TEACHERS' CHARACTERISTICS AND SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY

Akuche, Ukamaka Evelyn & Babatunde, I. R.
Faculty of Arts and Education
Lead City University, Ibadan, Nigeria

Abstract
This study investigated the influence of Teachers' characteristics on students' academic achievement in Biology, in Ibadan, Oyo State Nigeria. Descriptive survey research design was used in this study. All secondary school Biology teachers and Biology students in Ibadan metropolis formed the population of the study. Random sampling technique was used for selecting 200 Biology teachers and 200 Biology students from randomly selected schools. Expert judgments were used to ensure face and content validity of the instruments. The reliability coefficients of the instruments were 0.78 and 0.83 for Teachers' Questionnaire and Biology Achievement Test respectively using test re-test method and cronbach alpha. Data were analysed using percentages, multiple regression and analysis of variance (ANOVA) at 0.5 level of significance. The result showed that teachers' characteristics significantly influenced students' academic achievement ($F=31.851$, $P<0.05$). It was therefore recommended that a proper teacher education reform that will concentrate on the standards a teacher must possess before teaching or going into teaching profession be enforced.

Keywords: Teachers' characteristics, academic achievement, Biology

Introduction

Science can exert a dominant, if not decisive influence on the life of individuals as well as in the developmental effort of a nation. The enviable position which science education systems of most countries of the world, including Nigeria is responsible for the prime position that has been accorded to Biology worldwide.

Biology has been identified as a very important school subject and its importance in scientific and technological development of any nation has been widely reported. It was as a result of the recognition given to Biology in the development of the individual and the nation

that it is made a core-subject among the natural sciences and other science-related courses in the Nigerian education system. Its inclusion as a core subject in science in the secondary schools calls for the need to teach it effectively. This is because effective science teaching can lead to the attainment of scientific and technological greatness.

Biology teaching can be result-oriented when students are willing to learn, teachers favourably disposed to teach and learning made enjoyable for students. With the current increase in scientific knowledge all over the world, much demand is placed and emphasis laid on the teacher. The educational analysis carried out in Nigeria by the National Economic Empowerment and Development Strategy (NEEDS, 2005) indicated that more than forty-nine percent (49%) of the teachers in Nigeria are unqualified. This revealed the quality of teachers teaching various school subjects in our secondary schools, and Biology teachers would probably be among the said forty-nine percent

Teacher's qualification (TQ), Teacher's Gender (TG) and Teacher's years of experience may be responsible for the downward trend in achievement observed in the Biology results of students. The achievement of students in Biology is reported to be majorly influenced by their teachers' years of experience. Kile 2003), defined teaching experience as all activities undertaken by the teacher in his pre- and post-teacher training exercise. It includes participation in professional development activities geared towards equipping the teacher for better service delivery. This aspect of teacher characteristics has not been given adequate attention because it is a general belief that any one that can talk convincingly will do well as a teacher, not minding if he or she has experience in pedagogy. However, Omotayo (2014) found a positive correlation between teacher's experience and students' learning outcomes.

Imogie and Johnson (2008) identified some areas of teacher experience such as pedagogical studies, content studies, instructional technology, and post-teaching training, among others. Recent studies show that a teacher with both content knowledge and instructional ability achieves a higher percentage of students' learning outcomes than teachers without such experience.

Another factor that may have causal influence on students' academic achievement is teacher's gender. In his contribution, Cochran (2005) claimed that teachers are among the most, if not the most

significant factors in children's learning. The question is 'what aspects of the teacher exactly have meaning with respect to the students' learning outcome?' Aelterman (2007) claimed that so far clear differences exist between male and female teachers. On the other hand, Li (2009) found that teaching is imbued with gender. Some other researchers found that a teacher's gender does have some influence over students' academic achievement.

How and to what extent a teacher's gender can affect the students' learning process will also depend on a series of relationships, which may include a student's age, cultural characteristics and other social conditions that vary from culture to culture. Studies have shown that students' motivational orientations typically change with age (Cochran, 2005). In the early primary grades, teachers would likely be the targets of students' emotional projections. During adolescence, however, students are more likely to distance themselves from teachers and other adults, that is, their own parents inclusive. The influence of a teacher's gender can therefore develop differently in secondary school (16-19 year-olds) than it does in primary school (6-12 year olds).

Statement of the Problem

The hues and cries about students' academic achievement in secondary school certificate examinations is becoming alarming. The degree of failure in science subjects (Biology inclusive) is giving the general public a serious concern. There is a persistent decline in the academic achievement of secondary school students and instead of looking into the general and specific causes of declines, some, most of the time castigate the school related factors especially those that are teacher related. A functional education system, however depends on the adequacy of some indispensable teacher characteristics. This study therefore examined the influence of teachers' characteristics – qualification, years of experience and gender on the academic achievement in Biology of some selected schools in Ibadan metropolis, Oyo State.

Research Questions

i. What are the perceived characteristics that can influence the teaching of Biology in the selected schools?

Research Hypotheses

Ho_1 There is no significant influence of teacher characteristics on students' achievement in Biology.

Ho_2 There is no significant gender difference on students' academic achievement in Biology.

Methods: This study employed the descriptive survey design.

Population, sample & Sampling technique: The population comprised all teachers teaching Biology within Ibadan metropolis, south west, Nigeria. Seven (7) local government areas were randomly selected from eleven local government areas in Ibadan metropolis. Twenty (20) schools were randomly selected from the selected Local Government Areas. A total of 10 Biology teachers were randomly selected from each selected school. This makes the total number 200.

Research Instruments: Two research instruments designed by the researchers were used for this research work. They were:

(i) Biology Achievement Test (BAT)- This is an achievement test given to senior secondary two students.

(ii) Teachers' Questionnaire (TQ) – This is questionnaire given to Biology teachers in senior secondary schools. Section A sought demographic information about the respondents. Section B contains questions that investigated the teachers' characteristics namely teachers' qualification, teachers' years of experience and the teachers' gender.

Validity & Reliability of the Instruments: Some Biology specialists were given the instrument to ascertain the content and face validity. Cronbach Alpha test and Test re-test method were used to ascertain the reliability of Teachers' Questionnaire (TQ) and Biology Achievement Test (BAT). They were found to be 0.78 and 0.83 respectively.

Method of Data Analysis: Data were analysed using percentages, multiple regression and Analysis of Variance (ANOVA).

Result Question 1: What are the perceived teacher characteristics that can influence the teaching of Biology in the selected schools?

Table 1: Teachers' Qualification (A)

Teacher's qualification	Strongly agree		Agree		Disagree			Strongly disagree
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Teacher's qualification has much effect on student's academic achievement	190	95.0	8	4.0	2	1.0	0	0
Teachers with NCE certificate perform much better than those with B.Ed. certificate	7	3.5	11	5.5	51	25.5	13.1	65.5
A qualified teacher should have good subject mastery of the content he/she is teaching	187	93.5	10	5.0	1	.5	2	1.0
Once an individual completes an undergraduate degree or post graduate programme in education he/she is qualified to be a teacher	150	75.0	41	20.5	8	4.0	1	.5
It is believed	16	8.0	4	2.0	14	7.0	166	83.0

that teachers with B.Sc. in Microbiology can perform better than teacher with B.Ed. in Biology								
Science is not static, therefore teachers qualification should not be static rather it should be upgrading to meet up with trends	146	73.0	39	19.5	2	1.0	13	6.5
For a teacher to be qualified to teach Biology he/she must have done two to three researches in science education.	137	68.5	52	26.0	8	4.0	3	1.5

Source: Field survey, June 2015

The qualification of teachers teaching a subject is very important in this study. 95% of the sampled teachers alluded to this. About 91% disagreed with the statement that teachers with NCE certificate perform much better than those with B.Ed. certificate. This affirms the findings of Mallise (2006) which stated that it is a must for a teacher to have good academic degrees such as Bachelors, Master's, Doctorate and others but not two years qualifications such as Diploma, etcetera.

Furthermore, the mastery and grasp of a teacher on a subject-matter is a function of his/her qualification, 93% of the teachers agreed to this.

The finding also showed that teachers that studied education with Biology (B.Ed. Biology) would perform better in teaching than

those with B.Sc. qualification alone. This is in accordance to the findings of Festus (2001) which asserted that teachers that study education with Biology (i.e. B.Ed. Biology) or other science related courses stand better chance of performing better than those with ordinary B.Sc. qualification because of the orientation and training that they have received during their years of study in colleges of education and universities.

Respondents also largely agreed and opined that in order to be continuously relevant, teachers need to continue to build on their experiences through trainings and higher degrees as well as conducting researches relevant to their field.

Table 2: Teachers' Years of Experience (B)

Teacher's Experience	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq uency	%	Freq uency	%	Freq uency	%	Frequency	%
Teacher's years of experience has much effect on the academic achievements of students in Biology.	174	87.0	15	7.5	5	2.5	5	2.5
Experience has nothing to do with academic achievements of students	19	9.5	8	4.0	16	8.0	15	78.0
Experienced teachers are considered to be more able to concentrate on the most appropriate	160	80.0	7	3.5	4	2.0	28	14.0

way to teach particular topics to students who differ in their abilities, prior knowledge and backgrounds.								
The more the teachers know about students, the better the teachers can connect with them and the more likely they will be able to benefit from the teachers' experience in reconstructing their world.	178	89.0	10	5.0	2	1.0	9	4.5
An effective teacher is better than an experienced teacher.	28	14.0	8	4.0	47	23.5	11	58.0
The more the experience of a teacher is, the more the rate of his/her subject mastery will be.	176	88.0	3	1.5	4	2.0	16	8.0
Experience determines effectiveness in teaching.	179	89.5	8	4.0	6	3.0	6	3.0

Source: Field survey, June 2015

87% of the teachers strongly agreed that teachers' years of experience has much influence on the academic achievement of Biology students. This is in accordance with Festus (2006) who opined that the more frequent one engages in an activity, the better one becomes in that activity.

89% of the teachers believe that the more the experience of a teacher is, the more the rate of his/her subject mastery will be. This finding matches the assertion of Gibbons (2007) which observed that most students taught by more experienced teachers achieve at a higher level, because the teachers have mastered the content and acquired classroom management skills to deal with different types of classroom problems.

Also, 78% of the teachers affirmed that teachers' experience has everything to do with academic achievement of the students. The sampled teachers also believe that experienced teachers are considered to be more able to concentrate on the most appropriate way to teach taking cognizance of students' abilities, prior knowledge and background.

80% strongly agreed, while 14% disagreed. On the basis of experience and effectiveness, 3.0% of the teachers disagreed that effectiveness of the teachers counts more than experience while 89% agreed to this. This is against the background that experience is said to determine effectiveness in teaching. This result is in accordance with the findings of Clotfelter (2007) who found evidence of growing teacher effectiveness in the analyses of North Carolina teacher data.

Table 3: Descriptive Statistics on Teachers' Gender (C)

Teacher's Gender	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq uency	%	Freq uency	%	Freq uency	%	Frequency	%
Teachers' gender has significant effect on the academic achievement of students in Biology.	69	34.5	4	2.0	79	39.5	47	23.5

Students taught by male teachers achieve higher than those taught by female teachers.	25	12.5	9	4.5	114	57.0	51	25.5
Students that are taught by male teachers performed significantly better than those taught by their female counterparts.	30	15.0	5	2.5	121	60.5	43	21.5
School girls areseducers, so they should be taught by female teachers only.	30	15.0	20	10.0	105	52.5	44	22.0
It is believed that male teachers teach better than female teachers.	52	26.0	67	33.5	38	19.0	42	21.0
Distraction is inevitable when female teacher teaches male students	118	59.0	51	25.5	17	8.5	13	6.5
The age of the students should determine the gender of the teacher that will be teaching them	162	81.0	4	2.0	10	5.0	23	11.5

Source: field survey, 2015

Opinions were slightly different on the idea that gender has significant effect on the academic achievement of students in Biology. About 35% of the teachers sampled agreed with this, while 63% disagreed/strongly disagreed with it. The teachers affirmed negatively also, though without any obvious reasons, that when students are taught Biology by only male teachers, they perform alot better than when taught by female teachers; about 82% disagreed with this. This result correlates

with the experiment carried out in Germany in 2006 on the effect of gender difference on students' academic performance in the first three years in college (Hutchings, 2008). At the end of the experiment, he noticed that male teachers had the zeal to teach more than the female teachers.

Teachers also largely disagreed that only female teachers should teach female students since these female students are thought to be seductive, about 75% disagreed while about 25% agreed. On the other hand, teachers felt that distractions will be more when female teachers teach male students. About 85% of the teachers agreed/strongly agreed with this while 14% disagreed. This is at variance with the findings of Cochran (2003) which showed that a well composed teacher in terms of dressing, either male or female will teach successfully without distractions. The age of the students being taught was also seen as a major factor that determines the gender of the teacher that teaches Biology.

Testing of Research Hypotheses

H_{01} There is no significant influence of teacher characteristics on students' achievement in Biology

Table 4: Table of Relationship between Teacher Characteristics and the Dependent variable

Model	Sum of Squares	Df	Mean Square	F	Sig	R	R Square
Regression	16.103	3	5.368	31.851	.000[b]	.573[a]	.329
on							
Residual	32.862	195	.169				
Total	48.965	198					

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
(Constant)	2.881	.367		7.848	.000
Teachers' Qualification	-.119	.019	-.415	-6.289	.000
Teachers' Years of Experience	.047	.018	.161	2.663	.008
Teachers' Gender	-.021	.007	-.181	-2.823	.005

The test shows that teachers' qualification teachers' years of experience and teachers' gender have significant influence on students' academic achievement. The coefficient of correlation was 0.573 indicating that a moderately strong relationship exists between Teachers' Characteristics and students' academic achievement. This shows that the better the teachers' characteristics, the better the academic achievement and vice versa. Furthermore, the trio accounts for about 32.9% of the relationship.

On the basis of their independent influence, the F result of 31.851, P: 0.000<0.05 shows their influence was independent and it is significant as it is buttressed by the measure of the individual contribution of the three independent variables.

The null hypothesis which says that there is no significant influence of teachers' characteristics on students' achievement was rejected. According to Fafunwa (2003) the only predictor of students' high academic achievements in various school subjects is the teacher's characteristics.

H_{02} There is no significant gender difference on students' academic achievement in Biology

Table 5: Teacher's gender and academic achievement in Biology

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	.263	1	.263	1.065	.303
Within Groups	48.892	198	.247		
Total	49.155	199			

Tested with analysis of variance, the result shows that there is no significant gender difference on students' academic achievement in Biology with an F value of 1.065, p:0.303 > 0.05 at a degree of freedom of 1:198. This implies that the gender of the Biology teacher is not significant in determining the performance of students, hence the null hypothesis is upheld. This finding is at variance with the findings of Afolabi (2007) who claimed that teachers' gender has significant effect on the performance of students in science.

Discussion

The results of this study indicated the importance of the qualification of teachers. Not only is the qualification important but having the right qualification as well. Fully prepared and certified teachers are more successful with students than teachers without this preparation (Wilson, 2005). It is not enough to teach Biology in secondary schools with a B.Sc. degree in Biology without B.Ed. Educational aspect of the degree is very important for one to be better qualified to impact knowledge. This conforms with the study of Mallise (2006), who discovered that teachers who had graduated from Kenya Science Teachers College were more practically oriented than those who had degrees from public universities. This was attributed to by the excellent instructions given by qualified teachers in addition to other inputs.

The study showed that the experienced teachers play significant roles in the achievement of students in Biology. This corroborates the finding of Gibbons (2007), who discovered that experienced teachers have a richer background of experience to draw from and can contribute insight and ideas to the course of teaching and learning than inexperienced teachers. Also the study agreed with Omotayo (2014) and Bangbade (2004) who confirmed that teachers attribute (teachers' qualification and experience) and students' academic performances are positively related. Teachers attributes in the first instance influences his/her performance which in turn enhance students' performance (Omotayo, 2014). The study revealed that these teachers with years of experience in the profession, especially in science subjects turned out students with higher academic performance.

Summary

The results of the study revealed that the qualifications of teachers matter very well if the best is to be seen in any subject. It is however not enough for the teacher to have a degree. Having the right one is vital. For instance, it is not enough to have a B.Sc in Biology as a teacher. This is because the educational aspect of the degree is important. Those with B.Ed are therefore adjudged to be better qualified to impart knowledge.

The level of experience possessed by teachers was also discovered to play a significant role in the achievement of students offering Biology. Students taught by more experienced teachers achieve a higher level of knowledge because their teachers have mastered the content and have acquired the classroom management skills to deal with different types of classroom problems.

Conclusion

Teachers' characteristics have not been given adequate attention because it is a general belief that any one that can talk convincingly will do well as a teacher, not minding if he/she has experience in pedagogy. Teachers' years of experience as revealed by earlier studies turned out students with high academic achievement because experienced teachers are able to harmonize the minds and emotions of their students in class (Imogie, 2008). He opined that teachers with both content knowledge and instructional ability achieve higher percentage of students' outcome than teachers without such experience. Seeing that teachers are among the most, if not the most, significant factors in children learning, teachers' interest should be paramount so that the desired learning outcomes would be achieved maximally in our students.

Recommendation

Teachers qualifications are considered to be related to students' learning, so teachers' qualification should be a significant target for teacher education reform. Some of these reforms call for the professionalization of teacher education by making it longer, upgrading it to graduate programmes and regulating it through the mechanisms of licensure, certification, and promotion aligned with standards, in all secondary schools in Ibadan and in Nigeria as a whole.

References

Aelterman, R.N. (2007). Attitudes towards Biology and its effects on students' achievement. *International Journal of Biology,* 3(4), 100-104.

Afolabi, A. (2007). Teacher efficacy, capturing an elusive construct. *Teaching and Teacher Education,* 117, 788-805.

Babatunde, I.R. (2015). Influence of teacher characteristics and school environmental factors on students' academic achievement in Biology in Ibadan Metropolis, Oyo State:*A B.Ed project* submitted to Faculty of Art and Education, Lead City University, Ibadan.

Bangbade, J.O.(2004). Effect of subject matter knowledge on the teaching and learning of Biology and Physics. *Teacher and Teacher Education*, 4(3): 109-102.

Cloffelter F.O. (2007). Teachers' characteristics as predictor of academic performance of students in secondary schools in Osun State – Nigeria. *European Journal of Educational Studies* 3(3),505-511.

Cochoran R.C. (2005). Relationship between teacher's attitude and students' academic achievement in Mathematics in some selected senior secondary schools in South West, Nigeria. *European Journal of Social Sciences*, 11(3), 364-369.

Emovon, S. & Ajayi, K. (Eds) (2003).Nigeria education; Trends and issues. Ile Ife, University of Ife Press Limited, 16-17.

Fafunwa ,B. & Orimoloye, P.S. (2002). Accountability in public examination: The situation in Nigeria

Gibbons, S.; Kimmel, H & O'shea, M. (2007). Changing teacher behaviour through staff development: Implementing the teaching and content standards in science. *School of Science and Mathematics*, 97(6), 302-310.

Hutchings, F. (2008).An investment of factors that influence performance in KSCE Biology in selected secondary schools in Nyakach District Kisumu country Kenya. *Journal of Education and Human Development*,3(2), 957-977.

Imogie, A. & Johnson, M.D. (2008). Teaching and learning of Biology practical; The Experience of some Nigerian secondary schools. *Journal of Science Teachers Association of Nigeria*, 124 (1&2), 33-37.

Kile, K. (2003). Instructional facilities and secondary school students' academic performance in Bida and Lavun Local Government of Niger State. *M.Ed. Dissertation*, University of Ilorin.

Lai, M.A., (2004). Teacher Quality: Understanding the effectiveness of teacher attributes, Washington D.C: Economic Policy Institute (28).

Li, D.O. (2009) "Community science: Implication of science teacher" Proceeding of the 39th Annual Conference of STA (1998).

Mallise F.A. (2006). Student, teacher and school environment factors as determinants of achievement in senior secondary school Chemistry in Oyo State, Nigeria. *The Journal of International Social Research*, 1(2),13-34.

National Economic Empowerment and Development Strategies(NEEDS) 2005. National Planning Commission, Central Bank of Nigeria, Abuja, 3, 34-38.

Omotayo, B. K. (2014). Teachers characteristics and students' performance level in senior secondary school financial accounting. *Journal of Empirical Studies*, 1(2): 48-53

Wilson, S.M. & Floden, R. (2005), Teacher preparation research; Current knowledge, gaps and recommendations: *A research report prepared for the US Department of Education and the Office for Educational Research and Improvement by the Center for the Study of Teaching and Policy in collaboration with Michigan State University.*