

Original Research Article

WEST AFRICAN SCHOOL CERTIFICATE PHYSICS EXAMINATION ACHIEVEMENT AS PREDICTOR OF PHYSICS EDUCATION STUDENTS' GENDER CLASS OF DEGREE IN NORTH CENTRAL, NIGERIA

NA'ALLAH ABUBAKAR AHMED

Physics Department, School Of Science, College Of Education, Akwanga, Nigeria.

ORCID:  0009-0000-4421-9635

Correspondence should be addressed to: bukarni12@gmail.com

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Abstract: This study investigates the West African School Certificate Physics examination achievement as a predictor of Physics Education students' gender class of degree in North Central, Nigeria. Ex-post facto design was adopted for the study. The study population comprised 989 Physics Education graduates from universities who completed their programme from 2014/2015 to 2018/2019 sessions. Multistage sampling techniques were employed to sample 694 (442 Males and 252 Females) students. The Physics Entry Qualifications and Universities Degree Proforma (PEQUDP) was employed as an instrument for data collection, whose reliability index was 0.84, obtained using Cronbach's Alpha. The research questions were answered with Pearson Product-Moment Correlation, while the null hypotheses were tested with Regression analysis. The findings reveal that Male students' WASSCE Physics grades significantly predicted their class of degrees in Physics Education ($t=9.968$; $p=0.000$ $\alpha=0.05$); Female students' WASSCE Physics grades significantly predicted their class of degrees in Physics Education ($t=4.588$; $p=0.000$ $\alpha=0.05$). The study recommends that WASSCE Physics grades should serve as a criterion for admitting students into university programmes because they predict gender achievement; gender equality should be considered in students' enrolment to increase the number of female students to serve as role models.

Keywords: Achievement, Class of Degree, Gender, Predictor, Physics Education.

Introduction

Education is the key to the development of the individual and the nation. Science education has been recognized as the bedrock of scientific and technological advancement of a nation. The government has prioritized science education in order to empower individuals for socio-economic, political, scientific and technological development of its citizens and nation. Therefore, science education is regarded as a strategic tool for empowering citizens, especially the youth, to become proactive agents of change in all sectors of the economy (Okebukola, 2018).

Physics is one of the core science subjects taught in secondary schools. It is compulsory for science students to offer Physics in senior secondary school level. The relevance of Physics knowledge to the upliftment of students cannot be overemphasized. The knowledge of Physics has been found to have a lot of applications in everyday life. Physics concepts and principles have useful applications in medicine, astrophysics, energy development, instrumentation and electronics (Kim, 2025; Chabrier, 2025; Russo & Cirelli, 2025; Gong et al., 2025). Physics deals with the study of matter, energy and the inter-relationship between them at the microscopic and dynamic levels. Serway and Jewett (2025) defined Physics as the study of the fundamental principles governing natural phenomena that provides the understanding of matter, energy, space, time and how they interact. The general objectives of secondary school Physics, as outlined in the curriculum, require learners to acquire basic concepts and principles of Physics, technological application of Physics, and to acquire scientific skills (NERDC, 2020). These objectives are attainable through effective teaching and learning of Physics in secondary schools. Students' achievement in a subject is usually assessed in the teaching and learning process, while formal assessment is in the form of a terminal examination. The Organization for Economic Co-operation and Development (OECD, 2023) reported that students' learning outcomes are based on classroom assessment through instruction, whereas national or terminal assessments are standardized summative assessments that formally certify students' achievement and progression. At the end of the three-year programme, the West Africa Examination Council (WAEC) conducts the West Africa Secondary School Certificate Examination (WASSCE) in all subject areas. Students' performance in each subject is usually scored and graded by WAEC. Based on students' performance in the examination, the scores are graded as A1, B2, B3, C4, C5, C6, D7, E8 and F9. These grades are used for the purpose of selection, placement, and to gain admission into tertiary institutions to study various courses. Arencibia et al. (2024) opined that school grades are an important tool for measuring academic achievement because they are used to make important educational decisions regarding student progression, placement, and access to further education.

Physics education is one of the programmes offered in universities. It deals with the pedagogy of teaching and learning of Physics for pre-service Physics teachers. In order to study Physics education, the applicant must have a secondary school Physics background and secure the minimum requirement for admission. The minimum requirement for admission into the programme at the university is a credit level pass and a required cut-off

point of the Unified Tertiary Matriculation Examination (UTME). Joint Admission and Matriculation Board (2024) stated that the general requirement for admission into degree programmes is a minimum of five ordinary level credit passes in relevant subjects together with an acceptable Unified Tertiary Matriculation Examination (UTME) score. Students' secondary school certificate Physics grades are used for securing admission to study Physics education at the university. It is expected that students' grades play an important role in determining their progression and future achievement. In the admission process, gender is also considered in offering admission to bridge the gap in gender equity in enrollment and achievement in science courses. United Nations Educational, Scientific and Cultural Organization (UNESCO, 2024) emphasized that government and tertiary institutions should implement gender-responsive policies and execute measures to bridge the gender gap in science education by increasing girls' and women's enrolment in STEM programmes. Therefore, students' gender entry qualification (WASSCE grades) has become relevant and necessary for progression and success in the university programme.

Gender is an important factor in science education that has attracted the attention of scholars and researchers globally. The issue of gender-equality in education is prioritize in order to improve and sustain girl-child education especially in the developing world. Gender disparity in enrolment and achievement of male and female students in science education has been worrisome to teachers, school authorities and parents. UNESCO (2026) has emphasized on gender equality and improve enrollment of the girl-child in Science, Technology and Mathematics Education (STME) for self-reliance and empowerment. This has result to increase in female students' enrollment in science in both secondary schools and tertiary institutions. Moreover, the achievement of students in secondary schools is fundamental for the attaining the objectives of Physics education. Students' gender performance in WASSCE examination result has been an important criterion for admission into Physics education programme. It is often believed that students' gender achievement in SSCE should have a strong relation and be able to predict future achievement in related course of study. Tapela and Simon (2025) confirmed that gender achievement gaps in secondary school has significant predictive implications for further learning of Science, Technology, Engineering and Mathematics (STEM) which is influenced by contextual inequalities. However, students' gender achievement in secondary school science subjects and how it relates to their undergraduate achievement has been an issue of concern to scholars and researchers. This is because gender achievement has been reported to be affected by gender stereotype and science is regarded as male-oriented subject which has result to females' underachievement. Orji et al. (2026) attributed that persistent gender disparities in participation and achievement in secondary school science subjects has been entrenched by stereotypes that portray science as a male domain. This has led to the difference in the achievement of male and female secondary school students in sciences and affect their future achieve in related field of study. The various SSCE grades of both male and female students are used for placement into courses of study at the university. The extend to which secondary school students' gender grades that influenced their Physics achievement at the universities is not certain.

Researchers have investigated gender achievement of secondary school students and how it predicts their achievement in tertiary institution to ascertain the level to which SSCE grades in school subjects can predict students' achievement in universities or other tertiary institutions. There are studies carried out on students' gender academic achievement at secondary schools as predictor of their academic achievement at tertiary institution. Ugochukwu et al. (2024), whose study reveals that Males' SSCE Mathematic grades significantly predicts their first year GPA in Mathematics, Engineering and Microbiology. Contrary to the finding of this study, El-Moussa (2023) highlighted that Male students' secondary school grades does not significantly predict their success in College CGPA. The male students' grades that do not predict their CGPA achievement might be attributed to improve in quality of teaching and the learners' commitment. In a study carried out by Egolun and Ndubueze (2026), found that SSCE Physics results significantly predict female students' final CGPA. In another study on predictive validity by Muhammad and Isaac (2022), whose findings reveal that SSCE grades does not significantly predict final CGPA, and lack of predictive validity applied to both male and female students because no gender-specific difference were found. The findings of the review studies shows that they are inconclusive. Therefore, this study intends to investigate the extent to which Physics education students' West Africa Secondary School Certificate Physics grades could predict their class of degree at the end of the academic programme.

Predictive validity is the extent to which a test scores or examination results of students could be able to relate to a similar future test scores or examination result. Diamond (2021) defined predictive validity as the attainment of a given measure when it predicts a future outcome that it is designed to forecast. The validity of the prediction could be high, moderate and low base the level of the relationship between the two compared scores. Moreover, the relationship between the two variables can be further be subject to regression analysis to provide significant effect by indicating the level of validity of the prediction. Florenzano et al. (2026) notes that most predictive validity summarizes the relationship between predictor and criterion using linear regression slope and enable the testing of where and to what extent predictor scores are statistically significant. In this study, WASSCE Physics grades is the predictor while class of degree is the criterion to be used to determine their predictive validity. The gender achievement of students in both WASSCE Physics grades and their class of degree are to be analyze to indicate whether WASSCE Physics grades significantly predict their class of degree. If it predicts, at what extend does it predicts, low, moderate or high.

Statement of the Problem

The performance of secondary school students in Physics is a strong factor in determining students' choice of related courses at the university. Students' background in Physics is believed to be an indicator of future performance in the course. Gender has been a key determining factor of students' choice in Science, Technology and Mathematics and hence gender gap in achievement between male and female students in secondary schools has been noted and attracted scholars and researchers' attention. The performance of students in WASSCE is used for admission into course of study with the aim of maintaining

the quality standard of tertiary education. Entry requirement such as WASSCE Physics grades used for studying Physics Education at the university by both male and female students is expected to produce quality Physics Educator that are manpower requirement for secondary schools. Both male and female students who graduate with various class of degrees such as third class and pass degrees while they are admitted with very good WASSCE Physics grades. This has been an issue of concern of which students' achievement at secondary schools cannot ascertain their performance and the awarded class of degree. The extent to which students' various Physics grades used for studying Physics Education programme at the universities has not established. Thus, this study intends to investigate the extent to which WASSCE Physics grades predicts Physics Education students' class of degree based on gender at the end of their programme.

Research Questions

The study would be guided by the following research questions:

1. What is the relationship between Physics Education male students' West Africa Secondary School Certificate Physics grades and their class of degrees in Universities in the North Central Zone of Nigeria?
2. What is the relationship between Physics Education female students' West Africa Secondary School Certificate Physics grades and their class of degrees in Universities in the North Central Zone of Nigeria?

Objectives of the Study

The study has the following objectives:

1. To find out the extent to which male students' West African Secondary School Certificate Physics grades predict their class of degree in Universities in the North Central Zone of Nigeria.
2. To investigate the extent to which female students' West African Secondary Schools Certificate Physics grades predict their class of degree in Universities in the North Central zone of Nigeria.

Statement of the Hypotheses

To facilitate the investigation, the following null hypotheses postulated were tested at 0.05 level of significance:

H₀₁: Male students' WASSCE Physics grades do not significantly predict the class of degrees of Physics Education students in Universities in the North Central Zone of Nigeria.

H₀₂: Female students' WASSCE Physics grades do not significantly predict the class of degrees of Physics Education students in Universities in the North Central Zone of Nigeria.

Significance of the Study

In more specific terms, the outcomes of the study are significant to teachers, students and university authorities in the following ways:

1. The findings of the study would widen the scope of knowledge on the extent to which WASSCE Physics grades contributed to predicting students' class of degree in Physics education based on gender in universities across the North Central, Nigeria. Physics teachers would become aware of WASSCE Physics grades as a contributing factor to students' achievement in Physics education and be ready to improve their performance.
2. When students are aware of the implications of WASSCE Physics grades as a predictor of their class of degree in Physics education based on gender, this gives room for students to be more committed and be prepared for the task ahead in the course of their studies at the universities.
3. It provides the university with data on the relevance of WASSCE Physics grades as a predictor of the class of degree in Physics education. This information can be used as a guide for selecting and admitting students into Physics education programmes in the universities in order to maintain and improve the quality of their input and to maintain a high standard.

Methodology

The study adopted an ex-post facto research design. The ex-post facto design is a type of design that requires the use of existing data to establish the effect between the variables under study. The respondents were Physics Education students whose data were used for the study. The population for the study comprised graduates of Physics Education from Science, Technology and Mathematics Education Department in the Universities in the North Central, Nigeria. The students that made up this population are Physics Education students that had SSCE Physics grades and graduated with their class of degree in Physics Education in 2014/2015, 2015/2016, 2016/2017, 2017/2018 and 2018/2019 sessions. The population of the study was nine hundred eighty-nine. Multistage sampling procedure was employed to obtain a sample of 689 (442 Male and 252 Female) Physics Education students. The data were obtained from students' academic files in the Science, Technology and Mathematics Education department were Physics Education students' WASSCE Physics grades, and class of degree in State and Federal Universities were obtained. The instrument used for data collection was a Proforma, "Physics Entry Qualification and University Degree Proforma". The data were entered in the Proforma and were analyzed with Pearson Product Moment Correlation Coefficient and linear regression analysis. The instrument was subjected to face validity by three research experts in Science, Technology and Mathematics Education and Educational Measurement and Evaluation at Nasarawa State University, Keffi. The validity index of the Proforma obtain was 0.91. The instrument was pilot tested by obtaining data from students not involved in the study. Cronbach Alpha coefficient method of estimating reliability was employed to compute coefficient of internal consistency of which the reliability index of 0.84 was obtained. The research questions were answered with Pearson Product Moment Correlation Coefficient while the Research hypotheses were tested with linear regression analysis at 0.05 level of significance

Results

Research Question One

What is the relationship between Physics Education male students' West Africa Secondary School Certificate Physics grades and their class of degree in Universities in North Central Zone of Nigeria?

Table 1: Relationship between Physics Education Male Students' West Africa Secondary School Certificate Physics Grades and their Class of Degree

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.429 ^a	0.184	0.182	0.683

a. Predictors: (Constant), WAEC

Table 1 reveals the correlation coefficient of the relationship between Male students' West African Secondary School Certificate Physics grades and their class of degrees in Physics Education in Universities in North Central Zone of Nigeria. The correlation coefficient of the relationship between the Male students' WASSCE Physics grades and their class of degrees in Physics Education as indicated on Table 1 is 0.429 with standard error of estimate of 0.683. The moderate correlation coefficient value of 0.429 indicates a moderate correlation between the male students' WASSCE Physics grades and their class of degrees in Physics Education in Universities in North Central Zone of Nigeria.

Hypothesis One

Ho₂: Male students' WASSCE Physics grades do not significantly predict the class of degree of Physics Education students in Universities in North Central Zone of Nigeria

Table 2: Regression Analysis of Male Students' WASSCE Physics Grades and their Class of Degree in Physics Education

Coefficients					
Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	0.388	0.255	1.518	0.130
	WAEC	0.801	0.080	9.968	0.000

a. Dependent Variable: DegreeMale

Table 2 reveals the calculated linear regression's t-value of Male students' WASSCE Physics grades as predictor of the class of degree of Physics Education students which is 9.968 significant at $P=0.000 < \alpha=0.05$. The null hypothesis is therefore rejected. This means that WASSCE Physics grades significantly predicts the class of degree of Physics Education students in Universities in the North Central Zone of Nigeria. Furthermore, the linear regression model as indicated on Table 2 above, is Class of degree = 0.801

(WASSCE Phy. Grade) + 0.388. From the model, the class of degree as a dependent variable in the equation has a coefficient of Beta value of 0.801 for WASSCE Physics grade and a constant of 0.388, respectively. This implies that for each increase in the class of degree, there is 0.801 increase in WASSCE Physics grade and a constant value of 0.388. This is the implication of the linear regression model of hypothesis two of this study.

Research Question Two

What is the relationship between Physics Education female students' West African Secondary School Certificate Physics grades and their class of degrees in Universities in the North Central Zone of Nigeria?

Table 3: Relationship between Physics Education Female Students' West African Secondary School Certificate Physics Grades and their Class of Degree

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.279 ^a	0.078	0.074	0.620

a. Predictors: (Constant), WAEC

Table 3 reveals the correlation coefficient of the relationship between Female students' West African Secondary School Certificate Physics grades and their class of degrees in Physics Education in Universities in North Central Zone of Nigeria. The correlation coefficient of the relationship between the Female students' WASSCE Physics grades and their class of degrees in Physics Education as indicated on Table 3 is 0.279 with standard error of estimate of 0.620. The low correlation coefficient value of 0.279 indicates a low correlation between the Female students' WASSCE Physics grades and their class of degrees in Physics Education in Universities in North Central Zone of Nigeria.

Hypothesis Two

H₀₃: Female students' WASSCE Physics grades do not significantly predict the class of degrees of Physics Education students in Universities in North Central Zone of Nigeria

Table 4: Regression Analysis of Female Students' WASSCE Physics Grades and their Class of Degrees in Physics Education

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.312	0.332		3.950	0.000
	WAEC	0.483	0.105	0.279	4.588	0.000

a. Dependent Variable: Degree Female

Table 4 reveals the calculated linear regression's t-value of Female students' WASSCE Physics grades as predictor of the class of degree of Physics Education students which is 4.588 significance at $P=0.000 < \alpha=0.05$. The null hypothesis is therefore rejected.

This means that WASSCE Physics grades significantly predicts the class of degree of Physics Education students in Universities in North Central Zone of Nigeria. Furthermore, the linear regression model as indicated on Table 4 above is $\text{Class of degree} = 0.483 (\text{WASSCE Phy. Grade}) + 1.312$. From the model, the class of degree as a dependent variable in the equation has a coefficient of Beta value of 0.483 for WASSCE Physics grades and a constant of 1.312 respectively. This implies that for each increase in the class of degree, there is 0.483 increase in WASSCE Physics grade and a constant value of 1.312 associated with it. This is the implication of the linear regression model of hypothesis three of this study.

Discussion of Findings

The analysis of the result on Male students' WASSCE Physics grades as predictors of the class of degrees in Physics Education in Universities in the North Central Zone of Nigeria reveals that Male students' WASSCE Physics grades predict the class of degree of Physics Education students in Universities in the North Central Zone of Nigeria, thus the null hypothesis was rejected. The linear regression's t-test, as shown in Table 1, shows that the probability associated with the t (9.968) is 0.000, and since the probability value is 0.000 less than the 0.05 level of significance, the null hypothesis is rejected. This indicates that there is a significant relationship between the Male students' WASSCE Physics grades and their class of degrees in Physics Education. This means that the Male students' WASSCE Physics grades can predict their class of degrees in Physics Education. This study concurred with the study of Oguchukwu, Osuala & Felista (2018), whose study reveals that Male students' SSCE Mathematics grades significantly predict their first year GPA in Medicine, Engineering and Microbiology. Contrary to the finding of this study, El-Moussa (2023) found that Male students' secondary school grades do not significantly predict their CGPA achievement at college.

The analysis of the result on Female students' WASSCE Physics grades as predictors of the class of degrees of Physics Education students in Universities in North Central Zone of Nigeria reveals that Female students' WASSCE Physics grades predict their class of degrees in Physics Education in Universities in North Central Zone of Nigeria, thus the null hypothesis was rejected. The linear regression's t-test, as shown in Table 4, shows that the probability associated with the t (4.588) is 0.000, and since the probability value is 0.000 less than the 0.05 level of significance, the null hypothesis was rejected. This indicates that there is a significant relationship between Female students' WASSCE Physics grades and their class of degrees in Physics Education. This means that Female students' WASSCE Physics grades can predict their class of degrees in Physics Education. The findings of this study agree with the findings of Egolun and Ndubueze (2026), whose study reveals that SSCE Physics results significantly predict female students' final CGPA. Also, the findings of this study disagree with the findings of Muhammad and Isaac (2022), whose findings reveal that SSCE grades do not significantly predict final CGPA, and a lack of predictive validity was found for both male and female students because no gender-specific differences were found.

Conclusion

Based on the findings of the study, it is concluded that Male students' WASSCE Physics grades can predict their class of degrees in Physics Education in Universities in the North Central Zone of Nigeria; Female students' WASSCE Physics grades can predict their class of degrees in Physics Education in Universities in the North Central Zone of Nigeria. The study investigated the extent to which West African Secondary School Certificate Physics Examination grades predict the class of degrees of Physics Education students based on gender in Universities in the North Central zone of Nigeria. This was to examine the influence of moderator variables such as students' gender (male/female) on students' achievement in Physics Education at the Universities in North Central, Nigeria. Therefore, the study investigated secondary school students' achievement as a predictor of their class of degree based on gender, however future studies can involve other factors, such as school ownership and socio-economic status, to determine their achievement.

Recommendations

Based on the findings, the following recommendations are advanced:

1. The University system should continue to admit students with WASSCE Physics grades as a requirement for entry qualification for the Physics Education programme since it predicts both male and female students' achievement.
2. Gender equality should be considered in students' enrolment in Physics Education to increase the number of female students who would graduate as role models and as Physics teachers.
3. The West Africa Examination Council should be thorough in conducting and supervising the WASSCE examination so that it can be free from exam malpractice and reflect the true achievements of students, which can predict their future achievements.
4. Secondary school Physics teachers should make sure that the Physics syllabus is thoroughly taught and covered so that students have a sound background in Physics in preparation for further studies in Physics Education and other courses in tertiary institutions.

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