

School Environment Factors and Physics Students' Academic Achievement in Calabar Education Zone of Cross River State, Nigeria

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Abstract:- The study sought to find-out the effects of school environment factors on academic achievement in physics among senior secondary schools students in Calabar Education Zone of Cross River State, Nigeria. Based on these purposes, three research questions were formed, from which three (3) null hypotheses were formulated. This work uses Ex-post-facto design, 3,559 SS 2 physics students in Calabar Education Zone of Cross River State formed the total population of the study, and from population, 500 physics students were selected using multipurpose sampling technique to form the sample. Data were gathered using School environment factors questionnaire (SEFQ) and physics students' achievement test (PSAT) instruments. Data analysis was carried out using the Independent t – test. All the hypotheses were tested at 95% level of significance. The following findings were obtained: students in urban and rural schools do not differ significantly in physics academic achievement ($p = 0.984$, $p > .05$); schools with facilities (such as laboratory, electricity supply and Library) do not differ significantly from schools without facilities ($p = 0.000$, $p < .05$) in terms of physics achievement, and finally school type does not affect student' academic achievement in physics ($p = 0.000$, $p < .05$). The major implication in this study is that, physics students' achievement can be enhanced through improving the physical school environment factors. Recommendations were made, such as, 'government should provide funds for the procurement of educational facilities'.

Keywords:- Academic achievement, school location, school type, school facility.

I. INTRODUCTION

Science has become such an essential tool that every non-industrialized and industrialized nation, wishing to grow in socio-economic scope will afford to improve its learning in schools. The progress of any nation is grounded on the importance of science in educational system. Science teaching and learning is a different form of creative human activity which encompasses diverse ways to see, explore and comprehend the truth. Science, being a fundamental part of everyday life and essential to our understanding of the physical world, teaches us a way of finding out about the world (by becoming curious and seeking explanations) and also helping us to develop a growing body of ideas about the ways things work.

Science and technology knowledge is therefore a necessity in all countries of the world, required by all people worldwide because of ever increasing challenges confronting mankind. These challenges include production of new drugs that is resistant to diseases, consequences of genetic investigation and engineering, ecological effect of modern technology and explosions and global warming among others (Alsop & Hicks, 2001. Minishi, Muni, Okumu, Mutai, Mwangasha, Omolo & Muniyake, 2004). This had caused a rapid changes to take place in the area of medicine, commerce, agriculture and communication. According to Validya (2003), science as a mediator of advancement, plays vital part in bringing about changes in national wealth enhancement, scientific advancement, industrialization and upgrading of health. Scientific and technological breakthrough of any non-industrialized nation like Nigeria, is usually the goal of such nation.

Wenham, Dorlin, Snell and Taylor (1984) posited that, Physics is and will continue to be a ultimate among other science subjects, reason being that, many of its tools on which the scientific and technological development depends on the direct products of physics. Theories and principles of physics have been extensively used for several economic, scientific and technological advancement, for instant, the use

of satellites and computers system. Also, ideas from Physics theories had led to maintain the growth in the area of industrialization as well as improving the wellbeing of individuals.

In the aspect of teaching and learning, physics assists students to acquire the skills in problem-solving and decision-making, which allowed them to think critically.

Despite the significance of Physics in scientific and industrial development of our nation, understanding of the subject among students had declined over the years, and also students' performance in the subjects had also not been encouraging. Ho and Boo (2007) noted that, in many countries, the number of students desiring to study physics has deteriorated. Nneji (1998), Ogunleye, (2000), Okebukola (1997) and Umeh (2002) have all noted that, students' performance in physics has been very low over the years.

Therefore, for active studying of physics, school factors in the school environment should be considered essential. School environment factors refer to factors inside the school that affect the process of teaching and learning. The school environment comprises of library, classrooms, technical workshops, teachers' quality, teaching methods, peers relationships, student-teacher relationships, together with other variables that can influence the process of teaching and learning (Ajayi, 2001). The degree to which students learning could be improved hinge on what the school environment can afford for learners and teachers.

Williams, Persaud and Turner (2008) quoting Marsden (2005) stated that, school environment and school facilities are significantly related to students' academic achievement in schools. School facilities (such as laboratory, library and electric power supply) are often the most effective means of developing students' outcome (Psacharapoulos & Woodhall, 1995). In developing countries, poor learning environments have been recognized as important factors that lead to students' poor academic achievement in schools (United Nations International Children's Emergency Fund UNICEF, 2003).

Byoung-suk (2012) posited that, a healthy, safe and motivating environment is needed by children to develop in learning ability. A good and sympathetic school environment supplemented with sufficient learning tools, and good weather makes students concentrate on their academic activities, thereby resulting in a well improved academic outcome. Therefore, suitable and proper environment is much essential for a successful learning among students.

Eric (2005) in an article stated that, funding school setting in encouraging academic success, guessed that, school atmosphere has wide impact on students' growth and learning, together with their social, ethical and emotional development.

Influence of school environment factors is shown in poor academic achievement of students in that particular subject in the West African Senior School Certificate

Examination. Some inhibiting school environment factors as identified by (Macmillan, 2012) include school location which affect physics learning and students' academic achievement.

Owoeye (2011) indicated that, students' academic achievement in rural schools differ significantly from that of urban schools. Owoeye, held that, there is a significant impact on the students' academic performance based on where the schools is located.

Sequel to these information on the effect of school environment factors, it is essential to carry out this study with a view to determining which of the selected school environment factors (school location, school type and school facilities) will have causal influence on students' academic achievement in physics.

II. THEORETICAL FRAMEWORK

This study is anchored on Cognitive Learning Theory. Cognitive learning theory is the theory that was put together by Jerome Bruner. According to Bruner, learning is a dynamic social practice in which students create new concepts or ideas based on the existing knowledge (Bruner, 1984). The student selects information, originates hypotheses, and makes verdicts in the course of assimilating experiences into their existing mental ideas. This is similar to Information Processing Theory (IPT), where the learner chooses and converts newly acquired information into meaning, by organizing his or her mental structure. The implication of this theory in this study is that, physics students should be fortified to develop knowledge on their own in a favorable environment.

III. STATEMENT OF THE PROBLEM

In an unindustrialized nation like Nigeria, physics students are often evaluated. Records and data of results of both external and internal examinations from Ministry of Education have revealed that, more than a decade now, students' academic achievement in physics in secondary schools have been low compared to other subjects. A research conducted by Effiong (2002) and Orji (1998) had acknowledged series of factors that affect students' achievement in physics and in other science subjects. Efforts have been made by Federal Government, Ministry of Education (Federal, State and Local Governments), parents and non-governmental organizations, and curriculum implementers (teachers) towards the improvement of students' achievement in physics, but not much has been accomplished.

Though impact of school environment factors on learning have been recognized since, but few experimental researches have been conducted in Nigeria, particularly in Calabar Education Zone. Hence, it is appropriate to study the effect of school atmosphere on students' achievement in physics in Calabar Education Zone of Cross River State, Nigeria. Moreover, questions may arise due to this low academic achievement. Government, teachers, parents may

wonder what factors might have contributed to this continuous poor achievement in physics.

IV. SIGNIFICANCE OF THE STUDY

This study may be of assistance to government, curriculum planners, principals, physics teachers, students and researchers. The finding of this study may equip government with useful information about school environment factors that affect student's academic achievement in physics. This study may also provide information to curriculum designers to design physics curriculum so as to suit with the school environment.

A. Purpose of the Study

Generally, the purpose of this study was to determine the influence of school environment factors on students' academic achievement in physics. Specifically, this study was to determine influence of:

- School location on students' achievement in physics.
- School facilities (laboratory, library and electric power supply) on students' achievement in physics.
- School type (Public, Private) on students' achievement in physics.

B. Research questions

On the basis of the specific purposes, the following research questions were raised

- How does school location (urban/rural) influence students' achievement in physics?
- To what extent does availability of school facilities (such as electricity supply, laboratory and Library) affect students' achievement in physics?
- How does school type (public and private) influence physics students' achievement?

C. Statement of Hypotheses

On the basis of the research questions posed, three null hypotheses were framed to guide this study

- School location does not significantly affect students' achievement in physics.
- School facilities (laboratory, electricity supply and Library) do not significantly influence students' achievement in physics.
- School type does not significantly influence physics students' achievement.

V. LITERATURE REVIEW

A. School Location and Students' Academic Achievement in Physics.

School location refers to the socio-economic classification of area or position where school is located. Ezendu (2003) defined school location as a particular place a schools is sited. Quirk (2008) noted that location of schools could influence achievement of students in science subjects. The nature as well as human factors have obligated some individual person to settle either in urban or rural area, and this settlement had been found to have strong influence on educational attainment of people (Beeson & Strange, 2000; Howley, 2001). Similarly, Ezike (1997) indicated that, in urban areas population of people are found to be

much compared with rural area whose population seems to be less, subsistent, boring and burde. Akpan (2008) stated that, urban schools are electrified, with water supply, sufficient teachers, and infrastructure and with enough teaching and learning equipment. Adebule and Aborisade (2013) stressed that, students schooling in urban areas could easily have access to libraries and laboratories compare to those in rural locations. Olonade (2000) stated that, school size and her location affects students' achievement in sciences most especially physics.

Owoeye and Yara (2011) studied the effect of school location on students' academic achievement among secondary schools. Data obtained from West African School Certificate Examinations (WASCE) between 1990 and 1997 in 50 secondary schools in both rural and urban areas of Ekiti state was used in the study. Student Location Questionnaire (SLQ) instrument was used for collecting of data, one hypothesis was framed, and data collected were analyzed using dependent t – test and mean. The results indicated that, students' academic achievement in rural setting differ significantly compare to students in urban secondary schools ($t=2.73$, $p<0.05$). Particularly the study proved that students in urban areas achieved more than their counterparts in rural schools.

A research by Orlu (2013) to determine the environmental effect on the academic achievement of secondary school students in Port Harcourt local government area of Rivers state. The study uses six hundred students and teachers. The results of the study showed that, school environment significantly affect the achievement of students.

The location of school may affect students' achievement, for instance, schools that is positioned in a earsplitting area like an airport, where school activities is being interferes with other activities in this area. In this case, one may not expect the achievement of students in such areas to be high. Interference of noise is one the serious problem facing learning and teaching processes. Considine and Zappala (2002) studied students in Australia and found out that geographical locations do not significantly predict outcomes of students in school achievement.

Conversely, Akpan (2001) asserted that, where school is positioned had been noticed as one of the factors that influence academic achievement of students. Similarly, Bosede (2010) stated that, where school is sited affects achievement of students in some subjects. Ogunkola and Fayombo (2009) also established that, physics students' academic achievement of urban students significantly differ from that of rural students and is in favor of schools sited in urban areas. The reason for this variation from various researchers, may be because of different in teaching and learning material and method used

B. School Facilities and Students' Academic Achievement in Physics.

School facilities in this context referred to as the teaching materials within the school, which is used in teaching physics. Bandele (2003) stated that, the significance of school amenities cannot be downgraded, hence modern facilities like libraries, laboratories and classrooms need to be fixed at their positions in all schools where teaching and learning takes place.

The availability and accessibility of sufficient school laboratories, buildings, chairs, desks, classrooms and other amenities are essential for the achievement of educational aims and objectives (Ayodele, 2000). The author also stressed that, an active organization and control of school facilities brings about an increase in educational programmes and also boosts the relationship between schools and community.

Moyer (1995) stated that, the design of school building with different structures and parts have been verified to have a quantifiable effect on students' learning and their achievement. Sunday (2012) reported that, school physical setting and physics students' academic outcome in secondary schools are significantly related. To the author, physical setting of the school has some impacts on secondary schools students' academic achievement in physics. The author also mentioned that, school environment comprises of both human resources and physical environment, and their relationship determine what he referred to as 'school environment'.

A study carried out by Isola (2010) in Kwara State of Nigeria, to investigate the impacts of teaching materials on the academic achievement of students using the results of WASCE. In the study, academic achievements in ten subjects were correlated with different teaching materials. Data were gathered from the teachers teaching different subjects in relation to their teaching materials. Students achievements from WASCE results for a number of five years were compared with the available teaching materials from each subjects. The author concluded that, teaching material significantly affects students' academic achievement in each subject.

C. School Type and Students' Academic Achievement in Physics.

School type is referred to the educational institution which learning processes takes place. School type is categorized into two schools. Alimi, Ehinola and Alabi (2011) studied the impacts of types of school and students' performance. The research was performed in the State of Ondo, to determine whether types of school is significantly related to the achievement of students. The research uses survey design and a simple random sampling technique was used in selecting fifty schools. School Facility Questionnaire (SFQ) for principals while School Facility Questionnaire (SFQ) for teachers were the two instruments use and t- test analyzes was performed using spss. All hypotheses were tested at 95% significant level. The result revealed that, the mean score (17.42) of students'

performance in private schools was marginally greater than those in public schools with a mean score of 17.20. Hence, the null hypothesis was retained, which implies that, public schools do not differ significantly compared to private schools in respects to achievement of students.

A research conducted by Alderman, Paterno and Orazem (2001), found that, achievements in language and mathematics of students was higher in private schools compared to public secondary schools in a nation of Pakistan. Another study by Arif and Saqib (2003) also established that, students in public schools when assessed on skill, scored less compared to their counterparts in private schools. Moreover, a study carried out by Das, Pandey and Zajonc (2006) noticed that, private school students out performed than government schools students in science subjects.

However, Ajayi (1999) in his study indicated that, school type can contribute to students' academic attainment. Results of finding on the effect of facilities in both public and private post primary schools on students' performance is contentious. Philius and Wanjobi (2011) also restated that, type of school, (public, private or mixed, single sex) has impact on students' performance in Mathematics.

A study conducted by Getahun, (2002) concerning the influences of school environment associated factors between students with low and high scores in Addis Ababa (in ESLCE and ESCECE examinations). Result of findings indicated that, greater number students that scored high were from private junior secondary schools while those that had low scores were from government public schools. Findings from the study also indicated that, students who had attended junior secondary schools in mission schools and private schools had better scores in national examinations than public schools (Washington and Getahun, 2002).

Likewise, a research carried out by Maliki, Ngban, and Ibu (2009) on the performance of students in Mathematics in post primary school indicated that, public schools students achieved lower than those in private schools. A research carried by Braun, Grigg and Jenkins (2006), Gouda (2013) and Day (2014) also established a related result. Horowitz and Spector (2005) obtained a result from their study showed that, public secondary schools do not differ significantly in their scores. A research conducted by Yalew, Dawit and Alemayehu (2010) indicated that, the average marks obtained by students in examination from public schools were noticed to be lower than students in private secondary schools.

VI. METHODOLOGY

A. Research Design

The study adopted “ex post facto” design. “Ex post facto” design is a research design that does not permit the control of the independent variable by the investigator (Dehejia & Wahba, 2002).

B. Area of the Study

The research was conducted in Calabar Education Zone of Cross River State, Nigeria.

C. Population of the Study

The study uses a population of 633 senior secondary two (SS2) students offering Physics in Calabar Education Zone of Cross River State in 2015/2016. The total number of physics students in Calabar Education Zone is 3391. The data in study was obtained from Ministry of Education of Cross River State, Nigeria.

D. Sampling technique

A stratified sampling technique was used to select one Educational Zone (Calabar Education Zone), from Calabar Education Zone, seven (7) secondary schools were selected from eighty-nine (89) secondary schools in Calabar Education Zone using simple random sampling technique. A purposive sampling technique, otherwise known as judgment sampling procedure (Onafowokan & Okpala, 1998) was used to select four secondary schools, (two public and two private), 80% of students’ population from each selected school were sampled, making a total of 500 SS2 physics students to constitute the study sample.

E. Sample

The sample size comprised 500 SS2 physics students drawn from four secondary schools in Calabar Education Zone. Three hundred and eighty eight (388) students were selected from 2 public secondary schools while one hundred and twelve (112) students were selected from 2 private secondary schools

F. Instrumentation

Two researcher-designed instruments were used in this study for data collection; School Environment Factors Questionnaire (SEFQ) and Physics Students’ Achievement

Test (PSAT). School Environment Factors Questionnaire (SEFQ) is a 19-item of four point likert-type scale. The responses include: Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (DA).

G. Validity of the Instruments

In this study, face and content validity was established. The instruments were presented to two experts in Physics Education and two experts in Educational Measurement at Cross River University of Technology, Calabar, Calabar. The experts determined whether the items were internally consistent enough for use in the study.

H. Reliability of the instrument

The Kuder-Richarson (K-R₂₀) method was used to test the reliability of PAT while Cronbach- coefficient Alpha method was used for testing the reliability of SEFQ. Based upon the formula $KR_{20} = \frac{K}{K-1} [1 - \frac{\sum p_i q_i}{S^2}]$ and $\alpha = \frac{K}{K-1} [1 - \frac{\sum S_i^2}{S^2}]$, the calculated reliability coefficient for PAT is 0.71, SEFQ data for school facilities is 0.89.

VII. DATA ANALYSIS/ DISCUSSION

Data collected were analysed using independent t-test and descriptive statistics, and each hypothesis was tested at 0.05 level of significance. Results of the findings were presented in a and discussed.

• Hypothesis 1

The first hypothesis states that School location does not significantly influence students’ academic achievement in physics. To test the hypothesis, independent t-test was performed using SPSS version 22 computer programme. The results from the analysis are presented in Table 1.

The result in Table 1, with p-value of 0.374 was found to be greater than 0.05 level of significance and at 498 degree of freedom for the two-tailed test. With this result, the null hypothesis was retained, meaning that school location (urban and rural) does not significantly influence students’ academic achievement in physics. This also means that students in urban (mean= 11.8199, SD=4.87185) and rural (mean=12.2237, SD=5.26211) schools do not differ significantly in their academic achievement in physics.

Variables	N	\bar{x}	SD	t _{cal}	df	Sig(2-tailed)
Urban schools	272	11.8199	4.87185			
Rural schools	228	12.2237	5.26211	-0.890	498	0.374
Total	500					

Table 1: Result of Independent t-test Analysis of the Difference in Students’ Academic Achievement in Physics between Urban and Rural Schools

P>0.05; df=498 ; p-value 0.374

• Hypothesis 2

The second hypothesis states that school facilities (such as laboratory, electricity supply and Library) do not significantly influence students’ academic achievement in physics. To test the hypothesis, independent t-test was performed using SPSS version 22 computer programme. The results from the analysis are presented in Table 2.

The result in Table 2, with p-value of 0.000 was found to be less than 0.05 level of significance (that is P<0.05) at 498 degree of freedom for the two-tailed test. With this result, the null hypothesis was rejected, meaning that availability of school facilities (laboratory, library and electricity supply) significantly influence students’ academic

achievement in physics. This also means that students in schools with adequate school facilities (mean=20.9033, SD=7.26060) and schools without school facilities

(mean=14.5200, SD= 5.29241) do differ significantly in their academic achievement in physics.

Variables	N	\bar{x}	SD	t_{cal}	df	Sig (2-tailed)
Schools with adequate facilities	300	20.9033	7.26060	10.66	498	.000
Schools without adequate facilities	200	14.5200	5.29241			
Total	500					

Table 2: Summary Result of Independent t-test Analysis of the Difference in Students’ Academic Achievement in Physics between Schools with Adequate Facilities and Schools without Adequate Facilities

* P<0.05; df=498; p-value 0.000

Hypothesis 3

The third hypothesis states that School type does not significantly influence students’ academic achievement in physics. To test the hypothesis, independent t-test was performed using SPSS version 22 computer programme. The results from the analysis are presented in Table 3.

The result in Table 3, with p-value of 0.000 was found to be less than 0.05 level of significance (that is P<.05) at 498 degree of freedom for the two-tailed test. With this result, the null hypothesis was rejected, meaning that school type (public and private) significantly influences students’ academic achievement in physics. This also means that students in public schools (mean=19.0464, SD=6.64787) and private schools (mean=29.5982, SD=9.22439) differ significantly in their academic achievement in physics.

School type	N	\bar{x}	SD	t_{cal}	df	Sig(2-tailed)
Public Schools	388	19.0464	6.64787	-13.473	498	.000
Private Schools	112	29.5982	9.22439			
* Total	500					

Table 3: Summary Results of Independent t-test Analysis of significant Difference in Academic Achievement in Physics between students in Public and Private Schools

P < 0.05, df= 498, p-value =0.000

VIII. DISCUSSION OF FINDINGS

The findings of this study are discussed as follows:

A. School Location and Students Academic Achievement in Physics

The results of the study show that, there is no significant difference between schools in the urban and those in the rural area in terms of students’academic achievement. This means that, students in urban and rural schools achievement scores are alike in physics. This finding, is in support with findings reported by Ayayi and Ogunyem (1990), Considine and Zappala (2002), Reeves (2005).

This finding also corroborates the report of Ayayi and Ogunyemi (1990). Their study reported that there was no significant difference between academic achievement of physics students in urban and rural schools. The findings from this study are also in line with the study of Reeves (2005) which reported that school location has no effect on students’ academic achievement. This indicates that, there is no significant difference in physics students’ achievement between urban and rural schools. Akpan (2001) also asserted that school location has influence on academic achievement in physics.

Observed empirical difference between the finding of this study and others in literature may be attributed to geographical distinction in study location and the fast growing technological development of the present, which now makes the world to be more or less a global village. Most facilities that were hitherto available only in the urban are today also obtainable in varying degree in rural locations. Beside the use of the multimedia instructional facilities, as well as the internet facility is virtually in all residential communities could account for this as it bridges the rural-urban gap.

B. School Facilities and Physics student’s Academic Achievement.

Result from the findings in this study shows that, there is a significant difference in physics achievement between schools with adequate (laboratory, library and electricity) and inadequate school facilities. This implies that, the academic achievement in physics students between schools with facilities and schools without adequate facilities differ. This also implies that schools with facilities achieved more than schools without facilities.

This study is in line with Isola's (2010), findings obtained in a study conducted in Kwara state showed that, there was a significant difference in academic achievement in physics between schools with adequate school facilities and schools without adequate school facilities. This study is supported by Sunday (2012), who reported that, school physical environment and physics students' academic achievement in senior secondary school do significantly related.

C. School Type and Students' Academic Achievement in Physics.

The finding in this study shows that, there is a significant difference in physics students' academic achievement between private schools and public schools. This implies that students in private and public schools differ significantly in terms of academic achievement in physics. This findings corroborates with the finding reported by Alderman, Orazem and Paterno (2001). Their report showed that private schools scored higher in physics and mathematics compare to public schools.

Researches carried out by Braun, Jenkin and Grigg (2006), Malaki, Ngban and Ibu (2009), Grouda (2013) and Day (2014) also supported that, there was a significant difference in physics academic achievement between private and public schools. Their findings show that, students in private schools achieve academically in physics than students in public schools. Finding carried by Ajayi shows that there is difference in academic achievement in physics between private and public schools. Results from study conducted by Alimi, Ehinola and Alabi (2011) shows that, there is no significant difference between students in public schools and students in private schools in terms of academic achievement in physics. This report goes contrary with the result in this findings.

The reason for contradictory findings in respect to difference in students' academic achievement might be connected with the variation in sample used and the period covered by this study. Another reason may be because of the fact that, in some privately owned schools there are adequate facilities like laboratory, library and electricity supply, and some time the class size may small compared to large class size as found in the public schools. In this case, students are expected to thrive well in terms of academic achievement in private schools than their counterpart in government public schools.

IX. CONCLUSION

Data obtained in this study shows that, some school environment factors (location, facilities and school type) significantly affect physics students' academic achievement, while the school location exert no significant influence on students' academic achievement in physics.

X. RECOMMENDATIONS

Based on the above findings and conclusions, the following recommendations are made:

- The relevant government and private schools organizing establishments should endeavor to employ qualified and experienced teachers and rationally distributed among secondary schools in urban/rural areas. Since both forms of schools have equal capacity to achieve.
- Government should inject more funds into the school system for the procurement of teaching and learning facilities. Government should give priority to public schools in the provision of school facilities (such as laboratory, library and constant power supply). This responsibility lies on the educational planners and administrators in the Ministry of Education. Also, corporate organizations and individuals should be encouraged, by government and school proprietors to donate generously in cash and in material for the provision of educational facilities especially in public schools. Apart from school and public libraries, Education Resource Centres (ERC) such as Teacher Resource and Audio Visual Centres should be established by government. In addition, teacher's training and re-training programme should be conducted yearly, so as to encourage the use of instructional facilities while teaching
- School administrators, Educational planners and evaluators should monitor, supervised and organize the activities of the students, school heads and teachers in both private schools and public schools.

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