

A Survey on Teacher's Variables Responsible for Student Poor Academic Performance in Biology.

A Case Study of Zaria Educational Zone of Kaduna State, Nigeria.

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Abstract

This research work was undertaken to find out the teacher variables responsible for student poor academic performance in Biology (such variables are teacher qualification and teacher years of experience) in zaria educational zone of kaduna state, Nigeria. It was a survey research work and population for the study consisted of all the Science Teachers in Secondary Schools in Zaria Educational Zone where student performance was obtained from school records. The sample of the population was achieved by simple random (paper ballot) method. The instrument used for data collection was a questionnaire. Two Hypothesis were put forward and tested using Pearson Product Moment Correlation (PPMC). Findings from the study showed that there is relationship between Teachers qualification, teachers year of experience and student academic performance in Biology at $P < 0.001$. Based on the findings, recommendations were made one of which is that Teachers should be encouraged to attend Workshop and conferences. Biology teachers should also be encouraged to further their education.

Keywords: Student, science teachers, academic performance, biology, teacher qualification, teacher experience.

1. Introduction

Success in certain endeavours may be contingent upon certain factors. This may also be true of achievement in schooling. Good achievement in schooling could be a partial contribution of an individual's gender sensitivity, cognitive, affective (attitude) and psychomotor domain (Daramola and Gbore, 2013). Teaching is a way of acquiring knowledge and is useful in the upbringing of the young generations. The quality of education depends on the teacher as reflected in the performance of their duties. Over time student's academic performance in both internal and external exams had been used to determine excellence in teachers and teaching (Ajao, 2001). Teachers have been shown to have an important influence on students' academic achievements and they play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into action and principle based on practice during interaction

with students (Afe, 2001). The teacher is the strong factor joining the peoples and curriculum for effective academic achievement (Darling-Hammond, 2000).

The issue of poor academic performance of students in Nigeria has been of much concern to all and sundry. The problem is so much that it has led to the widely acclaimed fallen standard of education in some state and Nigeria at large (Agharuwhe and Nkechi, 2009). Some of these problems as agreed by educators and critics that most secondary school teachers have an important influence on student academic achievement and they play a crucial role in educational attainment (Afe, 2001).

Considering government huge investment in public education, its output in terms of quality of student has been observed to be unequal with government expenditure. Consequently, upon the observed deterioration in the academic achievement, attitude and values of secondary school students in public secondary school one wonders if the high failure rate and the poor quality of students is not a reflection of the instructional quality in the schools. It is probably for this reason that Ibukun (2009) asserted that no education system can rise above the quality of its teachers. In other words, the effectiveness of teachers in classrooms interaction with the student could be responsible for the observed poor performance of students and the widely acclaimed falling standard of education in Nigeria.

Ajeyalami (2005) opined that the students' poor performance and lack of interest in biology is as a result of lack of qualified teachers and facilities in biology education. If teachers from any other fields are mandated to teach biology in schools, in such cases due to the nature of biology, the trainees will not be able to benefit maximally from the lesson because the teacher is not professionally trained in the mandated field of study. A basic knowledge of biology improves the quality of our domestic life. This is evident in topics like health, hygiene, disease and their control are amongst the topics taught in biology.

1.1 The Role of Teachers in the Preparation of Student towards Examinations

Teachers' role in the preparation of student to succeed in examinations cannot be undermined. In Nigeria, public discussions frequently focus on educational standard. Teachers are role models to the student, because as they act so do the student demonstrate and perfect such act or behaviour. It is very unfortunate that little did many teachers realize that the manner they handle the teaching, behave and interact with the student could produce major effect on student performance. Good achievement in schooling could be the partial contribution of an individual's gender, sensitivity, cognitive, affective (attitude) and psychomotor domain. Adodo (2007) argued that the one key overriding factor for the success of students' academic achievement is the teacher. In same vein, Ibrahim (2000) observed that teacher's qualifications and experience can go a long way to bring about students' high academic achievement. It is probably for this reason Ibukun (2009) stated that no education system can rise above the quality of its teacher.

Adeyemo (2005) notes that teacher characteristic influenced teaching and learning in classrooms. So also, Iyamu (2005) contended that the provision of all these factors may not have significant impacts on successful learning if the learners are not exposed to competent principal teachers and other school teams. Gravestock and Gregor-Greenleaf (2008), states that the explanation for good or poor students' academic performance have been quite exhaustive yet controversy still exists among scholars as to what contribute

singly or jointly to student poor performance. The teacher characteristic was found to be dominant in cross-country studies related to qualification, experience, attitude and personality.

Ibe and Maduabum (2001) argued that candidates' performance at the senior school certificate examination (SSCE) conducted by West African Examination Council have consistently remain poor, with biology having the highest enrolments and the poorest result 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, the poor academic achievement observable in the biology result of the student should be a thing of serious concern to any citizen of Nigeria (Daramola and Gbore, 2013).

1.2 Research Hypothesis

- i. There is no significant relationship between teachers' qualification and students' academic performance in biology.
- ii. There is no significant relationship between teachers' years of experience and students' academic performance in biology.

2. Teachers' Qualification

According to Okoye *et al*, (2008), a qualified teacher is a professionally prepared teacher in content and methods of teaching any of the science subjects (i.e. Biology, physics, and chemistry). They added that a professional university degree Biology teacher is expected to have a B.sc. in education with biology as the major subject of specialization, or B.sc. (Hons) Biology with a post-graduate Diploma in education (P.G.D.E.) and Nigerian certificate of education (N.C.E.) with biology in combination with any other science subjects (Chemistry, Mathematics and Physics). Teacher quality matters, in fact, it is the most important school related factor influencing student performance. Teachers' effectiveness in a subject may be prime determinant of student performance in the subject. Ineffective teaching in secondary schools arises probably from the quality of teachers recruited to teach science (Daramola and Gbore, 2013). In many secondary schools science subjects are taught by people who are neither interested nor qualified in teaching the subject. For instance, undesirable situation showed engineers teaching mathematics and physics, biochemist teaching chemistry and microbiologist and Agricultural scientist teaching biology. In this kind of situation, student may end up disillusioned hence leading to poor academic performance. Usman (2003) seems to have proved the observation of Ademulegun (2001) right by showing that a significant difference exists in the achievement of the student taught by professionally trained and non-professionally trained teachers in the art of teaching biology. Ayodele (2004) found a positive relationship between teachers' qualification and student academic achievement. Adepoju (2002) reported that a significant relationship exist between variable such as gender, area of specialization, possession of academic qualification in education and learning outcomes of secondary school students. Also Nyikana (2002) found out that inadequate qualifications of teachers contributed to students' repetition of a class. Owoeye and Yara (2011) concluded that there is a significant correlation between teacher qualification in biology and pupils' performance in Kenya. The good performance was attributed to excellent instructions given by qualified teacher in addition to other input.

Ruthland and Bremer (2002) refer to teacher in two ways; traditional and alternative qualification routes. Traditional certification is when an individual complete an undergraduate degree or post graduate program in education. Alternative route of certification are based on coursework in pedagogy and subject area without a degree in education. Maundu (1986) establishes that teachers who had graduated from science teachers' college were more practically oriented than those who had degrees from public universities. Several studies report a positive relationship between teacher's preparation in the subject matter they teach and student achievement (Goldhaber and Brewer, 2000). Similarly, Monk (1994) finds both positive and negative effects of teachers in field preparation on student achievement.

2.1 Teachers' Year of Experience

According to the National policy on education (2006), no educational system can rise above the quality of its teachers regarding the professional preparation of teachers and those associated with teaching and learning process outcomes. These days, the teachers have little or no training experience. Illugbusi *et al.* (2007) shows that teachers' experience exerts a great influence on the academic performance of students and teaching experience in schools count significantly in the determination of students' achievement in external examinations such as West African Senior School Certificate Examination, National Examination Council (NECO) and National Business and Technical Education Examination. Rivers and Sanders (2002) suggest that teachers' effectiveness increases dramatically each year during the first ten years of teaching. In the extreme cases, Clotfelter *et al.* (2007) found evidence of growing teacher effectiveness out to 20 or more years in analysis of North Carolina teacher data; although more than half of the gains in teacher effectiveness occurred during the first few years of teaching. Also, Omenyi (1994) found that a significant difference exists between the performance ratings of inexperienced biology teachers and those of experienced teachers with the mean performance of experienced teachers being almost a factor of two larger than inexperienced teachers. Gibbon *et al.* (1997) reported a significant relationship between teachers' experience and student academic performance since student taught by more experienced teachers achieved at a higher level due to the fact that the experienced teacher have mastered the subject content and acquired cumulated classroom management skills and strategies to handle and cope with different classroom problems.

2.2 Teacher Attitude - Student Attitude

The word attitude has been variously defined by many educators and scholars. Abonu (2000), in his work attitude of teachers and student toward social studies in selected junior secondary schools in Benue state mentioned that attitude relates to tenderness to accept or reject particular group of individual and set of ideas or social institutions.

Mukherjee (2002), described attitude as "one's feelings, thought and predisposition to behave in some particular manner towards some aspects of environment. Attitude, by nature are said to be difficult to identify and measure as cited by Abonu (2000), the value an individual put on an event, knowledge or object and subsequent use of it depends to some extent on his attitude of it.

Various research findings on teachers and student attitude towards teaching and learning biology are inconsistent. Research have indicated that teachers' attitude have exerted some influence on the academic achievement of student. Yara (2009) reported that teachers' attitude towards science (biology) has strong relationship with student academic performance as well as student attitude towards science. In a similar study Adodo (2005) revealed that teachers' attitude towards integrated science teaching influence student attitude toward learning integrated science and achievement in the subject. Also, Ogunwuyi (2000) reported a significant relationship between teachers' attitude and students' attitude in student academic performance in integrated science. Duyilemi (1996) argued that some science teachers show positive attitude toward teaching the science subject while some exhibit negative attitude toward teaching the subject. Adesoyi and Olatunbosun (2008) illustrated that students' attitude was related to teachers' characteristics. This therefore, meant that teacher attitude directly affected student attitude. Ali and Aigbomian (1990) have argued that the extent a student prefer a subject to that extent the student works hard to achieve in it. A close examination of the submission of Ekwesseli (2006) revealed that academic achievement may be dependent upon positive attitude from the teachers and the student in the teaching and learning.

2.3 Adequate Instructional Materials or Laboratories

Experimentation is essential for effective learning. In many countries, the value of experimenting is undisputed. Most of the secondary schools in Nigeria lack teaching equipment especially laboratory equipment for effective teaching of biology (Ovansa *et al.*, 2013).

Science is different from other disciplines by its processes which are: observation, problem identification, prediction, classification, measurement, analysis, experimentation etc. Although laboratory work is recommended for the teaching of biology in school curriculum, laboratory or field experimentations are neglected because of lack of laboratory equipment. Hence, biology teachers use the traditional teaching method of talk-chalk method to pass information to their student. Many research works have been carried out on the implication of practical in the learning and teaching of biology. Biology comes alive when students are engaged in practical work (Ango, 2002). Practical activities helps student to get greater understanding of biology.

Scientists and researchers like Oyekan (1999) saw science and technology as basic tools for industrial and national development. As people think about the teaching and learning of science and technology in a country like Nigeria. Laboratory work is indispensable to the understanding of science (Ottader and Grelsson, 2006)

Mgba (1974) states that student understand biology better when teacher supplement his teaching with appropriate teaching aids. Provision of teaching aids and facilities to stimulate student interest is necessary for better academic performance in biology. On the view of Ajaja (2005) in order that the social value of biology to be exploited fully as possible, ideas and social phenomenon must be made clear through the use of biological techniques in the teaching of the subject.

Ajileye (2006) noted that insufficient resources for the teaching and learning of science subjects at secondary school level constitute a major cause of student under performance. Onuoha (1997) also identified that poor practical orientation will lead to poor understanding of theory. Ukwuma (1990) in his

investigation of factors that impair science education confirmed that over 80% of failure in science and technology are due to the inability of students to perform well in practical. Ogunbiyi (1986) investigated that many secondary school students are unfamiliar with more than half of laboratory apparatus and are unable to know in what experiment they are used. Ike (1977), while emphasizing on the importance of a well-equipped laboratory stated that “it will be difficult if not impossible for a carpenter to perform without his ideal tools”.

West African Examination Council (WAEC) international final Award committee (1985) has also identified overcrowding in the classrooms as a contributory factor on the academic performance of students. This even applies much more to the science where our laboratories are overcrowded as students do not have access to learning basic experimental skills as such most of the experiments are by teacher demonstration. So, lack of laboratory work as a result of unavailability of laboratory equipments may affect academic performance of students negatively.

3. Methodology

A survey research work was conducted with a population that consisted of all biology teachers in senior secondary schools and SS III biology student in the secondary schools.

3.1 Sample and Sampling Procedure

Five secondary schools were randomly selected from the target population which were used as the sample for the study.

3.2 Administration of Instrumentation

The instrument used for the collection of data in this study was a structured questionnaire administered to sought background information about the respondent, the class they teach, teaching qualification, and teaching year of experience of the respondent while Student academic performance was obtained from school record. The questionnaire was personally given hand to hand to respondent in all the schools. This is to ensure a large percentage of return.

3.4 Data Analysis

The reliability of the instrument was determined using Pearson product correlation coefficient (PPMC) statistic and the data was analysed using Statistical Package for Social Sciences (SPSS) for Windows version 19.

4. Results

Association between the variable (teachers academic qualification and students' performance in biology as well as teachers year of experience and student performance in biology) was assessed using chi-square with level of significance set at 0.05 (i.e. $p < 0.05$) as presented in the Tables.

From Table 1, it was observed that out of 1852 SS III biology student of class 2008, 757 passed (40.9%) while 1095 (59.1%) failed.

Tables 1. Number of passes and failures in 2008 for 1852 student.

School	Number of student	High (pass)	Fail (poor)
2	670	69	601
3	330	199	131
4	281	257	24
5	481	143	338
Total	1852	757	1095
%		40.9%	59.1%

From table 2 it was observed that out of 2189 student of SS III biology class of 2009 952 passed, while 1237 failed.

Tables 2. Number of passes and failures in 2009 SSIII Biology Examination for 2189 student

School	Number of student	high (pass)	fail(poor)
1	202	102	100
2	738	113	625
3	390	287	103
4	275	203	72
5	584	247	337
Total	2189	952	1237
%		43.5%	56.5%

From table 3 it was observed that, out of 2342 students of SS III biology class of 2010, 1014 passed while 1328 failed.

Table 3. Number of passes and failure in 2010 SS III biology Examination for 2342 student

School	Number of student	high (pass)	fail (poor)
1	195	183	12
2	712	187	525
3	293	150	143

4	150	113	37
5	992	181	611
Total	2324	1014	1328
%	43.7%	56.7%	

When the performances of the 3 years were compared in table (4), it was observed that in all causes the percentage fail was high. This gives the fact that in all the 3years under study, the percentage fail was above 50%.

Table 4. Summary of passes and failure in Biology Examination Between 2008-2010

Year	High (pass)	Fail (poor)
2008	757(40.9%)	1085(59.1%)
2009	952(43.5%)	1237(56.5%)
2010	1014(43.3%)	1328(56.7%)

It was observed from table 5 that the majority of the teachers in these sampled schools are Bachelor degree holders.

Table 5. Teachers Academic Qualifications

School	Year	No of student	Teachers Qualification
1	2008	90	B.Sc (Ed) Biology
	2009	202	N.C.E Biology
	2010	195	B.Sc (Ed) Biology
2	2008	670	N.C.E Bio/Chemistry
	2009	738	B.Sc (Ed) Biology
	2010	712	B.Sc Biology
3	2008	330	B.Sc Zoology
	2009	390	N.C.E Biology
	2010	293	B.Sc Biology
4	2008	281	B.Sc Biology
	2009	275	B.Sc (Ed) Biology
	2010	150	B.Sc Botany
5	2008	481	B. Sc Biolohy

2009	584	B. Ed Biology
2010	992	B. Ed Biology

It was observed from Table 6 that the majority of the teachers in the sampled school have 6-10 years of experience.

Table 6 Teachers Year of Experience

School	1- 5 years	6- 10 years	Above 10 years
1	-	3	-
2	-	-	3
3	-	2	1
4	2	1	1
5	-	2	-

HO I: - There is no significant relationship between teachers' qualification and students' academic performance.

Table 7. Chi-Square Presentation of Teachers' Qualification in Relation to Students Academic Performance (2008-2010)

TEACHER QUALIFICATION	OBSERVED			PERCENT AGE		EXPECTED		(O - E)		(O - E) ²		X ²		
	PAS S	FAI L	TOTA L	PAS S (%)	FAI L (%)	PASS	FAIL	PAS S	FAI L	PASS	FAIL			
NCE (Bio)	458	804	1262	36.3	63.7	538.4	723.6	-80.4	80.4	6459.596	6459.596	11.998396	8.9266758	
B.Sc (Ed)	1216	1658	2874	42.3	57.7	1226.1	1647.9	-10.1	10.1	101.08077	101.08077	0.082444	0.0613374	
B.Sc Bio	737	1030	1767	41.7	58.3	753.8	1013.2	-16.8	16.8	282.42743	282.42743	0.3746688	0.2787495	
B.Sc Bot	113	37	150	75.3	24.7	64.0	86.0	49.0	-49.0	2401.952	2401.952	37.536197	27.92652	
B.Sc Zoo	199	131	330	60.3	39.7	140.8	189.2	58.2	-58.2	3389.7278	3389.7278	24.078426	17.914086	
TOTAL	2723	3660	6383									74.070132	55.107369	129.1775

KEY: Bio- Biology, Bot- Botany, Zoo- Zoology, Ed- Education, B. Sc- Bachelor of Science, NCE- Nigeria Certificate of Education

Table 8. Chi-Square Paired Sample Test of Teachers' Qualification

Paired Samples Test

	Paired Differences		X ²	Df	Sig. (2-tailed)
	Grand Total	P			
Teachers - qualification	6383.000	0.001	129.178	5	.063

Results in Table 7 revealed that the relationship between teachers' academic qualification and student performance in biology over the three years (2008-2010) under consideration was discovered to have

significant association ($\chi^2 = 129.178$, $df = 5$, $p < 0.001$). Out of the 6383 students enrolled for this study, 2874 were taught by teachers with B.Sc (Ed) Biology and 1216 (42.3%) of them passed biology while 1658 (57.7%) failed the subject. The highest percentage of pass 113 (75.3%) was recorded by student (150) who were taught by teachers who had B.Sc (Botany). One hundred and ninety nine, 199 (60.3%) out of 330 student were taught by teachers that had B.Sc (Zoology). The least level of pass, 458 (36.3%) out of 1262 student was among student that were taught by NCE holders. In this regard teachers' qualification influences student performance.

HO II: there is no significant relationship between teachers year of experience and student academic performance.

Table 9. Chi-Square Presentation of Teachers' Teaching Experience in Relation to Students' Academic Performance.

S	OBSERVED				PERCENTAGE			EXPECTED			(O - E)			(O - E) ²		
	(1-5)yrs	(6-10)yrs	(11-15)yrs	TOTAL	(1-5)yrs%	(6-10)yrs%	(11-15)yrs%	(1-5)yrs	(6-10)yrs	(11-15)yrs	(1-5)yrs	(6-10)yrs	(11-15)yrs	(6-10)yrs	(11-15)yrs	
A	0	2	0	2	0.0	100.0	0.0	0.3	1.1	0.6	-0.3	0.9	-0.6	0.1	0.765625	0.390625
B	0	0	3	3	0.0	0.0	100.0	0.4	1.7	0.9	-0.4	-1.7	2.1	0.1	2.8476563	4.2539063
C	0	3	1	4	0.0	75.0	25.0	0.5	2.3	1.3	-0.5	0.8	-0.3	0.3	0.5625	0.0625
D	2	3	1	6	33.3	50.0	16.7	0.8	3.4	1.9	1.3	-0.4	-0.9	1.6	0.140625	0.765625
E	0	1	0	1	0.0	100.0	0.0	0.1	0.6	0.3	-0.1	0.4	-0.3	0.0	0.1914063	0.0976563
TOTAL	2	9	5	16	12.5	56.3	31.3									3

Table 10. Chi-Square Paired Sample Test of Teachers' Teaching Experience in Relation to Students' Academic Performance

	Paired Differences		X ²	df	Sig. (2-tailed)
	Grand Total	P			
Teachers – year of experience	16.00	0.001	12.267	2	.071

Table 9 presents the record of the association between teachers' years of teaching experience and students' performance in biology tested using chi-square. The assessment revealed that there was a significant association ($\chi^2 = 966,489$, $df = 2$, $p < 0.001$) between teachers' years of experience which increases as students' performance in biology increases. Student who were taught by teachers that had teaching experience of above 10years had 67.3% passes followed by 48.6% out of 2763 who were taught by teachers with 6-10years of teaching experience and the least was 17.4% out of 2120 students taught by teachers with teaching experience of 1-5years.

5. Discussion

Table 4 shows the summary of students' academic performance in biology in the sampled secondary schools for three (3) years where the percentage fail was higher than that of the percentage pass; 59.1% to 40.9% in 2008, 56.5% to 43.5% in 2009 and 56.7% to 43.3% in 2010 respectively. This confirms the finding of Akinsolu (2010), Adeoye (1983) and Ajayi (2003) on the quality of students' performance in West Africa senior school certificate examination (WASSEC) where only half of the candidates present for the examination had ample opportunity of gaining admission into institution of higher learning.

Table 5 revealed that the majority of the teachers in these sampled schools are B. Sc holders. This showed that Zaria educational zone public secondary schools teaching personnel are in accordance with the ESA report of 2005 that stated that the majority of teachers in Nigerian secondary schools should be bachelors and master degree holders.

Table 7 revealed that there was a positive relationship between teachers' qualification and students' academic performance in biology. This finding confirms that of Darling-Hammond (2000), Egungun (1992) and Iyamu (2005) assertion that qualitative education is a function of quality and quantity of teaching personnel within a system. The finding points out that "No educational System can rise above the quality of teachers in the system" as stated in the National policy of Education (FGN, 2006)

On the issue of teachers' years of experience in the selected public secondary schools in Zaria educational Zone, Table 9 shows that as teacher's years of experience increases, so does students' performance in biology increase, with the highest academic performance recorded with teachers that have experience of above 10years followed by teachers with teaching experience of 6-10years and the least was teachers with teaching experience of 1-5years. These findings indicated that teachers' years of experience is a measure of quality and this become imperative in the achievement of students' academic performance which showed a significant relationship between teachers' years of experience and students' academic performance. This finding confirms with those of Owolabi (2007) and Darling-Hammond (2000) who agreed that teachers' years of experience as a measure of quality is important in the achievement of students' academic performance. It also supports those who advocate that experienced teachers need to be retained in schools if higher productivity is to be obtained because learners achieve more from these teachers.

6. Conclusion

The findings of this research showed significant relationship between teachers' qualification (quality) and teachers' teaching years of experience (professionalism) in relation to students' academic performance in Biology in Zaria public secondary schools which means that teachers' competency and adequacy is important for attainment of educational goals and objectives.

Finally, even though qualification and experience of the teaching personnel affect students' performance, there are also other contributing factors, such as availability of laboratory equipment, poor conduction of Biology practical, lack of exposure to external environment such as zoo, field trips and also teachers and student attitude toward teaching and learning of Biology.

7. References

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