TEACHING STRATEGIES IN MATHEMATICS FOR CLASS XITH AND XIITH STUDENTS OF NATIONAL INSTITUTE OF OPEN SCHOOLING IN TERMS OF ACHIEVEMENTS BY TAKING PRE-TEST ACHIEVEMENT SCORE AS CO-VARIATE

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ABSTRACT

This paper is based on experimental research work with "Teaching Strategies In Mathematics For Class XIth And XIIth Students Of National Institute Of Open Schooling In Terms Of Achievements By Taking Pre-Test Achievement Score As Co-Variate" . The study was experimented with experimental group with traditional groups as follows The Traditional Method (i.e. readers of text book); The Text Book + Audio-Visual Method; The Text Book + Audio-Visual and Discussion Method; The Text Book + Audio-Visual + Discussion Method and Biology Laboratory Method. Keeping in view the aim of the present research the experimental method of comparing four different methods with respect to each other was found to be most appropriate and suitable. Hence the method used in this research work was the Experimental method. The findings of the study were teaching strategies adopted in experimental group found effective compare to the traditional group.

Key words: **NIOS, Teaching Strategies, Audio Visual**

1.0.0 INTRODUCTION

Our secondary education is still behind the target of universalization of education for all. Because of the inherent weakness of the social and educational system, we have not been able to get rid of the problems of wastage and stagnation and drop-outs. This problem is acute and alarming in the peoples, belonging to the weaker and culturally disadvantaged section of the society. For making secondary education familiar in rural and urban areas different instructional strategies, techniques with the help of different media's Indian Educational Policy makers put forth the concept. Television is the best media cover the areas irrespective of any geographical locations for spreading knowledge immediately. Keeping the view of advantages of teleconference, television broadcasting, television and other instructional strategies for facilitating learning out comes in the part of learners with full supports of psychological factors promoting learning problem has been taken. Awareness towards use of technology and their importance in students' life facilitated motivational factors towards learning attitude.

METHOD EMPLOYED FOR THE STUDY

The selection of method depends largely upon the nature and purpose of the problem selected and the kind of data necessary for its solution. There were various research methods that were mainly classified under three major headings. All research involves the elements of observation, description and analysis of what happens under certain circumstances. The actual method selected would depend upon the nature and the purpose of study. The main aim of this study is to find out the comparative effect of four different methods of teaching to different groups and different units from the topics of mathematics of National Institute of Open Schooling (NIOS) for the standard X from Bhopal and Shehor Districts of M.P. State. The four different methods under considerations was as follows –The Traditional Method (i.e. readers of text book); The Text Book + Audio-Visual Method; The Text Book + Audio-Visual and Discussion Method; The Text Book + Audio-Visual + Discussion Method and Biology Laboratory Method. Keeping in view the aim of the present research the experimental method of comparing four different methods with respect to each other was found to be most appropriate and suitable. Hence the method used in this research work was the Experimental method.

1.2.0 EXPERIMENTAL METHOD

This method is based on experiments conducted in a laboratory but here experimental method is used as the different teaching methods. This method is to be tried out on different groups of students for different topics in the teaching of mathematics of National Institute of Open Schooling (NIOS) for the standard XI and XII from Bhopal and Sehore Districts of M.P. State. Therefore the research was conducted on the basis of Experimental method.

1.3.0 POPULATION

Lindquist defines a population as "Any identifiable group of individual or as any collection or agreement of comparable measure". Usually the population is known as the total human being involved in the research activity. The researcher considers all students of standard studying through NIOS class XI and XII as the total population of the study.

1.4.0 SAMPLE

Lindquist defines sample as "Any number of members of a population that had been selected to represent that population." The purpose of any research is to know something about a larger group of people (here pupils) by studying a much smaller group of people (pupils). The larger group we wish to learn about is called a population whereas the smaller group we actually study is called a sample. The sample will comprise 160 students of NIOS secondary schools.

1.5.0 DESIGN

The present study was experimental in nature. Pre-test, post-test control group design was employed. 160 students were randomly divided into four equal groups. These randomly divided groups were

randomly assigned to the treatment. The treatment in the study had four levels, namely, (1). The Traditional Method (i.e. readers of text book); Group-I, (2). The Text Book + Audio-Visual Method; Group-II, 3. The Text Book + Audio-Visual and Discussion Method; Group-III and 4. The Text Book + Audio-Visual + Discussion Method and Biology Laboratory Method; Group-IV.

1.6.0 TOOLS

For majoring different variable standardized tools were developed by the investigator was used for the study. Details about different tools used in the study was given details caption wise as under-

1.6.1. CRITERION REFERENCE TEST (CRT)
Investigator was developed criterion Reference Test for measuring the learners' achievement taught through different methods to different groups. The test was consisted of 120 questions was objective types followed different pattern of questions. All the questions were objective type for making the test more reliable. Knowledge, understanding, application, analysis, synthesis and evaluation level of cognitive variables is measured through the objective type of questions. Questions were covered fifteen topics which were integrated from Maths subject of NIOS, XIth and XIIth level. With the view of experts the test was finalized.

As stated above the first objective of the study is tested through applying percentile technique and t test to know the significant difference among different mode of instruction(i.e. . text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) are given below;

1.7.0 OBJECTIVES:
To study teaching strategies in mathematics for class XIth and XIIth students of national institute of open schooling in terms of achievements by taking pre-test achievement score as co-variate

1.8.0 HYPOTHESIS
There will be no teaching strategies in mathematics for class XIth and XIIth students of national institute of open schooling in terms of achievements by taking pre-test achievement score as co-variate

1.9.0 ANALYSIS OF DATA
As stated above there are four groups(i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) in the study have gone through different treatment. In order to know the effect of co-variate i.e. pre-achievement score upon the achievement of the learners 2x2 ANCOVA technique were used to know its effect.

1.9.1: Comparison of Print Material with Print + Video Mode of Instruction In Terms Of Over All Achievement of Mathematics Students by Taking Pre-Test Score as Co-Variate

The hypothesis formulated for the above objective was There was no significant difference of mean achievement score of different teaching strategies(i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) of mathematics learners of class XIth and XIIth students of National Institute of Open Schooling by taking pre-test achievement score as co-variate Related to the above hypothesis data were analyzed by using statistical technique analysis of covariance i.e ANCOVA. The results are presented in Table 1.1

Table 1.1: Summary of ANCOVA for overall achievement of G1 & G2 groups by taking pre achievement score as co-variate

Source of variance	Df	SSy.x	MSSy.x	Fy.x
Among	1	5.708985	5.708985	.0586321*
Within	77	7447.886	96.72579	
Total	78	7453.595		

From Table 1.1 It can be seen that, the f- value of the overall achievement for the two group is .0586321 which is not significant even at 0.05 level with df = 1/77. It shows that, the adjusted mean over all achievement score of the students taught through print material is not significantly different from those taught through print material + video mode of instruction when pre achievement scores is taken as co-variate. Thus the null hypothesis, namely There was no significant difference between the adjusted mean overall achievement scores of the students taught through print material with those students studying through print material + video mode of instruction when pre achievement score was taken as co-variate, is accepted. The adjusted mean over all achievement of the student taught through print material was not significantly lower than those who were taught through print material + video mode of instruction (vide table 1.2). But the mean difference among the treatment group is differing from their mean achievement score.

Table 1.2: Adjusted mean achievement scores of G1 and G2

Groups	N	Mx	My	My.X
G1	40	46.15	55.95	55.31737
G2	40	46.9	55.15	55.78263

FINDING

The print material + video mode of instruction was found slightly significantly superior to print material mode of instruction when students overall achievement scores were adjusted with respect to pre achievement score.

1.9.2 : Comparison Of Print Material Mode With Print Material + Video + Discussion In Terms Of Over All Achievement Of Mathematics Students By Taking Pre-Achievement Score As Co-Variate

The hypothesis formulated for the above objective was There was no significant difference of mean achievement score of different teaching strategies(i.e. text, text + video, text + video+ discussion and

text + video+ discussion+ math laboratory) of mathematics learners of class XIth and XIIth students of National Institute of Open Schooling by taking pre-test achievement score as co-variate Related to the above hypothesis data were analyzed by using statistical technique analysis of covariance i.e ANCOVA. The results are presented in Table 1.3.

Table 1.3: Summary of ANCOVA for overall achievement of G1 & G3 groups by taking pre achievement score as co-variate

Source of variance	Df	SSy.x	MSSy.x	Fy.x
Among	1	25.1626	25.1626	.3118146
Within	77	5966.752	77.49028	
Total	78	5990.914		

From Table 1.3 It can be seen that, the f- value of the overall achievement for the two group is .3118146 which not significant even at 0.05 level with df = 1/77. It shows that, the adjusted mean over all achievement score of the students taught through print material is not significantly differ from those taught through print material + video + discussion mode of instruction when pre achievement scores is taken as co-variate. Thus the null hypothesis, namely There was no significant difference between the adjusted mean overall achievement scores of the students taught through print material mode with those students studying through print material + video + discussion mode of instruction when pre achievement score was taken as co-variate, is accepted. The adjusted mean over all achievement of the student taught through print material mode was significantly differ than those who were taught through print material + video mode + discussion of instruction(vide table 1.4).

Table 1.4: Adjusted mean achievement scores of G1 and G3

Group	N	Mx	My	My.X
G1	40	46.15	55.95	57.08227
G3	40	52.075	60.7	58.21773

FINDING

The print material + video + discussion mode of instruction was found significantly superior to print material mode of instruction when students overall achievement scores were adjusted with respect to pre achievement score.

1.9.3: Comparison of Print Material Mode with Print Material + Video + Discussion + Math Laboratory In Terms Of Over All Achievement of Mathematics Students by Taking Pre-Achievement Score as Co-Variate

The hypothesis formulated for the above objective was There was no significant difference of mean achievement score of different teaching strategies(i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) of mathematics learners of class XIth and XIIth students of National Institute of Open Schooling by taking pre-test achievement score as co-variate Related to

the above hypothesis data were analyzed by using statistical technique analysis of covariance i.e ANCOVA. The results are presented in Table 5.5.

Table 1.5: Summary of ANCOVA for overall achievement of G1 & G4 groups by taking pre achievement score as co-variate

Source of variance	Df	SSy.x	MSSy.x	Fy.x
Among	1	23.46192	23.46192	
Within	77	6315.495	82.00643	
Total	78	6337.957		.2860985

From Table 1.5 It can be seen that, the f- value of the overall achievement for the two group is .2860985 which not significant even at 0.05 level with df = 1/77. It shows that, the adjusted mean over all achievement score of the students taught through print material is not significantly differ from those taught through print material + video + discussion+ Math Laboratory mode of instruction when pre achievement scores is taken as co-variate. Thus the null hypothesis, namely There was no significant difference between the adjusted mean overall achievement scores of the students taught through print material mode with those students studying through print material + video + discussion + Math Laboratory mode of instruction when pre achievement score was taken as co-variate, is accepted. The adjusted mean over all achievement of the student taught through print material mode was significantly differ than those who were taught through print material + video mode + discussion + Math Laboratory of instruction(vide table 1.6).

Table 1.6: Adjusted mean achievement scores of G1 and G4

Group	N	Mx	My	My.X
G1	40	46.15	55.95	58.01819
G4	40	53.15	62.225	59.15681

FINDING

The print material + video + discussion + Math Laboratory mode of instruction was found significantly superior to print material mode of instruction when students overall achievement scores were adjusted with respect to pre achievement score.

1.9.4: Comparison of Print + Video Mode of Instruction with Print + Video + Discussion Mode of Instruction In Terms Of Over All Achievement of Mathematics Students by Taking Pre-Test Score as Co-Variate

The hypothesis formulated for the above objective was There was no significant difference of mean achievement score of different teaching strategies(i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) of mathematics learners of class XIth and XIIth students of National Institute of Open Schooling by taking pre-test achievement score as co-variate Related to the above hypothesis data were analyzed by using statistical technique analysis of covariance i.e ANCOVA. The results are presented in Table 1.7.

Table 1.7: Summary of ANCOVA for overall achievement of G2 & G3 groups by taking pre achievement score as co-variate

Source of variance	Df	SSy.x	MSSy.x	Fy.x
Among	1	18.31885	18.31885	.2182403
Within	77	6463.296	83.93891	
Total	78	6481.615		

From Table 1.7 It can be seen that, the f- value of the overall achievement for the two group is .2182403 which is not significant even at 0.05 level with df = 1/77. It shows that, the adjusted mean over all achievement score of the students taught through print material + video mode of instruction is not significantly differ from those taught through print material + video + discussion mode of instruction when pre achievement scores is taken as co-variate. Thus the null hypothesis, namely There was no significant difference between the adjusted mean overall achievement scores of the students taught through print material + video mode of instruction with those students studying through print material + video + discussion mode of instruction when pre achievement score was taken as co-variate, is accepted. The adjusted mean over all achievement of the student taught through print material + video + discussion mode of instruction was slightly differ than those who were taught through print material + video mode of instruction(vide table 1.8). But the mean difference among the treatment group is differing from their mean achievement score.

Table 1.8: Adjusted mean achievement scores of G2 and G3

Group	N	Mx	My	My.X
G2	40	46.9	55.15	57.43423
G3	40	52.075	60.07	58.41578

FINDING

The print material + video+ discussion mode of instruction was found slightly superior to print material + video mode of instruction when students overall achievement scores were adjusted with respect to pre achievement score.

1.9.5: Comparison of Print Material +Video Mode with Print Material + Video + Discussion +Math Laboratory In Terms Of Over All Achievement of Mathematics Students by Taking Pre-Achievement Score as Co-Variate

The hypothesis formulated for the above objective was There was no significant difference of mean achievement score of different teaching strategies(i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) of mathematics learners of class XIth and XIIth students of National Institute of Open Schooling by taking pre-test achievement score as co-variate Related to the above hypothesis data were analyzed by using statistical technique analysis of covariance i.e ANCOVA. The results are presented in Table 1.9.

Table 1.9: Summary of ANCOVA for overall achievement of G2 & G4 groups by taking pre achievement score as co-variate

Source of variance	Df	SSy.x	MSSy.x	Fy.x
Among	1	33.28516	33.28516	.3600509
Within	77	7118.32	92.44571	
Total	78	7151.605		

From Table 1.9 It can be seen that, the f- value of the overall achievement for the two group is .3600509 which is not significant even at 0.05 level with df = 1/77. It shows that, the adjusted mean over all achievement score of the students taught through print material + video mode of instruction is not significantly differ from those taught through print material + video + discussion + math laboratory mode of instruction when pre achievement scores is taken as co-variate. Thus the null hypothesis, namely There was no significant difference between the adjusted mean overall achievement scores of the students taught through print material + video mode of instruction with those students studying through print material + video + discussion + math laboratory instruction mode of instruction when pre achievement score was taken as co-variate, is accepted. The adjusted mean over all achievement of the student taught through print material + video mode of instruction was significantly differ than those who were taught through print material + video + discussion + math laboratory of instruction(vide table 1.10).

Table 1.10: Adjusted mean achievement scores of G2 and G4

Group	N	Mx	My	My.X
G2	40	46.9	55.15	58.0139
G4	40	53.15	62.225	59.36111

FINDING

The print material + video + discussion + Math Laboratory mode of instruction was found significantly superior to print material + video mode of instruction when students overall achievement scores were adjusted with respect to pre achievement score.

1.9.6: Comparison Of Print Material + Video + Discussion Mode Of Instruction With Print Material + Video + Discussion + Math Laboratory In Terms Of Over All Achievement Of Mathematics Students By Taking Pre-Achievement Score As Co-Variate

The hypothesis formulated for the above objective was There was no significant difference of mean achievement score of different teaching strategies(i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) of mathematics learners of class XIth and XIIth students of National Institute of Open Schooling by taking pre-test achievement score as co-variate Related to the above hypothesis data were analyzed by using statistical technique analysis of covariance i.e ANCOVA. The results are presented in Table 1.11.

Table 1.11: Summary of ANCOVA for overall achievement of G3 & G4 groups by taking pre achievement score as co-variate

Source of variance	Df	SSy.x	MSSy.x	Fy.x
Among	1	10.06641	10.06641	.1498461
Within	77	5172.73	67.17831	
Total	78	5182.796		

From Table 1.11 It can be seen that, the f- value of the overall achievement for the two group is .1498461 which not significant even at 0.05 level with df = 1/77. It shows that, the adjusted mean over all achievement score of the students taught through print material + video+ discussion mode of instruction is not significantly differ from those taught through print material + video + discussion+ Math Laboratory mode of instruction when pre achievement scores is taken as co-variate. Thus the null hypothesis, namely There was no significant difference between the adjusted mean overall achievement scores of the students taught through print material + video+ discussion mode of instruction with those students studying through print material + video + discussion + Math Laboratory mode of instruction when pre achievement score was taken as co-variate, is accepted. The adjusted mean over all achievement of the student taught through print material + video+ discussion mode of instruction was significantly differ than those who were taught through print material + video mode + discussion + Math Laboratory of instruction(vide table 1.12).

Table 1.12: Adjusted mean achievement scores of G3 and G4

Group	N	Mx	My	My.X
G3	40	52.075	60.7	61.10799
G4	40	53.15	62.225	61.81707

FINDING

The print material + video + discussion + Math Laboratory mode of instruction was found significantly superior to print material + video+ discussion mode of instruction when students overall achievement scores were adjusted with respect to pre achievement score.

1.9.7: OVER ALL FINDINGS

There is significant difference of mean achievement score of different groups taught through different teaching strategies (i.e. text, text + video, text + video+ discussion and text + video+ discussion+ math laboratory) of mathematics learner of class XIth and XIIth students of National Institute of Open Schooling in terms of their mean achievement scores. Whereas the F-value of all the four groups with their interaction did not found significantly differ each other. Therefore, the stated null hypothesis "There was no significant difference of mean achievement score of different groups taught through different teaching strategies (i.e. text, text + video, text + video+ discussion and text +

video+ discussion+ math laboratory) of mathematics learner of class XIth and XIIth students of National Institute of Open Schooling" by taking pre-achievement score as co-variate is accepted.

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