# SCHOOL LOCATION AND STUDENTS' PROBLEM-SOLVING COMPETENCE IN PHYSICS

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**Abstract**

This study is an attempt to determine the effects of school location on students' problem-solving competence in physics. A total of 250 Senior Secondary Two (SS2) Physics Students randomly selected from Uyo Local Government Area of Akwa Ibom State, Nigeria were involved in the study. One research instrument, Physics Problem-Solving Competence Test (PPSCT) was used in generating data for the study. The reliability coefficient of PPSCT determined using Kudar-Richardson formula 21 (KR-21) was 0.91. One hypothesis was stated to guide the investigation and the data generated in the study were analyzed using t-test. The finding of the study reveals mat school location has significant effect on students* problem-solving competence in Physics. School location should therefore be considered as an important criterion in the development and implementation of both curriculum and instructional programmes for meaningful learning of Physics.

## Introduction

The level of intellectual development of a learner results mainly from the interaction of his/her intelligence level (cognitive factor) with various environmental variables (non-cognitive factors) (Anderson, 1998). This implies that students with the same level of intelligence measured by an index I.Q. will have different levels of achievement when they are exposed to different environments. This assertion has been buttressed by results of an experiment with two identical twins. The twins were found to have the same intelligence quotient (I.Q.) but different levels of academic achievement. This was traced to the environmental condition each of them grew up with (Chacko, 1981). It was found that twin that grew up in a rural area with less amenities and facilities performed lower academically.

According to Anderson (1967), some of the deficits in the impoverished environment of the poor which contribute to poor academic achievement include restricted language patterns, alienation . from and powerlessness toward social and educational establishments; and lack of toys, games and other stimulating materials found in more favoured environments. Furthermore, this dichotomous residential division of rural and urban locations was observed by Inyang and Jegede (1991) to exert great consequences on access to, and effect of, several amenities, education and welfare programmes in majority of the developing countries of the world.

Ekakitie (1977) and Fakuade (1979), in their studies on students' performances in biology and mathematics respectively reported unequal patterns of achievement by rural and urban school students with the latter group performing much more than the former.

In Nigeria .today, there is an improvement in socio-economic status of civil servants, social amenities and other changes. This development therefore, gives rise to a need to revisit the issue of the effect of school location on science achievement and Physics in particular. The educational system of the country with its far reaching philosophical and infrastructural inputs in the National Policy on Education (1981) and revision of physics curriculum, with reference to using environment as immediate physics laboratory by teachers further strengthen the need to revisit the effect of school location on student's achievement in science.

The present study was therefore, conceived to provide current data on influences of location on students' problem-solving competence in Physics.

## Purpose of Study

The purpose of this study is to determine the influence of school location on students' problem-solving competence in Physics.

## Significance of the Study

The findings of the study would help to inform educational practitioners and researchers on current situation with respect to development programme. The finding would also provide the data upon which to base decision by school counselors.

**Hypothesis**

There is no significant difference between urban and rural students in their Physics problem-solving competence.

**Methodology**

**Sample**

The sample of the study was two hundred and fifty (250) senior secondary two (SS 2) Physics students randomly drawn from Uyo Local Government Area of Akwa Ibom State of Nigeria.

**Instrumentation**

One research instrument, Physics Problem-Solving Competence Test (PPSCT) was used in collecting the data for the study. Physics problem-solving competence was measured by a ten-item physics problem test which was constructed by the researcher. The test items were taken out of the West African Examinations Council past question theory papers (2003 - 2005) for Senior Secondary Certificate Examinations (SSCE).

**Scoring of Instrument**

The Physics Problem-Solving Competence Test (PPSCT) was scored based on the problem-solving difficulties of the students identified in their observed performance. The types of difficulties encountered by the students were scored from the written protocols by locating errors, misconceptions and omissions in their written solutions to the problem (Kalejaife, 1987 and Adejumo, 1990). This was carried out within the framework of the Ashmore et al (1989), physics problem-solving model. The scoring techniques were based on the model namely:

(a) Definitions;
(b) Selecting information from the problem statement (data);
(c) Selecting information from memory;
(d) Reasoning; and
(e) Computation.

The maximum obtainable mark for each test was one hundred percent. That is, each correctly answered question was scored ten marks.

**Validation and Reliability**

After being face-validated by ten SS 2 Physics teachers, the instrument (PPSCT) was administered to a pilot sample of 50 SS 2 Physics students randomly drawn from four schools in Uyo Local Government Area who were not part of the main study subjects. The instrument was scored as outlined above. The reliability coefficient was determined using Kudar-Richardson formula 21 (KR-21) and the reliability index of the test was 0.91.

**Data Collection**

The researcher administered the instrument directly on the respondents in both urban and rural areas of the target population. The data collected were subjected to analysis.

**Method of Data Analysis**

The data obtained were analyzed using t-test at 0.05 significant level.

**Result**

**Table 1: t-test Comparison of Mean Score Difference in Physics Problem-Solving Competence between Urban and Rural Students**

| Source of Variation | N | X | SI | Df | t-cal | t-crt | P<.05 |
|---|---|---|---|---|---|---|---|
| **Urban vs Rural** | **132** | **49.8** | **12.2** | **124** | **22.4** | **1.96** | ***** |

* – = Significant at P<.05

The result as shown in the table above indicated that the calculated t-value (22,.4) exceed the

critical t-value (1.96) at .05 alpha level. This implies that the hypothesis which claims that there is no significant difference between urban and rural students in their Physics problem-solving competence is rejected. This means that school location influences significantly the students' problem-solving competence in Physics.

**Discussion**

Table 1, shows, that location has a significant influence on student's problem-solving competence in Physics. Urban Physics students were significantly superior over rural counterparts in Physics problem-solving competence. A number of reasons have been advanced for the academic superiority of urban Physics students. Most of these reasons seem to center on environmental stimulation and technology, which are felt comparatively more in urban areas and help urban student s to enhance their learning capacities. Good transport system in urban areas enhances movement of science equipment; students and teachers to schools and these in turn enhance prompt attention to Physics lessons. Also schools in urban areas are privileged to have more than one Physics teacher, a development which enhances team teaching to arrest differences of teachers. This enhances performance in problem-solving competence.

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**Recommendations and Conclusion**

Result obtained shows that:

i. Problem-solving competence in physics is greatly influenced by school location,
ii. School location should be considered as an important criterion in the development and implementation for both curriculum and instructional programmes for meaningful
learning of Physics.

References

Abdullahi, A. (1992). *Science Teacher in Nigeria.* Ilorin, Atoto Press Ltd. Pp. 26 - 31.

Acherson, N. J. (1967). Rural Youths in a Changed World. A Paper Presented at the National Outlook Conference on Rural Youth. Washington, D. C.

Adejumo, D. (1990). Cognitive Preference and Academic Performance among Pre-Service Teachers. Faculty of Education, University of Ife, Ile-Ife.

Asmore, A. D.; Frazer, M. J. and Casey, R. J. (1989). Problem-Solving and Problem-Solving Network in Chemistry. *Journal of Chemistry Education,* 56 (6), 377 — 379.

Anderson, R. O. (1992). *The Experience of Science: A New Perspective for Laboratory Teaching.* New York, Columbia University: Teacher College Press.

Chacko, T. (1981). Learning Outcomes in Secondary Mathematics as Related to Teachers and Students Characteristics. Unpublished Ph.D. Thesis, University of Ibadan.

Ekakitie, U. A. (1979). A Comparative Study of the Performance in Biology of Rural and Urban Secondary School Students in Western Urhobo Division of Bendel State. Unpublished B.Sc (Ed.) Project. University of Nigeria, Nsukka.

Fakuade, R. (1977), An Investigation of the Problems Involved in the Teaching and Learning of Mathematics in Some Secondary School in Western State of Nigeria. Unpublished Ph.D. Thesis, University of Walls, United Kingdom.

Inyang, N. and Jegede, O. (1991). The Effect of School Location on Science Achievement: A Revisitational Study of Some Selected Junior Secondary Schools. *Sokoto Educational Review.* Vol. 3, May, pp 1 - 9.

Kalejaiye, A. O. (1989). An Analysis of Performance of Bilingual Children in Solving Verbal Problems in Mathematics. Unpublished Ph.D. Thesis, University of Ibadan.