LOCATION AND ACHIEVEMENTS OF STUDENTS IN SENIOR SECONDARY SCHOOL PHYSICS

D. U. Ugwu, (Ph.D)

Abstract

This study set out to investigate the relationship between location and achievement of SS III students in Physics. Correlation research design was employed. Stratified proportionate random sampling technique was used. The study used 494 subjects randomly selected from 25 secondary schools across the six education zones of Enugu State. Intact classes were used. For schools that have more than one stream studying Physics, one intact class was selected by balloting. Test Of Understanding of Physics concepts (TOUPC) was the instrument in the study. Both TOUPC and School Certificate Physics Examination (SSCE) results were the achievement tests or the study. Results showed from the simple correlation and regression analysis a week positive relationship between location and students' attainment in TOUPC and SSCE respectively. The conclusion is that location of students was significantly related to senior secondary school Physics students understanding of Physics concepts and also significantly related to their level of achievement in SSCE.

Introduction

Physics Education can be referred to as education in Physics (Onwioduokit and Ikwa 2000). Physics education as contained in the core-curriculum for senior secondary schools has to do with creating awareness with respect to Physics. Abbott (1997) specified that it is for creating awareness with respect to physical principles and laws governing the universe – active and inactive as well as the relationship between energy and matter. The study of Physics has been and will continue to be of tremendous importance to humanity for its ability to explain natural phenomenon and everyday occurrences. The knowledge of Physics has been found to be very essential in the understanding of the modern technology and myriads of scientific developments useful to mankind. Since Physics is one of the most basic sciences (Abbott 1997), full development of technology would virtually be impossible without it. The question is why do the average secondary school students in Nigeria have difficulty in understanding physics. The problem that the research addresses is that of the difficulty many students experience with learning Physics in secondary schools.

The withdrawal of students from the study of Physics (Bomide 1986, Ogunleye, 1999, Okoli 1995) evident in the various low enrolment patterns in the secondary schools of Nigeria, require urgent attention. During the past decade, data have built up that Physics teachers have failed to make necessary impact on

the achievement of Physics students. Observation shows that the achievements of students in secondary schools in Nigeria have been very poor in recent times in Physics, (Ivowi 1995, Adumugu 1995, Ogunleye 2000, Iloputaife, 2002). The unsatisfactory state of secondary school Physics education in Nigeria calls for renewed search for identifying and understanding the nature and scope of factor(s) that influence learning and understanding in Physics. What teachers are teaching is important but it must be viewed in the context of what our students learn. It is not enough to adjust and readjust our testing so that the students can succeed which WAEC and NECO are being forced to do. There is need for research evidence to plan and execute necessary changes and to direct effort appropriately.

An important element in the issue of students' pursuit of Physics education and understanding of Physics concept and which is the focus of this study is the school location (environment). Teaching occurs in a context and so environment influences learning (Nnachi, 1988). However, some cultures offer rich opportunities for psychological satisfaction and fulfillment of potentials. Others are limiting, repressive and rigid (Maduka, 1980). Some provide fulfillment of opportunities for certain groups but not others. Location of school tends to influence one's attitude, acquisition of skill and knowledge. Aleyideino (1989) pointed out that numerous studies conducted in Western countries have repeatedly drawn attention to the fact that children who live in under-developed surroundings characteristically find it difficult to cope with school learning.

For clarity of purpose, Adimugu (1995) defined the rural areas to have the following characteristics: lack of electricity, no pipe borne water, absence of government hospital and decreasing population as well as a continuous exodus of young men and women to urban areas. Rural areas are also generally characterized by relative homogeneity, a predominantly agrarian economy – a high degree of illiteracy and earlier marriage and child-bearing. On the other hand, urban areas are diversified economically, more heterogeneous in composition and more literate as many jobs require some degree of education.

The absence or presence of new stimulus in the environment (Aleyideino 1989) has always a significant influence on the development of a child as Piaget pointed out. Thus, urban areas are said to be exposed to the moderning effects of science and technology and as such students would likely perform better in Physics achievement and understanding of Physics concepts. Aleyideino stated that the greater the variety of situation to which the child must accommodate his behavioural structures, the more differentiated and mobile they become. Thus, the more new things a child had seen and the more he has heard, the more he is interested in seeing and hearing which aids learning and understating. But Peacock (1995) pointed out that the major resource constraint in rural schools is difficulty of access to training and materials through inadequate communications

and infrastructures which make working conditions extremely difficult in the teaching and learning situations.

Even though government have been making efforts in developing the rural communities for over a decade, it is not clear whether much has been achieved in education sector. For instance Eze (2000) carried out a study on the availability of resources for Physics laboratory in Enugu State Secondary Schools and found out that on the average, every secondary school in the urban cities has one Physics teacher, less than one laboratory assistant to two schools and about one laboratory attendant to two schools. The results for rural schools show that on the average, there is one Physics teacher to about three schools, one laboratory assistant to seven schools and one laboratory attendant to about seven schools also. In Nigeria however, the influence of location of schools in Physics concept attainment is inconclusive (Aigbomian 1987, Inomiesa, 1989).

While Aigbomian found out that location of school is not a significant factor in Physics concept attainment, Daramola (1983) and Ugwu (1996) found out that location of school is a significant factor in Physics achievement. This study sought to throw more light with respect to the prevailing situations in Enugu State Secondary Schools in Physics.

Purpose

An important element in the issue of students' pursuit of physics education is the school location. However, the effect of location on student's achievement in Physics is inconclusive, (Aigbomian 1985, Inomiesa, 1989). This inconclusiveness is disturbing especially when one realizes that most of the nation's schools which are also rich in local materials are located in rural areas. In this study, we are not seeking the effect of school location on any variable but how it relates with achievement in physics. In other words, we seek answers to the following question.

What relationship exists between location and achievement of SS III Physics students in TOUPC and SSCE?

Procedure

This study employed a correlation design. The investigation was carried out during a normal school term. Intact classes were used. The sample comprised 494 subjects, 17 to 19 years olds in their second term of senior secondary school (SS3) in Enugu State of Nigeria. The sample was drawn from 25 schools across the six education zones of the State to ensure wide representation. The procedure for selection of schools involved the use of table of random numbers to select schools from a list of schools in a zone. The instrument used for collecting the data in the study was Test Of Understanding of Physics Concepts (TOUPC). TOUPC was constructed by the research based on the concepts of motion, force, electric current and electric circuit. TOUPC was a 36-item multiple-choice test with provisions for explanations on the choice of options made. A scoring guide

was developed by the researcher for use in marking the test scripts of the research subjects. It utilized a four point scale system of O (lowest quality answer to 3 highest quality answers). The TOUPC was given six expert educators for face and content validation. To ensure content validity, a table of specification was developed as a guide to ensure that items drawn were representative of all the concepts selected as well as the objectives. TOUPC was administered to the students by the researcher. The interest of the study necessitated that the SSCE results of the subjects of the study in the schools selected was obtained. Thus, the school certificate Physics examination result was an achievement test for the study. The data generated were subjected to correlation analysis to identify patterns in the relationships. Regression analysis was also employed with predictor variable school location on TOUPC and SSCE. The use of a simple correlation coefficient was employed because the researcher investigated the extent to which variation in school location relates with variation in TOUPC and achievement in SSCE and focused on the degree and direction of correlation.

Result

One research question and two hypotheses guided the study. The research questions is 'what relationship exists between location and achievement SS III Physics students in TOUPC and SSCE?

The null hypothesis one is that there is no significant relationship between location and achievement of SS III Physics students in TOUPC . The null hypothesis two states there is no significant relationship between location and achievement of SS III physics students in SSCE Physics.

Table 1: Strength of Relationship between Location and Achievement of Physics Students in TOUPC and SSCE

Variable	**R**	**Interpretation**
Location and TOUPC	0.31	Weak positive relationship
Location and SSCE	0.17	Weak positive relationship

Information in Table 1 show that urban based SS III Physics students' mean scores have a weak positive relationship with rural based Physics students in TOUPC. The tendency is that in TOUPC, low scores of urban-based students tend to occur with low scores of rural-based students while high scores of urban-based students tend to occur with high score of rural-based students. This indicates that when the scores in TOUPC of urban-based students increases, the scores of rural-based students increases while when the scores in TOUPC of urban-based students decreases, the scores of rural-based students decreases respectively.

Table 2: Regression of Students' achievement in TOUPC and SSCE on Location of Schools (n = 494).

Variable	R	r^2	Standard error	Tcal	Tcrit	Decision
Location and TOUPC	0.31	0.096	1.32	7.13	±1.96	S*
Location and SSCE	0.17	0.029	10.37	3.71	±1.96	S*

S* = Significant at P< 0.05

Information in Table show that the calculated t-value due to the relationship between location and TOUPC is 7.13 while the t-critical value at the 0.05 significant level with 1 and 492 degrees of freedom is 1.96. Since the modulus of the calculated t-value is greater than t-critical, the corresponding null hypothesis of no significant relationship is rejected. Thus location of SS III physics students was significantly related to their attainment in TOUPC at 0.05 probability level. This means that the relationship between location and TOUPC is not due to chance or error associated with the research. Therefore, location was a significant predictor of achievement in TOUPC and had a predictive power of 9.6%.

Furthermore data in Table 2 indicate that the calculated t-value due to the relationship between location and attainment in SSCE is 3.71 while the t-critical value at 0.05 significant level with 1 and 492 degrees of freedom is 1.96. Since the calculated t-value is greater than t-critical, the corresponding null hypothesis of no significant relationship is rejected. Therefore location is significantly related to SS III physics students' achievement in the SSCE physics at the 0.05 probability level. This means that the relationship is not attributed to chance or error of research. Location therefore was a significant predictor of students' attainment in SSCE and had a predictive power of 2.9%/

Discussion

This study sought to determine the relationship between location and students' achievement in understanding of Physics concepts (TOUPC) and SSCE. In this regard, location was regressed on understanding of Physics concepts and SSCE. In the relationship between location and students' achievement in TOUPC, the regression indicated that this relationship was significant at 0.05 probability level. The relationship between location and understanding of Physics concepts is in line with theory of psychology of education.

Psychology of education has made us to understand that man is made by nature and nurture. There is no doubt therefore that environment influences

learning and consequently understanding of physics concepts. Furthermore some scholars according to Aigbomian (1985) are of the opinion that a child's intelligence is not fixed at birth but it is a complex product of his innate capabilities and his experience. Experience is provided by the area or cultural environment in which the child is borne or resides. It follows that different locations will provide different learning environment to the students. Therefore, environment substantially influences learning. The finding agrees with Nnachi (1988) who reported that children of urban and rural areas might have different experiences. These experiences would likely influence their understanding of Physics concepts. Moreover, Physics teaching occurs in a societal context and so the environment influences the rate of internalization. What may account for the negative relationship may be due to the fact that differential environmental stimulations resulted to differences in understanding of the Physics concepts. And the differential understanding of the Physics concept which cuts across the students might have been stereotyped by location. What need to be investigated are the aspects of TOUPC which is stimulated by either the urban or rural location. Other unknown factors may have interacted with location to affect the nature of relationships. For instance, environmental influence has impact on cognitive development that in fact, influences understanding. Again, the impact of environment for example through value system and child rearing practices can be seen in the different behavior styles and content and in some cases, in rate of development. The rate of development influences the understanding of Physics concepts.

In the relationship between location and SSCE, the regression showed that location of SS III Physics students was significantly related to their attainment in SSCE at 0.05 probability level. The finding confirms partially that of Twoli and Power (1989) that urbanicity (whether a school is in rural or an urban area setting) has a strong and significant effect on science achievement in favour of urban students. In his own contribution on the influence of location, Maduka (1980) pointed out that some cultures offer rich opportunities for psychological satisfactions and fulfillment of potentials. Others are limiting, repressive and rigid. Learning of Physics depends on the opportunities and limitation offered by the local setting, Maduka posited that environment regulates many students learning Physics. Thus, environment tends to influence one's attitude, skills acquisition, knowledge and consequently students' attainment in SSCE in Nigeria. For example rural students lack basic amenities which are essential for learning but they are exposed to natural vegetation: - rivers, and mountain. Urban students on the other hand, are exposed to all forms of modern gadgets and equipment that to some extent are lacking in rural areas (Ugwu, 1996). Therefore, the finding of this study of significant relationship between location and physics students attainment in SSCE in Nigeria is in line with previous researchers, psychology of education and educational theories of learning.

Conclusion

The findings of this study have obvious implications for Physics education. It is important that school administrators ensure that school environment is conducive and educationally stimulating and rich to enable students acquire worthwhile scientific experiences to improve understanding and achievement in Physics. The Physics teacher on his own, should be changing his teaching methods, strategies and techniques to suit the cognitive capabilities of the learners at any particular period in any given environment. This suggests that investment in the improvement of school facilities so as to enhance quality of Physics and learning to Nigeria represents a wise decision on the allocation of the already scarce resources and a step in the right direction.

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