

REPOSITIONING TEACHER QUALIFICATION AND LABORATORY EQUIPMENT ON STUDENTS' ACADEMIC PERFORMANCE IN BIOLOGY IN SELECTED SECONDARY SCHOOLS IN MINNA

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ABSTRACT

Accomplishment in some pursuits may depend on a variety of factors, and this may also be true for academic success. The present study aimed at determining the effect of teacher qualification and laboratory equipment on student performance in biology SSCE from 2010-2020, using ten selected secondary schools out of fourteen schools in Minna as case study. To this end, this study related these factors to teaching and learning process and the extent to which each affect learner's performance in Biology. The study was a descriptive research of the survey type. Sample consisted of ten randomly selected secondary schools in Minna, Niger State. The instrument was a ten items teachers' and students' questionnaire together with the West African Senior School Certificate Examination (WASSCE) scores of students in Biology between 2010 and 2020. The hypotheses were tested using Chi-square statistical tool. Findings of the study revealed that there was a significant difference between teachers' qualification and students' academic performance; laboratory equipments and students' academic performance. The chi-square calculated values of 50.92 and 50.02 were greater than the critical value of 3.357 at $P=0.05$. This indicates that teachers' qualification and laboratory equipments influence students' academic performance in biology. The study recommends that more qualified biology teachers be recruited to reduce teachers' workload. Adequate provision of laboratory equipment's such as microscopes, stains, preservatives, preservation bottles, chemicals for food tests, wall Charts, models should be provided for effective teaching and learning in public schools.

Keywords: Repositioning, Teachers' qualification, laboratory equipments, students' academic performance and West African Senior School Certificate Examination.

Introduction

Education does not necessarily mean learning only how to read and write. It is rather more than that. Essentially, education which is considered mother of all professions and the basic raw material for all other forms of human and socio-economic development is nothing less than learning to live a healthy and worthy life, and the task of course is not an easy one. As a tri-polar in nature and the cornerstone for which any visionary nation's plan for development is founded upon, education remains the most powerful weapon applied in changing the society for the better.

One of the most important goals of education is for it to be functional and utilitarian,

preparing the individual for life in the community and reforming the society for relevance, adequacy ' and competitiveness in the world. Education is known to be the key to the economic, political, sociological and human resources development and well being of any society. The concept of teacher qualification and laboratory equipment adopted in this write-up is that which can provide those essential requirements for biology students.

Success in some endeavors may depend on a number of factors, and this might also apply to academic success. Teacher's qualification is also a major issue affecting students' performance in biology at senior secondary schools. Akin (2013) opined that qualification of teachers, is one of the factors to be considered when it comes to students' performance in schools. Others are lack of facilities and poor teaching method. The gender sensitivity, cognitive, emotional (attitude), and psychomotor domains of an individual may each play a small but significant role in their academic success. Adodo (2013) suggested that the instructor is one important, predominant component for the academic success of children. In a similar spirit, Ibrahim (2017) thought that teachers' training and experience might significantly contribute to students' good academic accomplishment. Because of this, Ogunniyi *et al.* (2015) asserted that no educational system can outperform the caliber of its instructors, which is probably true. Given the claims made by Ibrahim (2017), Adodo (2013) and Ibukun (2014), it indicates that teachers play a crucial role in ensuring that their pupils are prepared to perform in exams.

Furthermore, Balarabe *et al.* (2019) argued that shortage of qualified teachers is responsible for the poor academic achievement observable among the students while according to Kodi and Kumar (2020), students who are taught by teachers who are more knowledgeable about the subject matter and have more experience also perform better than students who are taught by less knowledgeable but more experienced teachers. A recent examination of education in Nigeria shows that a significant number of the country's teachers lack the necessary effective teaching credentials (Margaret *et al.*, 2021). This showed the level of instruction provided by secondary school instructors in a range of academic topics including biology.

As important as the knowledge of biology is to humans, it appears that students' achievement in this subject at the secondary school level is becoming worse than in other science subjects. Ibe and Maduabum (2001) argued that candidates performance at the Senior School Certificate Examinations (SSCE) conducted by West African Examination Council have consistently remain poor, with biology having the highest enrolments and the poorest results over the years. Looking at the importance of biology to the national development and considering the state of poor academic achievement in this very subject at the secondary school level which incidentally serves as the foundation for advance learning and professional courses in fields such as medicine, pharmacy, nursing and other allied courses, the poor academic achievement observable in the biology results of the students should be a thing of serious concern to any citizen of Nigeria.

Biology is one of the major natural science subjects that is studied in secondary schools. Biology has to do with the study of life and living organisms, including their structures, functions, growth, evolution, distribution, taxonomy, interrelation between living things and their environment with the social implications of what we know about living things. Farah (2011) cited in Omeodu and Abara (2018) observed that with biology, one can study any of the health science courses, become science teachers, laboratory assistant and can conduct research on related fields of botany, zoology among others.

Wada (2010) highlighted the following as objectives of biology curriculum in secondary school:

- i. Good laboratory and field skills in biology
- ii. Meaningful and relevant knowledge in biology
- iii. Ability to apply scientific knowledge to everyday life in matters of personal and community health, and agriculture.
- iv. Reasonable functional scientific attitude and
- v. Emphasis of content and context of the syllabus is placed on field studies, guided-discovery and biology as inquiry.

The curriculum is designed to produce educated individuals, some of whom may not take to the study of biology in their professional careers. The knowledge gotten from biology be it an art or science student will go a long way in helping them in their existence. It is believed that the biology knowledge they acquire in secondary will be of great significance to their education in all ramification. The purpose of education is to develop the knowledge, skills or character of students (Omeodu & Abara, 2018).

Therefore, this research aimed to fill the gap created by previous studies to investigate the influence of school factors on students' performance in senior school certificate biology. This study focused on the biology teachers' qualification and laboratory equipment on biology students' performance in senior school certificate examinations. The primary purpose of this study was to investigate the influence of selected school factors on the senior secondary school students' performance in biology in Minna, the state capital of Niger State.

Statement of the Problem

Statistics from the West African Examination Council has revealed a persistent poor performance in Biology (WAEC Chief Examiner's report from 2010 to 2020). It is surprising that despite the efforts of Niger State government, to improve the standard of education by providing the required human and material resources for the implementation of education at all levels, students' performance in biology in internal and external examination is very poor in recent years. This situation makes one to wonder what could be the causes of this persistent failure of students in biology examination. Some scholars attributed this high failure rate in science and biology to various factors which could be institutional and non-institutional.

Table 1: Performance of Niger State Students in WASCE from 2010 - 2020

Year	Number of Candidates Registered	Number of credits	%	Number of passes	%	Number of fails	%	Passes + fails	%
2010	10296	2178	21.15	3483	33.83	4635	45.02	8,118	78.85
2011	24938	3469	13.91	6528	26.18	14941	59.91	21,469	86.09
2012	27805	1897	6.82	7514	27.02	18394	66.19	25,908	93.18
2013	13712	1544	11.26	3705	27.02	8463	61.72	12,168	88.74
2014	11201	3108	27.75	2803	25.02	5290	47.23	8,093	72.25
2015	3676	1032	28.05	1080	29.36	1567	42.59	2,647	72.01
2016	4093	1078	26.34	1692	41.34	1323	32.32	3,015	73.66
2017	2335	883	37.82	647	27.70	805	34.48	1,452	62.18
2018	1987	958	48.2	532	26.77	497	25.01	1,029	51.79
2019	1758	800	43.34	683	38.85	313	17.81	871	56.66
2020	2083	1032	49.54	511	24.53	540	25.92	1,051	50.46
Total	103,884	17,979	17.31	29,137	28.06	56,768	54.65	85,821	82.61

Source: Niger State Ministry of Education (MOE), Test and measurement Unit, Minna, 2022

Table 1 reported West African Examinations Council (WAEC) Senior School Certificate Examinations (SSCE) Biology Results from 2010 to 2020 and indicated that the percentage of students with high academic achievement (number of credits with grades As, Bs, & Cs) which are admissible into tertiary institutions persistently ranged from 11.26 to 49.54% while the cumulative percentage of students with low academic achievement (number of passes with grades Ds & Es) and the number of students with poor academic achievement (number of fails with grade Fs) which are inadmissible into universities ranged from 50.46 to 93.18%. It is in response to the identified problem that this present study is designed using the Jabareen's (2009) system approach-conceptual framework and Vygotsky's Socio-Constructivist Theory of Learning to examine the efficacy of the effects of Think-Pair-Share Collaborative Learning on Secondary School Students' academic performance in Niger state, Nigeria under the following objectives.

Purpose of the Study

The main purpose of this study was to review the repositioning of teachers' qualification and laboratory equipment on students' academic performance in biology. The research is carried out specifically to:

1. Determine teachers' qualification on students' academic performance in biology.
2. Determine the role of laboratory equipment on students' academic performance in biology.

Research Questions

The following research questions were formed for the study:

1. What is the difference between students' taught by qualified teachers and those taught by unqualified teachers?
2. What is the role of laboratory equipment on students' academic performance in biology?

Null Hypotheses

In similar vein, the following null hypotheses were formulated by the researcher to guide the study.

H₀1: There is no significant difference between teacher qualifications and students' academic performance in biology

H₀2: There is no significant difference of laboratory equipment and students' academic performance in biology

Significance of the Study

The finding of this study if adopted would be useful to students thereby making them active participants and also giving them first-hand experience on practical process. It will expose them to acquire more and relevant skills required for the study of science and science related subjects.

It will also be useful to curriculum planners so they can structure the science (biology) curriculum to bring out the required practical process skills from students. It will also expose students, teachers, parents and relevant bodies to the importance of laboratory in the teaching and learning process.

Methodology

Area of the Study

This study was carried out in Minna area of Niger State. Specifically, the secondary schools in the local government area of the study were used.

There are 14 public secondary schools in the area including four private secondary schools; the researcher based this study on public secondary schools only.

Design of the Study

Descriptive survey design was used for the study. Survey design is research design in which the researcher administers a set of questionnaires to a sample of respondents for the purpose of describing attitudes, opinions, behaviors or characteristics of the population Creswell cited in Omeodu and Abara (2018). Here, the researcher administered a set of questionnaires to the respondents to describe their opinions concerning the qualification of teacher and laboratory equipments on academic performance among biology students.

Population/Sample of the Study

The population for this study includes all the SS II and SS III biology students. In each of the ten (10) schools, twenty (20) students and three (3) biology teachers were randomly selected using the simple random sampling technique. A total of two hundred (200) students and thirty (30) biology teachers were sampled in the ten (10) school which were randomly selected using sampling technique through simple balloting.

Research Instruments

The research instrument for data collection was a questionnaire titled 'the effect of teachers' qualification and laboratory equipment on Biology students' academic performance in Minna Niger State'. The constructed research questionnaire has two main parts; section A and B. Section A measures the personal data of the respondents such as name of school, gender, class etc. while section B contain twenty (10) items which were structured to elicit information on 'the effect of teachers' qualification and laboratory equipment on Biology Students' Academic Performance in Minna, Niger State. The questionnaire has four –point rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD)

SA= 4; A = 3; D = 2; SD = 1

Validation of the Instrument

The instrument was face validated by two experts in Science Education and one Expert in Measurement and Evaluation from School of Science Education, Federal University of Technology, Minna.

Administration of the Instrument

The researcher administered copies of the questionnaire to the respondents, two hundred and thirty (230) copies were administered to the respondents, two hundred (200) were given to students while thirty (30) copies were given to teachers. However, a total of one hundred and ninety eight (198) copies were retrieved from the students while 27 copies were retrieved from the teachers. Therefore, a total of 225 copies were retrieved from the respondents and used for data analysis.

Data Analysis and result

In analyzing the data collected for the study, the chi-square (X^2) formula was used to test the hypothesis.

The formula is presented as thus:

$$X^2 = \sum \frac{(O-E)^2}{E}$$

Where X^2 = chi-square

\sum = Sum of formula

O = observe variables

E = expected variables

Data analysis and discussion of results

All research questions were answered using simple percentage table while the Null Hypothesis were tested using Chi-square statistical technique.

Research question 1

What is the difference between students' taught by qualified teachers and those taught by unqualified teachers?

Table 2: Chi-square Analysis on the Relationship between Teachers' Qualification and Student Academic Performance

S/N	SA+A (%)	D+SD (%)	TOTAL (%)	DF	X ² - Cal	X ² - Crit	Level of sig.	Decision
1.	148	50	198	4	50.92	3.357	0.05	Rejected
2.	135	63	198					
3.	154	44	198					
4.	128	70	198					
5.	183	15	198					
Total	748 (75.6)	242 (24.4)	990 (100)					

Source: Field work 2022

Table 3 revealed that 75.6% of the respondents agreed that students taught by qualified teachers has positive impact on the performance of biology students while 24.4% disagreed. The table also revealed that the X² calculated value of 50.92 is higher than the X² critical value of 3.357 at 0.05 level of significant. The null hypothesis is therefore rejected. This implies that there is a significant relationship between teachers' qualification/experience and students' performance in biology. This finding is in agreement with the finding of Dan and Dominic (2010) examined the number of qualified teachers and relationship to students' academic performance in public secondary school in Nigeria. And instrument titled "Quantity and quality of teachers' and students' performance" was used for the study. Findings of the study showed teachers' qualifications, experience and class size were significantly related to students' academic performance.

Research question 2

What is the role of laboratory equipment on students' academic performance in biology?

Table 3: Chi-square Analysis on the Relationship between Laboratory Equipment and Student Academic Performance

S/N	SA+A (%)	D+SD (%)	TOTAL (%)	DF	X ² Cal	X ² Crit	Level of sig.	Decision
6.	121	77	198	4	50.02	3.357	0.05	Rejected
7.	168	30	198					
8.	143	55	198					
9.	113	85	198					
10.	159	39	198					
Total	704 (71.1)	286 (28.9)	990 (100)					

Source: Field work 2022

The table above shows that 71.1% of the total respondents agreed that laboratory equipments have significant effect on students' performance. This is an indication that practical activities when conducted in a fully equipped laboratory would contribute to the performance of students in biology. This finding agrees with another study which confirmed a strong and positive relationship quality of school facilities and student achievement (Cayubit, 2022). Study have also suggested that the teaching of biology in majority of Nigerian schools is more of theoretical than practical (Margaret *et al.*, 2021). The usual reason given is the unavailability of material and equipment. Table 4 also shows that X² calculated value of 50.02 is higher that X² critical value of 3.357 at 0.05 level of significance. The null hypothesis was therefore rejected while the alternate hypothesis was accepted. This implies that there is a significant difference between laboratory equipment and students' academic performance in biology.

Summary of Findings

From the data analysis above, the following are major findings of the study.

- i. There was significant relationship between teachers' qualification and students' performance in biology.
- ii. There was significant relationship between laboratory equipment and students performance.

Conclusion

Teaching of biology in the senior secondary level of our education system, a course of study in which concepts and principles are presented so as to express the fundamental unity of scientific thought is very germane. To achieve these, roles of teachers are pivotal and indispensable. They give meaning to a nation's education system, however scrupulous such a system may have been prepared. Hence, for any nation to attain its desired growth, development and progress it may aspire for, teachers' welfare and training for competence must be properly taken care of and not to be cheated on. To cheat on the teachers is to cheat the entire education sector. For certain, what affects one affects all.

Recommendations

The researcher recommends thus that, achieving self-reliance in a recessed economy; there is the need for the government and other stakeholders, to have a re-think of attitude on issues of national interest. Education, mother of all professions is being neglected and relegated to the background in the country. Stakeholders in the sector should have to restructure their thinking towards biology education matters for us to have a better Nigeria in the face of the present economic recession.

To this end, increased funding in the sector, recruiting qualified biology teachers and building more laboratory would enhanced good teaching and learning which invariably would translate on the academic performance of biology students' and also have a long term implication on the entire economy of the country.

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