



Impact of Instructional Materials in Teaching and Learning Mathematics: A Case Study of Demonstration Secondary School, A B U Zaria.

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ABSTRACT

This research study adopted a survey research design that elicit data from target population through the administration of questionnaire in order to Assess the impact of instructional materials in teaching and learning mathematics in demonstration secondary school, A.B.U Zaria. A Proportional stratified random sampling technique was used to select the sample size of two hundred and thirty-five (235) out of 609 populations of students and teachers in demonstration secondary school, A.B.U Zaria which was analyzed and interpreted using Chi-square inferential statistical test. The analysis yielded the following findings that audio instructional materials do not promote mathematical intellectual abilities of the learners and this coincides with the Chinese proverb that says "I hear, I forget, I see, I remember, I do, I understand." Likewise, the analysis also reveals that visual and Audio-visual instructional materials have significant impact in teaching and learning mathematics, as they can simplify what is complex and difficult to express to a desirable level of their understanding. Finally, the utilization and good knowledge of mathematics teachers in handling mathematical instructional materials will go a long way in ensuring that students are exposed to different techniques of harnessing mathematical problems.

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INTRODUCTION

In the field of educational development, teaching and learning through the use of instructional materials facilitates, stimulates and help students to take active participation in any topic introduced by their teachers. Instructional materials stimulate students desire to learn and also helps to hold attention as well as objectives which may be accessible to many students (Kay, 2008). Instructional materials are used or created by teachers to facilitate effective teaching for better qualitative learning to students. Some students learn and retain concept or information that are fed to them through conventional lecture method, while others learn with the aid of audio, visual and audio-visual materials in addition to the lecture and reading. There are many Instructional aids available these days. We may classify these aids as Follows Audio Aids, Visual Aids, and Audio -Visual Aids. The Audio Aids are Instructional materials that involve the sense of hearing alone.

For example: - radio, tape recorder, gramophone and the Visual Aids are Instructional materials which appeals to the sense of seeing or vision. Which includes pictures, charts, maps, flash cards, chalkboard, and textbooks and so on. Out of these textbooks, black board and chalk are the commonest ones while Audio -Visual Aids are those Instructional materials which involve the sense of vision as well as hearing. Example of these are television, film projector, film strips, overhead projector, and computers and so forth (Ogwo and Oranu, 2006).

The impact of instructional materials or resources cannot be overemphasized, because they arouse the sense organs in the process of learning, predisposes teaching to be activity-based, thereby helping to concretize abstract concepts (Iwu, Ike and Okoye, 2002). Instructional materials or resources are equipment and materials, which the teachers can use to enhance the realization of the instructional objectives



(Nnaka and Anaekwe, 2006) For example, in the teaching and learning of science, technology and mathematics subjects, the laboratory constitutes the foremost resource centre. Meanwhile Betiku (2000), advised teachers of mathematics to improvise instructional resources where necessary. Therefore, one can rightly say that instructional materials are the materials, which the teacher uses in teaching in order to make his/her teaching real and meaningful. Okorie (2001), pointed out that improvisation is another source of selection and deployment of relevant instructional elements for the teaching and learning process in the absence or shortage of standard instructional aids for meaningful realization of specified educational goals and objectives. Improvisation could also be the act of using materials obtainable from the local environment or design by the teacher or with the help of local personnel to enhance instruction. Egwu (2008) defined instructional materials as audio visual materials or as innovations in teaching and learning which involves the use of human effort, appropriate choice design and utilization of objects to ensure effectiveness in teaching and learning process. Instructional materials also include those materials and services used in learning situations to supplement the written or spoken words in the transmission of knowledge, attitude and ideas. It is a material that facilitates teaching and learning activities and consequently the attainment of the lesson objectives. It helps in making teaching and learning real and meaningful (Emezie, 2010).

Ewudo (2009), stated that instructional materials help students to improve in their learning procedure through range of experiences and skills developed to achieve their desired aim. It equally assists the student learning process by making assimilation and memorization of materials easy and help to hold attention as well as longer retention of information. Also Ani (2006), stressed that Instructional materials help the teacher in presenting the subject matter effectively before the students. Abdullahi (2008) opined that Instructional material help teachers to make use of the working model. In this case, the teacher will be properly organized in impacting the actual course content to students. Chima (2009) pointed out that Instructional material help the teacher to have better understanding with his students. In this

case, students would be very proud of their teacher and goes to the teacher even after teaching to obtain from the teacher the area they failed to understand in their previous class. Adewale (2011), is of the view that instructional material will help the teacher to hold students' attention in the class. This because students believe in their teacher who teachers objectively as it will help students understand the mechanism of learning. In addition, the good use of Instructional materials helps the teacher to control the pace of learning. Likewise, Oladipo (2001) asserted that instructional materials are important tools for enriching, visualizing, simplifying, transmitting and accelerating the teaching and learning processes. Fakomogbon (2000) observed that one of the causes of failure in Nigerian Secondary Schools is inadequate school resources. He further explained that it cannot be over-emphasized that the provision of adequate resources is a prerequisite for adequate performance in schools. Most of our schools lack necessary infrastructural facilities required for effective learning.

Instructional materials have been well accepted as educational instruments that help teachers to teach students effectively in the areas of curriculum development, implementation, and perception and retention abilities. Therefore, some problems may arise for instance as the use of audio, visual and audio-visual materials on it impact to students' academic performance in mathematics by classroom teachers. To this extent, this research will help to find other ways on how to assess the impact of instructional materials on students' academic performance in mathematics. The result of this study will help provide evidence for teachers to incorporate instructional materials in teaching and learning in order to improve students' attitude on their perception and retention abilities in mathematics. With the objectives to:

1. Assess the impact of audio instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.
2. Assess the impact of visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.



3. Assess the impact of audio-visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

METHODOLOGY

The research design adopted in this study is a survey research design that elicit data from target population through the administration of questionnaire. The data gathered will be analyzed using Chi-square inferential statistical test for the purpose of drawing necessary conclusions.

The decision rule of Chi-square test is that the null hypothesis (H_0) should be rejected if the chi-square (X^2_{cal}) calculated is greater than the chi-square critical value ($X^2_{(R-1)(C-1), \alpha}$) and concludes with the alternative hypotheses (H_1). Otherwise fail to reject the Null hypotheses and concludes with the Null hypotheses.

The population for the study is made up of all the SS2 and SS3 students together with all the teachers of mathematics in Demonstration Secondary School Ahmadu Bello University Zaria. As seen in the table below:

Table 2.1 Population of the study

STUDENTS							TEACHERS	
Classes	A	B	C	D	E	F	No. of Teachers	Total
SS 2	50	46	50	49	55	47	11	308
SS 3	52	47	46	48	50	48	10	301
Total	102	93	96	97	105	95	21	609

The sample size of the study is 235 out of the total population of 609 (Cochran, 1977). Therefore, two hundred and thirty-five questionnaires will be produced and distributed to the sample size obtained across the study area. The Proportional stratified random sampling technique was used to select the sample size of the study. The choice of this sampling technique

was because the various classes have different characteristics and each of them needed to be adequately represented to increase the reliability of the findings of the study (Obasi, 2000). In addition, proportional stratified random sampling adopted for this study was to allow every member in the population have an equal opportunity of been selected.

Table 2.2: Sample Size for the Study

STUDENTS							TEACHERS	
Classes	A	B	C	D	E	F	No. of Teachers	Total
SS 2	50	46	50	49	55	47	11	308
SS 3	52	47	46	48	50	48	10	301
Population	102	93	96	97	105	95	21	609
Sample size	39	36	37	37	41	37	8	235

RESULT AND DISCUSSION

The data provided by the respondents to the three research questions of the study were analysed and interpreted using the chi-square test (χ^2). In the course of the analysis, opinion of the respondents were scored using the four point Likert rating scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) for a better understanding and clear interpretation of data, Strongly Agreed and Agreed represent "Agreed statement" while Disagreed

and Strongly Disagreed represent "Disagreed statement" Meaning that 50% and above response will be regarded as Agreed and is considered to be significant while less than 50% response will be regarded as Disagreed and is considered not significant.

Chi-square statistic was used to test the entire three null hypotheses. The choice of the statistical tool for these null hypothesis was because it provides an avenue of measuring the test of independence that is, dependent and

independent relationship (Nworgu, 2006). Chi-square test statistics was found to be extensive in many field of studies because it is suitable in the analysis of data in form of frequencies and categories. All the three Null hypotheses were tested at 5% level of significance representing Alpha " $\alpha = 0.05$ ". In the process of calculation and interpretation of result of the chi-square (χ^2) test. H_0 was rejected if the chi-square (χ^2_{cal}) calculated is greater than the chi-square critical value ($\chi^2_{(R-1)(C-1), \alpha}$) and concludes with the alternative hypotheses (H_1). Otherwise fail to reject the Null hypotheses and concludes with the Null hypotheses. A measure of the discrepancy existing between the observed and expected frequencies is given by

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Research Hypotheses One

H_0 : There is no significant difference in the opinion of respondents on the impact of Audio instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

H_1 : There is significant difference in the opinion of respondents on the impact of Audio instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

The chi-square contingency test was used to test the hypothesis at 0.05 level of significance, the result of the findings is presented in Table 3.1

Table 3.1 Summary of Chi-square Test Result for Research Question one

χ^2_{cal}	χ^2_{tab}	Df	α level of sig
13.23	24.99	15	0.05

From Table 3.1, it was observed that there is no significant difference in the opinion of respondents on the impact of audio instructional materials in teaching and learning mathematics in Demonstration Secondary School A.B.U Zaria. This is because the chi – square χ^2_{cal} (13.23) is less than χ^2_{tab} (24.99) and therefore the null hypothesis is not rejected. Implying that audio instructional materials have no impact in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

Research Hypothesis Two

H_0 : There is no significant difference in the opinion of respondents on the impact of visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

H_1 : There is significant difference in in the opinion of respondents on the impact of visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

The chi-square contingency test was used to test the hypothesis at 0.05 level of significance, the result of the findings is presented in Table 3.2

Table 3.2 Summary of Chi-square Test Result for Research Question two

χ^2_{cal}	χ^2_{tab}	Df	α level of sig
39.42	24.99	15	0.05

Table 3.2 above revealed that there is significant difference in the opinion of respondents on the impact of visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria. This is because the χ^2_{cal} (39.42) is greater than the

χ^2_{tab} (24.99) and therefore the null hypothesis is rejected. This implies that visual instructional materials have significant impact in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

**Research Hypothesis Three**

H₀: There is no significant difference in the opinion of respondents on the impact of Audio-visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

H₁: There is significant difference in the opinion of respondents on the impact of Audio-visual

instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

Chi-square contingency test was used to test the hypothesis at 0.05 level of significance, the result of the findings is presented in Table 3.3

Table 3.3 Summary of the Chi-square Test Result for Research Question Three

X^2_{cal}	X^2_{tit}	Df	α level of sig
27.14	24.99	15	0.05

Table 3.3 shows that there is significant difference in the opinion respondents on the impact of Audio-visual instructional materials in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria. This is due to the fact that the X^2_{cal} (27.14) is greater than X^2_{tab} (24.99). Therefore, the null hypothesis is rejected and concludes that audio-visual instructional materials have significant impact in teaching and learning mathematics in Demonstration Secondary School, A.B.U Zaria.

From the analysis of result obtained, it was observed that of audio instructional materials do not have much impact in teaching and learning mathematics. This was because audio instructional materials do not promote mathematical intellectual abilities of the learners which coincides with the Chinese proverb of "I hear, I forget, I see, I remember, I do, I understand." Also it was found that visual instructional materials have the characteristics of visibility, sufficiency, simplicity and relevancy in teaching and learning mathematics. This is in line with the findings of anyuwa and anyuwa (1987) who stated that textbooks were the most common instructional materials that teachers used to disseminate knowledge and the use of audio-visual instructional materials has significant impact in teaching and learning mathematics as this can be buttress that good audio-visual instructional materials must be visible, attractive and hold attention of the learners in mathematics because it appeals to the sense of seeing and hearing.

CONCLUSION

Based on the findings of the study, it

was found that Teachers of mathematics should not adopt audio instructional materials in their teaching and learning process, thus it is suitable in teaching English and oral communications. Likewise, students will perform better in mathematics when the instructional materials possess the characteristics of appropriateness, visibility, attractive and hold attention of the learners in disseminating knowledge of mathematics and this is in line with the Chinese proverb that says "I hear, I forget, I see, I remember, I do, I understand." It was also observed that visual and audio-visual instruction materials have much impact in teaching and learning in mathematics as they can simplify and clarify what is complex and difficult to express to a desirable level of their understanding. Finally, the utilization and good knowledge of mathematics teachers in handling mathematical instructional materials will go a long way in ensuring that students are exposed to different techniques of harnessing mathematical problems.

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