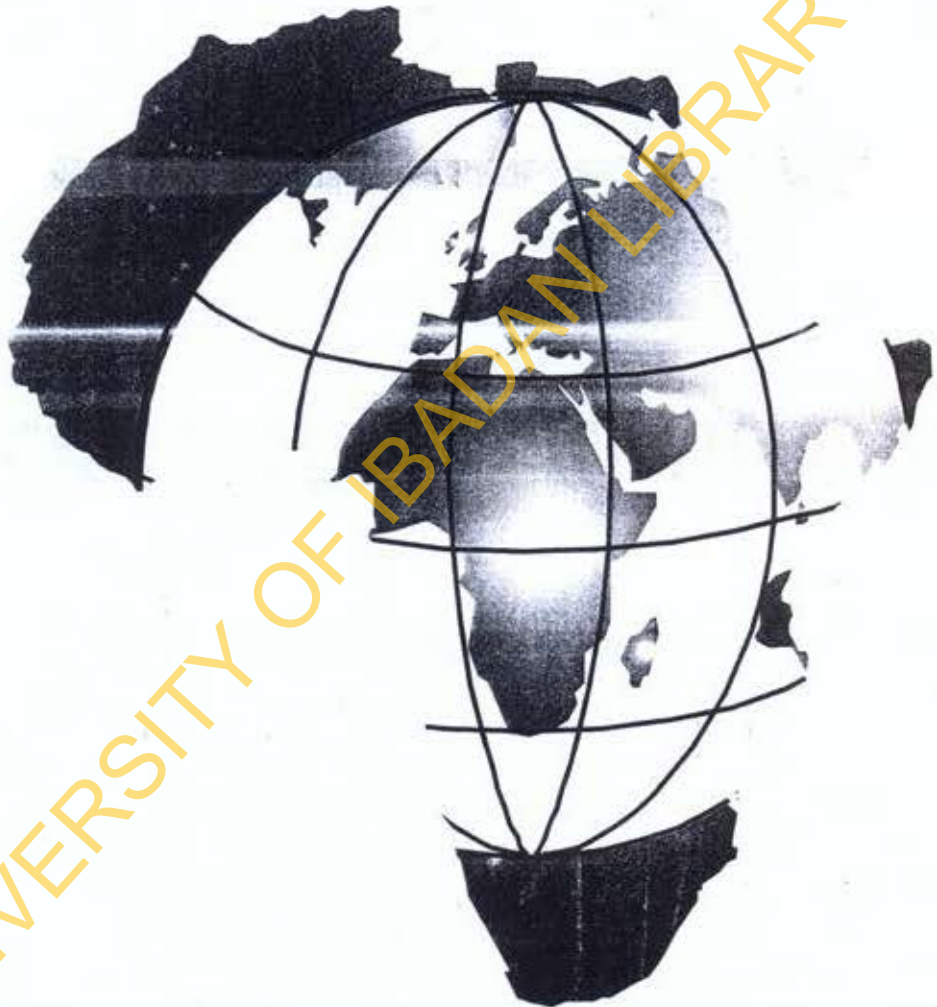


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## LIBRARY RESOURCES AS CORRELATES OF STUDENTS' ACHIEVEMENT IN SECONDARY SCHOOL PHYSICS: A STUDY IN SCHOOL EFFECTIVENESS

Dr. J. Gbenga Adewale

International Centre for Educational Evaluation,  
Institute of Education, University of Ibadan,  
Ibadan - Nigeria  
[gbengaadewale@yahoo.co.uk](mailto:gbengaadewale@yahoo.co.uk)

### Abstract

One of the indicators of school effectiveness is students' achievement. Unfortunately, students' achievement at the end of secondary school education in virtually all subjects especially physics. One of the resources that could increase students' achievement is library resources, therefore, this study sought to correlate the library and library activities with students' achievement in Physics in Osun State. A total of 934 secondary schools Physics students and 30 secondary schools principals were used as samples of the study. Descriptive statistics and multiple regression analysis were used to answer the research questions raised. Two research instruments were used in the study; these are the Physics Achievement Test (PAT) and School Questionnaire (SQ). The findings show that 6 out of the seven variables used in this study (availability of school library; availability of school librarian; frequency of use of library by students; frequency of use of library by teachers; number of recommended Physics textbooks in the school library; and adequacy of seats) contributed significantly ( $P < 0.05$ ) to the explanation of students' achievement in Physics. If libraries are provided in schools where there are no libraries, students use the library regularly, more physics textbooks are provided in the library, it is likely that students' achievement in physics will improve.

**Key words:** Library, Library resources, Students' achievement in secondary school physics, School effectiveness

Word Count: 206

### Introduction

Physics is a very important and useful school subject for technology and manpower development of every nation (Emovo, 1985 and Okpala, 1995). Physics is highly needed for any nation's technological break through. According to Okeke (1997), physics is the heart of science and the hub of all technological activities. Physics keeps transforming the world. Physics draws awe and respect from people because of its contributions to knowledge, growth and development of individuals in particular and the society in general.

Unfortunately, as important as physics is, there

are two major problems associated with the learning of physics in secondary schools (Adewale, 2002). The first is the enrolment pattern of the students in the subjects, not many students patronize the subject because some of them believe that it is a difficult subject, boring, abstract, many laws, principles and formula to memorize (Ariyo, 2005 & Adewale, 2002). The second problem is associated with unfavourable performance of students in the subject (Ariyo, 2005, Adewale, 2002, Orji, 1999 and Iroegbu, 1998). Physics appears to be one in which students experience the greatest difficulty (Adeoye 1992). This is because the perception of students that physics is a difficulty subject affected their interest and subsequently led to declining enrolment and poor performance in national examination like the West African Senior School Certificate Examination (WASCE) and University Matriculation Examination (UME) (Femi & Raimi, 2005, Emmanuel, 2003 and Okpala & Onocha, 1995).

This problem of students under achievement in physics has also engaged the attention of many scholars over the years (Bojuwoye, 1985; Fidelis & Akinyemi; 2005, Evans & Akinyele, 2007). Major factors which have been identified as contributing to the persistence of poor level of achievement in physics are; ineffective teaching methods adopted by the physics teachers in the field (Adeyegbe, 1993, Ivowi, Okebukda, Oludotun, and Akpan 1992); learner variables such as gender, poor attitude and low numerical aptitude (Okeke & Nwanna, 1992), lack of organized strategies for problem solving, poor reasoning and mental skills (Maloney & Sigler 1993).

There is therefore a need to search for more effective explanations why the performance of students have not improved significantly even with all the research efforts along this direction. A growing body of literature on effective schools has regularly emphasized that opportunity to learn is associated with students' achievement. Opportunity to learn is made possible through libraries and library resources. A school library is essentially a place

where books are kept for safety and reading purposes by students and teachers. Fuller (1986) identified a school library as an instructional resource which may significantly influence pupils' achievement after controlling for pupils' family background. He found out that the effect of library size and its activity have been positive in 15 out of 18 analyses.

Other research work such as Carnoy (1971) reports that the simple presence of school library is related to the school's average achievement especially in the third world and developing countries. The efficacy of library size and its utilization rates were found to be significant and much less strong than the social class control variables and the availability of text books (Ryan, 1973). Library size (volume of text books) may not be effective if the books are not adequate and up-to-date. For it to be impactful, the library should be opened to the students always for a considerable length of time in a school day. The students ought to be oriented on the use of the library and be allowed to borrow the books at their request.

Furthermore, Fuller (1986) addresses the question of which specific material inputs in the library are related to students' achievement. He reviews seventy-two (72) studies conducted in certain developing countries over fifteen (15) years and discovered that instructional process consistently influence pupils' achievement. For instance, out of twenty-two studies aimed at determining the influence of textbooks, fourteen have found a significant effect on achievement (Heyneman and Loxley, 1983). In the same vein, fifteen out of eighteen studies carried out on the effect of library (intensity of utilization) on academic attainment strongly supports that the use of library has positive and significant effect on students' achievement (Costa, 1977; Heyneman and Loxley, 1983; Arriagada, 1983; Thorndike 1973; and Beebout, 1972). Arubayi (1987) in a study on the comparative study on correlates of selected extrinsic variables with students' academic performance in science. He finds that there exists a positive relationship between the independent variables (laboratory-facilities, recommended textbooks, number of science textbooks in the library and the teachers' qualification); and the dependent variables- (academic achievement of students in Biology, Chemistry and Physics).

The federal government of Nigeria realized the importance of library states in the National Policy on Education (FRN, 2004) that:

Libraries are one of the most important educational services. Each State Ministry needs to provide funds for the establishment of libraries in all our educational institutions and to train librarians and library assistants for this service.

In a study conducted by Popoola (1981) on the relationship between institutional resources and academic performance, the investigator discovers that the library correlates with academic performance showing that schools with well-equipped library normally maintain high academic performance. However, Fuller (1986) in a study in rural Brazil discovers that while the collection of books kept for reading in the library is related to academic performance, the possession of personal textbooks as well influences academic achievement.

Akinwumiju and Orimoloye (1987) also state in support of material resources for any educational system that:

Educational institutions from nursery to university require buildings for their effective operations. Classrooms, offices, assembly halls, laboratories, and staff quarters are needed. Within the buildings, there should be fixtures and fittings to make them useable, the infrastructural facilities included here are important items like furniture for staff and students, books, science equipment, game and sport equipment and other facilities have to be in good condition for schools to function properly.

One of the other facilities described by Akinwumiju and Orimoloye (1987) include school library and library resources. Hallak (1990) identifies facilities as major factors contributing to academic achievement in the school system. These include the school buildings, classroom accommodation, libraries, laboratories, furniture, recreational equipment, apparatus and other instructional materials. While the availability, relevance, and adequacy of these resource items contribute to sound academic achievement and absence of these may contribute to poor academic performance of students. It is assumed that if there is a library in a school and such materials as physics textbooks, journals and comics are available and are read by the students,

there is the tendency that they will perform well in physics.

### Statement of the problem

The study sought to determine the contributions of the following: availability of library and librarian, library size, frequency of use of library by Physics students and teachers, number of Physics textbooks and comics in the library, and adequacy of seats in the library in explaining the students' performance in secondary school Physics.

### Research Questions

1. What are the characteristics of the library size and library activities in terms of availability of library and librarian, library size, frequency of use of library by Physics students and teachers, number of Physics textbooks and comics in the library, and adequacy of seats in the library?
2. What are the composite and relative contributions of the following: availability of library and librarian, library size, frequency of use of library by Physics students and teachers, number of Physics textbooks and comics in the library, and adequacy of seats in the library to the explanation of students' achievement in Physics in Osun State?

### Population, Sampling Technique and Samples

The senior secondary school class 1 (SS I) Physics students and teachers in all the senior secondary school in Osun State constituted the population of this study. Multistage sampling technique was adopted for this study. The sampling was done at three levels: These include the local government area (LGA); the school and the students.

Sampling at the local government level: Out of the 30 LGA in the State, 6 were randomly selected.

Sampling at the local government level: Out of the 30 LGA in the State, 6 were randomly selected.

Sampling at the school level: There were 106 senior secondary schools in the 6 LGA selected, forty schools were chosen using probability proportional to size. However, the schools selected had:

1. 30 students in SS I.
2. a full-time Physics teacher for SS I.

Sampling at the subject level: The actual number of students randomly selected were between twenty-five (25) and twenty-nine (29) in each of the forty schools. The Physics teachers also partook in the study. So in all, there were one thousand and twenty-nine students and 40 Physics teachers in the sample.

### Research Instruments

Two research instruments were used in the study; they were the Physics Achievement Test (PAT) and the School Questionnaire (SQ). The Physics Achievement Test (PAT) consists of two sections A and B. Items were drawn from mechanics and properties of matter (this formed section A) and heat (section B) of O' level Physics teaching syllabus. PAT contained 30 items with options A, B, C and D selected from a pool of 200 items developed and validated for use in testing the SS I students in Physics. The 30 items had high and positive discriminating indices. The difficulty levels varied from 0.4 to 0.6. An investigation of the scheme and record of work indicated that the topics from which PAT items were picked had been covered in the class. The Kuder-Richardson formula 20 was used to establish a reliability estimate of 0.778 for the test. This reflects the internal consistence and constructs validity of the test.

The school questionnaire contained information about the background of the school like the setting or location, age, population of teachers and students. It also contained question about the availability of library and librarian, library size, frequency of use of library by Physics students and teachers, number of Physics textbooks and comics in the library, and adequacy of seats in the library. This instrument was validated by experts in the Institute of education, University of Ibadan.

### Method of Data Analysis

PAT was dichotomously scored using SCORBATT programme for right or wrong. Every student who shaded the correct option scored 1 while shading the wrong option earned zero. Students' total scores, therefore, represented their achievement in Physics. Descriptive and multiple regression analysis were used to answer the research questions 1 and 2 respectively.

### Results and Discussion

#### Research Question 1

What are the characteristics of the library size and library activities in terms of availability of library and librarian, library size, frequency of use of library by Physics students and teachers, number of Physics textbooks and comics in the library, and adequacy of seats in the library?

Table 1 Frequency and Percentage of Library and Library Activities

S/N	Variable	Category	Freq.	%
1	Availability of school library	Not available	3	7.5
		Available	37	92.5
2	Library size	No school library	3	7.5
		Improvised (a classroom)	15	37.5
		Standard school library	22	55.0
3	Availability of school librarian	Not available	10	25.0
		Available but not qualified	19	47.5
		Available and qualified	11	27.5
4	Frequency of use of library by students	Never use	102	9.92
		Once a week	372	36.15
		Twice a week	254	24.68
		Thrice a week	151	14.67
		Four times a week	125	12.15
		Everyday	25	2.43
5	Frequency of use of library by teachers	Never use	3	7.5
		Once a week	13	32.5
		Twice a week	11	27.5
		Thrice a week	8	20.0
		Four times a week	3	7.5
		Everyday	2	5.0
6	Number of recommended Physics textbooks in the school library	No Physics textbooks	6	15.0
		Less than 5 Physics textbook	17	42.5
		Between 5 and 10 Physics textbook	10	25.0
		Between 11 and 20 Physics textbook	4	10.0
		More than 20 Physics textbook	3	7.5
7	Adequacy of seats	Very adequate	5	12.5
		Moderately adequate	12	30.0
		Not adequate	20	50.0
		Not applicable	3	7.5

It is surprising to note that there are still some schools without school library. However, more than 90 percent of the schools had a library. Out of some schools converted a classroom into a library. The services of a librarian are necessary in a school system, it is unfortunate that only 27.5 percent of the school had a qualified school librarian. There are some schools where the students and staff members never visited the library. However, majority of the students and staff members visited the school library.

Majority of the schools had to some extent collections of recommended physics textbooks.

#### Research Question 2

What are the composite and relative contributions of the following: availability of library and librarian, library size, frequency of use of library by Physics students and teachers, number of Physics textbooks and comics in the library, and adequacy of seats in the library to the explanation of students' achievement in Physics in Osun State?

Table 2 (a) Regression Summary of Library and Library Activities Explaining Students' Achievement in Physics

Multiple R	.91623
R Square	.83948
Adjusted R Square	.80436
Standard Error	.75754



Table 2 (b) Analysis of Variance,

Source of variation	DF	Sum of Squares	Mean Square	F	Sig. F
Regression	7	96.03631	13.71947	23.90713	.0000*
Residual	32	18.36369	.57387		

\*= Significant ( $p < 0.05$ )

Table 2 (c) Parameter Estimate

Variable	B	SE B	Beta	T	Sig. T
Availability of school library	.047192	.063777	.260170	2.740	.0131*
Library size	-.244951	.418919	-.062719	-0.585	.5628 <sup>ns</sup>
Availability of school librarian	1.101277	.363087	.305005	3.033	.0048*
Frequency of use of library by students	.476649	.087188	.445585	5.467	.0000*
Frequency of use of library by teachers	.592431	.103967	.579869	5.698	.0000*
Number of recommended Physics textbooks in the school library	.747014	.289546	.259216	2.580	.0147*
Adequacy of seats	.355526	.193597	.209635	1.836	.0756 <sup>ns</sup>
(Constant)	1.628346	1.286991		1.265	.2149

\*= Significant ( $p < 0.05$ )

NS = Not significant ( $p > 0.05$ )

Results in Tables 2 (a) shows that the combination of the seven variables in library and library activities have a multiple correlation of 0.91623 with the students' achievement in Physics. However, the combination of these seven variables explained 83.95 percent of the variance in students' achievement in Physics as shown by the coefficient of determination ( $R^2 = 0.83948$ ). The analysis of variance (ANOVA) in Table 2(b) further shows that there is a clear trend of students' achievement in Physics increasing with the library and library activities under study.

Results as shown under parameter estimate (Table 2c) indicate that partial correlation coefficients of such library and library activities as library has negative contribution to the explanation of the students' achievement in Physics. The rest library and library activities (availability of school library; availability of school librarian; frequency of use of library by students; frequency of use of library by teachers; number of recommended Physics textbooks in the school library; and adequacy of seats).

The standard regression coefficients were used to determine the relative contributions of each of the seven library and library activities variables to the

explanation of students' achievement in Physics. The significant of each of the variables' contributions was tested and it was observed that availability of school library; availability of school librarian; frequency of use of library by students; frequency of use of library by teachers; number of recommended Physics textbooks in the school library; and adequacy of seats contributed significantly to the explanation of students' achievement in Physics.

#### Discussion

Heyneman and Loxley (1983) believe that the length of time students spent interacting with the learning materials is a consistent predictor of students' achievement. This is probably why the result of this study point to the fact that frequency of use of library by students help in predicting students achievement in Physics. In the same vein, fifteen out of eighteen studies carried out on the effect of library (intensity of utilization) on academic attainment strongly supports that the use of library has positive and significant effect on students achievement (Costa, 1977; Heyneman and Loxley, 1983; Arriagada, 1983; Thorndike 1973; and Beebout, 1972).

Availability of library is found to contribute significantly to the explanation of students' achievement in Physics. This finding is in agreement with the assertions of Obanya (1980) where he observed that a child whose school has good facilities (library, laboratories, teachers in sufficient number etc) for learning is likely to learn more than another child whose school lacks all these facilities. Research works of Carnoy (1971) and Hussen et. al (1978) provide such information as the simple presence of school library is related to the school's average achievement especially in the developing countries.

The importance of a school librarian in the learning process of a child is explained by Asiru, (1996), he stated that school librarian should provide service that will make teachers see themselves as incomplete without the school librarians. In addition, Fabunmi, (2000) saw a school librarian as an information resource manager who holds the key to knowledge. This implies that if there are no school librarians it is likely that the students will not be able to make use of the library properly. This explains why there is a significant contribution of the presence of school librarians to the explanation of students' achievement in Physics.

Library size in this study is measured by the actual dimensions of the library or building used as library. Contrary to earlier findings of Ryan (1973), library size's contribution to students' achievement in physics despite the fact that is not significant is negative. These suggest that students' achievement in physics is not a function of how big a school library is, since a library may be big in size in terms of its dimension (length and width) without relevant textbooks, journals, periodicals and comfortable seats. This type of libraries will not be attractive to students.

Availability of textbooks is found to be a consistent predictor of academic achievement. This study shows that availability of textbooks contribute significantly to the prediction of students achievement in Physics. This agrees with the studies of Popoola (1981), he found significant relationship between institutional resources like school library and academic performance, he discovered that the library correlates with academic performance showing that schools with well-equipped library normally maintain high academic performance. However, while the collection of books kept for reading in the library is related to academic performance, the possession of personal textbooks as

well influences academic achievement, as buttressed by Fuller (1986).

### Conclusion and Recommendations

The results have shown clearly that most variables used in library and library activities are good predictors of students' achievement in Physics. These are the availability of school library; availability of school librarian; frequency of use of library by students; frequency of use of library by teachers; number of recommended Physics textbooks in the school library; and adequacy of seats. It can therefore be argued that if these factors can be manipulated, it is likely that the students' achievement in Physics will be affected. For example, if libraries are provided in the schools where such do not exist, the presence of library is likely to raise students' interest in reading and indirectly increases their chance of performing well in their academic work. The same thing goes for provision of textbooks where such are lacking.

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