International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 5 Issue 9, September 2018

ISSN: 2394-4404

School Characteristics As Correlates Of Senior Secondary School Physics Students' Achievement In Federal Capital Territory, Abuja, Nigeria

Dr. P.A. Agu

Mr. C.O. Iyamu

Department of Science, Technology and Mathematics Education, Faculty of Education,
Nasarawa State University, Keffi, Nigeria

Abstract: ***This study investigated school characteristics (class size and school location) as correlates of senior secondary school physics' students' achievement in Federal Capital Territory (FCT), Abuja, Nigeria. A sample size of 2505 students selected from a population of 25,050 using stratified random sampling based on 10% representation from the six local area councils in FCT was used for the study. Ex-post Facto research design was employed for the study. The instrument used for data collection was a questionnaire that consisted of a Performa soliciting for the location of schools based on rural and urban classification. The West African Senior School Certificate Examination (WASSCE) result sheets from the year2011 to 2017 were sorted out to group students into two groups which are the Pass group with grades A1 to C6 and the Fail group with grades from D7 to F9. WASSCE result sheets were also used to determine the class size. The analyses of these data collected from the data were analyzed using Pearson's Product Moment Correlation and t-test. Results of the investigation showed that class size and school location had significant relationship with students' achievement in physics. Based on these findings, it was recommended that FCT educational authorities should construct additional classrooms to take care of the inadequate classrooms. Also Government should provide access roads, water supply, electricity, ICT facilities and other infrastructure to link schools located within rural areas with their urban counterparts.***

Keywords: School characteristics, Correlates, Physics, Achievement

I. INTRODUCTION

Science is recognized internationally for the economic wellbeing of nations and the need for scientifically literate citizenry (Fraser and Walberg, 1995). Knowledge of science and technology is therefore a requirement in all countries and all people globally that are prepared to face challenges of economic growth and development. These challenges include pollution, global warming, desertification and erosion among others.

The enviable position that science education occupies is perhaps justifiable due to the reason that it brings about technological development and economic growth. Another reason given by Emovon (1995) was that science exerts a dominant influence on the life of an individual as well as the developmental effort of a nation. Science education consists of several subjects among them is physics. Olumuyiwa and Okunola (2015) defined physics as a natural phenomenon that is concerned with matter and energy. The concept of matter and energy has contributed to many scientific discoveries and innovations.

Physics is a pivotal subject in secondary school education of any country on which the foundation of all scientific and technological discoveries are founded. As a result of this, Dayo (1994) gave the general goals of physics education to consist of self-realization, good human relationship, economic efficiency and civil responsibility. According to him, these

goals equip youth with basic academic and vocational skills to cope with the problem of life and self-actualization.

As a result of the importance of physics as a major subject in all science, engineering and technology development, physics education is therefore regarded as one of the foundational frameworks on which rests the entire scientific and technological machinery of a nation (Anyebe, 2007). Consequent upon this, students graduating from secondary schools must have a pass in the subject at least credit level before being considered for admission into higher institutions to read science, engineering or technological fields.

Despite the importance of physics, the achievement of students in the subject remains low in Nigeria (Adeyegbe, 2005). Statistics of students' achievement in May/June WASSCE physics examinations from 2011 to 2017 is presented in Table 1 to show this disturbing situation.

Year	Total Entry	Pass Grade Levels		Fail Grade Levels	
		(A1-C6)	%	(D7-F9)	%
2011	374,958	162,769	43.41%	212,189	56.59%
2012	386,449	190,210	49.22%	196,239	50.78%
2013	423,146	153,137	36.19%	270,009	63.81%
2014	402,228	140,056	34.82%	262,172	65.18%
2015	398,870	145,747	36.54%	253,123	63.46%
2016	416,580	174,432	41.9%	242,148	58.1%
2017	422,110	183,020	43.4%	239,090	56.6%

Source: West African Examinations Council (2017)

Table 1: Students' Achievement in May/June2010-2017 WASSCE Physics in Nigeria

Akomolafe and Olorunfemi (2011) observed that the recurrent poor performance of secondary school students in SSCE in Nigeria is disturbing and embarrassing due to the reason that the released result of 2010 WASSCE revealed that about 80% of the candidates that sat for the examination failed because they did not have credit passes in five subjects including physics.

Among the school factors that may have casual relationships with students' academic achievement in physics include class size and school location (Bajah, 1999). Class size describes the number of students that are accommodated by a school in a class. According to the Federal Republic of Nigeria (2004), the teacher-pupil ratio at the senior secondary level should be 1:40. This means that a class of over 40 students is classified as high density class size meaning that it is overcrowded. Overcrowded class makes teaching and learning difficult because the teacher cannot evaluate each of the students and some of the students especially those at the back may not comprehend what the teacher is teaching. According to Dayo (1994) overcrowded class reduces air ventilation and creates rowdiness among students which may have negative psychological effect on the learner. Also, the effect of overcrowded class induces restlessness and uncooperative behaviour which may prevent some students from attending to classroom activities adequately. As a result of the problem of overcrowding, the Federal Ministry of Education (2008) gave the following problems as attributes of large class size:

- ✓ The teacher has difficulty in making eye contact with individual students.
- ✓ Distribution of learning resources is difficult.
- ✓ Correlation of students' assignment is laborious.
- ✓ The teacher has difficulty in marking students' work regularly.
- ✓ Class control is difficult.

Thus a class of manageable proportion enables a physics teacher to individualize instructions and use teaching aids to explain physics concepts. That is why Akiri and Ugborugbo (2009) recommended that the population of students admitted into schools should be dependent on the available space and facilities.

School location can be defined as the environment in which a school is situated. Basically, there are two types of school locations - urban and rural school locations. School location factor is considered because of the importance of infrastructure to development which is often not widely spread to urban and rural areas in most communities. Infrastructure such as electricity, roads, ICT and water supply are not adequate in the rural areas when compared to their urban counterpart. The reason for this difference may be that there are larger populations, government presence and industries in the urban areas. As a result of the importance of school location, Adesoji and Olatunbosun (2008) revealed that school location predicts students achievement in science, while Ariyo (2011) revealed that there was a significant difference between the effect of urban and rural areas on students' academic achievement in all school subjects.

The purpose of this study is rooted in the fact that school as an institution enables the acquisition of knowledge and skills that is needed for economic development and physics is one of the subjects that enhances these knowledge and skills. It is in view of the problem of low achievement in physics that this study set out to investigate the relationship between school characteristics and students' achievement in physics in FCT-Abuja.

RESEARCH QUESTIONS

The following research questions guided the study:

- ✓ What is the relationship between class size and students' achievement in physics in secondary schools in FCT-Abuja?
- ✓ What is the relationship between school location and students' achievement in physics in secondary schools in FCT-Abuja?

STATEMENT OF THE HYPOTHESES

The following null hypotheses were tested at 0.05 level of significance.

Ho_1: There is no significant relationship between students' achievement in physics and class size.

Ho_2: There is no significant relationship between students' achievement in physics and school location.

II. METHODOLOGY

The design used for the study was Ex-post research design. This design made use of data generated from secondary sources such as WASSCE results. The results are

used as physics achievement and serves as the dependent variable while class size and school locations are the independent variables investigated to ascertain their effect on students' achievement in physics.

The targeted population of this study comprised 25,050 senior secondary schools students offering physics in one hundred and sixty two pubic co-education senior secondary schools in Federal Capital Territory, Abuja. Out of this population, sample of 2,505 senior secondary schools students offering physics was selected using stratified random sampling technique.

The instrument for data collection was a Performa questionnaire that solicited for the name of schools, type of schools and location of schools based on rural and urban classification. Secondary data used for this study was the May-June WASSCE results of 2011 to 2017. The results were used to analyze the achievement of students in physics.

The research questions were answered using correlation coefficient and bar-charts. The hypotheses were tested using Pearson Product Moment Correlation (PPMC). The correlation coefficient obtained from the analyses was compared to the tabular value to test the hypotheses at 0.05 level of significance.

III. RESULTS

RESEARCH QUESTION ONE

What is the relationship between class size and students' achievement in physics in secondary schools in FCT-Abuja?

Year	Total no. of Students	No. of Students in Schools with High Class Size	No. of Students in Schools with Low Class Size	No./ % Pass(A1-C6) of Students in Schools with High Class Size	No./ % Pass (A1-C6) of Students in Schools with Low Class Size	Correlation Coefficient
2011	831	477	354	193(40%)	195(55%)	0.15
2012	810	442	368	192(52%)	189(51%)	0.09
2013	827	455	372	182(40%)	197(53%)	0.13
2014	833	515	318	155(30%)	211(66%)	0.12
2015	815	507	308	123(24%)	219(71%)	0.08
2016	864	598	266	201(34%)	168(63%)	0.03
2017	901	630	271	239(38%)	202(75%)	0.01

Table 2: Distribution of May/June WASSCE Students by Class Size and Physics Achievement

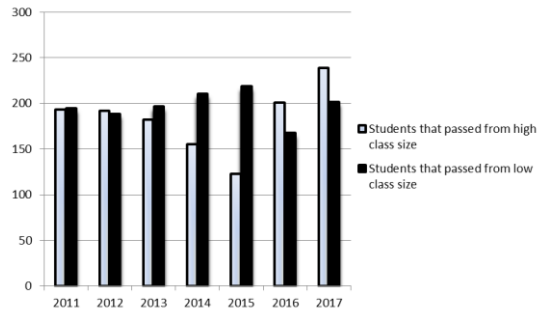

Figure 1: Bar Chart of May/June WASSCE Students by Class Size and Physics Achievement

Table 2 shows that a greater number of students in schools with lower class size performed better in physics compared to the students in schools that had higher class size, especially for the 2013, 2014 and 2015 examination years. The correlation coefficients show a low positive correlation between class size and physics achievement.

The percentage analyses of the data in Figure 1 shows that the percentage of students that got Pass mark (A1-C6) in schools with low class size was higher compared to students in schools with higher class size.

HYPOTHESIS ONE

There is no significant relationship between students' achievement in physics and class size.

S/N	Class Size	D.F	PPMC	Tabular value	Decision
1	High	1373	0.98	0.95	Rejected
2	Low	1093			

Table 3: Test of Hypothesis on the Relationship between Class Size and Achievement in Physics

Table 2 shows that the calculated PPMC was greater than the PPMC at 0.05 level of significance. The null hypothesis of non-significant relationship is therefore rejected. This implies that there was a significant relationship between students' achievement scores in physics and class size in secondary schools in FCT, Abuja.

RESEARCH QUESTION TWO

What is the relationship between school location and students' achievement in physics in secondary schools in FCT-Abuja?

Year	Total no. of Students	No. of Students in Urban Schools	No. of Students in Rural Schools	No./ % Pass (A1-C6) of Students in Urban Schools	No./ % Pass (A1-C6) of Students in Rural Schools	Correlation Coefficient
2011	831	400	431	209(52%)	179(42%)	0.11
2012	810	375	435	187(50%)	197(45%)	0.05
2013	827	486	341	305(63%)	158(46%)	0.03
2014	833	510	323	298(58%)	133(41%)	0.006
2015	815	486	329	301(62%)	142(43%)	0.02
2016	864	530	334	339(64%)	130(39%)	0.02
2017	901	478	423	279(58%)	169(40%)	0.01

Table 4: Distribution of May/June WASSCE Students by School Location and Physics Achievement

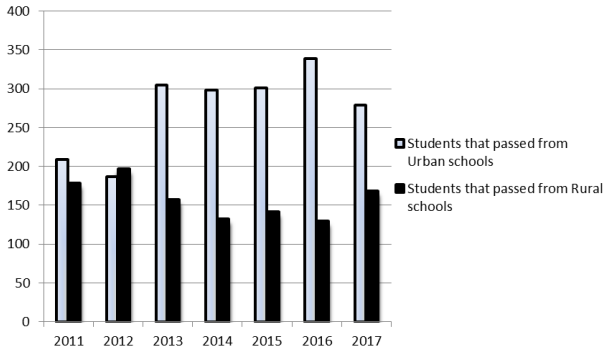

Figure 2: Bar Chart of May/June WASSCE Students by School Location and Physics Achievement

Table 4 shows that a greater number of students from urban schools performed better in physics compared to the number of students from rural schools for all the examination years except 2012. The correlation coefficients show a low positive correlation between school location and physics achievement.

The percentage analysis of the data in Figure 2 shows that the percentage of students that got Pass mark (A1-C6) from urban school location was higher compared to students in rural schools location.

HYPOTHESIS TWO

There is no significant relationship between students' achievement in physics and school location.

S/N	School Location	D.F	Correlation coefficient	Tabular value	Decision
1	Urban	1129	1.06	0.95	Rejected
2	Rural	1310			

Table 5: Test of Hypothesis on the Relationship between School Location and Achievement in Physics

Table 5 shows that the calculated PPMC was greater than the table PPMC at 0.05 level of significance. The null hypothesis of non-significant relationship is therefore rejected. This implies that there was a significant relationship in students' achievement scores in physics based on school location in secondary schools in FCT, Abuja.

IV. DISCUSSION

The finding of this study showed that high class size affects students' achievement in physics. This finding agrees with that of Adeyemo (2010) which revealed that class size affects students' achievement in physics. Another research that supports this finding is that of Dayo (1994), where he found that class size had significant relationship with students' performance. The reason for this outcome may be that the class of proportional size enables teachers to monitor students' progress better during lessons than when the class is very large. It may also enable students to be more attentive in class due to less noise and over rowdiness. However, the work of Keil and Partell (2002) contradicts the present finding when it revealed that there was no relationship between class size and students' achievement.

The findings of this study also show that School location affects students' achievement in physics. This finding agrees with Airyo (2011), whose finding revealed that school location has significant relationship with students' performance in physics. A research work that supports this finding is that of Osokoya (2010) whose results showed that there was a significant effect of school location on students' cognitive attainment in practical physics. The reason for this outcome may be that urban schools have more infrastructural amenities such as access road, electricity, ICT facilities and water supply.

V. CONCLUSION

Based on the above findings, the following conclusions were drawn:

- ✓ Classroom population in secondary schools in FCT-Abuja should be reduced to the size that is recommended by curriculum experts especially for teaching science subjects. Also more public secondary schools should be constructed to reduce the over-crowding in schools.
- ✓ Rural schools should be provided with more infrastructural facilities such as electricity, access road, ICT facilities and water supply. These would make the rural schools more conducive for learning thereby improving students' performance in physics.

VI. RECOMMENDATIONS

Based on the findings of the study, the researcher made the following recommendations:

- ✓ Additional physics classrooms should be constructed to reduce the high density class size in those schools having congestion problem.
- ✓ To further solve the problem of overcrowded classrooms, more senior secondary schools should be constructed in FCT, Abuja.
- ✓ Rural schools should be given attention through the provision of infrastructure such as electricity, access road, ICT facilities and water supply.

REFERENCES

[1] Adesoji, F.A. & Olutunbosun, S.M. (2008). Students, teacher and school environment factors as determinants of achievement in senior secondary school chemistry in oyo state, Nigeria. Journal of International Social Research, 1, 1-7.

[2] Adeyebe, S.O. (2005). In search of indices for measuring the standard of education: A need a shift in paradigm. A special seminar by West African Examinations Council. Lagos, 7th May.

[3] Adeyemo, S.A. (2010). Background and classroom correlates of students' achievement in physics. International Journal of Educational Research and Technology, 1(1), 23-34.

[4] Akiri, A.A. & Ugborugbo M.N. (2009). Teachers' effectiveness and students' academic performance in Ondo State, Nigeria. European Journal of Educational Studies, 3(3)

[5] Akomolafe, M.J. and Olurunfemi, F.A. (2011). Impact of family type on secondary school students' academic performance in Ondo state, Nigeria. European Journal of Educational Studies, 3(3).

[6] Anyebe, E.A. (2007). Constraints in the teaching and learning of physics at the senior secondary schools in Nigeria. In M.J. Adejoh and C.O Iji. (Ed). Innovations in teaching and learning. Makurdi: Adeka printing and publishing co. Ltd.

[7] Ariyo, A.O. (2011). Gender differences and school location factors as correlates of secondary school students' achievement in physics. The 2011 Movi International Academic Conference, 259-263.
[8] Bajah, S.T. (1999). The challenges of science technology and teacher education in Nigeria: Beyond the Year 2000. Africa Journal of Education, 1(9), 43-49.
[9] Dayo, A. (1994). Psychological characteristics of secondary education in Nigeria. In A. Segun and O. Segun (Ed). Secondary Education in Nigeria. Ibadan: Abiprint and Pak Limited.
[10] Emovon, E.U. (1995). Sciencing: The Nigerian experience, practice of science in Nigeria. Keynote Address, Proceedings of the 26th Annual Conference of Science Teachers' Association of Nigeria, 7-12.
[11] Federal Republic of Nigeria (2004). National policy on education. Nigeria Educational Research and Development Council. Pg.22.
[12] Fraser, B.J. & Walberg, H.J.(1995). Improving science education. National Society for the Study of Education (NSSE), Illinois.
[13] Keil, J. & Partell, P.J. (2002). The effect of class size on students' performance and retention at Binghamton University. Office of Budget and Institutional Research, Binghamton University.
[14] Osokoya, M.M. (2012). Effects of school location on students' learning outcomes in practical physics. Ife Psychologia, 8(2),5-8.