COMPARATIVE STUDY OF THE EFFECTIVENESS OF INDUCTIVE, DEDUCTIVE AND JIGSAW METHODS OF TEACHING ON THE ACHIEVEMENT IN MATHEMATICS OF SECONDARY SCHOOL STUDENTS

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ABSTRACT

The present comparative study aimed to study the effectiveness of inductive, deductive and jigsaw methods of teaching on the achievement in mathematics of secondary school students. The study revealed a significant difference in the achievement of secondary school students in mathematics when taught by inductive, deductive and jigsaw methods of teaching.

INTRODUCTION

Mathematics is not a bunch of facts. It is a sequential subject. The term mathematics has been interpreted and explained in various ways. It is the numerical and calculative part of man's life and knowledge. The word mathematics has been used in two distinct and different senses i.e. one as a method used to solve the problems of quantity, space, order etc. and the second, as a set of laws of generalization of truths that are discovered. Each concept is based on previous concept and it becomes a basis for the development of further concepts. We think teaching of mathematics focuses on solving problems of textbooks only. Most of the teachers, parents and principals want percent results in mathematics. Therefore, our students have become just calculating machines without thinking and understanding. If we analyze the errors made by the students in mathematics, we find that the maximum number of errors is in knowledge and understanding.

There is a great world outside and mind within, and it is the duty of the teacher to bring these together. This process of interpreting the world of

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knowledge to child's mind is called the method of teaching. Success in teaching depends mainly on two factors. The first one is the mastery over the subject matter and the second one is the skill in teaching. Methods are the ways or modes to understand and practice the teaching. So, it is essential that a teacher should be acquainted with different methods of teaching that have been proposed or propounded by different educational thinkers of the schools of thought in education. Some teachers possess a wonderful ability to awaken interest by using different methods of teaching. One method cannot be equipped with equal amount of knowledge because of individual differences. According to Thorndike, "There is much difference between lower and higher categories of students of the same class. Higher category students learn six times more than the lower category students or lower category students learn only one sixth in comparison of higher category students." Therefore, a teacher has to apply different methods to teach same topic to same class so that every student understands and learn the content adequately.

The prescribed curriculum is transacted in the classroom at every stage of education through various methods. These methods can be Lecture, Project, Jigsaw, Inductive, Deductive, Analytical, Heuristic etc..

INDUCTIVE METHOD

Induction method is a type of method where the teachers do not supply rules and formulae to the students. Here only various facts and examples are presented to the students and from here they have to establish a general formula. This method is psychological in nature and is based on the principle of induction.

DEDUCTIVE METHOD

Deduction method is a way by which a particular fact is derived from some general known truth. In deduction method, a pre-established rules or formula is given to the students and they are asked to solve the related problems by using the formula. Deduction teaching secures first the learning of definition or rules, then carefully explains it's meaning and lastly illustrates it fully by applying to facts.

JIGSAW METHOD

The Jigsaw method is a cooperative learning technique in which students work in small groups. Jigsaw can be used in a variety of ways for a variety of goals, but it is primarily used for the acquisition and presentation of new material, review or informed debate. In this method, each group member is assigned to become an "expert" on some aspect of a unit of study. After reading about their area of expertise, the experts from different groups meet to discuss their topic and then return to their groups and take turns of teaching their topic to their group mates.

Emergence of the Problem

It is observed that most of the students avoid mathematics in higher classes as the teachers most of the time fail to make the subject interesting due to one reason or other. Out of so many reasons, one reason can be selection of appropriate method of teaching or use of only traditional method in the classroom. In the present study an attempt was made to find out the usefulness and compatibility of the three different methods i.e. inductive, deductive and jigsaw methods in teaching to study effectiveness of these methods on the achievement of secondary school students.

OBJECTIVES

The objectives of the present investigation were:

- To study the effectiveness of different methods of teaching on the achievement in mathematics of secondary school students.
- To compare the effectiveness of inductive and jigsaw methods of teaching on the achievement in mathematics of secondary school students.
- To compare the effectiveness of deductive and jigsaw methods of teaching on the achievement in mathematics of secondary school students.
- To compare the effectiveness of inductive, deductive and jigsaw methods of teaching on the achievement in mathematics of secondary school students.

HYPOTHESES

The following hypotheses were formulated for the present study:

- There is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive and deductive methods of teaching.
- There is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive and jigsaw methods of teaching.
- There is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by deductive and jigsaw methods of teaching.
- There is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive, deductive and jigsaw methods of teaching.

METHODOLOGY

Sample

Adopting simple random sampling technique a sample of 200 students of class IX from Sant Baba Hazara Singh Sr. Sec. School, Nikke Ghumman, District Gurdaspur was selected for the present study.

Tools Used

The following tools had been selected and used by the investigator in the present study:

1. Lesson transcripts based on inductive, deductive and jigsaw method (self-prepared).
2. Raven's Standard Progressive Matrices (1983).
3. Achievement test in mathematics to know the scores obtained after teaching through different methods (self-prepared).

Analysis and Interpretation

Comparison of Means

Hypothesis-I

There is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive and deductive methods of teaching.

't'-value was computed to study of significant difference between mean scores of post test achievements scores of secondary school students when taught by inductive and deductive teaching methods of teaching.

The results so obtained were entered in table.

Table 1

Showing mean scores of post test achievement scores of secondary school students when taught by inductive and deductive methods of teaching

Teaching Method	N	Mean	SD	df	t-value	Significance Level
Inductive	40	20.012	4.48	78	5.01	Significant at 0.05 level
Deductive	40	13.75	6.67			

Table reveals that mean score and S.D of inductive teaching method were 20.12 and 4.48 respectively and mean score and S.D of deductive teaching method were 13.75 and 6.67 respectively. It was observed that t-value (5.01) was greater than the table value for 0.05 level of significance. Therefore null hypothesis that there is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive and deductive methods got rejected.

Hypothesis-II

There is no significant difference between in the mean scores of achievement of secondary school students in mathematics when taught by inductive and jigsaw methods of teaching.

't'-value was computed to study of significant difference between mean scores of post test achievements scores of secondary school students when taught by inductive and jigsaw methods of teaching.

The results so obtained were entered in table.

Table 2

Showing mean scores of post test achievement scores of secondary school students when taught by inductive and jigsaw methods of teaching

Teaching Method	N	Mean	SD	df	t-value	Significance Level
Inductive	40	20.12	4.48	78	1.33	Not Significant at 0.05 level
Jigsaw	40	18.73	7.02			

Table reveals that mean score and S.D of inductive teaching method were 20.12 and 4.48 respectively and mean score and S.D of Jigsaw teaching method were 18.73 and 7.02 respectively. It is observed that t-value (1.33) is less than the table value for 0.05 level of significance. Therefore null hypothesis that there is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive and jigsaw methods was not rejected.

Hypothesis-III

There is no significant difference between in the mean scores of achievement of secondary school students in mathematics when taught by deductive and jigsaw methods of teaching.

't'-value was computed to study of significant difference between mean scores of post test achievements scores of secondary school students when taught by deductive and jigsaw methods of teaching.

The results so obtained were entered in table.

Table 3

Showing mean scores of post test achievement scores of secondary school students when taught by deductive and jigsaw methods of teaching

Teaching Method	N	Mean	SD	df	t-value	Significance Level
Jigsaw	40	18.73	7.02	78	3.92	Significant at 0.05 level
Deductive	40	13.75	6.67			

Table reveals that mean score and S.D of Jigsaw teaching method were 18.73 and 7.02 respectively and value of mean score and S.D of deductive teaching method were 13.75 and 6.67 respectively. It is observed that t-value (3.92) is greater than the table value for 0.05 level of significance. Therefore null hypothesis that there is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by deductive and jigsaw methods of teaching got rejected.

Hypothesis-IV

There is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive, deductive and jigsaw methods of teaching.

't'-value was computed to study of significant difference between mean scores of post test achievements scores of secondary school students when taught by inductive, deductive and jigsaw methods of teaching.

The results so obtained were entered in table.

Table 4

Showing mean scores of post test achievement scores of secondary school students when taught by inductive, deductive and jigsaw methods of teaching

Source of variance	Degrees of freedom	Sum of square SS	Mean square MS	F-ratio
Between groups	2	637.65	318.82	8.25
Within group	117	4519.35	38.63	

From table it is observed that the obtained value of F-ratio (21.16) was found well beyond the table value for 0.05 level of significance and therefore significant at 0.05 level. Therefore null hypothesis that there is no significant difference in the mean scores of achievement of secondary school students in mathematics when taught by inductive, deductive and jigsaw methods of teaching got rejected.

Findings of the Study

The notable finding of the present study are given below:

1. There is significant difference in the achievement of secondary school students in mathematics when taught by inductive and deductive methods of teaching.
2. There is no significant difference in the achievement of secondary school students in mathematics when taught by inductive and jigsaw methods of teaching.
3. There is significant difference in the achievement of secondary school students in mathematics when taught by deductive and jigsaw methods of teaching.
4. There is significant difference in the achievement of secondary school students in mathematics when taught by inductive, deductive and jigsaw methods of teaching.

CONCLUSIONS

On the basis of the results drawn and discussion with the teachers and principal of Sant Baba Hazara Singh Sr. Sec. School, Nikke Ghumman, the following conclusions were drawn:

- It was found that Inductive method helps in understanding a mathematical principle and formula in a better manner.
- Deductive method is simple for the students as they get a ready made key to solve the relevant problems.
- Jigsaw and inductive methods are not fruitful for below average students.

EDUCATIONAL IMPLICATIONS

- This study helps in suggesting teachers that more effective and fruitful methods for teaching of mathematics should be used.

- While teaching mathematics school and teachers should be prompted to assemble the students into categories like below average and above average, gifted so that effective teaching can occur in the class. Care should be taken that Inductive method should not be applied for below average students and they should be taught with deductive method up to a maximum extent. Average students should to be taught through inductive and deductive methods as and when required.
- Mathematical principles and formulas should be taught to majority of the students with inductive method.
- The teacher training schools and colleges should play their role effectively in this direction. It should be strong part of curriculum of J.B.T and B.Ed. courses. Teacher educators should try to develop practical skill for the use of Jigsaw teaching method approach.

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