GENDER AND FOUNDATION YEAR OF SCHOOL ON ACADEMIC ACHIEVEMENT OF SECONDARY STUDENTS IN BIOLOGY USING STATE UNIFIED AND EXTERNAL EXAMINATIONS

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Abstract
The influence of students' gender and year school was founded on academic achievement in biology among higher secondary school students in Ogun State, Nigeria, were researched using state unified tests and external examinations. The study used ex-post facto research design. 600 SS 3 students made up the sample, which was drawn using a simple random sampling procedure. Students' biology grades were derived from both school assessment records and WASSCE results using Academic Performance Data Extract Proforma (APDEP). The mean, standard deviation, index of skewness, t-test, and one-way and two-way ANOVA were used to examine the data. The findings showed that students' achievement in WASSCE in biology was poor in 2018 (index of skewness = 0.31) and 2019 (index of skewness = 0.26) but high in the state unified examinations for 2018 (index of skewness = -0.20) and 2019 (index of skewness = -0.32). Students' achievement in WASSCE and state unified examination was however not influenced by both gender and school foundation year. The recommendation among others was that government should not hesitate irrespective of gender to deploy facilities and approaches considered relevant towards improving students' academic achievement.

Keywords: Academic achievement; External examinations; Gender; School foundation year; State unified examination.

Introduction

Biology is a life science and its applications to various dimensions of national growth and development cannot be overemphasized. It is a field of knowledge concerned with the study of plants and animals. Biology is the bedrock of medicine and nursing. A few other fields of knowledge where biology is considered indispensable are agronomy, animal science, soil science, veterinary medicine, biochemistry, food science and technology and psychology. The knowledge of biology is required in everyday activities and issues relating to humanity such as environmental protection, personal and community hygiene, human nutrition and sexuality.

However, secondary school pupils' educational attainment in this crucial subject is not encouraging. Records of students' performances over the last 20 years remain persistently below average in West African Senior School Certificate Examinations (WASSCE) which happens to be the major certificate examination for secondary school students in West African subregion (WAEC, Planning and Statistics Unit, 2019). The source indicated isolated cases of above average level of performance in few occasions. The trend should not be allowed to continue bearing in mind the widespread requirement of the subject in pursuing some specialisations at the university level.

The elements that impact students' success in biology may be linked back to instructional approaches, according to evidence from empirical investigations, teacher factors, student factors (attitude towards the subject, study habit, self-concept, self-esteem), home factors and school factors (laboratory materials and equipment, water resources, power supply and library facilities). There have also been studies on effect of gender (Dayioglu &Turut, 2007; Khwaileh & Zaza, 2010, Wangu, 2014, Obadaki, 2011; Babalola & Onyiloye, 2012) and year college was founded (Phillips, 1997, Jago & Tanner (2012) on students' performance in biology but the findings have remained largely inconsistent. On this note, the effect of students' gender and year school was founded on students' performance in biology was being investigated with focus on Ogun state unified examinations and West African Examinations Council (WAEC).

Gender is a concept of either being male or female. Further, it specifies distinguishing social role being assigned to male and female individuals respectively. The influence of gender on students' achievement or academic performance has been heavily researched yet, without a consensus. Gender was ruled out as a factor that predict or determine students' achievement or understanding of

biology concepts (Agboghoroma & Oyovwi, 2015). In contrast, according to Ihejiamazu, Obi and Neji (2020) gender produced a significant impact on students' biology grades and it was in favour of the male gender. Akinnubi, Oketayo, Akinwande and Ifedayo (2012) observed that gender influences students' performance in biology but in favour of the female gender.

In addition, this study looks at the year school was founded as it affects students' performance. The school is a social and learning agency that creates an environment in which students can be officially educated and achieve their educational objectives. Humans have an infinite ability to learn, but this capacity may be restricted by the behavior patterns and facilities provided by the local environment, such as the school (Nsa, Offiong, Udo & Ikot, 2014). The year school was founded is an expression of age of the school. Given the fact that the nation's economy was better in the past, one may be quick to say that schools that were advanced in age might be favoured with required educational facilities that foster effective learning. However, going by the reason of poor maintenance culture of Nigerians, the insinuation is that schools that were advanced in age might not be better off due to decay of the facilities with the passage of time. Incidental upsurge in students' enrolment over time could also have added to the shortfall in quality of the facilities. The allusions in diverse directions informed why it was necessary to investigate the effects of students' gender and year school was founded on the academic achievement of biology students as measured by the State joint examination and external examinations.

The goal of the study was to look at the impact of students' gender and school year on their biology performance in WASSCE and Ogun State unified examinations. Specifically, the objectives were to determine: The profile of students' performance in biology both at the state unified examinations and WASSCE, if there is a substantial disparity in the performance of the students in both the state unified examination and WASSCE based on gender, if there is a substantial disparity in the performance of the students in both the state unified examination and WASSCE based on year school was founded, if there is a substantial disparity in the performance of the students in both the state unified examination and WASSCE based on interaction of gender and years school was founded.

Statement of the Problem

The academic achievement of students in biology at external tests administered by the West African Examinations Council has been a source of contention since the intervention involving Ogun State unified examinations for the public secondary schools in the State. The public outcry has been that of why the students' performance at WASSCE has not been reflecting the performance from the state unified examinations. Previous studies have traced factors that are related to the teacher, students, home background and school facilities to the problem of poor performance of students at external examinations yet, it persists. Thus, it becomes imperative to investigate the effect of students' gender and year school was founded on students' performance in biology from WASSCE and Ogun state unified examinations.

Research Question

In this study, the following research question would be addressed:

1. What is the pattern of students' biology performance on the state unified test and the WASSCE?

Hypotheses

$HO_{1:}$ The performance of students does not differ significantly in both the State Unified examination and WASSCE based on gender.

HO_2: The performance of students does not differ significantly.in both the State Unified examination and WASSCE based on year school was founded.

HO_3: The performance of students does not differ significantly in both the State Unified examination and WASSCE based on the interaction of gender and years school was founded.

Methodology

The study employed ex-post facto research design. This was because the design excluded variables manipulation and randomization of respondents. All Biology students in public schools in Ogun East Senatorial District of Nigeria were included in the population.

The sample comprised six hundred (n= 600) senior secondary school 3 students of Biology. Five Local Government Areas (LGAs) from Ogun East Senatorial District were selected. From

each LGA, three schools were selected giving a total of fifteen schools. Forty (40) students were selected from each school, making a total of 600 students. The selection across the LGAs, schools and students were done using simple random sampling technique.

Students' academic performance grades in Biology were gathered from both school assessment records and WASSCE results using Academic Performance Data Extract Proforma (APDEP). APDEP consists of a column for names of students in addition to two-by-two matrix for WASSCE and the state unified examination against the years 2018 and 2019. In order to have access to the students' academic performance records in both SSCE and the Unified Examinations due to their confidentiality status, a letter of introduction was collected from the HOD of the Department of Counseling Psychology and Educational Foundations by the researcher to the heads of the selected schools. The whole process lasted for three weeks.

The research question and hypotheses that were raised in the study were answered using t-test, one-way and two-way ANOVA.

Results

Research Question

What is the pattern of students' biology performance on the State Unified Test and the WASSCE?

Table 1: Descriptive statistics showing the performance of students in biology at the State Unified Examination and WASSCE (2018-2019).

	Grade	F	%	Mean	S.D	Skewness	Decision
2018 WASSCE	0	131	21.8	1.41	1.03	0.31	Poor
	1	185	30.8				
	2	203	33.8				
	3	69	11.5				
	4	10	1.7				
	5	2	0.3				
2018 UNIFIED	0	26	4.3	3.03	1.23	-0.20	High
	1	15	2.5				
	2	152	25.3				
	3	221	36.8				
	4	94	15.7				
	5	92	15.3				
2019 WASSCE	0	97	16.2	1.60	1.02	0.26	Poor
	1	154	25.7				
	2	264	44.0				
	3	65	10.8				
	4	15	2.5				
	5	5	0.8				
2019 UNIFIED	0	14	2.3	3.29	1.14	-0.32	High
	1	8	1.3				
	2	116	19.3				
	3	216	36.0				
	4	142	23.7				
	5	104	17.3				

Given the frequency counts, percentages, mean, standard deviation and index of skewness on Table 1, the performance of students in 2018 WASSCE (Mean = 1.41; S.D =1.03; index of skewness = 0.31) and 2019 WASSCE (Mean = 1.60; S.D = 1.02; index of skewness = 0.26) on a six-point grading system of pass in use by WAEC and other external examinations in Nigeria was at a minimum of C4-C6 grade point. A small proportion (47.3%) of the students that wrote WASSCE in 2018 passed at C6 level and above while, 58.1% of the candidates in 2019 passed at the same level. However, the performance of the same students in 2018 (Mean = 3.03; S.D = 1.23; index of skewness = -0.20) and 2019 (Mean = 3.29; S.D = 1.14; index of skewness = -0.32) in the unified examinations was at a minimum range of B2-B3 grade point. Further details of the results show that 93.1% of the candidates in 2018 and 96.3% in 2019 passed at a minimum of C6.

Hypothesis 1

The performance of students does not differ significantly in both the State Unified examination and WASSCE based on gender.

Table 2: Group mean difference in students' performance in both the unified examination and WASSCE (2018-2019) based on gender.

	Group	N	Mean	S.D	Df	T	Sig	Decision
2018 WASSCE	**Male**	233	1.37	1.03	598	-0.760	0.447	
	Female	367	1.44	1.03				Not significant
2018 UNIFIED	**Male**	233	3.15	1.20	598	1.910	0.057	
	Female	367	2.95	1.25				Not significant
2019 WASSCE	**Male**	233	1.56	1.05	598	-0.790	0.430	
	Female	367	1.63	0.99				Not significant
2019 UNIFIED	**Male**	233	3.29	1.07	598	-0.099	0.921	
	Female	367	3.30	1.18				Not significant

According to results presented on Table 2, students' performance in the unified examination both in 2018 ($t = 1.910$; $p>0.05$) and 2019 ($t = -0.099$; $p>0.05$) reflects a no significant difference based on gender. On a similar note, students' performance in WASSCE both in 2018 ($t = -0.760$; $p>0.05$) and 2019 (-0.790; $p>0.05$) was not significantly different based on gender. In other words, male and female students performed similarly in both exams. Therefore, the hypothesis was rejected.

Hypothesis 2

The performance of students does not differ significantly in both the State Unified examination and WASSCE based on year school was founded.

Table 3: Test of ANOVA on students' performance in the unified examination and WASSCE (2018-2019) based on year school was founded.

		S S	Df	MS	F	Sig	Decision
2018 WASSCE	**Between Groups**	.293	2	.147	.139	.870	Not significant
	Within Groups	629.200	597	1.054			
	Total	**629.493**					
2018 UNIFIED	**Between Groups**	7.504	2	3.752	2.489	.084	Not significant
	Within Groups	899.956	597	1.507			
	Total	**907.460**					
2019 WASSCE	**Between Groups**	1.168	2	.584	.566	.568	Not significant
	Within Groups	616.425	597	1.033			
	Total	**617.593**					
2019 UNIFIED	**Between Groups**	1.249	2	.625	.479	.620	Not significant
	Within Groups	779.124	597	1.305			
	Total	**780.373**					

Test of ANOVA on Table 3 show that students' performance in the unified examination both in 2018 ($F_{(2,597)} = 2.489$; $p>0.05$) and 2019 ($F_{(2,597)} = 0.479$; $P>0.05$) was not significant based on year school was founded. The test results on students' performance was not different with WASSCE for 2018 ($F_{(2,597)} = .139$; $p>0.05$) and 2019 ($F_{(2,597)} = .566$; $p>0.05$) based on year school was founded. Hence, the hypothesis was rejected.

Hypothesis 3

The performance of students does not differ significantly in both the State Unified Examination and WASSCE based on interaction of gender and years school was founded.

Table 4a: Two-way ANOVA on students' performance in the Unified Examination (2018 and 2019) based on interactions between gender and year school was founded.

	Source	Type III Sum of Squares	Df	MS	F	Sig
2018 UNIFIED	Corrected Model	12.952	5	2.590	1.720	.128
	Intercept	3909.177	1	3909.177	2595.899	.000
	Gender	3.183	1	3.183	2.114	.147
	Year school was founded	7.038	2	3.519	2.337	.098
	Gender*Year school was founded		.252	2	.126	.084
.920						
	Error	894.508	594	1.506		
	Total	**6416.000**	**600**			
	Corrected Total	907.460	599			
2019 UNIFIED	Corrected Model	16.974	5	3.395	2.642	.022
	Intercept	4421.481	1	4421.481	3440.350	.000
	Gender	.891	1	.891	.694	.405
	Year school was founded	1.388	2	.694	.540	.583
	Gender*Year school was founded		15.685	2	7.842	6.102
.002						
	Error	763.399	594	1.285		
	Total	**7288.000**	**600**			
	Corrected Total	**780.373**	**599**			

Based on the results of two-way ANOVA on Table 4a, there was no significant difference in students' performance ($F_{(2,594)} = 0.084$; $p>0.05$) in the Unified Examination for 2018 based on interaction between gender and the year school was founded. However, a significant difference in students' performance ($F_{(2,594)} = 6.102$; $p>0.05$) in same Unified Examination in 2019 was recorded based on interaction between gender and year school was founded. In other words, gender difference exists in students' performance for the year through a mediating role of year school was founded.

Table 4b: Two-way ANOVA on students' performance in WASSCE (2018 and 2019) based on interactions between gender and year school was founded.

	Source	Type III Sum of Squares	Df	MS	F	Sig
	Corrected Model	5.065	5	1.013	.964	.439
2018 WASSCE	Intercept	795.058	1	795.058	756.315	.000
	Gender	.218	1	.218	.207	.649
	Year school was founded	.004	2	.002	.002	.998
	Gender*Year school was founded	4.186	2	2.093	1.991	.137
	Error	624.428	594	1.051		
	Total	**1828.000**	**600**			
	Corrected Total	**629.493**	**599**			
	Corrected Model	2.103	5	.421	.406	.845
2019 WASSCE	Intercept	1038.597	1	1038.597	1002.333	.000
	Gender	.393	1	.393	.380	.538
	Year school was founded	1.353	2	.676	.653	.521
	Gender*Year school was founded	.166	2	.083	.080	.923
	Error	615.491	.594	1.036		
	Total	**2160.000**	**.600**			
	Corrected Total	**617.593**	**.599**			

Results of two-way ANOVA on Table 4b indicated there was no significant difference in students' performance in WASSCE for 2018 ($F_{(2,594)} = 1.051$; $p>0.05$) and 2019 ($F_{(2,594)} = 1.036$; $p>0.05$) based on interaction between gender and year school was founded.

Discussion of Findings

The findings on the basis of answer to research question one showed that students' performance in biology at WASSCE in 2018 and 2019 was poor contrary to high performance recorded by the same set of students at the State Unified Examinations for the same years under review. The findings suggest that the two examinations were not favourably comparable. The State Unified Examinations could perhaps be described as being weak in predicting performance in future related tasks which was the main purpose for which it was developed.

The results of test of hypothesis one indicated that academic performance of students in biology is not sensitive to gender both at the State Unified Examination and WASSCE across the two years under review. In other sense, most male and female students performed within the same range on both assessments. The explanation for the result is that since the opportunities provided to the students during instructional engagement and assessment procedure were not discriminating, performance across gender divide is also not expected. In addition, nature does not discriminate

between the male and female gender on cognitive functioning. This finding corroborates McDowall and Jackling (2010) who claimed that there was no correlation between gender and academic achievement. Ajai and Imoko (2015) conducted research to see if there were any gender differences in science achievement and retention. The study found no significant differences in achievement or retention between male and female students. Oludipe (2012) also asserted that no significant difference exists between boys and girls students on academic achievement in basic science. On a similar note, Goni, Yaganawali and Bularafa (2015) reported that there were no significant differences in academic achievement between men and women. In contrast, Zoghi, Kazemi, and Kalan (2013) investigated the influence of gender on academic achievement and found that it had a substantial impact to some extent. Female students outperformed their male counterparts, according to Khwaileh and Zara (2010). Ghazvini and Khajehpour (2011) argued that gender difference in cognitive performance occurs in the academic setting. The authors claim that girls are more likely adaptive in learning. Norsida Mohd Bakri, Norwati and Habshah (2010) reported that females achieve better academic performance compared to the males. On the same note but in favour of male gender, Eseine-Aloja (2021) reported that male students performed better in biology than their female counterparts with whom they attended the school extra-mural classes. Wangu (2014) revealed in research performed among secondary school students that male gender did better than their female counterparts.

The results of test of hypothesis two showed that students' performance in the unified examination both in 2018 and 2019 was not significant based on year school was founded. Similarly, the test result on students' performance was not different with WASSCE for 2018 and 2019 based on year school was founded. The age of the school alone cannot influence students' performance unless it is translated to the state of existing facilities in the school. In this case, the results imply that the schools on account of sharing the same proprietor share similar existing facilities. This finding is in support of Phillips (1997) who argued that it was only on account of newer facilities (schools newly built) that students' academic performance may vary compared to schools where facilities have deteriorated. Phillips' report that there was a substantial correlation between building age and pupils' academic achievement was supported by Jago and Tanner (2012). Human beings have an endless ability to learn, according to Nsa, Offiong, Udo, and Ikot (2014), but this capacity may be restricted by the behaviour patterns and facilities that the surrounding environment, namely the school provides.

Conclusion

Based on the outcomes of the study, the researchers conclude that students' gender and the year in which their school were established had no concomitant consequence on their academic performance in biology for both Ogun State Unified Examination and WAEC. Neither the effect of gender moderated by the year school was founded and vice-versa on students' academic performance in biology was significant across the two comparative examinations for the years under review except for the year 2019 on the State Unified Examination.

Recommendations

According to the results of the study, the followings are suggested:

1. Government should not hesitate on the basis of gender to deploy facilities and approaches considered to help in improving students' academic performance.
2. Government should make efforts at keeping all the schools relevant and effective irrespective of age bearing in mind staff personnel and material resources.

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