
COMPARATIVE ANALYSIS AND GENDER EFFECTS OF STUDENTS ACADEMIC PERFORMANCE IN SENIOR SECONDARY SCHOOL CERTIFICATE EXAMINATION (SSCE) IN PHYSICS BETWEEN YEAR 2013 AND 2017 IN EKITI STATE, NIGERIA

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ABSTRACT: *The study examines the comparative analysis and gender effects of students academic performance in Physics of male and female students for five years of S.S.C.E result across all the local government area of Ekiti State, Nigeria. 27,376 students comprising of male= 12,927, female= 14,449 were sampled for the study. The researcher designed three research questions from the analysis of the data collected from the Ekiti State Ministry of Education, Science and Technology, Planning, Research and Statistics Department, Ado-Ekiti and it were answered descriptively. The percentage, t-test and chi-square were used to analyze the data collected and two hypotheses were generated and was tested at 0.05 level of significance. The project concluded that Students' performance in Physics in secondary school is no gender bias. However, male students are better in performance than female students. It was recommended amongst others that Government, school management and individual should also encourage female students who performed well in Physics by given them scholarship or bursary award as it is being done in some secondary schools like Principals' award, Teachers' award or any other special awards.*

KEY WORDS: physics, academic performance, gender effects and secondary schools

INTRODUCTION

Physics is a science subject dealing with physical quantities. Physics is widely considered to be the most fundamental and important of all the natural sciences (Bello, 2015). Physics pertains to the quantification of almost all matter that exists in this world and were on the view that in most mathematics and mathematics related fields such as Physics, it tends to be more of males than females (Bello, 2002). For instance, when we look at the ancient physicists including; Isaac Newton, Neils Bohr , Michael Faraday, Albert Einsten, all of them were men''. However, one begins to ask on the possible causes of such imbalance between male and female such that could it be that female's brain are weaker than those of males? According to Soleiman & Vahedi, (2011), girls and boys are equal in mathematics and science performance in school, they appear to do equally well in both subject in elementary schools, then some girls begin to lose interest in mathematics and science around the age of twelve.

Moreover, academic performance is the quality and quantity of knowledge, skills, techniques and positive attitudes, behavior and philosophy that students achieve or acquire. This

achievement is evaluated by the mark or grade that students attain in a term or education cycle. The quality of grades and the number of students that pass Physics in the various grades determine the level of their academic performance (Grace Jethro, 2012). There are many factors, which account for the good or poor academic performance of students in secondary schools like; the quality of students admitted, the type of scholastic materials available in the school and home environment, the methods of teaching, the nature of administration and teachers involvement in academic matters etc. However, it seems that the most important factor to the academic performance of students is the impact of sex differences on students' academic matters.

In the same way, academic performance in secondary schools is a concern of all people who have invested interest in schools. Research on this topic is of paramount importance. Attempts will be made to identify the conditions presumed to be responsible for the differential performance of boys and girls as claimed by the teachers and some researchers.

Statement of the Problem

In spite of all the available qualified and trained teachers, the academic achievement of students in Nigeria has been a source of concern to researchers, educators, government and parents. This is understandably due to the great quality that education has on the national development of the country. Research report indicated a consensus of opinion about the fallen standard of education in Nigeria (Fabunmi, M., 2004). Parents and government are in total agreement that their investment in education is not yielding the desired dividend. The reports from the West African Examination Council chief examiners indicates that the general performance of the candidates in Physics for the May/June 2011, 2012, 2014 and 2015 examinations did not differ significantly from those of the previous years (WAEC, 2011,2012, 2014 & 2015). However, the Chief Examiners also reported that candidates' performance in Physics for the May/June 2016 and 2017 examinations appeared to have improved when compared to previous years. From the foregoing, it becomes necessary to ask the question; Is there any comparatively significant improvement of student achievement with respect to gender in the May/June WAEC in Nigeria from 2013 to 2015 and 2016 to 2017 years in Physics?

Research Questions:

The following research questions were generated to guide the study.

- i. What is the percentage increase/decrease in the population of students in Nigeria that sat for the May/June WAEC in Physics between 2013 to 2015 and 2016 to 2017 years?
- ii. What is the percentage of students in Ekiti State, Nigeria with respect to gender that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 and 2017 years?
- iii. What is the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 to 2015 and 2016 to 2017 years?

Research Hypotheses

Sequel to the research question stated above, the following research hypotheses were formulated for the study and will be tested at 0.05 level of significance.

H₀₁: There is no significant difference in the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 and 2015 and 2016 to 2017 years.

H₀₂: There is no significant difference in the performance of male and female students in Ekiti State, Nigeria in the May/June WAEC in physics between 2013 and 2017.

RESEARCH METHODOLOGY

Percentage, t-test and chi square techniques were used to analyze the data collected from the Ekiti State Ministry of Education, Science and Technology, Planning, Research and Statistics Department, Ado-Ekiti.

Research Design

This research was designed to determine the comparative analysis and gender effects of students' academic performance in senior secondary school certificate examination (SSCE) in physics between year 2013 and 2017 in Ado Local Government Area of Ekiti State.

Population Sample

The researcher could not make use of all the WAEC results across all the states in Nigeria. However, Ekiti State WAEC result for five consecutive years; 2013-2017 were collected.

The WAEC results which cuts across all the local governments area of Ekiti state were sampled. The total number of students with respect to gender in Ekiti State, Nigeria that sat for the May/June WAEC in physics between 2013 to 2017;

The Years selected

YEAR 2013

Male=2339, Female= 2625, Total=4964

YEAR 2014

Male=2881, Female=2981, Total=5862

YEAR 2015

Male=2858, Female=3211, Total=6069

YEAR 2016

Male=2501, Female=2730, Total=5231

YEAR 2017

Male=2348, Female=2902, Total=5250

OVERALL TOTAL

MALE= 12,927

FEMALE= 14,449

TOTAL= 27,376

Research Instrument

The researcher designed three research questions from the analysis of the datas collected from the Ekiti State Ministry of Education, Science and Technology, Planning, Research and Statistics Department, Ado-Ekiti and it were answered descriptively.

Validity of the Instrument

The constructed questionnaire was given to the supervisor for necessary corrections and amendments.

Reliability of Instrument

Copies of relevant datas were collected from the Ekiti State Ministry of Education, Science and Technology, Planning, Research and Statistics Department, Ado-Ekiti.

Procedure for Data Analysis

The Researcher Used Percentage, T-Test and chi-square to analyze the data collected. of students in physics in senior secondary schools in Ekiti State. Three (3) research questions were postulated and answered descriptively. The three (3) hypotheses raised for the study were tested at 0.05 level of significance and analyzed using appropriate inferential statistic.

Research Question 1:

What is the percentage increase/decrease in the population of students in Nigeria that sat for the May/June WAEC in Physics between 2013 to 2015 and 2016 to 2017 years?

Table 1a: Total number of students in Ekiti State, Nigeria that sat for the May/June WAEC in physics between 2013 to 2015 and 2016 to 2017.

S/N	Year	Total No. of Student Sat	Year	Total No. of Student Sat
1	2013	4,964	2016	5,231
2	2014	5,862	2017	5,250
3	2015	6,069		
	Total	16,895	Total	10,481

Source: *Ekiti State Ministry of Education, Science & Technology, Planning, Research & Statistics Department, Ado-Ekiti.*

Table 1a: shows that a total of 16,895 students sat for WAEC in physics between 2013 and 2015 while a total of 10,481 students sat for the same examination between 2016 and 2017.

Table 1b: Total number of students with respect to gender in Ekiti State, Nigeria that sat for the May/June WAEC in physics between 2013 to 2015 and 2016 to 2017.

s/n	Year	Total Registered	Male	Female	Year	Total Registered	Male	Female	% Increase
1	2013	4,964	2339	2625	2016	5,231	2501	2730	Male (-25) Female (-22)
2	2014	5,862	2881	2981	2017	5,250	2348	2902	
3	2015	6,069	2858	3211					
Total		16,895	8,078	8,817		10,481	4,849	5,632	

Source: *Ekiti State Ministry of Education, Science & Technology, Planning, Research & Statistics Department, Ado-Ekiti.*

Table 1b shows that out of the total of 16,895 students sat for WAEC in physics between 2013 and 2015, 8,078 of them were male students while the remaining 8,817 were female students. Out of the total of 10,481 students sat for the same examination between 2016 and 2017, 4,849 of them were male students while the remaining 5,632 were female students. In the years under compares, the total number of male students who sat for WAEC in physics between 2013 and 2015 and those between 2016 and 2017 were decreased by 25% while the total number of female students who sat for WAEC in physics between 2013 and 2015 and those between 2016 and 2017 were decreased by 22%. This implies that there were more female students who registered for the subject than male students.

Research Question 2:

What is the percentage of students in Ekiti State, Nigeria with respect to gender that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 and 2017 years?

Table 2: percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 and 2017 years.

Year	Total Registered	A1 – C6		%		D7 – F9		%	
		Male	Female	Male	Female	Male	Female	Male	Female
2013	4,964	1373	1421	27.7	28.6	1031	1777	20.8	35.8
2014	5,862	1609	1651	27.4	28.2	1272	1330	21.7	22.7
2015	6,069	1249	1614	20.6	26.6	1609	1597	26.5	26.3
2016	5,231	2002	2171	38.3	41.5	499	559	9.5	10.7
2017	5,250	1223	1501	23.3	28.6	1125	1401	21.4	26.7
		Mean (%)		27.46	30.70	Mean (%)		19.98	24.44

Source: Ekiti State Ministry of Education, Science & Technology, Planning, Research & Statistics Department, Ado-Ekiti.

Table 2 above reveals that between 2013 and 2017, a period of 5 years, a mean population of 58.16% of students in Ekiti State, Nigeria obtained credit and above (A1 – C6), out of which 27.46% were male and the remaining 30.70% were female. Also, a mean population of 44.42% of students in Ekiti State had pass and below (D7 – F9) in the May/June WAEC in physics out of which 19.98 were male and 24.44 were female. This implies that female students outperformed their male counterpart with a mean performance of 30.7% to 27.46%. However, the female students ironically have the highest failure rate with a mean performance of 24.44% against male students mean performance of 19.98%.

Research Question 3:

What is the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 to 2015 and 2016 to 2017 years?

Table 3: percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 to 2015 and 2016 to 2017 years

Performance		2013 – 2015		2016 - 2017	
Mean (%)	S.D	Mean (%)	S.D		
Credit & above (A1 – C6)		53.0	127.17	65.85	107.18
Pass & below (D7 – F9)		51.3	77.19	32.31	16.26

Table 3 shows that the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1 – C6) is higher ($\bar{x} = 65.85$) between 2016 and 2017 when compared to the period between 2013 and 2015 ($\bar{x} = 53.0$). Also, the students' performance rate in physics with pass and below (D7 – F9) is low ($\bar{x} = 16.26$) between 2016 and 2017 as compared to the period between 2013 and 2015 ($\bar{x} = 51.3$).

Hypotheses Testing

Hypothesis 1:

There is no significant difference in the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 and 2015 and 2016 to 2017 years.

Table 4: Chi-square analysis of the difference in the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics

% in No. of students	2013 – 2015		2016 – 2017	Total
Performance grades				
A1 – C6	1,103,112		5,322,523	6,425,635
	1362653		4387361	
D7 – F9	4,275,761		9,278,029	13,553,790
	4286192	9462763		
Total	5,378,873		14,600,552	19,979,425
**= 358162.62	*= 3.291			df=1

Table 4 reveals that there is significant difference in the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1 – C6) and pass and below (D7 – F9) in May/June WAEC in physics between 2013 and 2015 and 2016 to 2017 years. This implies that there was significant difference in the percentage of students in Ekiti State, Nigeria that obtained credit and above (A1-C6) and pass and below (D7-F9) in the May/June WAEC in physics between 2013 and 2015 and 2016 to 2017 years. Hence, the null hypothesis was not upheld.

Hypothesis 2:

There is no significant difference in the performance of male and female students in Ekiti State, Nigeria in the May/June WAEC in physics between 2013 and 2017.

Table 5: *t – test analysis of difference in the performance of male and female students in Ekiti State, Nigeria in the May*

Gender	N	Mean	SD	df	t_(cal)	t_(tab)	Decision
Male	12,927	47.44	23.19	27,374	12.73	1.96	S
Female	14,449	55.14	24.35				

/June WAEC in physics between 2013 and 2017 $p < 0.05$ level of significance. S = Significant.

From table 5 above, the mean scores of male students (47.44) which is less than the mean scores of female students (55.14) with a mean difference of (7.7). Its measure of variability has difference of (1.16). The *t-test* analysis show that $t_{(cal)}$ (12.73) is higher than the $t_{(tab)}$ (1.96) at $p < 0.05$ level of significance. This indicated that there was significant difference in the performance of male and female students in Ekiti State, Nigeria in the May/June WAEC in physics between 2013 and 2017, hence the null hypothesis was not upheld. By implication, since the mean performance of female students was higher significantly than the mean performance of male student, this inferred that female students outperforms male students in the May/June WAEC in physics between 2013 and 2017.

DISCUSSION OF FINDINGS

On the basis of a critical observation made on the secondary data collected for the study which comparatively analyzed the learning performance of students with respect to gender in physics in the May/June West Africa Examination Council (WAEC) in Ekiti State, Nigeria between 2013 to 2015 and 2016 to 2017 years. The result obtained in table 1b indicated that the population of students in Ekiti State, Nigeria who registered and sat for the WAEC in physics decreased by 25.0% for male students and 22.0% for female students after a period of 3 years. The result obtained in table 2 revealed that students from Ekiti State, Nigeria performed averagely well in May/June WAEC in physics over the 5 years with 58.16% of them obtaining credit and above while 44.42% of them had pass and below. The result in table 3 however showed that the percentage of students in Ekiti State, Nigeria that obtained credit and above was higher (65.85%) between 2016 and 2017 when compared to the period between 2013 and 2015 (53.0%). Also, the students' performance rate in physics with pass and below was low (32.31%) between 2016 and 2017 as compared to the period between 2013 and 2015 (51.3%). The statistical test from table 4 revealed that there was significant difference in the percentage of students in Ekiti State, Nigeria that obtained credit and above, and pass and below in the May/June WAEC in physics between 2013 to 2015 and 2016 to 2017 years. The null hypothesis was not upheld at 0.05 level of significance.

The *t-test* analysis for the study in table 5 indicated that there was significant difference in the performance of male and female students in Ekiti State, Nigeria in the May/June WAEC in physics between 2013 and 2017 and since the mean performance of female students was higher significantly than the mean performance of male student, it was inferred that female students

outperforms male students in the May/June WAEC in physics between 2013 and 2017. The findings of this study was in line with the findings of Wamalwa & Wamalwa, (2014) who comparatively analyzed students achievement in West African Senior Secondary Certificate Examination in Nigeria between the period of 26 years, 1991 to 2016. The findings of this study also corroborated that reports of WAEC chief examiners reports that candidates' performance in physics for May/June 2016 and 2017 examinations was really encouraging when compared to previous years (WAEC 2016 and 2017). This trend of improvement over time could be ascribed to integration of relevant method into the teaching and learning of physics, utilization of innovation instructional materials and resolute determination and quest for academic excellence on the part of the students irrespective of gender amongst others.

SUMMARY

The study examines the comparative analysis and gender effects of students academic performance in physics of male and female students for five years of S.S.C.E result across all the local government area of Ekiti state, Nigeria. 27,376 students comprising of male= 12,927, female= 14,449 were sampled for the study. The researcher designed three research questions from the analysis of the datas collected from the Ekiti State Ministry of Education, Science and Technology, Planning, Research and Statistics Department, Ado-Ekiti and it were answered descriptively. The researcher used percentage, t-test and chi-square to analyze the data collected and two hypotheses were generated and was tested at 0.05 level of significance.

The findings of this study was in line with the findings of Zalmon and Wonu (2017) who comparatively analyzed students achievement in West African Senior Secondary Certificate Examination in Nigeria between the period of 26 years, 1991 to 2016. The findings of this study also corroborated that reports of WAEC chief examiners reports that candidates' performance in physics for May/June 2016 and 2017 examinations was really encouraging when compared to previous years (WAEC 2016 and 2017). This trend of improvement over time could be ascribed to integration of relevant method into the teaching and learning of physics, utilization of innovation instructional materials and resolute determination and quest for academic excellence on the part of the students irrespective of gender amongst others.

CONCLUSION

The conclusion reached from the finding is: The trend of improvement over time could be ascribed to integration of relevant method into the teaching and learning of Physics, utilization of innovation instructional materials and resolute determination and quest for academic excellence on the part of the students irrespective of gender amongst others.

More also, students' performance in Physics in secondary schools is no gender bias; however, male students are better in performance than female students.

Recommendations

The findings of this study leads to the following suggestions as recommendations that will help to improve on the academic performance of both genders.

- i. Government should try as much as possible to provide and equip schools laboratory with enough equipments and other facilities that make up a better laboratory.
- ii. Government should also support and encourage teachers by organising training and workshop on Physics practical and physics teaching methods from time to time in order to increase their performances.
- iii. Parents and other lovers of education should assist governments by contributing their own quota to schools.
- iv. In scheduling of time-table, enough periods should be allotted for both physics teaching and practical.
- v. Government, school management and individual should also encourage female students who performed well in physics by given them scholarship or bursary award as it is been done in some secondary schools through awards like Principals, Teachers' awards or any other special awards.
- vi. Automatic job should be provided for any female physics student who excels in physics. For instance, female student who made distinction grade should be given job immediately they finish their programme in school or made to further her education according to her choice.
- vii. There should be special attention to female students by the teacher with the aim of making them to be more committed to their work.
- viii. They should be monitored to ensure they do their assignments, attend practical classes and take part in group project works.

If these recommendations are implemented, it will definitely improve the academic performance of both genders, thereby improving the quality of education, the improvement of science and technology which will contribute to the socio-economic development in our country.

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