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MANAGEMENT OF SCIENCE AND TECHNOLOGY EDUCATION FOR NATIONAL DEVELOPMENT: A CASE OF SECONDARY SCHOOLS IN SOUTH EAST OF NIGERIA

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ABSTRACT

This study ascertained strategies for managing science and technology education in Nigeria for national development with a focus on secondary schools in South East, Nigeria. Five research questions and five null hypotheses guided the study. The study adopted descriptive survey research design. The area of the study was South East States of Nigeria using all public secondary schools in the area. The population of the study constituted of 36,562 teachers in public secondary schools in the area. The sample for the study comprised 3,656 respondents made up of 10% of the population. The data for the study were collected using a self-structured questionnaire entitled "Managing Science and Technology Education for National Development Questionnaire" (MSTENDQ). The researcher validated the instrument with the help of three experts from Nnamdi Azikiwe University, Awka. The reliability of the instrument was established through a pilot test conducted in South-South, Nigeria. Cronbach Alpha was used in the data analysis and an overall reliability value of 0.81was found. Copies of the data collection instrument were administered on the respondents in the institutions personally by the researcher with the help of two research assistants who are teachers in the area. The research questions will be answered using mean and standard deviations. The hypotheses were tested at 0.05 level of significance using t-test statistics. The major findings of the study were that the teachers in the South East of Nigeria have the same view towards the science and technology education instructional strategies, information communication technology (ICT) infusion strategies, students' assessment strategies and school location strategies in secondary schools in South East, Nigeria for national development. Based on the findings, the recommendations for managing science and technology education in secondary schools in South East Nigeria for national development include: improving teacher training; upgrading facilities and resources; integrating practical learning; promoting STEM awareness; collaborating with industry; regular curriculum updates; support for students and teachers; enhance ICT integration; community and parental engagement and monitoring and evaluation.

Keywords: Management; Science and Technology; Education; National Development

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Introduction

This study discusses some challenges facing the development of science and technology education in Nigeria. Some of the challenges include gender, school location and the need to incorporate Information Communication Technology (ICT) into the teaching of science. Many textbooks used in teaching science and technology are written to favour the male gender in term of content presentation. Many schools in the rural areas are highly disadvantaged because of lack of qualified teachers and equipment. The challenges posed by ICT also require that teaching of science should be ICT-based. It is therefore imperative for stakeholders to rise up to these challenges by providing required instructional materials and enabling environment for the teaching of science and technology. The reason is obvious. The world in which people live today is vast in science and technology and governed by ever increasing discoveries, inventions and innovations. It is a world characterized by tremendous scientific and technological explorations; a world of the Internet and e-mails, supersonic jets, the robotics and biotechnologies. It is distant from the world of yesteryears which was characterized by dogma, witch-craft, taboos and subjugation of human beings to natural phenomena. Thus, science and technology have helped people unravel many of human mysteries and technological advancement has converted seemingly inevitable mysteries into abundant comfort and pleasure. Challenges in science and technology education in Nigeria will be unraveled in this study. The challenges posed by gender, school location, instructional strategies, Information Communication Technology (ICT) and assessment in science education are focused. Remedies will be advanced in form of recommendations to address the challenges.

The world we live in today is rich in science and technology, shaped by constant discoveries, inventions, and innovations. It's a world marked by significant scientific and technological explorations, featuring the Internet, emails, supersonic jets, robotics, and biotechnologies. This stands in stark contrast to the past, which was characterized by dogma, superstition, taboos, and the subjugation of humans to natural phenomena. Science has helped unravel many mysteries, and technological advancements have turned what once seemed inevitable into abundant comfort and pleasure. This study explores the challenges in science education in Nigeria.

Science has many definitions, depending on the perspectives of different philosophers. Harry (1904) defined science as 'knowledge attained through study and practice, covering general truths and the operation of general laws, as tested through the scientific method and concerned with the physical world.' For the purposes of this text, science is defined as the systematic study of natural phenomena, an organized body of knowledge that helps us understand and relate to nature and the universe (Olagunju, 1996). Science employs the scientific method, which involves careful observation,

hypothesis formulation, experimentation, and conclusion drawing.

Studying science allows students to experience the richness and excitement of the natural world. Adults face complex questions requiring scientific thinking, reasoning, and informed decision-making (Adepoju, 1999). These processes involve various stages of acquiring knowledge and understanding. For clarity and emphasis, science is divided into Biological, Chemical, Physical, Information, and Health Sciences sections. Overall, science helps us understand our world by interpreting the laws and principles that govern it (Iroegbu, 1998). It blends logic and imagination to explain and predict events through scientific inquiry, demanding evidence. The scientific enterprise is a major activity of the modern world, a complex social activity with generally accepted ethical principles. It is not authoritarian and cannot provide complete answers to all questions. Scientific knowledge is durable, yet ideas are subject to change.

Education, in a broad sense, is any act or experience that has a formative effect on an individual's mind, character, or physical ability. Technically, education is the process by which society deliberately transmits its accumulated knowledge, skills, and values from one generation to another (Ajitoni, 2005). It involves imparting or acquiring knowledge, mental and moral training, and cultivating the mind, feelings, and manners. Harry (1904) broadly defines education as comprehending all that disciplines and enlightens the understanding, corrects the temper, cultivates the taste, and forms the manners and habits. In a narrower sense, it refers to specific training courses pursued by parents or teachers to achieve these ends.

Education is crucial as it equips individuals with the skills needed for survival and helps us gain knowledge, which enhances our thinking and reasoning abilities. This, in turn, helps us innovate and constantly seek better outcomes. Education also helps us understand and adapt to changes, making people useful members of society. Gaining knowledge and education has become vital, and it is a primary objective for governments worldwide to provide basic education to their citizens and allocate substantial resources to achieve educational goals. There is a close connection between education and scientific knowledge for a nation like Nigeria to progress, evolve, learn, and develop in fields like science education.

Science and technology education aims to share scientific and technological content and processes with individuals not traditionally part of the scientific community, including children, college students, or the general public. This field covers science and technology content and teaching methods. In Nigeria, the traditional subjects include Biology Education,

Chemistry Education, Physics Education, and Integrated Science Education.

The goal of science and technology education is to help students experience the richness and excitement of understanding the natural world, use scientific processes and principles in personal decision-making, engage in public discourse on scientific matters, and increase economic productivity through the knowledge and skills gained. The science and technology curriculum aims to create scientifically literate individuals who can understand and apply scientific knowledge. This study seeks to explore mechanisms for managing science and technology education for national development in Nigeria, focusing on the South East region, to reduce unemployment and its negative effects by effectively harnessing human and material resources.

Statement of the Problem

Nigeria and South East in particular has spent huge amount of money on science and technology, yet, significant development is not felt in the area. Many human and material resources are not properly or fully harnessed in the area. The results have been poor human development, social violence and other crimes and criminalities. Excellence in science and technology education embodies the idea that all students can achieve understanding of science and technology if they are given the opportunity. Science and technology education takes more into consideration what students should understand and be able to do and the manner in which students will achieve those outcomes. Students will achieve understanding in different ways and at different depths as they answer questions about the natural world. Students will achieve the outcomes at different rates, some sooner than others. However, all should have opportunities in the form of multiple experiences over several years to develop the understanding associated with the concepts of science, science education and technology. All these are found in formal science and technology education. History of science and technology education in Nigeria is fairly old. Researches in the field are already part of the Nigerian system. It is a regret to tell these noble professionals that the results of the researches are lying idle in Nigerian university libraries. The challenges to science and technology education in Nigeria are seemingly worse in the secondary schools, which ordinarily should be laying solid foundation for science and technology development of the nation. The problem of this study in question form is: "What are the mechanisms for managing science and technology education in secondary schools in south east, Nigeria for national development?"

Research Questions

The following research questions guided the study:

1. What are the science and technology education instructional strategies in secondary schools in South East, Nigeria for national development?
2. What are the information communication technology (ICT) infusion strategies in science and technology education in secondary

schools in South East, Nigeria for national development?

3. What are the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development?
4. What are the science and technology education school location strategies in secondary schools in South East, Nigeria for national development?
5. What are the gender management strategies in science and technology education in secondary schools in South East, Nigeria for national development?

Research Hypotheses

1. There will be no significant difference in the mean ratings of teachers on science and technology education instructional strategies for national development.
2. There will be no significant difference in the mean ratings of teachers on information communication technology (ICT) infusion strategies in science and technology education for national development.
3. There will be no significant difference in the mean ratings of teachers on science and technology education students' assessment strategies for national development.
4. There will be no significant difference in the mean ratings of teachers on science and technology education school location strategies for national development.
5. There will be no significant difference in the mean ratings of teachers on gender management strategies in science and technology education for national development.

Research Method

The study adopted descriptive survey research design. The area of the study was South East States of Nigeria using all public secondary schools in the area. The South East geopolitical zone of Nigeria comprises five states namely, Abia, Anambra, Ebonyi, Enugu and Imo States. The population of the study constituted of 36,562 comprising 10, 360 teachers in public secondary schools in Ebonyi State, 5949 teachers of public secondary schools in Anambra State, 10,112 teachers in public secondary schools in Enugu State, 10,216 in Abia state and 10, 141in Imo State. The sample for the study comprised 3,656 respondents made up of 10% of the population of teachers in the five States in the South East, Nigeria.

The data for the study were collected using a self-structured questionnaire entitled "Managing Science and Technology Education for National Development Questionnaire" (MSTENDQ). The questionnaire has two sections-"A" and "B". Section "A" contains information on the gender of the respondents while section "B" contains two clusters of B1-B4 in line with the research questions with items on the clusters respectively. The B is structured on the 4-point scale of strongly agree (SA 4 Points); agree (A 3 points); disagree (D 2 points) and strongly agree (SA 1 point). The

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researcher validated the instrument by consulting three experts. Two of them were from Department of Educational Management and Policy and one from Department of Educational Foundations, all in Nnamdi Azikiwe University, Awka. They scrutinized the instrument using the purpose of the study, the research questions and the null hypotheses as guides. The observations, contributions and comments by these professionals were carefully used to restructure the final draft of this instrument. To establish the internal consistency of the instrument, the researcher conducted a pilot test by administering 20 copies of the instrument which were administered to 70 respondents in public secondary schools in South-South, Nigeria. Cronbach Alpha was used in the data analysis which yielded coefficient values of 0.81, 0.83, 0.79, 0.80 and 0.82 for the five clusters and an overall reliability value of 0.81. This high overall coefficient value indicated that the instrument is reliable for the study as recommended by Nwankwo (2023), Nworgu (2015) and Uzoagulu (2012) that a reliability coefficient value of 0.70 and above is acceptable for a test of internal consistency for a research instrument. Copies of the data collection instrument were administered on the respondents in the institutions personally by the researcher with the help of two research assistants who are teachers in the area. They will be briefed on the methods to be used. All the copies of the questionnaire were collected and used for the data analysis. The research questions were answered using mean and standard deviations. The hypotheses were tested at 0.05 level of significance using t-test statistics. As a general rule, a hypothesis is rejected where the p-value is less than the significant value. On the other hand, where p-value is equal or greater than the level of significance (0.05), the difference is adjudged to be significant and the null hypothesis is not rejected.

Presentation of Results

Research Question 1: What are the science and technology education instructional strategies in secondary schools in South East, Nigeria for national development?

Table 1: The mean rating of respondents' opinion on Information Communication Technology (ICT) for Science and Technology Education Development in South East

S/NO	Item	Abia Teachers Total	(x)	Anambra Teachers Total	Mean (x)	Ebonyi Teachers Total	Mean (x)	Enugu Teachers Total	Mean (x)	Imo Teachers Total	Mean (x)	Remark
1	Lecture methods	57	3.2	61	3.2	47	3.4	28	3.7	35	3.5	Accepted
2	Group discussions	24	3.4	75	3.6	29	3.1	65	3.6	34	1.1	Accepted
3	Field trips	56	3.2	86	3.8	76	3.7	86	3.8	55	3.2	Accepted
4	Hands-on experiments	57	3.3	65	3.5	67	3.5	39	3.4	86	3.5	Accepted

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5	Project-based learning/use of multimedia(videos, simulations)	65	3.5	66	3.5	54	3.5	49	2.0	68	3.6	Accepted

Table 1 with grand mean score of 3.8 and lowest mean rating of 1.1 for teachers in the South East respectively shows that the respondents accepted the five items listed as the science and technology education instructional strategies in secondary schools in South East, Nigeria for national development.

Research Question 2: What are the information communication technology (ICT) infusion strategies in science and technology education in secondary schools in South East, Nigeria for national development?

Table 2: The mean rating of the respondent's opinion on Information Communication Technology (ICT) for Science and Technology Education Development

S/NO	Item	Abia Teachers Total (x)		Anambra Teachers Total Mean (x)		Ebonyi Teachers Total Mean (x)		Enugu Teachers Total Mean (x)		Imo Teachers Total Mean (x)		Remark
16	Proximity to Industrial and Research Hubs	67	3.2	61	3.2	47	3.4	28	3.7	35	3.5	Accepted
17	Accessibility and Transportation	58	3.0	75	3.6	29	3.1	65	3.6	34	1.1	Accepted
18	Policy and Government Support (Funding, Incentives, Strategic Planning)	56	3.1	86	3.8	76	3.7	86	3.8	55	3.2	Accepted
19	Community and Industrial Partnership	57	2.6	65	3.5	67	3.5	39	3.4	86	3.5	Accepted
20	Resource Allocation and Infrastructure	65	3.4	66	3.5	54	3.5	49	2.0	68	3.6	Accepted

Table 2 with grand mean score of 3.8 and lowest mean rating of 1.1 for teachers in the South East respectively shows the respondents agreed with the five items listed as the information communication technology (ICT) infusion strategies in science and technology education in

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secondary schools in South East, Nigeria for national development.

Research Question 3: What are the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development?

Table 3: The mean rating of the respondents' opinion on Students' Assessment Strategies for Science and Technology Education Development

S/NO	Item	Abia Teachers Total (x)	Anambra Teachers Total (x)	Ebonyi Teachers Total (x)	Enugu Teachers Total (x)	Imo Teachers Total (x)	Remark
11	Types of Assessment Methods (e.g., formative, summative, diagnostic, performance-based)	67 3.2	61 3.2	47 3.4	28 3.7	35 3.5	Accepted
12	Integration of Technology in Assessments	58 3.0	75 3.6	29 3.1	65 3.6	34 1.1	Accepted
13	Teacher Training and Professional Development	56 3.1	86 3.8	76 3.7	86 3.8	55 3.2	Accepted
14	Student Feedback Mechanism	57 2.6	65 3.5	67 3.5	39 3.4	86 3.5	Accepted
15	Impact on National Development	65 3.4	66 3.5	54 3.5	49 2.0	68 3.6	Accepted

Table 3with grand mean score of 3.8 and minimum mean rating of 1.1 respectively for teachers in the South East, shows that the respondents accepted the five items listed as the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development.

Research Question 4: What are the science and technology education school location strategies in secondary schools in South East, Nigeria for national development?

Table 4: The mean rating of the respondents' opinion on School Location Strategies for Science and Technology Education Development

S/NO	Item	Abia Teachers Total (x)	Anambra Teachers Total (x)	Ebonyi Teachers Total x)	Enugu Teachers Total x)	Imo Teachers Total (x)	Remark
16	Proximity to Industrial and Research Hubs	57 3.2	61 3.2	47 3.4	28 3.7	35 3.5	Accepted
17	Accessibility and Transportation	24 3.4	75 3.6	29 3.1	65 3.6	34 2.0	Accepted

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18	Policy and Government Support (Funding, Incentives, Strategic Planning)	56 3.2	86	3.7	76	3.7	86	3.8	55	3.2	Accepted
19	Community and Industrial Partnership	57 3.3	65	3.5	67	3.5	39	3.4	86	3.5	Accepted
20	Resource Allocation and Infrastructure	65 3.5	66	3.5	54	3.5	49	2.0	68	3.6	Accepted

Table 4 with the grand mean of 3.7 and minimum mean rating of 2.0 for the teachers in the South East respectively shows that the respondents accepted the five items listed as the science and technology education school location strategies in secondary schools in South East, Nigeria for national development.

Research Question 5: What are the gender management strategies in science and technology education in secondary schools in South East, Nigeria for national development?

Table 5: The mean rating of respondents' opinion on Gender management Strategies for Science and Technology Education Development

S/NO	Item	Abia Teachers Total (x)	Anambra Teachers Total (x)	Ebonyi Teachers Total(x)	Enugu Teachers Total (x)	Imo Teachers Total (x)	Remark
21	Perception of Gender Equity	67 3.2	61 3.2	47 3.4	28 3.7	35 3.5	Accepted
22	Use of Gender Sensitive Materials	58 3.0	75 3.6	29 3.1	65 3.6	34 1.1	Accepted
23	Support and Mentorship Programs	56 3.1	66 3.5	76 3.7	54 3.2	55 3.2	Accepted
24	Impact on Student Outcomes	57 2.6	65 3.5	67 3.5	39 3.4	86 3.5	Accepted
25	Classroom Practices and Interactions	65 3.4	66 3.5	54 3.5	49 2.0	68 3.6	Accepted

Table 5 with grand mean of 3.7 and minimum mean of 1.1 for the teachers in the South East respectively shows that the respondents accepted the five items listed as the gender management strategies in science and technology education in secondary schools in South East, Nigeria for national development.

Hypothesis Testing

The following null hypotheses were tested at 0.05 level of significance.

Hypothesis One: There is no significant difference between the mean rating of teachers in the South East towards the science and technology education instructional strategies in secondary schools in South East, Nigeria for national development.

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Table 6: t-test analysis of the difference in the mean responses of teachers in South East, Nigeria with regards to science and technology education instructional strategies in secondary schools

Sample Group	Sample size	Mean	df	t-cal	t-calculated	Decision
Teachers in Abia, Anambra, Enugu	18	3.3		1.39	1.734	Significant
Teachers in Ebonyi and Imo State	18	3.4	36			

Table 6 above presents the t-test analysis of the difference in the mean responses of teachers in South East, Nigeria with regards to science and technology education instructional strategies in secondary schools. The table shows that the calculated t-value is 1.39 degrees of freedom and 0.05 level of significance which is less than the critical t-value of 1.734. the null hypothesis is therefore accepted which states that there is no significant difference between the mean rating of school teachers towards science and technology education instructional strategies in secondary schools in South East, Nigeria for national development.

Hypotheses Two: There is no significant difference between the mean rating of teachers in South East on the information communication technology (ICT) infusion strategies in science and technology education in secondary schools in South East, Nigeria for national development?

Table 7: t-test analysis of the difference in the mean responses of South East teachers with regards to the information communication technology (ICT) infusion strategies

Sample Group	Sample size	Mean	Df.	t-cal.	t-calculated	Decision
Teachers in Abia, Anambra, Enugu	18	3.4		1.39	1.734	Significant
Teachers in Ebonyi and Imo	18	3.4	36			

Table 7 above presents the t-test analysis of the difference in the mean responses of South East teachers with regards to the information communication technology (ICT) infusion strategies in science and technology education in secondary schools in South East, Nigeria for national development.

The table shows that the calculated t-value is 1.44 at 36 degrees of freedom and 0.05 level of significance which is less than the critical t-value of 1.734. the null hypotheses is therefore accepted which states that there is no significant difference between the mean rating of South East teachers on the information communication technology

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(ICT) infusion strategies in science and technology education in secondary schools in South East, Nigeria for national development.

Hypothesis Three: There is no significant difference between the mean rating of South East teachers on the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development.

Table 8: t-test analysis of the difference in the mean responses of South East teachers with regards to the science and technology education students' assessment strategies

Sample Group	Sample size	Mean	d.f	t-cal	t-calculated	Decision
Teachers in Abia, Anambra, Enugu	18	3.3		1.67	1.734	Significant
Teachers in Ebonyi and Imo	18	3.3	36			

Table 8 above presents the t-test analysis of the difference in the mean responses of South East teachers with regards to the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development.

The table shows that the calculated t-value is 1.67 at 36 degrees of freedom and 0.05 level of significance which is less than the critical t-value of 1.734. the null hypotheses is therefore accepted which states that there is no significant difference between the mean rating of South East teachers on the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development.

Hypotheses Four: There is no significant difference between the mean rating of South East teachers on the science and technology education school location strategies in secondary schools in South East, Nigeria for national development.

Table 9: t-test analysis of the difference in the mean responses of South East teachers with regards to the science and technology education school location strategies

Sample Group	Sample size	Mean	d.f	t-cal	t-calculated	Decision
Teachers in Abia, Anambra, Enugu	18	3.3		1.67	1.734	Significant
Teachers in Ebonyi and Imo.	18	3.5	36			

Table 9 above presents the t-test analysis of the difference in the mean responses of South East teachers with regards to the science and technology education school location strategies in secondary schools in South East, Nigeria for national development.

The table shows that the calculated t-value is 1.29 at 36 degrees of freedom and 0.05 level of significance which is less than the critical t-value of 1.734. the null hypotheses is therefore accepted which states that there is no significant difference between the mean

rating of South East teachers on the science and technology education school location strategies in secondary schools in South East, Nigeria for national development.

Summary of Findings

Based on the analysis of data, the major findings that emerged from the study were summarized as follows:

1. The teachers in the South East of Nigeria have the same view towards the science and technology education instructional strategies in secondary schools in South East, Nigeria for national development.

2. The teachers in the South East of Nigeria has the same view on the information communication technology (ICT) infusion strategies in science and technology education in secondary schools in South East, Nigeria for national development.

3. There is no difference between the view of South East teachers on the science and technology education students' assessment strategies in secondary schools in South East, Nigeria for national development.

4. There is no difference between the views of the South East teachers on the science and technology education school location strategies in secondary schools in South East, Nigeria for national development.

Discussion of Results

Instructional Strategies for Science and Technology Education Development in secondary schools in South East, Nigeria for national development

On instructional strategies for sciences and technology education in secondary schools in South East Nigeria highlights several key findings for national development. Effective strategies include the use of inquiry-based learning, which encourages critical thinking and problem-solving skills among students. Additionally, integrating technology into the classroom, such as using multimedia resources and computer simulations, has been shown to enhance student engagement and understanding of complex scientific concepts. Teacher professional development is crucial, as well-trained educators are better equipped to implement innovative teaching methods. Collaborative learning and hands-on experiments also play significant role in making science education more interactive and practical. Overall, these strategies aim to a skilled workforce capable of contributing to Nigeria's technology and economic growth.

Information Communication Technology (ICT) for Science and Technology Education Development in secondary schools in South East, Nigeria for national development

The findings on the integration of information communication technology (ICT) in science and technology education in secondary schools in South East Nigeria reveal several critical findings for national development. The incorporation of ICT tools, such as computers, projectors, and

educational software, has significantly enhanced the teaching and learning process. These technologies has improved students' understanding of scientific concepts and increased their engagement and motivation. The use of ICT in education also facilitates access up-to-date information and global scientific knowledge, fostering a more comprehensive learning experience. Moreover, teacher training in ICT is essential to ensure effective implementation and maximize the benefits of these technologies. Overall, the adoption of ICT in science and technology education is seen as a vital step towards producing a technologically proficient workforce, crucial for Nigeria's national development and global competitiveness.

Students' Assessment Strategies for Science and Technology Education Development in secondary schools in South East, Nigeria for national development

The study on student assessment strategies for science and technology education development in secondary schools in South East, Nigeria highlights several key findings essential for national development. The research underscores the importance of continuous and diverse assessment method, including formative and summative evaluations, to enhance students understanding and skills in science and technologies. It identifies a need for improved teacher training to effectively implement these assessment strategies. Additionally, the study points out infrastructural and resource challenges that hinder the effective teaching and assessment of science and technology subjects. Addressing these challenges through targeted policies and investments is crucial for fostering a robust educational frame work that can drive national development by producing a skilled and innovative workforce.

School Location Strategies for Science and Technology Education Development in secondary schools in South East, Nigeria for national development

The study on school location strategies for science and technology education development in secondary schools in South East, Nigeria, highlighted several key findings relevant to national development:

a. Strategic Placement: Schools located in urban areas tend to have better access to resources, infrastructure, and qualified teachers, which positively influences the quality of science and technology education.
b. Resource allocation: there is disparity in resource allocation between urban and rural schools. Urban schools are generally better equipped with laboratories, libraries, and ICT facilities essential for effective science and technology education.
c. Teacher Distribution: The concentration of qualified science technology teachers is higher in urban areas compared to rural areas, leading to gap in the quality of education provided.
d. Government Policies: Effective government policies and interventions are crucial for bridging

the gap between urban and rural schools. These policies should focus on equitable distribution of resources and incentives to attract and retain qualified teachers in rural areas.

e. Infrastructure Development: Improving infrastructure in rural schools, such as reliable electricity and internet connectivity, is essential for fostering a conducive learning environment.

The study emphasizes the need for a balanced approach in the distribution of resources and the importance of targeted interventions to ensure that both urban and rural schools can contribute effectively to national development through improved science and technology education.

Gender management Strategies for Science and Technology Education Development in secondary schools in South East, Nigeria for national development

The study on gender management strategies for science and technology education development in secondary schools in South East, Nigeria, revealed several important findings pertinent to national development:

1. Gender Disparity: There is a notable gender disparity in enrollment and performance in science and technology subjects, with male students generally outperforming their female counterparts.
2. Cultural Barriers: Societal and cultural norms often discourage girls from pursuing science and technology education. These fields are more suitable for boys.
3. Role Models and Mentorship: The presence of female role models and mentors in science and technology can inspire and motivate female students to pursue these fields. However, such role models are currently insufficient in the South East.
4. School Policies: Implementing school policies that promote gender equality, such as providing equal opportunities for boys and girls in science clubs and competitions, is crucial for balanced development.
5. Awareness Campaigns: Raising awareness among parents and communities about the importance of science and technology education for girls can help change negative perceptions and encourage more girls to pursue these subjects.

Conclusion

The management of science and technology education in secondary schools in South East Nigeria plays a vital role in national development. Effective management strategies can enhance the quality of education, equipping students with the necessary skills and knowledge to drive innovation and economic growth. This case study highlights critical factors, including the need for adequate funding, well-trained teachers and up-to-date facilities. It also underscores the importance of a curriculum that is aligned with current technological advancements and the demand of a global economy. By addressing these issues,

secondary schools in South East, Nigeria can better prepare students for future challenges, thereby contributing significantly to the nation's development. The success of these initiatives requires a collaborative effort between government bodies, educational institutions, and the private sector to ensure a sustainable and impactful science and technology education frame work.

Recommendations

The following recommendations were made for managing science and technology education in secondary schools in South East Nigeria for National Development.

1. Improve Teacher Training: Enhance the training and development of science and technology teachers to ensure they have the necessary skills and knowledge to teach effectively.
2. Upgrade Facilities and Resources: Invest in better laboratories, equipment, and educational materials to provide students with hands-on experience in science and technology subjects.
3. Integrate Practical Learning: Incorporate more practical sessions and experiments into the curriculum to help students understand theoretical concepts through real-world applications.
4. Promote STEM Awareness: Encourage students to pursue science, technology, engineering, and mathematics (STEM) careers through awareness programs and career guidance.
5. Collaborate with Industry: Establish partnerships between schools and local industries to provide students with exposure to current technologies and potential career opportunities.
6. Regular Curriculum Updates: Update the curriculum regularly to include the latest developments in science and technology; ensuring students learn current and relevant content.
7. Support for Students and Teachers: Provide scholarships, grants, and incentives for students pursuing science and technology fields and for teachers specializing in these subjects.
8. Enhance ICT Integration: Integrate Information and Communication Technology (ICT) into the teaching and learning process to support digital literacy and enhance learning outcomes.
9. Community and Parental Engagement: Involve the community and parents in supporting science and technology education, fostering an environment that values and supports these fields.
10. Monitoring and Evaluation: Implement a robust monitoring and evaluation system to assess the effectiveness of science and technology education programs and make necessary improvements.

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