ISSN 2250-3153

Empirical Nexus between Teaching/Learning Resources and Academic Performance in Mathematics among Pre-University Students in Ile-Ife, South-West Nigeria

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***Abstract*-** The education system in Nigeria is faced with a mirage of defects which include inadequate provision of teaching and learning resources as a result of poor planning and corruption among other things. This study considers the effect of teaching/learning resources on academic performance in mathematics among pre-university students in Ile-Ife, South-West, Nigeria.

A total of 126 questionnaires were administered among two major pre-university schools in Ile-Ile, Nigeria. The research instrument developed for this research is student's questionnaire on performance (SQP) to answer at least three research questions on academic performance of students in mathematics. Correlation analysis, coefficient of determination and multiple regression analysis were used to analyze the data.

In all analyses, we find that all the independent variables considered could not account well for academic performance of students in mathematics. Cogent recommendations were made based on our empirical findings.

***Index Terms*-** Teaching/Learning aids, Mathematics, Academic Performance, Pre-University Students, Nigeria, Regression Analysis.

I. INTRODUCTION

Globally, education is viewed as an essential pathway to making a total child. As noted by Wolfenson (2000), Yara & Otieno (2010), it is a fundamental human right. The pivot to sustainable development, stability and tranquility within and among nations is the provision of education to the populace of such countries. Availability and adequacy of teaching/learning resources promote the effectiveness of schools as these are basic things that can trigger good academic performance in the students. Resources (both human and non-human) are germane to overall students' outcome. Maicibi (2003) submitted that all institutions or organization are made up of human beings (workers) and other non-human resources which can be manipulated to realize set objectives. Yara & Otieno,(2010) asserted that the abstract nature of mathematics should be reduced through demonstration , practical methods and use of teaching/learning materials like relevant textbooks; classroom/laboratories; stationeries/teaching aids,; textbooks and trained teachers. Agwagah (1997) observed that the problem of ineffective teaching can be tackled through planned and intelligent application of the mathematics laboratory.

Teachers are very important human resources to achieve the objectives of a school system. Teachers are usually responsible for teaching and learning process in the schools. They are important inputs in the educational system which involves highly-skilled labour resources that combine with educational materials (Hansen, 1996).They are that largest most critical inputs of an educational system (Combs, 1968).Teachers are the backbone of the entire educational system. Their effectiveness is perhaps the most vital function affecting the future development of education process Akudu(2007). Ukeje(1979) described them as the hub of the educational system. They are seen as role model in the schools and custodians of knowledge. According to Balogun (1995), teacher's job does not end at teaching effectively and efficiently only, but he is a model, as his students look up to him both as a mirror and as an instrument of learning, not only does what he says but what he does also matter. The outcomes of their efforts are typically represented by grades. The consequence of these opinions is that well trained teachers in mathematics if well deployed to the secondary schools will produce students who will perform academically well in mathematics. Mathematics is the pillar of science and technology and its functional roles in the development of science and technology is multi-dimensional that no area of science, technology and business enterprise escapes its application (Okereke, 2006, Okigbo and Osuafor, 2008). Ukeje (1986) posited mathematics as the backbone of civilization in all the centuries of meticulous calculation, and the most basic discipline for any person who would be truly educated in any science and in many other endeavours.

The problem of poor performance in mathematics as a subject is global and it is a serious concern to parents and education stakeholders (Valverde and Schmidt 1997; Mudulia, 2012). This problem is made worse in developing countries by the existing digital divide, poverty and other problems unique to the third world especially Nigeria. Mathematics being a compulsory subject up to pre-university level especially in social science and science oriented subjects. Despite the importance placed on mathematics, researchers (Odili, 1986; Salau, 1995; Amazigo, 2000; Agwagah, 2001; Betiku, 2001; Obioma, 2005; Maduabum andOdili, 2006; Okereke, 2006 Okigbo and Osuafor ,2008) had observed that students lack interest in the subject and perform poorly in it. During the past few years, performances in Mathematics in National examinations such as General Certificate Examination, WASC, NECO, NBTE and UTME) have dropped significantly and this has been a major concern for the society. Ale (2012), submitted that lack of interest in

mathematics and mass failure in mathematics at school certificate level and the country could not achieve its transformation agenda without promoting the study of sciences through mathematics. This paper aims to determine the connection between teaching/learning resources and academic performance in mathematics among pre-university students in south- western Nigeria. Two major pre-university institutes were used as case studies viz Damico Educational Institute and Obafemi Awolowo University Parent Assisted Coaching Centre, both situated at Ile-Ife, South-West Nigeria.

The rest of this paper is organized as follows: Section 2 is on literature review, section 3 on the research design and methodology, section 4 discusses the results of empirical analyses while section 5 is on conclusion and recommendation.

II. Review of Related Literatures

Setidisho (1996) asserted that mathematics is a fulcrum on which understanding of most other fields hang. Probably, no subject forms such a binding force among the various branches of science - physical, biological and social as mathematics (Adetoye & Aiyedun, 2003, Olatoye 2007). Mathematics is the universal language of science and central intellectual discipline of the technological societies (Kalejaye, 1985; Odeyemi, 1995). A student needs fundamental knowledge of mathematics like change of subject to understand density which appears under major topics like Ecology in Biology, diffusion in Chemistry and Floatation in Physics .Students' achievement in mathematics at both Junior and external examinations worsen as years go by (Oyedeji, 2000).

Many other researchers confirm low performance in mathematics at both the qualifying examination (SSCE) and placement examination like Unified Tertiary Matriculation Examination – UTME (Ukeje, 1991; Buhari, 1994 & Okoro, 2005).

If the vision 20:2020 will be a reality, the education to develop human resources should be given much attention. In particular, low quality education in Science and Mathematics is an urgent issue to be addressed. In response to the request, there have been massive manpower development through workshops/ in–service training of teachers by National Teacher Institute and National Mathematical Center and other relevant agencies and also the procurement of mathematics kits to enhance Mathematics and Science education in secondary schools and pre-university in Nigeria. All the aforementioned efforts will not yield the desirable fruits if the teaching activities are not students centered, based on experiments and improvisation where necessary. Mathematics laboratory is a place where students can learn and explore various mathematical concepts and verify different mathematical facts and theories using varieties of activities and material (Igbokwe, 2000; Okigbo and Osuafor, 2008). The use of mathematics laboratory helps to synchronize theory and practical work in mathematics teaching /learning. Ohuche (1990) advocated the need for moderately equipped mathematics laboratories. Yadar (2007, Yara & Otieno, (2010) opined that no course in Science and Mathematics can be considered as complete without including some practical work. The practical work ought to be carried out by individuals either n Science laboratories or in classes. They stated further that at school level, practical work is even more important because of the fact that we learn by doing. Scientific practices and applications are thus rendered more meaningful. It is an established truth that an object handled impresses itself more firmly on the mind than the object merely seen from a distance or in an illustration. Thus practical work forms an important feature in any Science and Mathematics Course (UNESCO, 2008; Yara & Otieno, 2010).

Yara & Otieno, (2010) opined that the teaching/learning of Longitudes and Latitudes in mathematics can be accompanied by improvising a metallic or plastic globe and using it in locating the position of an object along the equator. The current dearth of teachers through attrition is serious concern to all and sundry. Students in most public schools are worst heated with mirage of overcrowded classrooms and lack of adequate learning resources. Consequently, they do not get individual attention from their teachers. On many occasion, they lack adequate textbooks and laboratory equipment. As a result, the students may lose hope in performing well in academic work. This is in sharp contrast to private schools where the numbers of students are few as there are adequate learning resources and the teachers are willing to sacrifice their time to ensure that the students perform well in examination.

Indigent students from low socio-economic status families tend to value domestic activities more than schooling. Such children are subjected to child labour, street hawking and they have little time for studies. Financial problems and penury which are prevalent in the third world nations have been major impedance to effective undertaking of the major government financed programmes. In most developing nations, there are many families whose members despite full days hard labour who find it hard to make two ends meet. Children of tender age in such families have to work for their living. These coupled with little government financing of education sector makes many families unable to meet the requirements for their children's education thus contributing greatly to their abysmal academic performance All these are perceived to be responsible for students' poor performance in external examinations.

In the spirit of Yara and Otieno(2010),we intend to investigate some of the indices and yardsticks used to measure academic performance in mathematics among a sample of pre-university mathematics students in South-West Nigeria in this study. The research questions considered in this study are written below:

- Is there any empirical relationship between availability of teaching/learning resources and students' academic performance in mathematics?
- Is there any significant relationship between availability of mathematics laboratory and students' academic performance in mathematics?
- Is there any empirical relationship between availability of mathematics textbooks and students' academic performance?

III. HYPOTHESES OF THE STUDY

H_O: There is no significant difference between the effect of availability of mathematics textbooks, availability of mathematics laboratory and availability of teaching/learning resources on students' academic performance in mathematics.

i.e Ho: X1=X2=X3 VS
H_1 : Not Ho.

IV. RESEARCH DESIGN AND METHODOLOGY.

A descriptive research of the survey was adopted in this study. A total of 126 questionnaires were administered among two major pre-university schools in Ile-Ile, south west Nigeria, using simple random sampling technique. The research instrument developed for this research is student's questionnaire on performance (SQP) to answer at least three research questions on academic performance of students in mathematics. The data collected was analyzed using frequency count, percentage score. Correlation analysis, coefficient of determination and multiple regression analysis formed part of the inferential analysis adopted in the study.

V. EMPIRICAL ANALYSIS AND RESULTS

This section contains the various empirical analyses carried out in this research. The frequency counts and percentages are contained in the tables 1-4 below:

Table 1: SCHOOL

	Frequency	Percent	Valid Percent	Cumulative Percent
DAMICO	76	60.3	60.3	60.3
OAU PRE - SCHL	50	39.7	39.7	100.0
Total	126	100.0	100.0	

Table 2: T/L RESOURCE AVAILABLE

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	109	86.5	86.5	86.5
NO	17	13.5	13.5	100.0
Total	126	100.0	100.0	

Table 3: AVAILABILITY OF MATHS LAB

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	24	19.0	19.0	19.0
NO	102	81.0	81.0	100.0
Total	126	100.0	100.0	

Table 4: NUMBER OF MATHS TEXTBOOKS USED

	Frequency	Percent	Valid Percent	Cumulative Percent
ONE	23	18.3	18.3	18.3
TWO	35	27.8	27.8	46.0
MORE THAN TWO	68	54.0	54.0	100.0
Total	126	100.0	100.0	

Table 5: CORELATION MATRIX

		PERFORMANCE IN MATHS	NO. OF MATHS TEXTBK	T/L RESOURCE AVAIL	AVAIL OF MATH LAB
Pearson Correlation	PERFORMANCE IN MATHS	1.000	-.135	-.068	-.003
	NO OF MATHS TEXTBK	-.135	1.000	-.040	.120
	T/L RESOURCE AVAIL	-.068	-.040	1.000	-.194
	AVAIL OF MATH LAB	-.003	.120	-.194	1.000
Sig. (1-tailed)	PERFORMANCE IN MATHS	.	.066	.226	.489
	NO OF MATHS TEXTBK	.066	.	.330	.091
	T/L RESOURCE AVAIL	.226	.330	.	.015
	AVAIL OF MATH LAB	.489	.091	.015	.
N	PERFORMANCE IN MATHS	126	126	126	126
	NO OF MATHS TEXTBK	126	126	126	126
	T/L RESOURCE AVAIL	126	126	126	126
	AVAIL OF MATH LAB	126	126	126	126

Table 6: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change	R Square Change	F Change	df1	df2
1	.154(a)	.024	.000	.76977	.024	.984	3	122	.403

a Predictors: (Constant), AVAIL OF MATH LAB, NO OF MATHS TEXTBK, T/L RESOURCE AVAIL

Table 7: ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.748	3	.583	.984	.403(a)
	Residual	72.291	122	.593		
	Total	74.040	125			

a Predictors: (Constant), AVAIL OF MATH LAB, NO OF MATHS TEXTBK, T/L RESOURCE AVAIL
b Dependent Variable: PERFORMANCE IN MATHS

Table 8: Model Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	2.409	.462		5.219	.000
	NO OF MATHS TEXTBK	-.137	.090	-.138	-1.532	.128
	T/L RESOURCE AVAIL	-.151	.188	-.073	-.801	.424
	AVAIL OF MATH LAB	.000	.179	.000	-.002	.999

a Dependent Variable: PERFORMANCE IN MATHS

Table 1 above, shows the two pre- university institutions captured in this research.one represented government owned and the other represented the private owned institution.76(60.3%) were from Damico Educational Institution while others were randomly selected from OAU pre-varsity coaching center. Table 2 revealed that 86.5% of the respondents made use of teaching /learning aid. On the other hand, only 19.3 were being taught with aid of mathematics laboratory. Our survey also shows that a good number of the respondents possessed more than two mathematics textbooks. The correlation matrix in table 5 revealed that there is negative correlation between students' academic performance in mathematics and the correlates considered in this study. The multiple regression model using number of mathematics possessed(X1) teaching/learning resources availability(X2) and mathematics laboratory(X3) as predictors of performance in mathematics (Y) gives the following model:

$Y=2.409-0.137X_1-0.151X_2$

The coefficient revealed that these variables accounted for only 2.4% of academic performance in mathematics among the students considered.

Result from the ANOVA table in table 7 above, shows that there is no significant difference between the effects of availability of mathematics textbooks, mathematics laboratory; and availability of teaching/learning resources on students' academic performance in mathematics. We fail to reject Ho at $\alpha = 0.05$ since p-value > 0.05, hence the test is not significant.

VI. Concluding Remarks and Recommendation

A lot of deductions have been made in this study. The fact that only 19.3% of the respondents are being taught with the aid of mathematics laboratory shows the pathetic state of education in Nigeria. Government and education stakeholders should provide mathematics laboratory in the schools in order to aid students' performance in mathematics. Also, the correlation matrix depicts negative correlation between the predictors and the dependent variables X1,X2,X3. This reveals that there is opposite relationship between these variables. The coefficient of determination obtained from the regression model shows that these variables can only account for 2.4% performance in mathematics. It means these variables (availability of teaching/learning resources, availability of mathematics laboratory and the number of textbooks) do not account for students' performance in mathematics. The result of this study is in support of Birgen (2005) , Yara and Otieno(2010).

Government and private institutions should provide enough teaching/learning aid to students in order to enhance academic performance in mathematics. Parents should be sensitized on the importance of textbooks to academic performance of their children in mathematics. Government should collaborate with private institutions and NGOs in order to establish mathematics laboratory in schools. Moreso, The National Mathematic Center of Nigeria (NMC) should critically look into how mathematics kits could be made available for the use of students to aid performance. Also, funds should be extended to private institutions. NGOs and other funding agencies should collaborate with private educational institutes like Damico Educational Institute, Ile-Ife, Nigeria to augment the efforts in trying to halt the abysmally low performance rate of students in mathematics.

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