

**ATTITUDE AS CORRELATES OF SENIOR SECONDARY SCHOOL
STUDENTS' ACADEMIC PERFORMANCE IN PHYSICS IN KOGI
STATE, NIGERIA**

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Abstract

This study investigated attitude as correlates of senior secondary school students' performance in physics in Kogi State, Nigeria. The design was correlational research design. The target population for the study comprised all the senior secondary two (SS 2) physics students in all the public co-educational secondary schools in Kogi State, Nigeria. The sample size was 386 physics students selected using the Yamane formula and the multistage sampling technique to determine the students from 18 secondary schools in each of the senatorial districts. The instruments used for data collection were Physics Attitude Rating Scale (PARS) and Physics Performance Test (PPT). The reliability coefficient of PARS was 0.88 and PPT was 0.81. Two research questions and two hypotheses guided the study. The research questions were answered using Pearson product moment correlation while regression analysis was used to test the hypothesis at 0.05 level of significance. The findings revealed a significant relationship between students' attitude and academic performance, students' attitude and academic performance based on gender in favour of the male students in physics. Based on the findings of the study, it was recommended among others that the school management and teachers should work towards the development of positive attitude, since students' attitude correlates positively with their academic performance in physics.

Keywords: Attitude, students, academic performance, physics.

Introduction

Science is a systematic body of knowledge that is concerned with the physical world and its phenomena and it entails unbiased observations and

systematic experimentation. Science is both a body of knowledge and a process; hence science is a systematic endeavour that creates and organizes information in the form of universe-related explanation and predictions that can be put to test (Achimugu, et al. 2023a). Science education is a field-dedicated to teaching and learning scientific concepts, principles and methodologies.

Physics as one of the natural sciences involve the study of matter, its fundamental constituents, its motion and behaviour through space and time, and the related entities of energies and forces. Among the sciences, physics is considered a fundamental subject because it equips learners with systematic thinking and provides the laws and theories necessary for the understanding of the working mechanism of the things man relies on for technological growth and development (Fasanya, et al. 2024). Despite the importance of physics, the school appears to have failed to meet the nation's expectations and realities especially in Science, Technology and Mathematics (STM) Education. Several studies, in Nigeria have revealed that students are not performing sufficiently in STEM subjects studied in school (Holmes et al. 2018; Kehdinge, 2019 & Abiodun, et al. 2023).

Often times, the teachers' factors such as the method of teaching and mastery of the subject area are considered as the reasons for students' poor academic performance in physics. Little or no consideration is given to the fact that students' attitude towards physics could influence his or her academic performance (Olagoke, 2016). Some studies have shown that attitude were the major reasons for low students' academic performance in physics (Sanja & Sanja, 2017; Oludipe, 2019; Ejiga & Shie, 2022 & Assem, et al. 2023). While others studies revealed that attitude were not the major reason for the students' low academic performance in physics (Mamuda & Peni, 2022 & Anierobi, 2021). That is why this study intends to examine students' attitudes as correlates of their academic performance in physics.

Attitude is the way in which a person views and evaluates something or someone, a predisposition or a tendency to respond positively or negatively towards certain idea, object, person or situation (Fasanya, et al. 2023). Attitude is the positive or negative feelings that an individual feels about objects and ideas (Achimugu, et al. 2023b). The word attitude is defined within the framework of social psychology as a subjective or mental preparation for action. The attitude of a learner towards Physics will determine the measures of the learners' attractiveness or repulsiveness to Physics (Wilcox & Lewandowski, 2016). In the study of physics, the attitude of inquiry, observation and reasoning is necessary rather than the memorization of facts or juggling formulae to get answers. Attitudes in science (physics) therefore mean a scientific approach assumed by an individual for solving, assessing ideas and making decision (Taangahar et al. 2017).

Academic performance is the progress made towards the goal of acquiring educational skills and knowledge usually spanning a variety of disciplines. Achimugu (2017) defined performance as the successful accomplishment or attainment of educational goals. It is typically measured by assessing students' grades, continuous assessments, class participation and overall classroom behaviour. The academic performance of students in physics in Nigeria has been a source of concern to researchers, educators, government, parents and stakeholders.

Gender as stated by Fasanya (2024) refers to the characteristics of men, women, boys, girls that are socially constructed. This includes norms, behaviours and roles associated with being a man, woman, boy or girl as well as relationship with each other. As a social construct, gender varies from society to society and can change over time (World Health Organization, [WHO] 2019). Gender difference in academic performance have engaged the attention of scholars for sometimes now (Morita, et al. 2017; Fasanya, 2024). Indeed, males in the past have had a higher enrolment in STEM subjects at the secondary school level of education compared to females, and their overall academic performance was rated higher than females (Kola & Taiwo, 2013; Ullah & Ullah, 2019; Awodun, 2021; Abu, 2021 & Amasuwa, et al. 2022). This situation often translated into employment opportunities for males in science and engineering professions (Maltese & Cooper, 2017). While another researcher found that female students outperformed the male students (Olusola, et al. 2020) Some studies revealed that there was no significant difference between the attitude of male and female students towards physics (Ajibade & Ajayi, 2015; Sakariyau, et al. (2016); & Ibrahim, et al. (2019)). While other researchers found significant difference between the attitude of male and female students in physics (Sanja & Sanja, 2017; Sri et al. (2017) & Abu, 2021).

The problem of unsatisfactory students' academic performance in physics has been a recurring issue in Nigeria (Fasanya, 2025). The records of students' academic performance in the (SSCE) physics as reported by West African Examination Council statistics section, 2013-2022 have shown a consistently average level of performance which was not above 55.54% mean score. This average level of performance will hinder students from gaining admission into the tertiary institutions to study courses related to STEM as physics is a prerequisite to study such courses. This will invariably reduce manpower in STEM fields. Research findings showed that there are multiple factors contributing to the low academic performance among students in physics (Capri, 2013). Though information on the relationship between attitude with academic performance is scanty, to the best of the researchers knowledge there is hardly any study that investigated this variable with academic performance in physics in Kogi State. The present study therefore seeks to examine the relationship between attitude as

correlates of senior secondary school students' academic performance in physics in Kogi State Nigeria. This study is anchored on Operant conditioning theory by B. F. Skinner in 1938.

Research Questions

The following research questions were generated to guide the study.

1. What is the relationship between students' attitude and their academic performance mean scores in physics?
2. What is the relationship between students' attitude and the academic performance mean scores of male and female in physics?

Hypotheses

The following hypotheses were formulated to guide the study.

1. There is no significant relationship between students' attitude and their academic performance mean scores in physics.
2. There is no significant relationship between students' attitude and the academic performance mean scores of male and female in physics.

Methodology

The design of this study was correlational research design. Correlational research design employs a special group of statistics known as correlation coefficient or regression analysis for data analysis (Achimugu et al. 2024). The population size for the study was 11,091 senior secondary two (SS2) physics students of public secondary school of Kogi State (Kogi State Science, Technical Education & Teaching Service Commission, [STETSCOM], 2024). The choice of using SS2 students was based on the fact that they mentally, emotionally and physically fit to respond to the instruments for data collection. In addition they were the next set of students to sit for the West African Examination Council (WAEC) and National Examinations Council (NECO) for 2025/2026 academic session. The sample size for the study is three hundred and eighty six (386) SS2 physics students. To achieve this, Yamane (1967) formula for determining sample size was used.

The instruments used for data collection were Physics Attitude Rating Scale (PARS) and Physics Performance Test (PPT). The items of the instruments were tried out on 30 students from a different school to determine the reliability of the instruments using Cronbach Alpha and Kuder Richardson 20 (K-R20) with reliability coefficients of 0.88 and 0.81 for PARS and PPT respectively. PARS towards physics are four point likerts scale. The PPT was constructed by the researcher basically on the topic motion. The PPT consisted of 30 items objective choice questions with option A-D with one correct option which attracted 3.3 marks, that students were required to complete within a designated timeframe. The researcher sought for the services of physics teachers in the sampled schools who helped to distribute and supervise the PARS and PPT. The respondents were adequately informed of the purpose of the research and the need to respond

objectively. The two research questions were answered using Pearson Product Moment Correlation coefficient while the hypothesis were tested at 0.05 level of significance using regression analysis.

Results

Research question 1

What is the relationship between students' attitude and their academic performance mean scores in physics?

Table 1: Pearson's Product Moment Correlation Analysis of Students' Attitude and their Academic Performance Mean Scores in Physics.

Variable	$\bar{x}$	SD	N	R	R^2
Students' Attitude	58.60	13.30	386	0.52	0.27
Academic Performance	49.16	13.80			

R^2 = coefficient of determination

Result on table 1 is the correlation coefficient of the relationship between students' attitude and their academic performance in physics. Results showed that the correlation between students' attitude and their academic performance in physics was 0.52. This means, there is a moderate positive relationship between students' attitude and their academic performance in physics. The coefficient of determination associated with 0.52 is 0.27. The coefficient of determination (0.27) also known as the predictive value, means that 27% of students' attitude accounted for the variation in academic performance in physics. This is an indication that 73% of variation in academic performance in physics of students is attributed to other factors other than attitude.

Hypothesis 1

H_{01} : there is no significant relationship between students' attitude and their academic performance mean scores in physics.

Table 2: Regression Analysis of the Relationship between Students' Attitude and their Academic Performance Mean Scores in Physics.

Model	sum of squares	DF	Mean Squares	F	Sig
Regression	19519.118	1	19519.118	139.335	0.000
Residual	53793.599	384	140.087		
Total	73312.718	385			

$\alpha = 0.05$

In order to test hypothesis 1 (H_{01}), regression analysis was used. The result in Table 2 shows that an F-ratio of 139.335 with associated exact probability value of 0.00 was obtained. This exact probability value of 0.00 is less than 0.05 level of significance set as bench mark and it was found to be significant. The null hypothesis which stated that there is no significant relationship between students' attitude and their academic performance in physics is therefore rejected and inference drawn is that, there is a significant relationship between students' attitude and their academic performance in physics. The findings of this study support the findings of other previous researchers such as Ajibade & Ajayi, 2015; Sakariyau, 2016; Mamuda & Peni, 2022, who found that academic performance correlate positively with attitude. By the virtue of this finding, this research has joined the school of thought that relates students' attitude significantly relate to students' academic performance.

Research Question 2

What is the relationship between students' attitude and academic performance mean scores in physics based on gender?

Table 3: Pearson Product Moment Correlation Analysis of the Relationship between Students' Attitude and Academic Performance Mean Score in Physics Based on Gender.

Variable	$\bar{x}$	SD	N	R	R^2
Male Students' Attitude	62.176	11.135	193	0.583	0.339
Male Academic Performance	50.912	11.046			
Female Student's Attitude	55.031	14.314	193	0.463	0.215
Female Academic Performance	47.415	15.928			
Difference in r				0.12	

R^2 = coefficient of determination

Results in table 3 provide answer to research question 2. Male students' responses on students' attitude and their academic performance in physics scores were correlated and the correlation coefficient obtained was 0.583 as shown on the table 3 above. This means that, there exists a direct positive relationship between male students' attitude and their academic performance in physics. The coefficient of determination associated with the correlation coefficient of 0.583 was 0.34. This coefficient of determination indicates that 34% of male students' attitude accounted for their variation in their academic performance in physics. This implies that 66% of variation in their academic performance in physics is attributed to other factors other than male students' attitude. Table 3 also indicates that female students' responses on students' attitude and academic performance in physics scores were correlated and the correlation coefficient obtained was 0.463.

This means that there exist a moderate and positive relationship between female students' attitude and their academic performance in physics. The coefficient of determination associated with the correlation coefficient of 0.463 was 0.22. This coefficient of determination indicates that 22% of female students' attitude accounted for the variation in their academic performance in physics. This implies that 78% of variation in their academic performance in physics is attributed to other factor other than female students' attitude. The difference in the relationship between students' attitude and their academic performance in physics based on gender is 0.12 in favour of the male students.

Hypothesis 2

Ho₂: There is no significant relationship between students' attitude and academic performance mean scores of male and female in physics.

Table 4: Regression Analysis of the Relationship between Students' Attitude and Academic Performance Mean Scores in Physics Based on Gender.

Model	sum of squares	DF	Mean Squares	F	Sig
Male Regression	7948.723	1	7948.723	98.121	0.000
Residual	15472.779	191	81.009		
Total	23421.503	192			
Female Regression	10458.662	1	10458.662	52.222	0.000
Residual	38252.177	191	200.273		
Total	48710.839	192			

$$\alpha = 0.05$$

Male attitude mean score: 62.176; Male performance mean score: 50.912

Female attitude mean score: 55.031; Female performance mean score: 47.416

To test hypothesis 2 (Ho₂), regression analysis was used. The results on Table 4 shows that an F-ratio of 98.121 with the exact probability value of 0.000 was obtained for male. Also F-ratio 52.222 with the exact probability value of 0.000 was obtained for female students. These exact probability value of 0.00 were less than 0.05 level of significance set as bench mark for testing the hypothesis and it was found significant. The null hypothesis which stated that there is no significant relationship between students' attitude and academic performance in physics based on gender was therefore rejected and the inference drawn was that, there is a significant relationship between students' attitude and academic performance in physics based on gender in favour of male students that had higher mean attitude score of 62.176 against the female students with attitude mean score of 55.031 this is because males in the past had a higher enrolment in

science subject at the secondary school level of education compared to females and the male academic performance was rated higher than the females (Kola & Taiwo, 2013; Ullah & Ullah, 2019 & Awodun, 2021). This finding corroborates the results of other researchers that claimed that male and female present different attitude towards physics with male students' performing better than female students in physics (Sri et al., 2017; Olusola et al., 2020 & Abuh, 2021).

Conclusion

Based on the investigation into attitude as correlates of senior secondary school students' academic performance in physics in Kogi State, Nigeria, it can be concluded that there is a significant relationship between students' attitude and their academic performance, also there is a significant relationship between attitude and academic performance in physics as male students reflected a better attitude compared to the female students' in physics, this was reflected in the male students' better academic performance in physics than the females.

Recommendations

Based on the findings of the study, the following recommendations were provided.

1. Students should be discouraged from forming negative attitude towards physics because of their sexes since academic performance is not a gender issue, both genders should be encouraged to excel in academic performance as equal opportunities are provided for both genders. This will boost competition between males and females and enhance academic performance and excellence.
2. Teachers and school management should work towards the development of positive attitude of the usefulness of physics by planning for the affective domain in their classroom. Operant conditioning is most effectively used in the classroom setting by using reinforcement to manage student' behaviour.
3. The school environment is a powerful agency of nurturing students to have positive attitude. The teachers should therefore engage the learners in both curricular and co-curricular activities to enhance their attitude. Teachers should guide and counsel students constantly to avoid a state of despair.
4. Counseling services should be provided in schools so that students having problems in academic performance can be attended to through the combined efforts of the school and home.
5. Parents should develop positive attitude in their children at the early stages of their lives. This can be best done at home which is the most important force in shaping and maintaining the child's attitude.
6. Attitude training workshops and seminars should be organized for physics teachers by the government.

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