place-Based Integrated STEM. *Teacher Education and Practice, 26,* 242-265.

National Science Board (2018). *Science & Engineering Indicators 2018*. National Science Foundation. https://www.nsf.gov/nsb/publications/2019/nsb201923.pdf

Nigerian Educational Research and Development Council (2019). *National Assessment of Science and Technology Education in Nigeria*. NERDC.

Ogunode, N. J. (2010). An Investigation into the Challenges Facing Administration of STEM Education in Gwagwalada UBE Junior Secondary Schools in FCT, Nigeria. *International Journal of Research in STEM Education, 2,* 59-75. https://doi.org/10.31098/ijrse.v2i1.200

Ogunode, N. J., & Jegede, D. (2019). Challenges Facing Implementation of Science Program in FCT Secondary Schools, Abuja, Nigeria. *Electronic Research Journal of Engineering, Computer and Applied Sciences, 1,* 1-13.

Onimisi, T., & Osasona, S. (2021). *Factors Affecting Effective Policy Implementation in Nigeria: Focus on Federal Character Principle*. https://www.researchgate.net/publication/352029043_FACTORS_AFFECTING_EFFECTIVE_POLICY_IMPLEMENTATION_IN_NIGERIA_FOCUS_ON_FEDERAL_CHARACTER_PRINCIPLE

Osagie, R. O. (2015). Factors Affecting the Implementation of Vocational and Technical Education Policy in Private Secondary Schools in Edo State. *Sokoto Educational Review, 16,* 20-31. https://www.sokedureview.org https://doi.org/10.35386/ser.v16i1.59

Osarenren-Osaghae R. I., & Irabor, Q. O. (2018). Educational Policies and Programmes Implementations: A Case Study of Education Funding, Universal Basic Education and Teacher Education. *International Journal of Educational Administration and Policy Studies, 10,* 91-102. https://doi.org/10.5897/IJEAPS2016.0457

Ruparanganda, F. (2016). An Evaluation of the Implementation of the Science-Technology and Society Concept in Science Instruction in Secondary Schools in Zimbabwe. *South American Journal of Academic Research*. https://doi.org/10.21522/TIJAR.2014.03.01.Art004

Thomas, B., & Watters, J. J. (2015). Perspectives on Australian Indian and Malaysian Approaches to STEM Education. *International Journal of Educational Development, 45,* 42-53. https://doi.org/10.1016/j.ijedudev.2015.08.002

Umar, M. (2019). Generation of Intellectual Property, Patenting Technology Acquisition and the Innovation Process for Economic Development. *The Bioscientist Journal, 11*, 24-28.

Van Haneghan, H. J. P., Pruet, S. A., Neal-Waltman, R., & Harlan, J. M. (2015). Teacher Beliefs about Motivating and Teaching Students to Carry out Engineering Design Challenges: Some Initial Data. *Journal of Pre-College Engineering Education Research, 5,* 1-9. https://doi.org/10.7771/2157-9288.1097

Xie, Y., Fang, M., & Shauman, K. (2015). STEM Education. *Annual Review of Sociology, 41,* 331-357. https://doi.org/10.1146/annurev-soc-071312-145659