International Journal of Innovative Social & Science Education Research 12(4):47-56, Oct-Dec, 2024

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DOI: 10.5281/zenodo.14003255

Effectiveness Of The Use Of Instructional Materials In Teaching Mathematics: Implications For Students Academic Performance Among Junior Secondary Schools In Sokoto South local government area, Sokoto State, Nigeria

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ABSTRACT

The study was conducted to identify the effective use of instructional materials on students academic performance in Mathematics at government secondary schools in Sokoto. The study covered 10 government secondary schools in Sokoto South Local Government. A cross sectional survey method was used in order to gather data from various respondents from the ten government secondary schools in Sokoto South Local Government. The population of study comprised of the H.O.Ds. Mathematics, Mathematics Teachers, and Student. The study was conducted using a Cross Sectional Survey because the researchers intended to collect data from various persons in 16 government secondary schools in Sokoto South Local Government. A sample size of 250 was used in the study. They comprised of 3 HODs, 15 Mathematics teachers, and 232 students from the selected government secondary schools in Sokoto South Local Government. Purposive sampling and simple random sampling techniques were used for selecting the respondent's. The findings indicated that the teachers in government secondary schools in Sokoto South Local Government they are not using instructional materials while teaching mathematics, they do not have the required instructional materials in most of the government secondary schools in Sokoto South Local Government. This revealed that teachers should made use of instructional materials-visual aids, teachers are not competent enough to use audio visual aids while teaching Mathematics in the classroom, and finally found that mathematics teachers use different real objects or realia to teach that enhance the teaching of mathematics and improve teaching and learning process.. Finally the interventions identified are the need for the government and schools administrators to provide instructional materials to the government secondary schools in Sokoto South Local Government. The conclusions arrived at the government and Ministry of Basic and Secondary school education should provide instructional materials visual aids, audio visual aids and realia in

order to improve the standard of teaching mathematics in government secondary schools in Sokoto South Local Government. The researcher recommends that the government, Ministry of Basic and Secondary school Education and other stake holders in education should provide the secondary schools with the necessary instructional materials so that the teaching of Mathematic in Sokoto South Local Government will be effective, there is need to train and develop the teachers skills and competencies so that they can effectively use and instructional materials, have skills in the teaching Mathematics in government secondary schools in Sokoto South Local Government, there is a need for the Mathematic teachers to use realia that are found within and outside the school environment.
Keywords: Instructional Materials, Academic Performance

1. INTRODUCTION

Instructional materials are the devices developed or acquired to assist or facilitate teachers in transmitting, organized knowledge, skills and attitudes to the learners within an instructional situation (Nwachukwu, 2006). Teachers use different instructional materials to motivate learning. Teachers often make use of textbooks, charts, models, graphics, realia as well as improvised materials (Awotua-Efebo, 2001). The success in the skill and knowledge acquisition in an instructional situation depends on the suitability of the instructional material, adequacy and effective utilization of the available materials (Olaitan & Agusiobo, 2004). Also, the relevance of instructional materials to the objective of the lesson and the ease of use of the instructional materials are serious considerations in instructional materials utilization to better the learner's performance.

The performance of the students in Mathematics in high schools respectively is not encouraged (Ikot, 2008). Ikot observed that the poor performance of students in Mathematics examinations may not be unconnected with non-utilization of suitable instructional materials. Many teachers go to classes to teach Mathematics without any material to assist them or the learners. Learning is facilitated when the learners make use of at least three of the sense organs namely: seeing, hearing and touching.

Teaching pedagogy and instructional communication have explained and illustrated the effectiveness of instructional materials as a tool for improving students' performance in the learning of difficult concepts (Ibe-Bassey, 2007; Etim, 2008; & Ikot, 2008). In spite of the role of instructional materials in facilitating learning, students have failed to acquire the needed knowledge and skills in Mathematics. This study was conceived to show empirically the effects of instructional materials utilization on the performance of students in secondary schools in Sokoto South Local Government.

Studies on learning theories and skill acquisition learning revealed that a single approach or strategy cannot adequately explain the concept of how people learn, how materials should be used, how the various interactions affect learning and how best to organize the teaching and learning process (Nsa, 2012).

Tumwebaze (2012) lamented that **"**we are all aware that government has to buy books for schools every year. But currently, it only buys them once in five years". This was confirmed by both district education officers in the sample districts. To make the situation worse, some schools have neither libraries nor alternative space to keep school books. The books in such cases are kept in the head teachers office or home. Moreover, Ogunleye (2000), Okonkwo (2000), Mkpanang (2005)&Obioha (2006) reported that there were inadequate resources for the teaching of arts subjects in secondary schools. They further stated that where there were little resources at all, they were not usually in good condition, while the few that were in good condition were not enough to go round those who needed them. Hence there is need for improvisation.

Omosewo (2008) & Akinsola (2000), considered the human factors as the teacher's professional commitment, creativity, mechanical skills, initiative and resourcefulness. They found that many teachers were aware of the possibility of improvisation but many exhibited poor attitudes towards improvisation. They also noted that very few teachers practice improvisation while majority depends on imported equipment's and claim that improvisation is time-consuming and fund depleting. The authors also noted that students too, possessed little or no interest in improvisation.

Onasanya (2008), Adebimpe (2007)&Aguisiobo (2009) noted that improvisation demands adventure, creativity, curiosity and perseverance on the part of the teacher. The author added that such skills are only realizable through well-planned training programme on improvisation. Akinyemi & Orukota

(2005) noted that improvisation whether they cost less than standard manufactured ones or not demand money and that money is usually not readily available for the teacher.

However the objectives of any educational process determine the contents, methods and materials needed for achieving such objectives. The materials used for enhancing instructional effectiveness are aspects of media employed for achieving the instructional objectives. Bassey (2002) described instructional media as system components that may be used as parts of instructional processes which are used to disseminate information, message and ideas or which make possible communication in the teaching-learning process.

Experience over the years has shown that teachers have been depending on excessive use of words to express, to convey ideas or facts in the teaching-learning process. This practice is termed the "chalk-talk" method. Today, advances in technology have made it possible to produce materials and devices that could be used to minimize the teachers talking and at the same time, make the message clearer, more interesting and easier for the learners to assimilate (Onasanya & Adegbija, 2008). Soetan. (2010), argued that instructional materials graphics include charts, posters, sketches, cartoons, graphs and drawings. Graphics communicate facts and ideas clearly through combination of drawings, words and pictures. The use of graphics in teaching Mathematics creates definitiveness to the materials being studied. They help to visualize the whole concepts learned and their relationships with one another.

The role of graphic materials in visual communication is both unique and significant. Historically, symbols as basic part of graphics have made it possible for the whole range of written language used in the world today. The instructional value of graphical illustrations lies generally in their capacity to attract attention and convey certain types of information in condensed form (Onasanya & Adegbija, 2007). Okpala. (2008) stated that graphical illustrations provide a common experience to a large group at the same time. Okpala, Ambali, & Alpha. (2008) also summarized the values of graphic for instructional design as follows: They require no special machine for projection, the teacher is confident in manipulating the material, their improvisation encourages more creativity and diversification of teaching methods, they are very easy to preserve and they could be produced within minimum cost and maximum efficiency.

Statement of the Problems

For many years, now there have been expressed concerns about the problem faced by most of the Mathematics teachers in secondary schools in Sokoto South Local Government. (Lwanga, 2011; Anthony, 2011) conducted a research about the effect of teachers on the use of instructional materials on the student's academic performance in secondary schools in Nigeria in which found that, most of the teachers in Nigeria are qualified to teach in secondary schools and they are competent enough to teach but there are not using instructional materials while teaching in secondary schools.

This makes the teacher to rely on theoretical skills. The greatest challenge in this case lies in how practical skills can be incorporated in the teaching of the subject and their unwillingness to invest in the teaching and learning materials. Funds from the government are allocated more on technical and science subjects compared to humanities on the pretext that humanities are subsidiary. There has been a shortage of text books and other teaching and learning materials in most of the schools where studies have been done. Management support to the teaching and learning of Mathematics has been found to be lack luster. The support given to Mathematics and Government teachers is wanting.

General Objective

The objective of the research is to find out Mathematics teachers use of instructional materials and their effect on student academic performance in Government secondary schools in Sokoto South Local Government.

Objectives of the Study

The research was guided by the following objectives:-

I. To examine how Mathematics teachers use Visual aids teach and how it affects on the academic performance of students in secondary schools.
II. To find out how Mathematics teachers use audio-visual aids and how this affect the academic performance of students in secondary schools
III. To find out whether Mathematics teachers use realia to teach and how it affects the students' performance academically in secondary schools.

MATERIALS AND METHODS

This section presents the research design, population of the study, sample size, procedure for data collection, research instruments, the validity of the instrument, reliability and data analyses.

Research Hypotheses.

HO_1: There is no significant difference between teacher's application of visual aids to teach and Student's academic performance.

HO_2: There is no significant difference between teacher's application of audio- visual aids to teach and Students' academic performance.

HO_3: There is no significant difference between teachers' application of realia to teach and

Research Design

The researcher used a cross-sectional survey design. A cross-sectional survey design are used to gather information on the entire population under study at a single point in time. The design involves obtaining information from a wide section of respondents at once without need to follow up the respondents for further information (Amin, 2005). The researcher collects data about preferences, attitude, practices and concern of people from the sample of a population at a particular time. The results are therefore extrapolated to represent the entire population. The design was used by the researcher to gather data from a sample of HODs, Teachers, and students.

Quantitative research approach involved the collection of numerical data in order to explain, predict and control phenomenon of interest. The research design was helped to describe the current teaching condition of utilization of instructional materials by Mathematic teachers in government secondary schools in Sokoto South Local Government.

2.3 Population of the Study

The population of the study comprised all the 16 government Secondary Schools in Sokoto South Local Government, Nigeria; all the schools are government schools, day, boarding, boys, girls and mixed. The population of the study will involve Mathematics subject HODS, teachers, and students as indicated in table 3.1 below summarize in a table.

Table 2.1: Population and sample of the Study

Category	Population	Sample Size	Sampling Techniques
HODs Mathematics subject	17	5	Purposive sampling
Mathematics teachers	31	15	Purposive sampling
Students	5,617	230	Simple random sampling
Total	**5,695**	**250**	

Source: Education Resource Center, Sokoto (2017)

2.4 Sample and Sampling Techniques Used

A sample of the listed number of elements selected from a population Galadima (2009). The sample of this study comprised of 17 government Secondary Schools selected randomly. A total of 250 respondents were used. These will comprise 5 HODs, 15 teachers, and 230 students which will selected from the secondary schools in Sokoto South Local Government. This sample therefore represented the whole population, and inference was drawn from them. Purposive and random sampling was used because they are the easiest sampling methods for choosing appropriate respondents from a target population and systematic random sampling was used to select the students.

Simple random sampling was applied in the study. This technique was used to select 250 respondents from 5,695 these include 5 HODs, 15 Mathematics teachers, and 230 students. Excel statistical analysis will used by the researcher to give identity to all the respondents randomly selected from the selected secondary schools to ensure that every respondent had equal chance to participate in the research.

2.5 Data collection Methods and instrumentation.

The researcher employed questionnaire to collect data. This instrument consist two sections A and B. Section A retrieved information on the respondents' personal data. Section B sought for information on the research objectives. Questionnaires items were formulated on section B and Likert-scale type response system was used to get response from the respondent. The rating on the Likert scale. The scale had items based on responses as: Strongly Agree, Agree, Disagree, Strongly Disagree. The questionnaire was distributed to all respondents sampled for the study. The questionnaire was open ended questionnaire that was distributed to both teachers and the students.

The interview guide was designed and administer to the HODS and Teachers in order to capture qualitative information. The interview guide was administered to three HODs and 6 teachers in order to provide an in depth views on the issue. This will purposely intend to get more information about the use of instructional materials on students' academic performance.

2.5.1 Validity of the Research Instrument

Validity means ascertaining the accuracy of the instruments by establishing whether the instruments focus on the information they are intended to collect. In order to ascertain face validity, the instruments were constructed and handed to the two senior researchers in the Department of Educational Management and Administration in one of the old universities for constructive criticisms. Thereafter, they were revised according to these researchers' comments.

In addition, content validity was also sought by requesting four experts in the field of study i.e Department of Curriculum and Instruction to provide their comments on the relevance of each item on the instrument. The experts were requested to indicate whether the item was relevant or not. The results of their indications were analyzed to establish the percentage representation using the content validity index. The Content Validity Index Formula by Amin (2005) below was used;

$$\text{CVI} = \frac{\text{agreed items by judge as suitable}}{\text{Total number of items in the questionnaire}}$$

A content validity index (CVI) of the questionnaire which was got as 0.9, which highlighted that the instrument was valid to collect the information it was designed to collect.

2.5.2 Reliability of Research Instrument

Reliability refers to the consistency of the instruments used in collection information from the respondents. Through a pilot study conducted on 20 respondents in two schools in Sokoto South Local Government, the researcher will establish the reliability of the instruments. Was carried out on a comparable sample.

The results obtained were to entered into the computer and correlation was run. The correlation coefficient attained from the teacher questionnaire was to ascertain detain the reliability of the instrument in the same vein. The researcher adopted a test, re-test method to test the instrument, and a meaningful reliability index was reached, indicating that the instrument tested what it supposed to test and had the same result repeatedly.

Reliability Statistics for Teachers

Cronbach's Alpha	N of Items
.895	27

And retested using SPSS. It was found that the instrument was reliable because the result generated a Cronbach alpha of 0.895. According to 0.895 it is highlighted that a cronbarch's Alpha between .80 to .90 shows that the instrument is highly reliable for that particular study.

Data Analysis

The researcher used statistical package for social science (SPSS) to retrieve, analyze and interpret data of the respondents with the use of correlation to analyze the data. Section A of the questionnaire was to analyse by descriptive statistics with the use of percentage while hypothesis 1 was analyse by T-test while 2 and 3 was analyse by using ANOVA

RESULT AND DISCUSSION

This section presents the analysis of data, presentation and discussion of findings. It is divided in to two sections. The first section present the analysis of the demographic characteristics of the respondents, while the second section involved the analysis of research hypotheses in an attempt to find out Mathematics teachers use of instructional materials and their effect on student academic performance in Government secondary schools in Sokoto South Local Government.

Table 1 Questionnaire Return Rates

Respondent category	Number issued out	Number returned	Percentage (%)
HODs Mathematics	5	5	100
Mathematics teachers	15	10	67
Students	230	174	74.56
Total	**250**	**189**	**75.6**

Table 4.1 show the information obtained analyzed in terms of frequencies and percentages. Responses from interviews and discussions with teachers staff were used to supplement responses from the closed ended questionnaires. The response rate was considered reasonable because at least more than 50% of the targeted respondents participated in the study. The researcher felt that the views expressed in the report is therefore representative of the target population.

Findings from the Hypotheses Testing

Test of the first hypothesis

The first null hypothesis was stated as: "There is no significant difference between teachers application of visual aids to teach and Student's academic performance". The null hypothesis was tested using a T-test find out whether there is a difference between the two variables. The result of the finding is presented in table 4.39

Table 2 t-test shows the Significance Differences between teachers application of visual aids and students academic performance

Paired Samples Test

Comparison Variables		Paired Differences					
		Mean	N	Std. Deviation	T	df	Sig. (2-tailed)
Paired 1	VISUAL AIDS	25.5318	173	4.588	71.820	172	.000
	ACADEMIC PERFORMANCE	2.5647	173	.6050			

The results of the t-test analysis in table 4.39 show that there is a significance difference in visual aids and students academic performance $t(172)=71.820$, $p<.05$. The p-value (.000) being less than the level of significance alpha .05 implies that the results were statistically significant. Therefore this shows that from our table the sig value is 0.000 which is actual greater than 0.05 hence we reject the null hypothesis and accept the alternative hypothesis. We therefore infer or conclude that means score in visual aids did not differ significantly. This suggests that using visual aids did not plays a significantly different towards student's academic performance. Hence the null hypothesis that instructional materials there is significant difference between teachers applying of visual aids to teach and Student's academic performance therefore we reject the null hypothesis and accept the alternative hypothesis.

This found that in the literature according to Kakuru, (2007) noted that most teachers fail to use visual aids while teaching Mathematics in secondary schools, particularly those that are rural-based, hardly have any teaching aids used in the classroom during lessons, except some form of a blackboard, chalk and duster. Some visual aids remain locked up in the head teachers' office due to lack of keys to lock the doors and windows of the classrooms. Some teachers lack creativity, initiative or imagination to prepare teaching aids, though the blame should not only be put on teachers, because as revealed by Bandikubi, (2007), most teachers fail to use instructional materials in teaching Mathematics due to; lack of enough time, non-availability of the materials, financial constraint of the school, poor relationship between the teachers and the school administrator.

Table 3 Test of the hypothesis two: to find out the differences between teachers application of audio visual aids and students academic performance.

ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	22.857	4	5.714	19.034	.000
Within Groups	51.338	171	.300		
Total	74.195	175			

Table 4.40 the result of ANOVA show that there is significance differences of teachers application of audio visual aids and students' academic performance, the *F* statistic has a value of 19.034 with the associated significance level of .000 (Technically, the *p*-value is less than 0.001). The significance level tells us that the hypothesis of no difference among two groups is rejected under the .05 significance level. Therefore we conclude that there is significant differences between teachers using audio visual materials and students' academic performance in Sokoto South Local Government.

According to the Ministry of Education (MOE) Report of 2002, many secondary schools are experiencing an acute shortage of the necessary instructional resources. The report note with concern that there are limited resources and that learners share a few available materials. According to Samreen, Sufiana and Malikh (2012) reported that secondary schools' Mathematics teachers do not realize the importance of using audio visual aids to teach Mathematics that is why they are not competent enough to use audio visual materials while teaching of Mathematics. Aminu (2009) indicated that audio-visual resources, when they are wisely selected and intelligently used, arouse and develop intense and beneficial student interest and therefore motivate students to learn. Properly motivated student learning means improved attitudes, permanency of impression rich, experience and ultimately more wholesome living.

Table 4 Show differences between teachers application of realia to teach and students academic performance.

ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	133.359	29	4.599	41.508	.000
Within Groups	15.843	143	.111		
Total	**149.201**	**172**			

In the above table which the hypothesis is that two categories of instructional materials do not differ in their students academic performance, the *F* statistic has a value of 41.508 with the associated significance level of .000 (Technically, the *p*-value is less than 0.001). The significance level tells us that the hypothesis of no difference among two groups is rejected under the .05 significance level. Therefore we conclude that there is significant differences between teachers applying realia to teach and students academic performance in Sokoto South Local Government.

According to Ebignade (2007), believed that a teacher of Mathematics is supposed to use different real objects with the application of reality so as to enhance the teaching of Mathematics and to improve the teaching and learning process. He observed that most of the Mathematics teachers are not using realia while teaching the subject but it is proven that if they apply this instructional material, the teaching of Mathematics in the class room will be improved. Ahmed (2008) opinion is that realia and models are the instructional materials that will motivate learners while learning as the teaching and learning process progresses this is because if such materials are used by the teacher while teaching in the class room they will improve the student understanding and academic performance. Ebignade (2007), he observed that most of the Mathematics teachers are not using realia while teaching the subject but it is proven that if they apply this instructional material, the teaching of Mathematics in the class room will be improved.

DISCUSSION OF THE MAJOR FINDINGS

Respondents' opinion on the effect of visual aids on the Mathematics students' academic performance.

The research finding revealed that (29.4%) of the respondents opined that Mathematics teachers made use of instructional materials- visual aids, to teach in government secondary schools in Sokoto South Local Government. This therefore made the Mathematics students to perform well in the examination. Kakuru' (2007) finding is different from the present study finding the researcher found out from his study that some teachers fail to use visual aids while teaching Mathematics in secondary schools particularly those that are rurally-based. They hardly have any teaching aids to use when teaching, except some form of a blackboard, chalk and duster.

Similarly (38.4%) the respondents strongly disagreed that Mathematics teachers made use of chart while teaching in secondary schools hence their teaching was not carried out effectively. Nabasunga (2003) due to this posited that there seem to be inadequate practical skills in the teachers of Mathematics. However, the finding also shows that, Mathematics teachers made use of pictures as visual aids while teaching Mathematics in secondary school. This finding shows that (32.4%) of the respondents disagreed that Mathematics teachers use visual aids while teaching Mathematics in the class. This study finding therefore proved that most of the Mathematics teachers do not use pictures as visual aids to teach in the class.

The finding indicates that (43.8%) of the respondents strongly agree that Mathematics teachers used illustrated text books to teach in the class. Therefore the Ministry of Education and sports ought to provide enough textbooks to government secondary schools in Sokoto South Local Governments. Savoury (2008) maintained that a well planned and imaginative use of visual aids in lessons will do much to banish apathy, complement inadequacy of books as well as arouse student's interest by giving them something practical to see and do, and at the same time help to train them to think things out themselves.

Respondents' responses on the Effect of Audio Visual Aids on the Students Academic Performance

The researcher found out from the finding that majority of the respondents (32.7%) disagreed that teachers are competent enough to use audio visual aids while teaching Mathematics in the class. Samreen, Sufiana and Malikh (2012) study is in agreement to the present study finding hence the researchers reported that secondary schools' Mathematics teachers do not realize the importance of using audio visual aids to teach Mathematics that is why they are not competent enough to use these materials to teach. However, in order to know whether secondary schools have enough of audio visual materials in school he finding showed that (30.2%) of the respondents strongly agreed to that while 47 (26.7%) disagreed on the issue. The interview conducted by the researcher with the Mathematics teachers and HOD affirmed this by revealing that these respondents said that government cannot afford to buy such materials like; video-tapes, projectors etc to facilitate teaching and learning process. This is because most of these instructional materials are expensive.

The finding further indicated that (27.8%) of the respondents strongly agreed that audio visual materials improve student's academic performance, 459(30.2%) also agreed on the issue. Aminu (2009) maintained that audio-visual resources, when they are wisely selected and intelligently used, arouse and develop student interests' therefore motivate them to learn. Hence, the researcher posited that properly motivated student learning means improved students' attitudes, permanency of impression, rich experience and ultimately more wholesome living.

Respondents' responses on the effectiveness of using realia and the Students Academic Performance

The researcher found out that (37.3%) of the respondents strongly disagreed that Mathematics teachers used realia to teach in the class, 38 (21.6%) agreed that Mathematics teacher used realia to teach Mathematics in the class. Ebignade's (2007) finding like the present study finding found out that Mathematics teachers use different real objects or realia to teach and that this enhances the teaching of Mathematics and improve the whole teaching and learning process. He also found out that most of the Mathematics teachers are not using realia to teach the subject.

However, the finding shows that (33.8%) of the respondents strongly disagreed on the issue, 37 (21%) of the respondents also agreed on the issue that Mathematics teachers used realia to teach Mathematics in the class. Ahmed (2008) on this issue opined that realia or models are instructional materials that is important and mostly needed in the school because it motivates learners to learn as teaching and learning process progress. This is because such materials enhance and improve students' understanding and academic performance.

CONCLUSION

From the discussions, the following conclusions were drawn:

1. The secondary schools do not have the necessary mathematics instructional materials for mathematics teachers to apply when teaching mathematics in secondary schools so as to improve the teaching and learning process in secondary schools in Sokoto South Local Government
2. From the research findings it is concluded that the government secondary schools in Sokoto South Local Government do not have the required audio visual materials needed to teach Mathematics subject this has made the teaching of Mathematics to be ineffective. This because some secondary schools in Sokoto South Local Government sthey are not using audio visual aids while teaching in the classroom.
3. The research finding has also concluded that Mathematics teachers have not used realia to teach in secondary schools hence the do not perform well in their examination.

RECOMMENDATIONS

1. The researcher recommends that the government, Ministry of Basic and Secondary school Education and other stake holders in education should provide the secondary schools with the necessary instructional materials so that the teaching of Mathematic in Sokoto South Local Government will be effective.

2. There is need to train and develop the teachers skills and competencies so that they can effectively use and instructional materials, have skills in the teaching Mathematics in government secondary schools in Sokoto South Local Government.

3. There is a need for the Mathematic teachers to use realia that are found within and outside the school environment.

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