IMPACT OF VIDEOTAPED INSTRUCTION ON LEARNING OF MATHEMATICS AT SENIOR SECONDARY SCHOOL LEVEL

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Abstract

This study investigated, using quasi-experimental research design, the impact of videotaped instruction on learning of Senior School Mathematics among the Senior School Students in Delta State Capital Territory. The sample consisted of 1,250 SS3 students from four Senior Secondary Schools. The four Schools comprised two urban and two rural Secondary schools. Two Secondary Schools (one urban and one rural) were randomly assigned to experimental group, while another two Secondary Schools (one urban and one rural) were randomly assigned to control group. Students in experimental group were exposed to Videotaped instruction, while students in control group had lesson through Conventional Lecture Method. The instrument for data collection was Mathematics Achievement Text Items (MATI). Z-test was used to analyze data. It was found that experimental group had significant higher Mean Academic Achievement than the control group. Implication of the study and recommendation were made to improve teaching and learning.

It is a common knowledge that any school, be it at the primary or secondary or tertiary level, that fails to provide Mathematics Education is viewed as being unserious. This is because of the key position Mathematics occupies in Nigeria Educational System and its application in developmental process. In this vein, Akuezuilo and Chinweoke (2009) stated that Mathematics is the bedrock of all Science Subjects and is therefore, needed for scientific and technological advancement of any nation. Maduabum and Odili (2006) described Mathematics as the Science of quantity and space which occupies a key position in Nigeria Educational System reflecting accurately the vital role the subject plays in contemporary society. According to Osafehinti (1990) and Aminu (1995), any society which aspires to be scientifically and technologically developed must have adequate level of Mathematics Education, since Mathematics has ingredient for the effective articulation of the abstract elements of science that gives impetus to the development of technologies. Rogers (1986), explained that Mathematics has become the central intellectual discipline of the technological society and that as the society develops so will its quantitative aspects assume greater influence and dominance over its qualitative features. Eguavon (2002),

described mathematics as the pivot of all civilization and technological development. Supporting Eguavon, Imoko and Agwagah (2006), opined that Mathematics is a key factor in the development of any nation.

Mathematical concepts and symbols are used in expressing the physical laws of nature (Tsue and Anyor, 2006). Therefore, Mathematical concepts and methods provide scientists with insight, into and about natural phenomenon. Ikeobi (1994) and Njoku (1997), opined that chemical Kinetics, chemical equilibrium, stiochemistry, mole concept, solubility, electrolysis, redox reactions and ionic equations are areas in chemistry that require a good knowledge of mathematical concepts. Jegede (1979), identified ratio, charts, proportions, measurement and statistics as the mathematical concepts needed in biology. Egbugara (1980), indicated that algebra, trigonometry, graphs, calculus and differential equations are the mathematical concepts required in physics and engineering science. Realizing the views of the aforementioned researchers on the importance of mathematics in national development and its position in the school system, the Federal Government of Nigeria (FGN) (2004) is continuously emphasizing the importance of Mathematics in national development by making the subject compulsory for both pupils and students in Primary and Secondary Schools. Supporting FGN, Maduabum and Odili (2006), asserted that for a nation such as ours, aspiring for scientific and technological take-off, the need to pay due attention to our students academic performance in mathematics cannot be over emphasized.

Akuezuilo and Chinweoke (2009) agreed that for students to have high academic achievement in Mathematics, teachers should be able to skillfully apply relevant instructional materials, in order, to drastically reduce the abstract and difficulty attributes of Mathematics. Also, Gbodi and Laleye (2006) and Alio, Ude and Okoye (2009), pointed out that the application of relevant instructional materials in teaching Mathematics, at the right time, gives better result than mere talking and writing. Abimbade (1997), stated that some materials are needed and essential for the purpose of bringing about effective teaching and learning which are called instructional materials or instructional media. According to Gbodi and Laleye (2006), instructional materials are possible channels through which information are conveyed from sender (the teacher) to the receiver (the student). Fademiro (2000), perceived instructional materials as the materials, equipment and techniques that can be used to communicate with the listeners (students), as well as, create opportunity for independent learning. Ugbede in Obara and Okoh (2005), opined that instructional materials are tools for communication; they are referred to all things that can be seen, heard, read and manipulated with the objectives of enhancing the teaching-learning process. Okafor (2003), defined instructional materials as aids to effective teaching and which aid effectiveness in classroom by evoking in the students the mental image as in the teacher, thereby making words less ambiguous. Obara and Okoh (2005), asserted that instructional materials are all the things the teacher utilizes to interactively enhance, motivate and facilitate teaching and learning in an attempt to ensuring the achievement of a set of objectives. According to Abimbade (1997), instructional materials are broad

ranges of resources, which can be used to facilitate effective and efficient communication. One of such instructional materials is the audio-visual material.

Audio-visual material is a type of instructional material that aids in making ideas or concepts clearer in instructional programmes, but should not be regarded as a substitute for good teaching (Moronkola, 2012). Fademiro (2000) posited that audio-visual materials are devices that have both audio and visual appeal; they require the use of the eyes and ears (sight and hearing). The videotaped instructional material is an example of audio-visual material. Gbodi and Laleye (2006), posited that videotaped recorder is an audio-visual material useful for programming instruction on topics that are abstract and difficult to explain verbally.

Statement of the Problem

Video and television constitute very important audio-visual material and could be used for effective teaching and learning of Mathematics in the classroom. According to Callahan and Clark (1977), students tend to enjoy viewing and they understand messages from video and television much faster. Gbodi (1998) reiterated that knowledge enters the human brain mainly through two major senses, sight and hearing; sight covers between 75-90% and hearing 10-15%. Supporting Gbodi (1998), Gbodi and Laleye (2006), stated that the effectiveness through sight and hearing is that students can remember 30% of what they hear and 50% of what they hear and see simultaneously. Nneji (2000), detected that videotaped instruction has the potential of enhancing quality learning; it can be used to arouse interest, modify attitude, clarify concepts, stimulate contents, demonstrate and concretize knowledge that could otherwise only be talked about in abstract terms. Therefore, the statement of problems is stated thus: what is the impact of videotaped instruction on academic achievement of students in senior school mathematics?

Null Hypothesis

The following null hypothesis was formulated to guide this study.

Ho_1: there is no significant difference between that Mean Academic Achievement (MAA) of experimental and control groups in Senior School Mathematics.

Methodology

This design used in this study was a pretest-posttest quasi- experimental research design. This was because intact classes were used, where complete randomization was not possible.

The population of the study comprised 5,395 Senior Secondary Three (SS3) students in the 17 Public Senior Secondary Schools (PSSS) in Delta State Capital Territory (DSCT). Out of the 17 PSSS, 10 were in the urban area while 7 were in the rural area. The 10 urban PSSS had population of 3,400, an average of 340 students in a school. There were 1995 students in the 7 rural PSSS, an average of 285 students in a school.

Through a stratified random sampling technique, 2 urban and 2 rural PSSS were selected as the sample schools. Using simple random sampling technique, one urban and one rural PSSS were assigned to both experimental and control groups. The students in the experimental group were exposed to videotaped instruction on 3-dimensional problems, carefully packaged in a stepwise manner, in order, to enhance individualized study, which in effect recognized differences in rate of learning among the students. The 3 dimensional problems were before now dreaded so much by the students because of the inability of the teachers to effectively and efficiently orientate and inclined the associated angles, which the videotaped instructional package can do with ease. The students in control group were taught with the Conventional Lecture Method (CLM).

Four teachers, each from the four selected secondary schools, taught the students. The two teachers in the experimental group underwent one week training programme on how to effectively use videotaped instructional packages for effective and efficient classroom teaching. The other two teachers in the control group equally underwent one week training programme, but on effective and efficient use of CLM of teaching for classroom teaching. After the one week training programme for both teachers in experimental and control groups, they were all certified as being competent enough to teach the students. Also, the researcher prepared uniform lesson note for the teachers based on the topic taught. The four teachers used in this study had the same years of experience and were all B.Sc.(Ed) holders in mathematics.

The instrument used in collecting data in this study was researcher made Mathematics Achievement Test Items (MATI). It consisted of 50 multiple choice mathematics questions on the concept of 3-dimensional problems. MATI was validated by two Science Education experts in mathematics and two test development experts, all at University of Benin, based on relevance and coverage of units of work and stated objectives. Kunder-Richardson 21 (K-R21) formula was used to determine the reliability index of MATI as 0.91 and therefore, MATI was judged to be very reliable.

Students in both groups were pretested before the treatment was made. Therefore, students in the experimental group were exposed to videotaped instructional interaction for four weeks and the students in the control groups were equally taught for four weeks, but with CLM of talk and chalk. After the four weeks of instruction/teaching, the students in both groups were posttested. The MAA of students in both experimental and control groups were calculated and compared. Z-test was used to find out whether the difference in posttested MAA of students in both groups was significant.

Data Analysis and Results

The summary of analyzed data and results are as shown in tables 1 and 2

Table 1: Z-test of Posttested MAA for the Experimental and Control Groups in Senior School Mathematics

Group	N	MAA	SD	Df	Zcal	Zcrit	P
Experimental	625	36.4	1.1	1248	1.65	1.96	<0.05
Control	625	38.7	1.3				

Data in table 1 show the Z-test result of pretested MAA for experimental group is 36.4, while that of the control group is 38.7. Data in table I further show that Zcal = 1.65, indicating that the experimental MAA is not significantly different from the control group MAA at 0.05 level of significance and 1248 df in a 2-tailed test. The implication is that the two groups are homogenous and comparable and so, comparable enough to take part in this study.

Ho_i: there is no significant difference between the MAA of experimental and control groups in senior school mathematics.

Table 2: Z-test of Posttested MAA of Experimental and Control Groups in Senior School Mathematics

Group	N	MAA	SD	Df	Zcal	Zcrit	P
Experimental	625	74.8	3.4				
Control	625	61.6	3.1	1248	3.78	1.96	>0.05

Data in table 2 show Z-test of posttested MAA experimental group is 74.8, while that of the control group is 61.6. Zcal = 3.78, showing that the experimental group MAA is significantly greater than the control group MAA at 0.05 level of significance and 1248 df in a 2-tailed test. Therefore, Ho_1 is rejected. That is, the SS 3 students in experimental group exposed to videotaped instruction have significant higher MAA than the SS3 students exposed to CLM in Senior School Mathematics.

Discussion

This study, investigated the impact of videotaped instruction on learning of Senior School Mathematics among the SS3 students in DSCT. The finding in this study showed that the pretested MAA of both experimental and control groups were not significantly different. However, the posttested MAA of both experimental and control groups were significantly different, with the experimental groups having the higher MAA or better academic achievement. This finding agrees with Gbodi and Laleye (2006) who reported that students exposed to videotaped instruction performed significantly better than those exposed to CLM of teaching. Also, the finding of Akuezuilo, Ude and Okoye (2009) is in alignment with finding of this study. They

opined that the application of relevant instructional materials during teaching-learning process gives better results than the talking and writing. The finding of Akuezuilo and Chinweoke (2009), that higher academic achievement of students in mathematics and science is a function of skilful and effective application of relevant instructional materials during teaching-learning process, in order, to drastically reduce the abstract and difficult aspect of mathematics and science to the barest minimum is a great support to the finding in this study. The findings of Okeke (1995, 1999) and Onyegaegbu (1999) that the videotaped instruction including the CLM.

Dale (1954) in Gbodi and Laleye (2006) agrees with the finding of this study by asserting that videotaped instruction offers a reality of experience that stimulates self activities on the part of the students and develop their continuity of thought. Gbodi and Laleye (2006) explanation on why experimental group had higher MAA than the control group is that video taped instruction is a multi-media instructional material, which appeals to both the senses of hearing and sight, they can transmit verbal and non-verbal information, reduce abstraction in classroom lessons, reduce boredom among students and teachers and conserve the teachers energy. In agreement with Gbodi and Laleye (2006) explanation, Nneji (2000) in her finding observed that videotaped instruction has the capability of enhancing quality learning in science and it can be used to arouse interest, modify attitude, clarify concepts, stimulate thinking, summarize contents, demonstrate and concretize knowledge that could, otherwise, only be talked about in abstract terms.

Conclusion

The experimental group (students exposed to videotaped instruction) had significant higher MAA than the control group (Students exposed to conventional lecture method of instruction). The researcher came to a conclusion that the treatment (exposure to videotaped instruction) on the experimental group resulted in the significant higher MAA.

Implication

1) Videotaped instruction should be used to teach abstract and difficulty oriented topics in mathematics, since it (i) arouses interest, (ii) modifies attitude, (iii) claries concepts, (iv) stimulates thinking, (v) summarizes contents, (vi) demonstrates knowledge and (vii) concretizes knowledge.

2) Competent mathematics teachers are difficult to come by. Therefore, in the absence of this category of teachers, videotaped instruction is inevitable.

Recommendation

1. Mathematics teachers should, therefore, be encouraged to use videotaped instructional packages to teach abstract and difficult oriented mathematical concepts, to enhance easy retention and high academic performance of our students.

2. Workshop/seminar should be organized for mathematics teachers on how to skillfully and effectively use the videotaped packages for effective and efficient classroom teaching-learning process.
3. Finally, Government should make videotaped instructional packages readily available for teachers.

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