

EFFECT OF TEACHING AIDS ON THE MATHEMATICS ACHIEVEMENT OF JUNIOR SECONDARY SCHOOL (JSS) STUDENTS IN ZARIA LOCAL GOVERNMENT AREA OF KADUNA STATE.

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Abstract

This study focused on the effect of teaching aids in the academic achievement of junior secondary school students in mathematics in Zaria local government area (L.G.A). It adopted a quasi-experimental control group design. The studies employed pre-test post test control group design. The population for the study was 4000 secondary schools mathematics students which were in junior secondary schools in Zaria (L.G.A). Samples of 200 students from intact classes were randomly drawn from the junior secondary school in Zaria L.G.A of Kaduna state were involved from the study. An achievement test on Geometrical plane shapes developed by the researcher was used for measuring students' achievement. The face and content validations of the instrument were done by four experts in mathematics education. The reliability coefficient of Mathematics Achievement Test (MAT) was 0.71 using Pearson Product Correlation Coefficient was used to answer the research question while t-test was used to test the null hypothesis at $P < 0.05$. The major finding of this study indicated that the use of teaching aids improved student's academic achievement in mathematics than lecture method without teaching aids. Based on the finding it was concluded that using teaching aids make the teaching more effective than lecture method without the teaching aids. Conclusions were reached and adequate recommendations made.

Introduction

Mathematics is a way of thinking that enables a learner to identify patterns and structures in order to solve problems. In particular it is the application of number and symbols in a logical order to arrive at a reasonable goal. The application of mathematics in everyday life is indispensable, especially in science, industry and business (Inekwe2001). Therefore, mathematics is an inquiry- oriented subject, which requires the use of various equipments to effectively teach it. In so doing, the students not only learn the contents of mathematics but also acquire mathematics skills such as classifying, manipulating, experimenting, interpreting and communicating.

The professional in many fields such as engineers, architects', designers, technologist etc requires extensive training in and indeed continual use of mathematics. "A good working knowledge of college Algebra, trigonometry, Calculus and a considerable familiarity with differential equations are generally regarded as essential for carrying on or directing engineering work" (Kulbir,2002). Mathematics is a necessary background to all science oriented secondary and post secondary courses and so the mathematics paper is compulsory for all candidates at the senior secondary school examinations.

To encourage those students, it is worth pointing out that Badmus (2002) gave considerable encouragement to those lacking in mathematical confidence through his cross- referencing of mathematical explanation in the concepts and through his step-by -step rearrangement of awkward formulae. In essence, teaching aids

should be used to elucidate any of the mathematical concepts than using verbal explanation. Thus, teachers need several concepts or structures that involve 3- dimensional figures and other visualisation problems. It makes students think and discover mathematical ideal and facilitate creative thinking. They motivate the students and provide a means of making independent investigation by the students on the concepts being taught in the class and also enhance retention. Example of such concepts are solid which is a collection of empty tins of different plane shapes, scales, Abacus, scale balance, triangle, circle, etc.

The use of teaching aids give students a firsthand understanding of mathematics content, confidence and ability to handle new types of problems by allowing them to explore and discover mathematical patterns relationships in an open ended manner, practice in applying their acquired knowledge to the solution of problems which are relevant to their particular field of interest. In order to realise successful ways of teaching mathematics to all secondary schools students, many new materials and techniques have to be developed. The teaching aids that seem most appropriate are those that allow each student to learn as an individual at a unique time and in a unique manner. This is why Moor (1987) suggested that the mathematics laboratory where teaching aids are kept is the best method for the secondary schools students aspiring to become mathematicians or to proceed to a college or schools of technology.

Ale (2003) said, the role of experience in concept formation by the school child is most

important. And most often, the provision of concrete materials gives the child the experiences that enable him to form his ideas. And when he lacks such concrete materials like teaching aids, his comprehension is greatly hindered. An investigation involving programmed instruction as a technique for improving spatial visualisation was conducted by Brinkman (1986). The program entailed a brief course in geometry, but rather than emphasizing formal proofs, he stressed a number of exercise requiring pattern folding and object manipulation as teaching aids. He then concluded that in view of the experimental group, it appears reasonable to assume that the functional skill of individuals in that area can be improved when appropriate training and teaching aids are provided.

It is believed that the study of mathematics could be made more interesting to the learners if appropriate teaching aids are used such as Geo Board, plane shapes, 3-dimensional shapes, etc. Most secondary schools in Nigeria are not in a good financial position to provide expensive but basic teaching aids. It would therefore be desirable for the teachers to improvise some simple teaching aids using local materials. The title of this paper was chosen after a thoughtful consideration on 'why most students in our secondary schools run away from mathematics'. The researcher believe that not much is done in mathematics especially geometry at the elementary level and that not much creative improvisation with our local materials are made by most mathematics teachers at the secondary school level other than the chalk board and the text books. Considering the annual reports of (WAEC, 2005), pointed out that candidates' performance was generally poor in geometry, 3-dimensional problems and trigonometry. Most of the candidates' exhibited lack of skills to tackle problems on those areas. Awodiji (2003), also identified areas in geometry as one of the areas in which students have serious difficulties at secondary school level.

Therefore, this paper discusses the reduction of mathematics abstractness in secondary schools by the use of teaching aids. I also predict that this will not only promote the learning of mathematics but will also effect a positive attitudes towards mathematics and other related fields which will eventually promote the socio-economic and technological development of this country, Nigeria

Statement of the problem

Students these days have great difficulty in understanding, comprehending and assimilating mathematics taught to them in the classroom. They neither understood the basic computation; logic, fundamental principles nor the underlying processes that gave rise to mathematical facts. So they resort to learning by rote memorization, which resulted in consistent gross mass failure of students.

This situation worries the researcher. This study therefore, intends to investigate the possibility of reducing mathematics abstractness using teaching aids to elucidate the concepts.

Purpose of the study

The purpose of the study is to determine the academic achievement of JSS students taught Mathematics using teaching aids in order to the importance of teaching aids in understanding mathematics.

Research Question

What is the effect of teaching aids on the academic achievement of secondary schools students taught in mathematics with teaching aids and those taught without teaching aids?

Hypothesis

There is no significant different in the post test mean scores of junior secondary school students taught mathematics using teaching aids and those taught without teaching aids.

Research design

This research design is quasi- experimental control group research that employed pre-test post test. Pre- test was administered before the treatment. This is to determine the entry behaviour of the subjects. Post test was administered after the treatment to determine the effect of treatment (reducing abstractness by using teaching aids) on the subjects. This was done using the same Instrument Mathematics Achievement test (MAT). Experimental group in this case were taught using teaching aid while control group did not received any treatment they were taught without teaching aids.

Population of the study

The population for this study was all the junior secondary schools (JSS 2) mathematics students in the 30 established secondary schools in Zaria metropolis with a total of 4000 mathematics students all offering general mathematics .

Sample and sample technique

Two hundred students (200) from two (2) junior secondary schools were randomly selected from the area of the study. In each schools selected intact class of junior secondary II students were selected using 'balloting method'. And the two schools were divided into experimental and control groups using odd and even number method where the odd number schools become the control group while the even number be the experimental group (school). According to Nworgu (1991) where the population is large or a large geographical area is to be covered a cluster sampling technique was used.

Validity of the instrument

The instrument was given to two senior lectures from Science Education Department, A.B.U. Zaria and two senior lecturers at Federal College of Education Zaria Teaching mathematics to validate. They made recommendation on the areas of appropriateness of the language and adequacy of the content coverage and the instrument was corrected as point out.

Reliability of the instrument

A pilot study was conducted in Sabon Gari local government of Kaduna state which is outside the study area to ensure that the instrument was consistent. A test retest was given to the same respondents in two weeks intervals in line with Tuckman (1975) recommendation. The results of the test were correlated using Pearson Product Correlation Coefficient, the reliability coefficient (r) was found to be 0.71 which shows that the instrument is reliable and can be used for the study.

Method of data collection

Since there are two groups for the study that is the experimental and control groups,

respectively. Lesson plan was developed by the researcher for experimental group using teaching aids and control group without teaching aids for the period of six weeks on geometric plane shapes and angles. Pre test was administered to the groups to determine the equivalent of the ability level of the sample subjects. The results indicated no significant difference in their ability level. The teaching in both the experimental and control groups was done by the researcher that lasted for six weeks.

The researcher then administered post test to the students using the same instrument and marking scheme. The instrument was rescheduled after the pre test to avoid test wideness. The scores were subjected to statistical analysis. The data collected from both group were subjected to t-test statistics at $p = 0.05$.

Result and Discussion

H_{01} ; There is no significant different in the post test mean scores of junior secondary school students taught mathematics using teaching aids and those taught without teaching aids.

Table1: t-test Analysis means score of difference in achievement of the experimental and control groups.

Groups	N	X	S.D	SE	t-cal	t-crit	Remark
experimental	32	25.26	4.34	0.89	11.12	2.00	Significant
Control	33	15.36	2.63				

Significant at $p > 0.05$

From the above table1 the t-cal value of 11.12 recorded $> t$ -crit of 2.00. Therefore the null hypothesis which states there is no significant difference is rejected in favour of the experimental group as observed in their mean scores.

In support of the finding of this nature, Bruner (1961) reported that what is crucial in learning are storage of knowledge and retrieval of such knowledge. Teaching aids strategy is activity-based and some mathematical manipulation were introduced where learners take active part in learning construction, therefore, knowledge storage and retrieval is encourage by this method. In addition to this Egbule (2000) opined that the greater the students involvement in learning process, the greater the learning and level of retention. It has been suggested by Abdullahi (1982) that since students are actively involved in learning process and was able to find out some information for them through activity-based instructional strategy such as using teaching aids therefore, retention of knowledge is better facilitated.

Conclusion

This study highlights the effect of teaching aids on the academic achievement of junior secondary school students in mathematics. One of the best ways for teaching mathematics is by using teaching aids since students who received instruction through it achieved higher than students taught mathematics without teaching aids. It can be concluded that if the right instructional material or teaching aids is employed, academic achievement of junior secondary school students in mathematics can be improved and also senior secondary school students would not find it difficult when they came for further geometrical aspect.

Recommendation

The number of recommendations that could be drawn from this study, which shows that improvisation, plays an important role on secondary schools students' achievement in mathematics. Improvisation makes students to participate in creative and analytical thinking when they are involve in making those needed instructional materials. Therefore, mathematics teachers should be trained through workshop and seminars on the role and importance of improvisation so that the teacher's will develop interest and be motivated to improvise.

Finally, it is important to recommend that the Federal and State Ministries of Education

should release funds to assist in the process of improvisation where necessary.

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