



School Environment and Senior Secondary School Students' Academic Performance in Biology in Obio-Akpor LGA, Rivers State, Nigeria

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Abstract

This study examined school environment and senior secondary school student's academic performance in Biology in Obio/Akpor Local Government Area of Rivers States. The study adopted the correlational research design. Three research questions and three null hypotheses guided the study. The population of the study comprised 10,259 students. The sample of the study consisted of 400 students drawn through simple random sampling technique. The instruments for data collection was designed by the researcher and titled: "School Environment Questionnaire (SEQ)" and "Biology Performance Test (BPT)". The instruments were validated by experts and the reliability coefficient ascertained. The (SEQ) yielded a coefficient of 0.79 while the (BPT) yielded a coefficient of 0.81. Pearson Product Moment Correlation was used to answer the research questions and test null hypotheses at 0.05 level of significance. The findings of the study showed that: There is a high positive relationship between teachers' characteristics and academic performance of students in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State, there is a positive moderate relationship between school facilities and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State, there is significant relationship between school facilities and students' academic performance in Biology in public senior secondary schools in the area. Based on the findings of the study, it was recommended amongst others that: Facilities should be provided in senior secondary schools in Rivers State.

Keywords: School environment, students, academic performance, Biology.

Introduction

Education is widely recognized as a vital tool for national development and individual advancement. It equips learners with knowledge, skills, and competencies necessary for effective participation in society. In Nigeria, secondary education plays a crucial role in preparing students for higher education and the world of work, particularly in science subjects such as Biology, which is fundamental to careers in medicine, agriculture, and environmental sciences (Elujekwute et al., 2021). Academic performance, especially in science subjects like Biology, has become a major concern among educators, policymakers, and stakeholders in Nigeria. Reports have consistently shown that students' performance in Biology at the senior secondary level is relatively low, thereby affecting their progression into science-related fields. This persistent poor performance has prompted researchers to investigate various factors responsible for students' academic outcomes (Akpan, 2020). One of the key factors influencing students' academic performance is the school environment. The school environment refers to the physical, social, and psychological conditions within which teaching and learning take place. It includes classroom conditions, availability of instructional materials, teacher-student relationships, peer interactions, and overall school climate (Okoi et al., 2022).

A conducive school environment is essential for effective learning, as it provides the necessary facilities and atmosphere that enhance students' concentration, motivation, and academic engagement. Conversely, a poor or

unconducive school environment can hinder learning and reduce students' academic performance. This highlights the importance of examining how school environmental factors influence students' achievement in Biology (Okoi et al., 2022). The physical components of the school environment, such as classrooms, laboratories, libraries, and instructional materials, play a significant role in students' academic performance. In the context of Biology, well-equipped laboratories and adequate teaching aids are particularly important for practical learning and understanding of scientific concepts. Studies have shown that inadequate facilities negatively affect students' academic performance (Akpan, 2020).

In addition to physical facilities, the social environment within the school also influences academic performance. Peer relationships, teacher attitudes, and school discipline contribute to shaping students' learning experiences. A supportive and interactive social environment fosters collaboration, enhances motivation, and promotes better academic outcomes among students (Ohia, 2018). Another important aspect of the school environment is class size. Overcrowded classrooms can limit teacher-student interaction, reduce individual attention, and hinder effective teaching and learning. Studies have indicated that smaller class sizes tend to improve students' academic performance, while larger class sizes negatively impact learning outcomes (Akpan, 2020).

School location is also a significant factor influencing academic performance. Schools located in urban areas often have better facilities, access to qualified teachers, and improved learning environments compared to those in rural areas. This disparity can lead to differences in academic performance among students in different locations (Akpan, 2020). Furthermore, the cleanliness, safety, and overall condition of the school environment play a vital role in students' learning. A clean and secure environment enhances students' comfort and reduces distractions, thereby improving their academic performance. Research has shown that environmental factors such as school safety and hygiene significantly influence students' academic achievement in Biology. Teacher-related factors within the school environment, such as teaching methods, attitude, and competence, also affect students' academic performance. Effective teaching strategies and positive teacher attitudes can motivate students and enhance their understanding of Biology concepts, while poor teaching practices can hinder learning (Ohia, 2018).

The psychological environment of the school, including students' sense of belonging, motivation, and emotional support, is equally important. A positive psychological environment encourages active participation in learning and improves academic performance, while a negative environment can lead to anxiety, low self-esteem, and poor academic outcomes. In Nigeria, efforts have been made by the government and educational stakeholders to improve the quality of education through the provision of facilities, recruitment of qualified teachers, and implementation of educational policies. Despite these efforts, challenges such as inadequate infrastructure, poor funding, and overcrowded classrooms persist in many public secondary schools. Specifically, in Rivers State and Obio/Akpor Local Government Area, variations exist in the quality of school environments across different schools. While some schools are well-equipped and conducive for learning, others lack basic facilities necessary for effective teaching and learning of Biology. These disparities may contribute to differences in students' academic performance (Akpan, 2020).

Biology, as a science subject, requires both theoretical understanding and practical application. Therefore, the availability of laboratories, instructional materials, and qualified teachers is crucial for effective teaching and learning. Where these resources are lacking, students may find it difficult to grasp biological concepts, leading to poor academic performance (Nwachukwu et al., 2024). Moreover, the interaction between students and their environment plays a critical role in learning. Biology, being closely related to the natural environment, requires students to engage actively with their surroundings. A stimulating school environment can enhance students' curiosity and interest in the subject, thereby improving their academic performance.

The issue of poor academic performance in Biology has become a national concern, as it affects students' ability to pursue science-related careers and contributes to the shortage of skilled professionals in scientific fields. This situation underscores the need to examine the factors influencing students' academic performance, particularly the role of the school environment (Akpan, 2020). Given the importance of the school environment in shaping students' academic outcomes, it is necessary to investigate how various environmental factors influence the performance of senior secondary school students in Biology. Such an investigation will provide insights into the challenges faced by students and help in developing strategies to improve academic performance (Elujekwute et al., 2021). Therefore, this study seeks to examine the relationship between school environment and senior secondary school students' academic performance in Biology in Obio/Akpor Local Government Area of Rivers State. The findings of this study are

expected to contribute to improving teaching and learning conditions and enhancing students' academic achievement in Biology.

Teachers' characteristics refer to the personal, professional, and pedagogical qualities possessed by teachers that influence the teaching and learning process. These characteristics include academic qualification, teaching experience, subject mastery, teaching methods, attitude to work, and classroom management skills. In the teaching of Biology, teachers play a central role in translating curriculum objectives into meaningful learning experiences for students (Akuche et al., 2021). Research has shown that teachers' characteristics significantly influence students' academic performance in Biology. For instance, a study conducted in Nigeria revealed that teacher-related variables such as qualification, years of experience, and instructional competence have a strong impact on students' academic achievement in Biology. Qualified and experienced teachers are better equipped to present complex biological concepts in a simplified manner, thereby enhancing students' understanding and retention.

Furthermore, teachers' subject mastery is a critical determinant of effective teaching. Teachers who possess in-depth knowledge of Biology are more confident in lesson delivery and can effectively engage students during practical and theoretical lessons. Studies have also shown that teachers' academic qualifications and professional training significantly contribute to improved student performance in Biology. In addition, teachers' pedagogical skills, including the use of appropriate teaching methods and strategies, play an important role in students' learning outcomes. Effective teachers employ learner-centred approaches such as demonstrations, experiments, and interactive discussions, which enhance students' engagement and academic performance. Teacher self-efficacy has also been identified as a strong predictor of students' learning outcomes, as confident teachers are more likely to adopt innovative teaching strategies.

School facilities refer to the physical infrastructure and resources available in a school to support teaching and learning. These include classrooms, laboratories, libraries, furniture, water supply, electricity, and sanitation facilities. In Biology education, well-equipped laboratories and conducive classrooms are particularly important for effective teaching and learning. The availability and adequacy of school facilities have a direct impact on students' academic performance. Studies have shown that students in schools with adequate facilities perform better academically than those in poorly equipped schools. This is because a conducive learning environment enhances students' concentration, motivation, and participation in classroom activities (Okoi et al., 2022).

Biology, as a practical-oriented subject, requires laboratories for experiments and demonstrations. Schools that lack functional laboratories deprive students of hands-on experiences, making it difficult for them to understand abstract biological concepts. Research has indicated that inadequate laboratory facilities significantly contribute to poor performance in Biology among secondary school students (Nwachukwu et al., 2024). In addition, classroom conditions such as ventilation, lighting, seating arrangement, and class size influence students' learning. Overcrowded and poorly ventilated classrooms can cause discomfort and reduce students' attention span, thereby affecting their academic performance. On the other hand, well-structured and comfortable classrooms create a conducive atmosphere for effective learning.

Instructional materials are the tools and resources used by teachers to facilitate teaching and enhance students' understanding of subject matter. These include textbooks, charts, models, specimens, audio-visual aids, and laboratory equipment. In Biology, instructional materials are essential for illustrating concepts and making learning more concrete and meaningful. The use of instructional materials has been found to significantly improve students' academic performance. When teachers use appropriate teaching aids, students are better able to understand and retain information. Instructional materials help to simplify complex biological processes and make learning more interesting and interactive.

Research indicates that the availability and utilization of instructional materials positively influence students' academic performance in Biology. For example, studies have shown that students taught with instructional materials perform better than those taught without them (Abidoye et al., 2022). This is because instructional materials enhance students' engagement and promote active learning. Furthermore, instructional materials support different learning styles among students. While some students learn better through visual aids, others benefit from hands-on activities or auditory explanations. The use of diverse instructional materials ensures that the needs of different learners are met, thereby improving overall academic performance.

In addition, the integration of modern instructional technologies such as multimedia and digital tools has further enhanced the teaching and learning of Biology. These technologies provide interactive learning experiences that improve students' understanding and retention of biological concepts. However, the lack of instructional materials in many schools remains a major challenge. Inadequate teaching aids limit the effectiveness of instruction and contribute to poor academic performance. Therefore, the provision and proper utilization of instructional materials are essential for improving students' achievement in Biology.

Students' academic performance in Biology refers to the level of achievement attained by students in the subject, usually measured through tests, examinations, and continuous assessments. It reflects students' understanding of biological concepts, ability to apply knowledge, and overall learning outcomes. Academic performance in Biology has been a major concern in Nigeria due to the persistent poor results recorded in external examinations. Several studies have highlighted that many students struggle with understanding key biological concepts, which affects their performance and limits their opportunities for science-related careers (Akpan, 2020).

Various factors influence students' academic performance in Biology, including teacher-related factors, school environment, availability of resources, and students' attitudes towards learning. Among these, the role of the teacher is particularly significant, as effective teaching enhances students' understanding and performance in the subject. In addition, students' motivation, interest, and study habits play a crucial role in determining their academic performance. Students who are motivated and actively engaged in learning are more likely to perform better than those who are not interested in the subject. A supportive school environment also contributes to improved academic outcomes. Furthermore, the use of practical approaches in teaching Biology has been shown to improve students' performance. Practical lessons enable students to observe and experiment, thereby enhancing their understanding of biological concepts. Schools that emphasize practical learning tend to record better academic performance in Biology.

Despite these factors, many students continue to perform poorly due to challenges such as inadequate facilities, lack of instructional materials, and ineffective teaching methods. This underscores the need for continuous improvement in teaching practices and learning environments to enhance students' academic performance in Biology.

Methodology

This study adopted a correlational design. The population of the study consisted of 10,259 senior secondary school students in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. A simple random sampling technique was used to select the sample for the study. The sample of the study consisted of 400 students. The researcher made use of two instruments in collecting data for the study. One of the instruments for data collection in the study was a self-designed questionnaire titled: "School Environment Questionnaire (SEQ)". The School Environment Questionnaire (SEQ) is segmented into three sub-scales viz: Teacher Characteristics Scale, School Facilities Scale (SFS), and Instructional Materials Scale (IMS). Also, the (SEQ) was patterned alongside the revised or modified Likert scale. The responses and the weights were as follows: Very High Extent (VHE) = 4, High Extent (HE) = 3, Low Extent (LE) = 2, Very Low Extent (VLE) = 1. In addition, Biology Performance Test (BPT) was used to determine the Academic Performance of the Senior Public Secondary School Students. The (SEQ) was validated by three experts. Two experts were Guidance Counsellors, while one of the experts was a Measurement and Evaluation expert. The Biology Achievement Test (BAT) was validated by one expert in Biology Education. The reliability of the (SEQ) was determined using Cronbach alpha reliability technique, while the reliability of the Biology Achievement Test (BAT) was determined using Kuder-Richardson21 (K-R21). The (SEQ) yielded a coefficient of 0.79, while the (BPT) yielded a coefficient of 0.81. The School Environment Questionnaire (SEQ) and Biology Achievement Test (BAT) were administered with the permission of the principals of the schools whose students were sampled for the study. In addition, copies of the instruments were administered with the assistance of 2 research assistants. The School Environment Questionnaire (SEQ) and the Biology Achievement Test (BAT) were administered in the same way to the students. The instruments were also retrieved immediately to avoid the loss of instruments. However, out of the 400 copies of the instrument administered, 391 copies were retrieved, which were used for data analysis. Pearson Product Moment Correlation Method was used to answer the research questions and test the null hypotheses at 0.05 level of significance.

Results

Table 1: Relationship between teachers' characteristics and students' academic performance in Biology
Correlations

		Teachers' Characteristics	Students Academic Performance
Teachers' Characteristics	Pearson Correlation	1	0.61**
	Sig. (2-tailed)		0.61
	N	391	391
Students Academic Performance	Pearson Correlation	0.61**	1
	Sig. (2-tailed)	0.021	
	N	391	391

** . Correlation is significant at the 0.05 level (2-tailed).

Results in Table 1 show the relationship between teachers' characteristics and students' academic performance in senior secondary schools in Obio/Akpor Local Government Area of Rivers State. This result indicates that there is a strong positive relationship between teachers' characteristics and academic performance in Biology in public senior secondary schools in the area. This result shows that as scores on teachers' characteristics increase, there is also a corresponding increase in the scores on students' academic performance in Biology. Again, the result in Table 1 reveals that the relationship between teachers' characteristics and students' academic performance in Biology among senior secondary school students in Obio/Akpor Local Government Area of Rivers State is significant at the 0.05 level of probability. This is due to the fact that the p-value (0.021) is less than the level of significance (0.05). This means that the null hypothesis is rejected while the alternative hypothesis is accepted. The result of this null hypothesis is that there is a significant relationship between teachers' characteristics and the academic performance of senior secondary school students in Obio/Akpor Local Government Area of Rivers State.

Table 2: Relationship between school facilities and students' academic performance in Biology
Correlations

		School Facilities	Students Academic Performance
School Facilities	Pearson Correlation	1	0.58**
	Sig. (2-tailed)		0.037
	N	391	391
Students Academic Performance	Pearson Correlation	0.58**	1
	Sig. (2-tailed)	0.037	
	N	391	391

** . Correlation is significant at the 0.05 level (2-tailed).

Result in Table 2 shows that the relationship between school facilities and students academic performance in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. This result indicates that there is a positive moderate relationship between school facilities and students academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area. This result reveals that as scores on school facilities increases, there is also an increase in the scores on students' academic performance in Biology. Also, result in Table 2 shows that the relationship between school facilities and students academic performance in Biology in Obio/Akpor Local Government Area of Rivers State is significant at 0.05 level of probability. This is due to the fact that the p-value (0.037) is less than the level of significance (0.05). This result shows that the null hypothesis is that there is significant relationship between school facilities and students' academic performance in Biology in public senior secondary schools in the area is rejected while the alternate hypothesis is accepted. The result of this null hypothesis is that there is significant relationship between school facilities and students academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Table 3: Relationship between teachers' use of instructional materials and students' academic performance in Biology

		Correlations	
		Instructional Materials	Students Academic Performance
Instructional Materials	Pearson Correlation	1	0.64**
	Sig. (2-tailed)		0.19
	N	391	391
Students Academic Performance	Pearson Correlation	0.64**	1
	Sig. (2-tailed)	0.019	
	N	391	391

** . Correlation is significant at the 0.05 level (2-tailed).

Results in Table 3 show a positive, high relationship between teachers' use of instructional materials and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. The results indicate that as scores on teachers' use of instructional materials increase, there is also an increase in scores on students' academic performance in Biology. The results further reveal that the relationship between teachers' use of instructional materials and students' academic performance in Biology in Obio/Akpor Local Government Area of Rivers State is significant at the 0.05 level of probability. This is because the p-value (0.019) is less than the level of significance (0.05). These results show that the null hypothesis, which states that there is no significant relationship between teachers' use of instructional materials and students' academic performance in Biology in public senior secondary schools in the area, is rejected, while the alternative hypothesis is accepted. The result of this null hypothesis is that there is a significant relationship between teachers' use of instructional materials and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Discussion

The results of this study revealed a strong positive relationship between teachers' characteristics and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. This means that as scores on teachers' characteristics increase, there is a corresponding increase in students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. In other words, in public senior secondary schools where scores on teachers' characteristics are high, there is also an increase in students' performance in Biology. The degree of relationship between teachers' characteristics and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area was found to be 0.61. The coefficient of alienation was found to be 0.79. This represents the degree of lack of association between teachers' characteristics and students' academic performance in Biology in Obio/Akpor Local Government Area. Thus, while the degree of relationship between teachers' characteristics and students' academic performance in Biology in public senior secondary schools is 0.61, the degree of lack of relationship between teachers' characteristics and students' academic performance in Biology in public senior secondary schools is 0.79. However, the results of the study revealed a significant relationship between teachers' characteristics and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Teachers characteristics such as mastery of subject, effective communication of subject matter, healthy teacher-student relationship, knowledge of evaluation, use of instructional materials, teachers interest in the success of students etc., correlates positively with students academic performance. This result is in agreement with Akuche et al. (2021) relates significantly between teachers' characteristics and students' academic performance in Kenya.

The results of this study revealed a moderate positive relationship between school facilities and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. This means that as scores on school facilities increase, there is a corresponding increase in students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. In other words, in public senior secondary schools where scores on school facilities are high, there is also an increase in students' performance in Biology. The degree of relationship between school facilities and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area was found to be

0.58. The coefficient of alienation was found to be 0.81. This represents the degree of lack of association between school facilities and students' academic performance in Biology in Obio/Akpor Local Government Area. Thus, while the degree of relationship between school facilities and students' academic performance in Biology in public senior secondary schools is 0.58, the degree of lack of relationship between school facilities and students' academic performance in Biology in public senior secondary schools is 0.81. However, the results of the study revealed a significant relationship between school facilities and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. School facilities in this study refer to laboratories, health facilities, lighting, workshops, library, and furniture (such as desks and tables). Availability and use of these school facilities will correlate positively with academic performance among students in secondary schools. This result is in agreement with Nwachukwu et al. (2024), who reported a significant relationship between school facilities and students' academic achievement.

The results of this study indicated that there is a strong positive relationship between teachers' use of instructional materials and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. This means that in schools where the use of instructional materials increases, there is a corresponding increase in students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. The degree of relationship between instructional materials and students' academic performance in public senior secondary schools in Obio/Akpor Local Government Area was found to be 0.64. The coefficient of alienation was found to be 0.77. This represents the degree of lack of association between teachers' use of instructional materials and students' academic performance in Biology in public senior secondary schools. This shows that while the coefficient of relationship is 0.64, the degree of lack of relationship between the two variables is 0.77. However, the results of the study revealed a significant relationship between teachers' use of instructional materials and students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Effective use of instructional materials by the teacher helps aid students with understanding of the lesson, makes the lesson clearer, stimulates students' interest in the lesson and aid retention. It is therefore not surprising that it correlates significantly with students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State. This result is in agreement with Abidoye et al. (2022) that effective use of instructional materials by teachers significantly relates to students' academic performance in economics.

Conclusion

The environment where teaching and learning takes place is expected to be stimulating, a good learning or school environment is a motivation to both teachers and the students. School environment may include teachers' characteristics, school facilities and instructional materials. Active interaction with the environment is regarded as the most basic requirement for proper intellectual development of students. In addition to the availability of these learning facilities, there is need for good maintenance of these facilities. The study therefore have established that teachers' characteristics, school facilities, and teachers' use of instructional facilities significantly correlate with students' academic performance in Biology in public senior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Recommendations

Based on the results of the study, the researcher recommended as follows:

1. Facilities should be provided in senior secondary schools in Rivers State.
2. Qualified teachers should be employed in public senior secondary schools as teachers' characteristics correlates positively with students' academic performance.
3. Teachers should be trained on how to improvise instructional materials for teaching and learning.
4. The utilization and maintenance of school facilities as well as effective teaching and learning should be well supervised government agencies.

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