



Gender and Assessment of Physics Students' Academic Performance in Senior Secondary School SSIII (SS3) Olamaboro Local Government Area of Kogi State, Nigeria

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Abstract

This study assessed the performance of senior secondary (SS3) students in Kogi state. Two research questions and one hypothesis guided the study. The study adopted descriptive survey design. The sample of 220 students was selected randomly from the sampled schools. The two instruments used for data collection, namely Survey Proforma Questionnaire (SPQ) and Opinion Survey Questionnaire (OSQ) were face validated by three experts in Physics and measurement and evaluation from Kogi State University Anyigba. Reliability index was 0.78 and 0.79 respectively (determined using Chronbach Alpha). Data were analyzed using frequency, percentage and Chi-squared (χ^2). Findings showed that significant difference exist between the performance of male and female students. Male students performed better than female students in physics. IT was recommended that teachers should re-assess their classroom instructional practices in order to adopt the one that gives students equal opportunities to excel academically among others.

Keywords: Gender, Assessment, Students' Academic Performance and Physics.

Introduction

Stereotypical approaches to problem solving are grossly inadequate in the face of complex reality of our time. A fixed idea that Mathematics and Sciences are Masculine area is not true and such stereotyped image can discourage the feminine gender. There is need to design ways forward and come up with different alternative solutions to seemingly naughty challenges of life. Policy decisions, such as funding for same sex education, as well as the continuing stereotype that girls and women lack science and mathematical ability call for up-to-date information about gender differences in students' performance in Sciences (Okeke, 2014). The reason is that such stereotypes can actually discourage women from entering or persisting in careers in science, technology, engineering and mathematics (STEM). Today women earn 45% of the undergraduate degrees in

science discipline (Okeke, 2014), Mathematics and science subjects such as physics are stereotyped as male domains (Nosek, Banaji & Greenwald, 2015). Stereotypes about female inferiority in physics are prominent among young ones / adolescents, parents and teachers (Steele, 2013). Although, children may view boys and girls as being equal in mathematical ability, they nonetheless view adult men to perform better at science and mathematics than adult women (Steele, 2013).

Performance in physics over the years have been a thing of major concern because of the large number of students that failed their final examinations (WAEC, 2008-2018). Several reasons have been given for poor performance by students in physics and other science subjects. Performance in science generally and physics in particular depends on the mode



of presentation of the subject. Abdullahi (2016) observed that the subject involves a lot of technical language (symbols) and specifics. Abdullahi further noted that every student must be mathematically oriented in order to perform well in physics and that the mode of presentation of the subject is the determinant of whether the subject becomes difficult for learner or not.

physics is one of the core sciences subjects that is most relevant to studying science disciplines like medicine, pharmacy, space science, engineering and internet communication technology (ICT) (Abuh, 2020). To study these disciplines in the tertiary institution, students are required to pass physics at a credit level at least credit 6 (C6). The West African Examination Council Chief Examiners' report (2010-2018) shows that more than half of students scored below credit level. Seeing the importance of physics knowledge for effective and functional living in the modern age and in the technological advanced age of the nation, there is a need for both male and female students to strive and acquire its knowledge and not push it over to any particular gender.

Gender studies in Literature by Nnamani and Oyibe (2016) found that gender have much differential effect on secondary school students mean performance in science taught by male teachers. The result of the study also implies that the difference in gender performance may be as a result of the teaching method of the Teachers. Similarly, Ayogu (2017) found that the ability of both male and female students' general academic performance, the result revealed that males are superior over females. On the contrary, Bassey and Banduran (2014) found that girls and boys performed equally in science and mathematics competence. Likewise,

Ugwuadu (2013) found that there was no significant difference between male and female performance in mathematics and science subjects irrespective of the gender (Sex) of the teachers. There is no conscientious as to whether gender of students or teachers influences performances of student in science and mathematics related subject such as physics or not. Hence, the present study sought to carry out gender assessment of students' academic performance in Senior secondary school (SS3) physics in Olamaboro Local Government Area of Kogi State.

Objectives of the Study

The following objectives guided the study

1. To determine the difference in gender (male and female) performance in physics in GCE O level result.
2. Establish the reasons for difference in gender (male and female) performance in Physics.

Research Questions

1. What is the difference between the male and female students' academic performance in physics in GCE O level result?
2. What are the students perceived reasons for the differences in gender (male and female) performance in physics?

Hypothesis

A hypothesis was formulated to guide the study.

H₀₁: There is no significant difference in the mean academic performance of male and female students in physics in GCE O level result.



Methodology

This study adopted descriptive survey design. According to Achor and Abuh (2018) descriptive survey design, involves accessing behavior, preference, perception and opinions of a sample. The study was conducted in Olamaboro local government area of Kogi state. The choice of the area was due to the fact that there is no known study to the researcher, like the present one that has been carried out in the area. Three public secondary schools were selected purposively for the study. Purposive sampling technique was needed to select the schools because they possess characteristics that is not common with other schools such as participation in West Africa secondary school examination (WASSEC) and national examination council (NECO). These schools are community secondary school Imane, Olamaboro community secondary school Okpo and community science secondary school Ogugu. A total population of 1107 SS3 students for 2018 academic session was selected, from the field survey. Sample size for the study is 220 (130 male & 90 female) and was selected using stratified random sampling techniques. The sample and population distribution are shown on in figure 1 in Appendix A (page 12).

Questionnaires designed by the researcher tagged Survey Proforma Questionnaire (SPQ) and Opinion Survey Questionnaire (OSQ) were used for data collection. The SPQ contains the names of the Institutions, percentage, grades and gender of students. The second questionnaire (OSQ) was structure using agreed and disagreed with their percentages and Sex. The instrument contains twelve (12) items on students' opinions on reasons

for the differences in gender performance in Physics. The questionnaires were face validated by two experts in physics education and measurement and evaluation respectively. Their comments were utilized in modifying the instruments. The instruments were further trial tested on 30 physics students (20 male and 10 female) in a secondary school (Demonstration Secondary School Ankpa) outside the school designated for the study. The data collected were used to determine the internal consistency of the items of the instruments; this was done using the Chronbach's Alpha. Chronbach Alpha formula was used because the items are not dichotomously scored. A reliability coefficient of 0.78 & 0.79 is obtained respectively. The questionnaires were administered on final year secondary school respondents to obtain their personal characteristics like sex and self-opinion. Thereafter their WAEC and NECO result were obtained from the management. The data collected were analyzed using descriptive statistics, frequency and percentage for the research questions and Chi-square for the hypothesis.

Results

In this section of the study, the results of data analysis are presented based on the two research questions and the null hypothesis that guide the conduct of this study.

Research Questions 1: What is the difference between the male & female academic performance in physics in GCE result?



Table 1. Actual Performance of Respondents in GCE O' level Examination

Institutions	Male (C6 – A1) pass %	Male (D7 – F9) fail %	Female pass %	Female fail %	Total %
OCSO	36(64.29)	20(35.70)	16(45.70)	24(60.00)	
CSSI	30(75)	10(25)	18(60)	12(40.00)	
CSSO	22(64.71)	12(35.29)	8(40.00)	12(60.00)	
Total	88(204%)	42(96%)	42(140%)	48(160%)	

The actual performance of the respondents in physics was assessed from their O level GCE and NECO results. The result as shown on table 1 indicates that 88 male students passed physics at least at credited level representing 204% of the total students that registered and wrote the examination in the sampled schools. Also, the table 1 shows that 42 male students failed physics representing 96% from the sampled SS3 similarly the female folk 42 students representing 140% pass physics at least at credit level from the 3 sampled secondary schools while 48 female students representing 160% failed physics from the 3 sampled secondary schools. This applies that out of the 130 male students who wrote physics examination in GCE and NECO from the sampled 3 secondary schools 88 of them passed physics while 42 of them failed. Also,

out of the 90 female students that enrolled for GCE examination from the 3 sampled secondary schools only 42 of them passed while 48 of them failed. The result indicates that the male folk have higher percentage performance of 204% than the female folk with 140%. It shows that there is difference between the male and female performance in physics. And the result shows that male students performed better than the female in physics at GCE and NECO O'level examination.

Research Question 2: What are the students' perceived reasons for the differences in gender (male and female) performance in physics?

Table 2: Students' Perceived Reasons for Differences in Gender (male and female) Poor Performance in Physics

SN	ITEMS	A	%	DA	%
1.	Gender of the teacher affect students understanding of physics	160	73	60	27
2.	Teaching method of the teacher affects students' comprehension in physics class.	170	77	50	23
3.	Feminine teacher helps students comprehend in physics class than masculine gender.	90	41	130	59
4.	Masculine teacher helps students to assimilate faster in physics class.	100	45	120	55
5.	Female students benefit more when the physics instructor is a masculine teacher.	140	64	80	36
6.	Male students are motivated to learn physics in class when the instructor is a feminine gender.	100	46	120	54
7.	Engagement in house hold chores and duties affect students study period.	170	77	50	23
8.	General dislike for physics affects longevity of revising at home.	160	73	60	27
9.	Difficult nature of the subject made the students give less time	156	71	64	29



	to it.				
10.	Abstract nature of the discipline/subject affects students' performance.	152	69	68	31
11.	The nature of practical work involved in the subject made students hate it.	100	45	120	55
12.	Physics teaching being theory dominated than practical experience, so students hate it.	172	78	48	22

Key: A= Agree, DA= Disagree, No. of respondents=220.

Table 3 shows that items 1, 2, 5, 6, 7, 8, 9, 10 and 12 scored 50% and above from the response agreed reason for differences in gender (male and female) performance in physics at GCE O level terminal examinations. 50% have been chosen as a benchmark because students are required to score 50% of the total scores to make at least a credit C6 in GCE O level examinations. This implies that these items, gender of the teacher teaching the subject, teaching method of the teacher, female students are motivated to learn physics when the instructor is a masculine gender, engagement in household chores and duties affect study period, general dislike for physics affect students longevity of revising at home and difficult nature of the subject affect students' performance. Physics teaching being theory dominated than practical experience which made students hate it, were perceived by students as the reasons for differences in gender (male and female) performance in physics at GCE O'Level examination. The rest items 3, 4, 6 and 11 scored percentage below the decision rule of 50% indicating that they are not part of the reasons for differences in gender (male and female) performance in physics in GCE O'Level examination.

Testing the null Hypothesis

H₀₁: There is no significant differences in the academic performance of male and female

students in physics in GCE O' Level result.

Table 3: Chi- Square (χ^2) Statistics Test on Academic Performance of Male and Female Students in Physics in GCE O'Level Examination Results.

Students Performa	Chi-Square	DF	Assymp. Sig.	Decision at P<.05
Based on Gender	24.800	11	0.003	Significant

Table 3 indicates that the gender of students influences their performance significantly at $P<.05$. The Chi-square value of 24.800 is significant because the P-value of 0.003 is less than 0.05. The hypothesis that there is no significant difference in the mean academic performance of male and female students in physics in GCE O'level result is not retained and the alternative accepted.

Discussion of Results

The result of the analyzed data revealed that male student's percentage pass of 204% was higher than that of the female students with 140% (percentage) pass in GCE O'Level examination result in the year under review as in table 2. The result indicates that male students perform better than female students in physics. The result of the hypothesis also revealed that student's gender (male & female) significantly influence performance in Physics in GCE O'Level results in favour of the male students. This is because, male students give quality time to study physics at home unlike the female students preoccupied with house hold chores and duties which affect their



study period. The result justifies the position of Sweeney (2013) who noted that female students are lower in mathematical inclined subjects like physics and spatial ability, as males were superior to females on problem solving tasks and on specific abilities related to problem solving. Also, the findings of this study are in agreement with Ayogu (2017) that indicated in an investigation spanning twelve industrialized countries, the ability of both male and female students in their general academic performance. The result revealed that males were superior over females. The superiority was not confining to the limited states of America alone. The finding also confirmed that even with the level of instruction held constant, males achieved higher levels than female. Ayogu (2017) attributed the differences in performance published by European centre for research training and Development UK (www.eajournal.org) between boys and girls to the school environment and programmes. Ayogu opined that prior to attending school, general intelligence of girls was higher than that of boys but the position gradually reversed with the findings that boys (males) perform better than girls (females) in science especially the mathematically inclined subjects. The finding of the study is also in agreement with Bassey and Banduran (2014) who found that girls and boys achieve equally in science and mathematics competence. The views of the respondents were sought to determine reasons for poor performance in physics. Table 3 shows that majority of the respondents about 73% implicated gender of the teacher, as the perceived opinion of the students in items of 64% female students benefiting more when the physics instructor is a masculine teacher. This indicates that male teachers teach physics better than the feminine teacher. This is in agreement with Nmanan and Oyibe

(2016) that gender have much differential effects on secondary school students mean achievement is science and social sciences taught by male teachers. The result of the study also implies that the difference in gender performance may be as the result of the teaching method of the teacher, engagement in household chores and duties, general dislike for physics, difficult nature of the subject, and teaching physics theoretically only without involving students in practical activities. The finding of this study is in agreement with the finding of Achor and Abuh (2018) who revealed that science subjects were taught only in the classroom neglecting the practical aspects due to lack of equipment. Some students only see practical apparatus in the WAEC hall. In addition, after age fourteen the boys usually overtake the girls. The poor achievements by girls than boys, according to Okoye (2010) was as a result of girls over attachments to their mother in household chores involving social interaction with their mothers and measuring out food items cooking, fetching water and being kept busy without plan or schedule to follow. They are involved in estimating how much each person in the family needs and making allowance for necessary wastages. All these are practical interactions girls are exposed to and made them under study their books and subjects at home and consequently leading to the poor performance in school. Similarly, Novasiah (2012) noted that learning of physics became a major area of concern over the years because large number of students failed their final examinations and several reasons have been given for poor performance by students in physics and other science subjects. Performance in physics depends on the mode of presentation of the subject. Abdullahi (2016) observed that the subject



involves a lot of technical language and specifics. Abdullahi further noted that every student must be mathematically oriented in order to perform well in physics and that the mode of presentation of the subject is the key determinant of whether the subject becomes difficult for the learner or not.

Conclusion

The performances of final year senior secondary school students of Olamaboro local government area of Kogi state have been assessed. The finding revealed that male students performed better than the female students in physics. It was concluded that one of the problems of teaching physics is that the subject is taught without practical activities which resulted in poor performance in physics. Other reasons given include gender of the teacher, teaching method of the teacher, engagement in household chores and duties, general dislike for physics, abstract nature of the subject and difficult nature of the subject.

Recommendations

Based on the findings, the following recommendations were made:

1. Physics teachers should re-assess their classroom instructional practices because there is a need for them to shift to instructional practice that will give the students equal opportunities to excel in instructional activities. Extra coaching should be given to females and relieving female secondary school students of some household duties to bridge the gap in poor performance.
2. Teachers should not focus on the theoretical aspect of the course/subject alone but should involve the students in practical aspect as well.
3. Physics instructional activities should not be entrusted on the hand of either

of the teachers' gender.

4. Students should have a workable schedule for household chores and duties so as not to interfere with their study period at home. They should equally allot more time to study subjects they found difficult to understand or abstract to them.

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Appendix A:

Figure1 Population and Sample Distribution of Sample Schools

Institutions	Total No. of SSIII students	No. of male students in SSIII	No. of female students in SSIII	Sampled male	Sampled female
OCSS					
OKPO	483	281	202	56	40
CSS IMANE	350	200	150	40	30
CSSS					
OGUGU	274	172	102	34	20
TOTAL	1107	653	454	130	90

Source: Field Survey, 2019.



Appendix B:

Analysis of Student Performance in WAEC (7-8) (%) 9(%)2007-2017				
Year	Total No. that Sat.	No. Passing Credit and above (1-6) (%)	7-8 (%)	9 (%)
2009	375824	218199 (58.1)	870275 (23.2)	62119 (16.5)
2010	418593	180797 (43.2)	140172 (33.0)	88480 (21.1)
2011	415113	200345 (48.3)	911167 (22.0)	166772 (8.1)
2012	465636	222722 (47.8)	141595 (30.4)	79919(17.2)
2013	468593	180797 (43.2)	140172 (33.5)	88480 (21.1)
2014	463755	237756 (51.3)	141283 (30.5)	84716 (18.3)
2015	275369	130982 (47.6)	84418 (30.5)	53079 (19.3)
2016	254188	120768 (47.5)	81814 (32.2)	51606 (20.3)
2017	321499	158837 (49.4)	90012 (28.0)	61940(19.5)
2018	334129	142943 (41.5)	102036 (29.6)	89150 (25.9)
	344846	144314 (41.8)	103242 (29.9)	97290 (28.2)