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OGUNJOBI Amos Olusola & BABALOLA Femi Emmanuel

Department of Science Education, Faculty of Education, Federal University, Oye Ekiti

olusola.ogunjobi@fuoye.edu.ng

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OGUNJOBI Amos Olusola & BABALOLA Femi Emmanuel

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Abstract
This study examined the impact of school location and teacher quality on the academic performance of secondary school students in science subjects. A descriptive survey research design, incorporating an ex post facto approach, was employed. The study sampled 80 science teachers and analyzed the West Africa Senior School Certificate Examination (WASSCE) results of 1,648 students using multistage sampling techniques. Two research instruments were used: the Location and Teacher Quality Questionnaire (LTQQT) and a Two-Year Examination Results Template. The LTQQT's face and content validity were assessed by experts in Science Education and Test, Measurement, and Evaluation, while its reliability was established through the test-retest method, yielding a coefficient of 0.72. The second instrument comprised standardized results from the West African Examinations Council (WAEC). Data were analyzed using the t-test and Pearson Product-Moment Correlation, with hypotheses tested at a 0.05 significance level. Results indicated no significant relationship between school location and academic performance, whereas teacher quality showed a significant impact on student achievement. The study concludes that while location does not affect performance, teacher quality is crucial. It is recommended that schools be in conducive environments and teachers undergo continuous professional development to enhance instructional effectiveness in science education.
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Introduction

Science education holds a prominent position in contemporary global educational practices. This prominence arises from the universal teaching of science subjects, as scholars and educators assert that no nation can afford to neglect science education in schools (Fafunwa, 2004). Science is regarded as a systematically organized body of knowledge generated through observation and experimentation, whereas science education builds upon this knowledge, equipping students with

the skills necessary to comprehend scientific principles, theories, and hypotheses. Aina (2013) defines science education as a process involving the dissemination of scientific principles, concepts, and theories among individuals who were not originally part of the scientific community.

Previous studies have highlighted the significant influence of school location and teacher quality on students' academic performance in science subjects (Kolawole, 2018). The learning environment plays a crucial role in shaping students' academic outcomes, affecting their interactions and responses to various academic challenges. The impact of school location on academic performance can be either positive or negative, depending on the school's infrastructure and resource availability. While rural schools in Nigeria are generally considered to be disadvantaged due to inadequate facilities, some rural schools with sufficient resources have demonstrated comparable academic outcomes to their urban counterparts. Kozol (2017) observed that many rural schools operate in deteriorating and poorly maintained buildings, lacking essential amenities, which negatively affects the quality of education. Rural schools are often characterized by high dropout rates and a lack of trust between the school and the community. Additionally, financial and human resource constraints further impede their effectiveness. In Nigeria, a shortage of qualified teachers in rural schools exacerbates these challenges, affecting students' ability to engage with science subjects effectively.

Several factors influence students' academic achievement, including school climate, availability of instructional materials, discipline, physical infrastructure, teacher quality, school location, and class size (Akpo, 2012). Schools that provide conducive learning environments and adequate facilities tend to produce students with better academic achievements. The quality and quantity of school resources significantly impact the effectiveness of teaching and learning processes. Lawani (2004) identified multiple challenges affecting education in rural areas, including teachers' reluctance to accept appointments in rural schools, inadequate transportation infrastructure, and insufficient teaching equipment. Similarly, Ojuawo (2009) emphasized that school location is a key determinant of student performance. Conversely, some researchers, including Owoeye (2010), Bankole (2013), and Fans and Chers (2005), have found no significant relationship between school location and academic performance, arguing that students from rural schools can perform as well as their urban counterparts.

Teacher quality is another critical factor influencing students' academic performance in science subjects. The extent to which students master a subject is largely determined by the effectiveness of their teachers. Sokiyo and Soleme (2008) reported that students' performance in science subjects remains low in both national and state examinations due to various factors, including inadequate teacher preparation, poor instructional methods, insufficient parental support, lack of government commitment, and inadequate science laboratory facilities.
Ngada (2007) emphasized that the success or failure of an educational program largely depends on the availability of qualified, competent, and dedicated teachers. Seweje and Jegede (2005) noted that effective teaching is not solely dependent on academic background but also on pedagogical skills. Furthermore, Ugada (2008) reported that over 80% of respondents in a survey perceived teachers as having significant weaknesses, including inadequate exposure to teaching practice, poor classroom management, limited subject knowledge, and lack of professionalism. Ajayi (2009) identified essential qualities of an effective teacher, including subject mastery,

organizational skills, and clarity in instruction, ability to motivate students, classroom management, and continuous assessment of students' progress.

Despite the importance of teacher quality, teaching is often treated as a fallback profession for unemployed individuals, regardless of their expertise. Many teachers lack the technical skills necessary for effective instruction, leading to suboptimal student performance. This has resulted in the production of inadequately prepared students who struggle in public examinations. The declining academic performance of science students in Ondo State, Nigeria, underscores the need to examine the impact of school location and teacher quality on academic outcomes. This study aims to investigate the extent to which these factors influence students' performance in science subjects.

Purpose of the Study

The study aims to:

1. Examine the influence of school location on the academic performance of secondary school students in science subjects.
2. Assess the impact of teacher quality on students' academic performance in science subjects.

Research Hypotheses

The study is guided by the following hypotheses:

1. There is no significant relationship between school location and students' academic performance in science subjects.
2. There is no significant relationship between teacher quality and students' academic performance in science subjects.

Methodology

This study adopted a descriptive survey research design and an ex-post-facto design. The sample comprised 1,648 students' WASSCE results and 80 science teachers. A simple random sampling technique was used to select two Local Government Areas from the six within each educational district. Stratified random sampling was employed to select one public and one private school from each chosen Local Government Area.

Two instruments were used for data collection: the Location and Teacher Quality Questionnaire for Teachers (LTQQT) and the Two-Year Examination Result Template (TYERT). The LTQQT included demographic information and 30 items evaluating the impact of school location and teacher quality on students' academic performance, scored on a binary Yes (2 points) or No (1 point) scale. TYERT was used to collect WASSCE results from 2021 and 2022.

The validity of LTQQT was established through expert review by experienced science educators and measurement specialists. Reliability was determined using the test-retest method, yielding a Pearson correlation coefficient of 0.72. The WASSCE results, as standardized assessments, required no additional reliability testing.

Results

Hypothesis 1: There is no significant difference in the academic performance in Science subjects of students in urban and rural schools.

Table 1: T-test showing school location and academic performance

School location	N	Mean	SD	Df	T_{cal}	T_{table}
Rural	4	1.9610	0.70356			
Urban	8	2.6073	0.47402	10	1.909	2.228

p>0.05

Table 1 shows that t_{cal} (1.909) is less than t_{table} (2.228) at 0.05 level of significance. The null hypothesis is accepted. This implies that there is no significant difference in the academic performance of students in science in urban and rural schools. Hence, location was not a determinant of academic performance of students in science subjects.

Hypothesis 2: There is no significant relationship between teachers' qualities and students' academic performance in science subjects.

Table 2: Pearson's product moment correlation of teachers' qualities and students' academic performance in science subjects

Variables	N	r_{cal}	r_{table}
Teachers' qualities	12		
Academic performance	12	*0.679*	0.532*

p>0.05

Since r-cal (0.679) exceeds r-table (0.532) at $p < 0.05$, the null hypothesis is rejected, indicating a significant positive relationship between teacher quality and students' academic performance.

Discussion of Findings

The findings of this study indicate that there is no statistically significant relationship between school location and students' academic performance in science subjects. This result contrasts with the findings of Lawani (2004), who reported that students in urban schools performed better than those in rural schools. Macroff (1992) argued that rural schools often lack essential amenities and face challenges such as high dropout rates, inadequate financial and human resources, and a shortage of qualified teachers with the necessary professional skills and pedagogical competence. According to Macroff, these factors negatively impact students' academic performance in rural areas. However, studies by Owoeye (2010), Bankole (2013), and Foms & Chena (2005) presented a differing perspective, indicating that students in rural schools can perform at par with their urban counterparts. These studies, in line with the present findings, suggest that school location is not a determinant of academic achievement.

Conversely, the results of this study reveal a significant relationship between teacher quality and students' academic performance in science subjects. This finding aligns with Aghyeneku (2008), who emphasized that students' success in science subjects is largely dependent on teacher-related factors such as temperament, class management skills, subject mastery, qualifications, self-esteem, assertiveness, and instructional competence. Aghyeneku further highlighted that poor academic performance in science subjects could be attributed to factors such as deficiencies in science curricula, ineffective teaching methodologies, inadequate parental support, government policies, and a lack of adequate science facilities. Additionally, Jegede and Seweje (2005) stressed that effective teaching is not solely determined by a teacher's academic background but also by their

pedagogical expertise and ability to engage students in meaningful learning. The study's findings reaffirm the crucial role of teacher quality in shaping students' academic outcomes.

Conclusion

Based on the findings, it is concluded that school location—whether urban or rural—does not significantly influence students' academic performance in science subjects. However, teacher quality plays a pivotal role in determining student success. Therefore, it is essential to invest in continuous teacher training, professional development programs, and pedagogical enhancement initiatives to improve instructional effectiveness and optimize learning outcomes in science education.

Recommendations

1. Schools should provide conducive learning environments to enhance teaching and learning effectiveness.
2. Schools should be strategically located in areas free from distractions such as noise and pollution.
3. Professionally trained teachers should be employed to teach science subjects.
4. Teachers should participate in professional development programs, including seminars, conferences, and workshops, to enhance their instructional effectiveness.

By implementing these recommendations, stakeholders in the education sector can improve students' academic performance in science subjects, fostering a stronger foundation for scientific literacy and innovation.

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