p-ISSN: 2184-044X e-ISSN: 2184-1489 ISBN: 978-989-35106-4-3 © 2023
https://doi.org/10.36315/2023v2end140

STUDENTS PERCEPTIONS ABOUT THE INFLUENCE OF SCHOOL ENVIRONMENT ON THEIR ACADEMIC PERFORMANCE IN PHYSICS

Ayodele Abosede Ogegbo
Department of Science and Technology Education, University of Johannesburg (South Africa)

Abstract

This study aimed to determine students' perceptions of related school environment factors and their influence on their performance in science at the school level. Data were collected from over 400 high school students from 5 secondary schools in a local education district in Nigeria. Correlation and descriptive analyses were the primary means of data analysis. The findings from the study showed that students perceived their parents' attendance at school to check on their progress as more influential on their academic performance in physics (M=2.85, SD=1.673). In addition, students considered their physics teacher's frequent connection of what they are learning to real-world experiences outside of the classroom (M=2.77, SD=1.469), provision of instructional material and resources to aid physics lessons (M=2.74, SD=1.496), physics teacher giving individual attention and extra help to students when they need it (M=2.60, SD=1.180) and students unlimited access to the school library (M=2.55, SD=0.632) as important predictors of school climate factors influencing their academic achievement in physics. In addition, a statistically significant correlation exists between students' perceptions of their school environment and achievement in physics. Implications for educational stakeholders are discussed.

Keywords: *Achievement, attitude, perceptions, science, high school students.*

1. Introduction

Physics has played a critical role in developing almost all other scientific disciplines, and every type of technology employs scientific principles related to physics. Despite the significance of physics, several factors affect students' performance in the subject. For instance, Masood (2014) argued that one of the most significant challenges causing a decline in physics performance among students is a need for more motivation. The American Association of Physics Teachers (AAPT, 2013) reports that students' performance and enrolment in physics have declined over a long period, most likely due to the subject's abstract nature. A study conducted by Erinosho (2013) in Nigeria reveals that students need help understanding specific topics in the physics curriculum that are usually characterized as lacking concrete examples and requiring a lot of mathematical manipulations or visualization, thus lowering their performance in the subject. Students' performance in physics has also been attributed to their negative attitudes toward the subject and their perception of the subject being overly mathematically focused, extensive, and heavily reliant on textbooks (Masood, 2014; Tesfaye & White, 2012). The poor performance and low enrolment in physics are also attributed to a nation's social and cultural foundation, where most students perceive physics as a difficult subject that requires extra time and hard work to understand (Masood, 2014). Mbamara and Eya (2015) claimed that most students in Nigeria do not enrol in physics at the university level because very few of them offered physics in secondary school, and the best of them end up enrolling in courses like medicine, engineering, and other lucrative courses at the tertiary level. This makes it difficult to find qualified university graduates to teach physics.

Aside from student factors causing poor physics performance, the decline in student enrollment and poor physics performance has also been attributed to the complex interaction of several factors, including historical, systematic, social, educational, political, and environmental characteristics (Tesfaye & White, 2012). One of the environmental factors associated with student performance that has recently received much attention in the literature is school climate. The National School Climate Centre (NSCC, 2021) describes school climate as the standard and personality of school life. School climate reflects the expectations, standards, motivations, values, interpersonal relationships, training, cultures, safety practices, learning, leadership practices, and organizational structures that are a part of an educational organization (Ramelow et al., 2015). As a result, a school environment is a link that connects many activities on the school premises together. Even though the thread is invisible, its influence is felt by everyone. The significance of school climate in science teaching and learning is also reflected in large-scale international studies like the Programme for International Student Assessment (PISA) and Trends in

International Mathematics and Science Study (TIMSS). According to PISA (OECD, 2016), the school learning environment includes many factors that can affect students' academic performance, such as disciplinary climate, student truancy, teacher support to students, legislation, school efforts to involve parents, parental involvement in school activities, curricular, instructional, professional and teachers' participation, as well as teacher and student behaviours that impede learning. Recent research indicates that a positive school climate can improve students' academic success, health, and well-being (Thapa et al., 2013). Furthermore, a positive school climate acts as a protective barrier against the impacts of poverty or adverse socioeconomic conditions on academic achievement (Dimitrova et al., 2018). It has been demonstrated that a supportive school environment correlates with decent behaviour, school satisfaction, and motivation to learn (Adolphus et al., 2021; Elsaesser et al., 2013). The progress of students and the learning required for a more fruitful, satisfying, and active life in a democratic society are encouraged by a positive school climate (NSCC, 2021). On the other hand, a negative school climate has been discovered to lower student learning and participation in school activities (Adolphus et al., 2021; Surayanah & Karma, 2018).

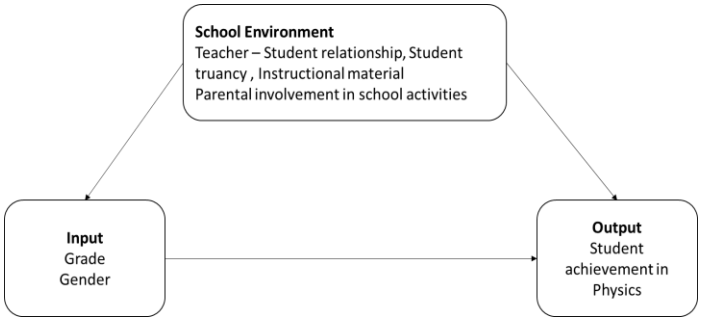
Various aspects of school climate have been found to significantly impact teaching and learning, influencing students' motivation and academic performance. Academic emphasis (Mullis et al., 2012), academic optimism (Beard et al., 2009), instructional management (Surayanah & Karma, 2018), and strong student-teacher relationships have all been found to be particularly influential. Longobardi et al. (2016) argued that student-teacher relationships serve as an effective protective factor for the teaching and learning process, including academic achievement as well as conduct and behavioural issues, particularly for students transitioning from middle school to high school. The important dynamic interaction between teacher and student and interaction between students is also included in instructional management. According to Surayanah and Karma (2018), poor instructional management leads students to lose focus, fail to pay attention and fail to complete assignments. This suggests that when teaching is supported by an encouraging, productive, and creative learning environment, the achievement will be impacted and improved, and positive social relationships will be subtly fostered. Given that school climate is regarded as a powerful moderator of student learning, interest in how it affects learning continues to grow. Most research on science teaching and learning in Nigerian classrooms has focused on students' physics problems in terms of conceptual difficulties, attitude, misconceptions, interest, teacher preparation, and quality. Even though school climate significantly impacts students' academic performance, there is little empirical research available for the Nigerian context on how school climate affects science teaching and learning, particularly in the area of physics. Hence this study addresses the following research question:

- What is the perception of students on the influence of school climate-related factors on their academic performance in physics?
- Is there a relationship between students' perceptions of the school environment and their performance in physics?

2. Conceptual framework

This study used the Input-Environment-Output (I-E-O) model developed by Astin and Lising (2012) as a conceptual framework to investigate the relationship between students' school experiences (environment) and academic performance in physics (output). The I-E-O model was designed to assess the impact of environment (or school-level) variables on students' output while controlling for individual characteristics (input) such as grade or gender (Figure 1). According to Astin, the outputs (O) are the student's cognitive or affective gains as a result of being exposed to the educational environment (Astin & Lising, 2012). Following Astin's model, the output variable chosen for this study is students' physics achievement, while the environmental variables chosen are -student relationship, student truancy, instructional material, and parental involvement in school activities. However, the input variables were not considered in this study.

Figure 1. Conceptual Framework.



3. Methodology

The research employed a descriptive survey research design. The choice of the design was based on the kind of data solicited from the students. Data was collected through a structured questionnaire from over 400 high school students from 5 secondary schools in a local education district in Southwest Nigeria. The questionnaire was created based on a review of the literature and instruments used to assess school climate. The questionnaire consisted primarily of closed-ended items on a four-point Likert scale ranging from strongly agree =4, agree =3, disagree =2 and strongly disagree = 1. The questionnaire was pre-tested to ensure the instruments' dependability. This allowed the study to clarify all ambiguous questions and identify potential challenges that may arise during the actual exercise and how to address them. The reliability coefficient was determined to be $\alpha = .83$. The questionnaire was validated by a panel consisting of a lecturer who is an expert in the field, a statistician, and two science teachers. Some items were reworded, and others were deleted in response to expert feedback. The questionnaires were distributed to the target students at the end of the academic year with the assistance of their teachers to facilitate data collection from the schools. The initial target population was 450 students at 90 per school. However, only 400 responses were returned. The collected data was analysed using descriptive statistics such as mean and standard deviation. The benchmark was calculated by taking the mean values attached to the scale. The obtained benchmark value was 2.50, which served as the basis for accepting or rejecting the items in the questionnaire. As a result, any item with a mean less than 2.50 is considered low, while any item with a mean greater than or equal to 2.50 is considered high. This study used the average composite score of students' performance in physics based on their first and second-term scores. Table 1 depicts the order of sample collection.

Table 1. Order of Population and Sample of Students in the Schools.

		N	Frequency (%)
Age	**9 – 12 years**	**48**	**12**
	13 - 16	**250**	**64.3**
	17 - 20	**89**	**22.2**
	21 & above	**13**	**1.5**
Gender	**Male**	**197**	**49.3**
	Female	**203**	**50.7**
Class	**S.S.S.1**	**222**	**55.5**
	S.S.S.2	**178**	**45.5**
School	**A**	**80**	**20.0**
	B	**85**	**21.25**
	C	**78**	**19.5**
	D	**82**	**20.5**
	E	**75**	**18.75**

4. Results

Research question 1: What is the perception of students on the influence of school climate-related factors on their academic performance in physics?

Table 2 below presents responses to students' perceptions of related school climate factors influencing academic performance in physics, as measured by ten items. Results indicate that most students believe that their parents' attendance at school to check on their progress is an important predictor of their academic achievement in physics (M=2.85). This is followed by responses on my physics teacher frequently connects what we are learning to real-world experiences outside of the classroom (M=2.77); the provision of instructional material and resources to aid physics lessons was high (M=2.74); students can use the school library at any time at my school (M=2.55), and physics teacher providing feedback to help students learn (M=2.52). This implies that the students agreed to these assertions. On the other hand, results in Table 2 indicate that students disagree that the lack of respect for teachers at their school prevents teaching and learning, affecting their performance on physics exams(M=1.85). Furthermore, students' response to my physics teacher showing interest in every student's learning was rated low (M=2.20), implying that students do not believe that teachers showing a personal interest in students' learning affects academic performance in physics. Analysis of students' responses shows that the overall rating of their perception of school climate as a factor influencing academic performance in physics was at an acceptable mean value of 2.51.

Table 2. The extent to which students perceive related school environment factors as an influence on their performance in Physics.

S/N\	Statements How strongly do you agree or disagree with the following statements in relation to your academic achievement in physics?	SA N (%)	A N (%)	D N (%)	SD N (%)	Mean (X)	SD
1	My school provides instructional materials and resources that aid effective teaching and learning of physics lessons	140(35.0)	55(13.8)	164(41.0)	41(10.2)	2.74	1.496
2	My physics teacher shows an interest in every students learning	66(16.5)	73(18.3)	137(34.2)	124(31.0)	2.20	1.549
3	My physics teacher gives individual attention and extra help to students when they need it	108(27.0)	101(25.3)	117(29.2)	74(18.5)	2.60	1.180
4	My physics teacher gives students an opportunity to express their opinions	55(13.7)	140(35.0)	156(39.5)	47(11.8)	2.49	0.400
5	My physics teacher often connects what we are learning to real life experiences outside the classroom	116 (29.0)	142 (35.5)	76 (19.0)	66 (16.5)	2.77	1.469
6	My physics teacher gives us feedback that helps us learn	94 (23.5)	121 (30.3)	83 (20.7)	102 (25.5)	2.52	0.400
7	In my school, students can get access to the school library at any time to access physics materials	75 (18.8)	163 (40.7)	67(16.7)	95 (23.8)	2.55	0.632
8	My parents always come to school to follow up on my studies and it contributes to my performance in physics	133 (33.3)	142 (35.5)	58 (14.5)	67 (16.7)	2.85	1.673
9	Students in my school have respects for teachers which contributes to good environment for learning physics	36(9.0)	40(10.0)	153(38.3)	171(42.7)	1.85	2.290
10	In my school, teachers, administrators, staff, students and parents listen to one other, resulting in a good environment for learning.	74 (18.5)	117 (29.3)	108 (27.0)	101 (25.2)	2.41	0.849

N = 400 (100%)

Research question 2: Is there a relationship between students' perception of the school environment and academic performance?

The results in Table 3 show the relationship between students' perception of the school environment and their academic performance in physics. The table shows a significant relationship between students' perception of their school environment and academic performance in physics with a correlation coefficient and significant value of r =.840, p = 0.019 > 0.05 level. This implies a strong positive relationship between students' perceptions of related school environment factors and their influence on academic performance in physics. This implies that if the learning environment is hostile or unhealthy, it may negatively influence students' performance in physics.

Table 3. Correlation between Students' perception of the school environment and academic performance.

Variable		Academic performance
Students' perceptions of the school environment	Pearson correlation Sig. (2-tailed) N	0.840* 0.019 400

5. Discussion and conclusion

The findings of this study show that school climate significantly impacts students' academic performance in physics. More importantly, certain aspects of school climate have a greater direct and significant impact on students' physics performance than others. For instance, most of the students rated their parents' regular attendance at school to monitor their progress, availability of instructional materials and resources to support physics lessons, physics teacher giving each student individualized attention and extra assistance when needed, teacher giving feedback to students and students' unrestricted use of the school library as important predictors of school climate factors influencing their academic performance in physics. The findings of the study on students' opinions about the provision of resources influencing academic performance correspond with the findings of a study by Adolphus et al. (2021), who found that students expressed concern about inadequate infrastructure, which could impede effective teaching and learning of physics. Duze and Ogbah (2013) argue that when teachers provide adequate support to students

in their studies, it fosters a cordial, friendly environment among students, making them happy with their school life and positively influencing their academic achievement. Moreso, the importance of parents in fostering a positive learning environment for their children's academic success cannot be overstated. Parental involvement is strongly correlated with a child's academic success, and it may even help mitigate risk factors like living in a low-income neighbourhood and having a low socioeconomic status (OECD, 2016). The findings of this study can be used to inform policies that will lead to effective school projects that can be implemented more widely in public secondary schools throughout the state. Based on the findings of this study, school authorities should continue to encourage parents to actively engage with teachers about their children's education in order for them to understand their children's progress. Furthermore, school authorities and other educational stakeholders must work together to provide adequate learning facilities and resources, as well as to equip teachers with strategies for developing positive teacher-student relationships, which can help create a favourable school climate with the goal of improving student performance and could also serve as a technique in reducing high school dropout and students' low enrolment in science, particularly physics at the university.

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