

**Teacher Qualifications, Class Size and Teaching Experience as Predictors of Achievement in Senior Secondary School Physics in Oyo State, Nigeria**

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**Abstract**

*This study investigated teacher qualification, class size, and teaching experience as the influencing factors on physics achievement among senior secondary school students. The study adopted the correlational descriptive research design. Ten schools in Oyo State were selected using multistage sampling procedures and a total of 220 secondary school students were used. Three research questions were generated and tested at 0.05 level of significance. Reliable instruments (teachers characteristics scale;  $r=0.87$  and physics achievement test;  $r=0.81$ ) were used in collecting the data. Data collected were analysed using Pearson Product Moment Correlation Coefficient and Multiple Linear Regression Statistical Tools. It was discovered that there was a significant relationship between class size ( $\alpha=0.201$ ) and teaching experience ( $\alpha=0.727$ ), physics achievement ( $\alpha=0.285$ ) and teacher qualification. Regression analysis revealed that the three independent variables combined accounted for 15.5% ( $Adj. R^2 = .155$ ) variation in the prediction of students' achievement. Based on the findings, it was recommended that most qualified Physics teachers must be allowed teaching physics in Senior Secondary Schools and class size should be reduced to 30 students per class.*

**Keywords:** class size, Physics achievement, teacher qualification, teaching experience

**Introduction**

Mankind depends heavily on scientific and technological development for survival in any country. Technology shapes and changes the physical world to meet human needs. According to Adegoke 2010 and Kuti (2006),

physics is one of the basic subjects in the science curriculum and most technological advancements are hinged on it. Developing nations such as Nigeria may not be able to achieve technological breakthrough unless physics education is properly developed.

Development in the area of electronics products such as cell phones, motorised equipment and computers attest to the dependence on physics for science and technological developments. Other sciences, including chemistry, geography, oceanography, seismology and astronomy depend on knowledge of physics. Physics is a prerequisite for pursuing careers in engineering, medicine, pharmacy and others. It broadens our understanding of disciplines such as chemical biology, agricultural science, medicine, astrophysics and cosmology. The principles of upper and lower atmosphere physics used in studying the environment have helped to guard against natural disasters. Although physics quests for technological advancement of developing nations such as Nigeria, enrolment and achievement at external examinations conducted by the West African Examinations Council (WAEC) and National Examinations Council (NECO) fall below expectations. The level of performance of students in physics in these examinations is of much concern to the government, educationists and researchers in the field of physics education (Adegoke, 2010; Adeoye, 2006 & Kuti, 2006).

Available evidence from literature in Nigeria indicates that students' enrolment and achievement in the subject in public examinations, National Board for Technical Education and Business (NABTEB) inclusive, continue to decrease yearly (Adeoye, 2006). Although, the performance of physics students in WAEC examinations from 2007 to 2014 improved in some years (51% in 2010, 64% in 2011, 69% in 2012 and 60% in 2014), the

improvement is not sufficient to conclude that students have mastered physics. The pass percentage was average throughout this period, but the poor performance was observed between 2007, 2008, 2009 and 2013 with 43%, 48%, 48% and 47% respectively.

Many factors have been identified to explain such students' achievement, such as school location, teachers' pedagogical knowledge, teachers' attitude to work, students' attitude to learning, class size, teachers' job satisfaction, parental educational background, parental influence on the choice of career, teaching styles, students' cognitive style, and students' gender. The Chief Examiners of public examinations attribute such students' performance to inappropriate methods of teaching, extent and manner of use of teaching/learning materials, teachers' qualification, class size, and years of teaching experience, among other reasons. Researchers have examined the influence of teachers' characteristics such as gender, educational qualification, and students' achievement. Adeyemi (2010) revealed that teachers' experience and educational qualification are the prime factors for students' academic achievement. Further, Ajadi (2017) found that there is a significant relationship between class size, teachers' characteristics and students' achievement.

Studies such as Mayer, Mullens and Moore (2000) and Goldhaber and Brewer (2000) found a perfect positive relationship between teachers' qualification and students' academic achievement in chemistry. Also, a significant positive relationship was found between physics teachers' qualification and students' achievement in physics (Ajadi, 2017; Betts, Zau, & Rice, 2003). In the case of Goldhaber and Brewer (2000), higher levels of performance were observed among students whose teachers

held a bachelor's or master's degree in physics, unlike students whose teachers were not physics graduates.

Classroom size can be defined as the total number of students in a particular class setting, specifically the number of students taught by individual teachers in a particular subject or classroom. The term can also be extended to the number of students participating in teaching and learning experiences that may not have taken place in regular classroom activities. Adeyela (2000) found in her study that large class size is not conducive for serious academic work. On the contrary, Afolabi (2002) found no significant relationship between class size and students' learning outcomes. Yara (2010) in his study on class size and academic achievement of students in mathematics in South-western Nigeria found that the performance of students in large classes was very low (23%) compared to those students in smaller classes (64%). Average class size in secondary schools may be different from one country to another. The assumption is that the lower the class size, the better the general performance of the students especially in sciences (Owoeye & Yara, 2011). According to the National Policy on Educational document (FRN, 2013) the average class size in Nigerian educational system is 30 and 40 for primary and secondary schools respectively.

Teaching experience has long been thought to affect teaching skills, with more experienced teachers associated with greater teaching effectiveness. Okigbo and Okeke (2004) stress that teachers must be knowledgeable and experienced in the discipline they profess to teach. Moreover, Oladokun (2010) reports that students taught by experienced teachers performed significantly higher than those taught by non-experienced teachers in science process skill acquisition. Goldhaber and

Brewer (2000) also discovered that teacher's experience positively relates to high school students' achievement in Physics. Similarly, Akinsolu (2010) posits that teachers who have spent more time studying and teaching are more effective overall, and they develop higher-order thinking skills for meeting the needs of diverse students and hence, increasing their performance.

As important as teacher qualification, class size, and years of teaching experience have not been used to predict students' performance in Physics. Therefore, this study investigated teacher qualification, class size, and teaching experience as predictors of achievement in senior secondary school Physics in Oyo State, Nigeria.

### **Statement of the problem**

Physics as a branch of pure science is introduced in the curriculum of secondary school because of its educational value and relevance to learners and the society as a whole. From public examination reports, it is shown that not many students are passing the subject at credit level despite the subject's importance. This poses a threat to stakeholders of the subject at large. Many researchers have carried out several kinds of research on factors including teachers' qualification and other variables to know the extent to which those factors are influencing students' achievement among senior secondary schools. Based on the previous studies, little efforts have been made on a combination of these important variables (teacher qualification, class size, and teaching experience) to establish the relationship on students' achievement in Physics. It is on this basis, the researcher sought to establish the existing relationship among teacher qualification, class size, and teaching experience on students'

achievement in Physics among senior secondary schools in Oyo State, Nigeria.

### **Purpose of the study**

The purpose of this study was to examine the influence of teacher qualification, class size, and teaching experience on students' achievement in Physics among senior secondary schools in Oyo State, Nigeria. The specific objectives were to:

- i. investigate the relationship between teacher qualification, class size, and teaching experience and students' achievement in Physics in senior secondary schools in Oyo State, Nigeria.
- ii. determine the joint contribution of teacher qualification, class size, and teaching experience to students' achievement in Physics in senior secondary schools in Oyo State, Nigeria.
- iii. examine the relative contribution of teacher qualification, class size, and teaching experience to students' achievement in physics in senior secondary schools in Oyo State, Nigeria.

### **Research question**

This study answered the following questions.

1. What type of correlation exists among the predictors (teacher qualification, class size, and teaching experience) and the criterion variable (students' achievement in Physics) among senior secondary schools?
2. What is the composite contribution of teacher qualification, class size, and teaching experience to physics among senior secondary schools?
3. What is the relative contribution of each of teacher qualification, class size, and teaching experience to the prediction of students'

achievement in physics among senior secondary schools in Oyo State?

### **Methodology**

The population in this correlational study comprised of all senior secondary school students (SS-II) studying Physics in a public school in Oyo State. Multistage sampling technique was adopted in this study. Firstly, the random sampling technique was used to select two educational zones from seven educational zones in the state. Secondly, using a similar technique to select ten public secondary schools, that is five schools from each educational zone. Thirdly, intact class of senior secondary school (SSS) 2 Physics students in the selected schools were used as the sample for this study, giving a total of 220 students in all. The ten respective teachers of these students also participated in the study. Two instruments were used for this study, these are Teachers Characteristics Scale ( $r = 0.87$ ) and Physics Achievement Test ( $r = 0.81$ ). Data were analysed using Pearson Product Moment Correlation Coefficient and Multiple Linear Regression to test the three research questions.

### **Results**

**Research question 1:** What type of correlation exists among the predictors (teacher qualification, class size, and teaching experience) and the criterion variable (students' achievement in Physics) among senior secondary schools? Data analysis employed Pearson Product Moment Correlation. This result is presented in Table 1 below:

**Table 1:** *Descriptive Statistics and Inter-correlations among the Variables*

Variables	N	Mean	SD	1	2	3	4
1. Teacher Qualification	220	1.85	0.64	1.000			
2. Class Size	220	9.95	1.07	.201**	1.000		
3. Teaching Experience	220	2.14	0.97	.727**	.108	1.000	
4. Physics Achievement	220	29.98	4.68	.285**	-.167*	.340**	1.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 1 reveals the inter-correlation matrix between the independent variables (teacher qualification, class size, and teaching experience) and the independent variable (achievement in Physics) among the secondary school students in Oyo State, Nigeria. Class size ( $r = .201$ ,  $p < 0.01$ ), teaching experience ( $r = .727$ ,  $p < 0.01$ ) and physics achievement ( $r = .285$ ,  $p < 0.01$ ) positively and significantly correlated with teacher qualification.

On the other hand, Physics achievement was negative and significantly correlated with class size ( $r = -.167$ ,  $p < 0.01$ ) among secondary school students. This implies that teacher qualification among secondary school students can be improved if the class size is not more than average and the teachers have appropriate years of teaching experience.

**Research question 2:** What is the composite contribution of teacher qualification, class size, and teaching experience to physics among senior secondary schools? Data for this question was analysed using multiple regression. The results are presented in Table 2.



**Table 2:** *Regression Analysis showing Joint Contribution of the Variables to Students' Achievement in Physics*

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**R = .408<sup>a</sup>**  
**R Square R<sup>2</sup> = .166**  
**Adjusted R Square = .155**  
**Standard Error of the Estimate = 4.299**

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Model	Sum of Square	df	Mean Square	F	Sig.
1 <b>Regression</b>	797.525	3	265.842	14.379	.000 <sup>b</sup>
<b>Residual</b>	3993.361	216	18.488		
<b>Total</b>	4790.887	219			

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Table 2 shows the joint contribution of the independent variable (teacher qualification, class size, and teaching experience) to the dependent variable (students' achievement in Physics) among senior secondary school students in Oyo State, Nigeria. The result revealed that teacher qualification, class size, and teaching experience yielded a coefficient of multiple correlations  $R = 0.408$ , multiple correlation  $R^2 = 0.166$  and the Adjusted  $R^2 = 15.5\%$ . This indicates that about 84.5% of the total variance of students' achievement among the senior secondary school students was accounted for by the linear combination of teacher qualification, class size, and teaching experience while the remaining 84.5% could be assigned to other estranged factors not considered in this study. Table 2 also reveals that teacher qualification, class size, and teaching experience had a significant joint influence on physics achievement among senior secondary school students ( $F_{(3, 216)} = 14.379$ ;  $p < 0.05$ ).

**Research question 3:** What is the relative contribution of each of teacher qualification, class size, and teaching experience to the prediction of

students' achievement in physics among senior secondary schools in Oyo State? Data for this question was analysed using multiple regression. The result is presented in Table 3.

**Table 3:** *Multiple Regression showing the Relative Contribution of each of the Variables to the Prediction of Students' Achievement in Physics*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta ( $\beta$ )		
1 (Constant)	35.098	2.736		12.828	.000
Teacher Qualification	1.004	.671	.138	1.497	.136
Class Size	-.974	.277	-.223	-3.513	.001
Teaching Experience	1.269	.435	.264	2.915	.004

a. Dependent Variable: Physics Achievement

Table 3 reveals the relative contribution of teacher qualification, class size, and teaching experience among senior secondary schools in Oyo State. The table also shows that teaching experience ( $\beta = 0.264$ ;  $t = 2.915$ ;  $p = 0.004 < 0.05$ ), class size ( $\beta = -0.223$ ;  $t = -3.513$ ;  $p = 0.001 < 0.05$ ) and teacher qualification ( $\beta = 0.138$ ;  $t = 1.497$ ;  $p = 0.136 > 0.05$ ). This implies that teaching experience and class size are the most potent contributing factors among secondary school students.

### **Discussion of Findings**

The findings of this study show that a positive relationship exists between students' achievement in Physics and teacher qualification, class size, and teaching experience. The result contradicts the findings of Alafiatayo, Anyanwu and Salau (2016) that there was no significant relationship between teachers' qualification and student achievement in science-based subjects at the Senior Secondary School Certificate level. Adodo & Oyeniyi (2013) also reported that teachers' qualification contributed marginally to students' academic achievement. The average class size observed in this study was 55 students per class far from a national directive by FRN-2013 of 40 students per class. It has been established that class size determines the students' academic performance, that is, the lower the class size, the better the academic performance of students. This assertion is corroborated with findings of Josiah (2013) who asserted

that the size of a class has a considerable effect on the general performance of students in any subject and the presence of many students in a class does not make for effective teaching and learning in any subject sciences inclusive. Additionally, Alafiatayo, Anyanwu and Salau (2016) observed a high significance between teachers' experience and students' academic achievement in science.

### **Conclusion**

Based on the findings of the study, it is concluded that the students' achievement in Physics is jointly determined and significantly influenced by teacher qualification, class size, and teaching experience. In this equation, teaching experience and class size have the highest proportion of relative contributions to students' achievement in Physics. The relative contributions of teacher qualification, class size and teaching experience were significant to students' achievement in Physics. Based on the findings of this study, the study recommends the Government to employ most qualified Physics teachers to teach Physics in senior secondary schools, allow senior physics teacher to teach physics in Senior Secondary School 2 and Senior Secondary School 3 respectively, and ensure that large class size is reduced to at least 30 to 35 students per class.

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