

COMPARATIVE STUDY OF INDUCTIVE & DEDUCTIVE METHODS OF TEACHING MATHEMATICS AT ELEMENTARY LEVEL

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ABSTRACT

Determination of this research article was to scrutinize the attainments of the students at elementary level when taught by deductive and inductive methods of teaching mathematics at elementary level. A thirty students sample was taken from six Government elementary schools and divided them into two groups, one was experimental and the second was control group. There is no significant difference between the performances of two groups was the pre-test scores. The students of control group were taught by deductive method and the students of experimental group were taught by inductive method under a control environment. After experiment, a researcher made post-test was conducted. The result of post-test shows that there is a significant difference between the performances of students of two groups it means that the students of experimental group performed better than the control group.

Keywords: *Deductive Method, Inductive Method, Mathematics teaching, Elementary level*

INTRODUCTION

Mathematics teachers use variety of methods and techniques in his/her daily classroom teaching in order to make his/her teaching more interactive and operative. Teachers and student interact with each other with in the school, so to develop this interaction; an educator uses new teaching substantial, procedures, strategies and approaches of teaching to make learning pertinent and beneficial. Till now so many methods and techniques has been launched but a mathematics teacher select only most relevant one keeping in view the topic, contents and needs of the learner. To grip or fully command on the content of mathematics it is too much necessary for an educator to use various relevant methods in the mathematics classroom at elementary level. It has been observed so many times that learners solved so many problems very rapidly by using a different methods, technique or formula to which they have already learnt in the classroom but unfortunately they have no idea about the basic logic that how this problem have done. Initially there was only the deductive approach of Aristotle to find

a solution for a problem but later is the inductive reasoning of Francis Bacon was introduced to solve the mathematics problems.

INDUCTIVE METHOD

Induction means to offer a general truth by showing, that if it is true for a particular case. It is true for all such cases. Inductive approach is psychological in nature. Inductive method develops curiosity with in the individual which is need of the day. Inductive approach is sponsored by Pestalozzi and Francis Bacon. Inductive approach is based on the process of induction in teaching learning process. In the world of mathematics it is a method of constructing a formula with the help of a sufficient number of concrete, actual and real examples. By using this method of teaching mathematics the students follow the content with great interest and understanding at various levels especially at elementary level. Inductive method is more useful in algebra, geometry, trigonometry and arithmetic teaching and learning. Inductive method proceeds from particular examples to general rules of formulae, concrete illustration to abstract rules, known to unknown and simple to complex.

By using inductive method following steps are used:-

a. Appearance/presentation of Examples

In first step of inductive method teacher shows lot of examples of same type and solutions of all those specific examples are obtained with the help of the student.

b. Observation/Reflection

After solving so many specific examples the students detect and observe these and try to reach some conclusion.

c. Generalization (Simplification)

After second step mean observing presented examples, the educator and students resolve some common rules, laws, formulae or principle by logical mutual discussion.

d. Testing and verification (authentication)

In this fourth step students test and prove the law, rule or principle with the help of other suitable specific examples. So in this way students logically achieve the knowledge of inductive method by following above given steps.

Inductive method makes use of student “perceiving”. In this method the teacher presents students with many examples showing how the concept is used.

DEDUCTIVE METHOD

Deductive method of teaching is based on deduction. In deductive method we proceed from general to particular and from abstract and concrete. In this method of teaching the educator tells the rule, principal or law to the students and then he sole that rule, principal or law with the help of specific examples. First of all the rules are given and then students are asked to apply these rules to solve more problems. This method is mainly used in Algebra, Geometry, arithmetic and Trigonometry. In this approach, help is taken from assumptions and guesses axioms of mathematics. This method is used for teaching mathematics in secondary, higher secondary or higher classes.

Deductive approach proceeds form

- General (rules, laws, principals or formula) to specific (examples)
- Unknown to know
- Abstract law to concrete example
- Complex to simple

Steps in deductive approach

Deductive method of teaching follows the following steps given below for effective teaching

- Clear recognition of the problem
- Search for a tentative hypothesis
- Formulating of a tentative hypothesis
- Verification

Deductive reasoning or logical deduction or “top-down” logic, is the process of reasoning from one or more statements to reach a logically certain conclusion. Deductive method of teaching is totally different from inductive method. A deductive method is more teacher-centred approach. This means that the teacher gives the students a new concept, explains it, and then has the students practice using the concept.

LITERATURE REVIEW

Qasim (2011), Aristotle, Education is a process necessary for the creation of sound mind in the sound body. Socrates, “Education is the mean that helps in searching the truth”. Imam Ghazali, “Education is a process which enables an individual to distinguish between the true and the false, the good and bad and the right and wrong”.

These sayings provide the basic concept of Education. Regarding new concept of education the child is the centre of interest, so the activities designed according to the needs and demands of the individual. To ripen the academic skill of the individual it is essential to design the content more interactive. (p.52)

Shaffer (1989) to check the effects of inductive-deductive methods in teaching investigator select three hundred and nine pupils of various levels from three various American high schools who were taught French and Spanish. In the light of this study eight classes were separated into two groups of even language ability. From these groups one group was instructed using the deductive method of teaching and the other group using the inductive method of teaching. Investigator developed material and a close test were the instruments used for the purposes of this research study. Shaffer concluded that an inductive method was much better than the deductive approach to all ability levels.

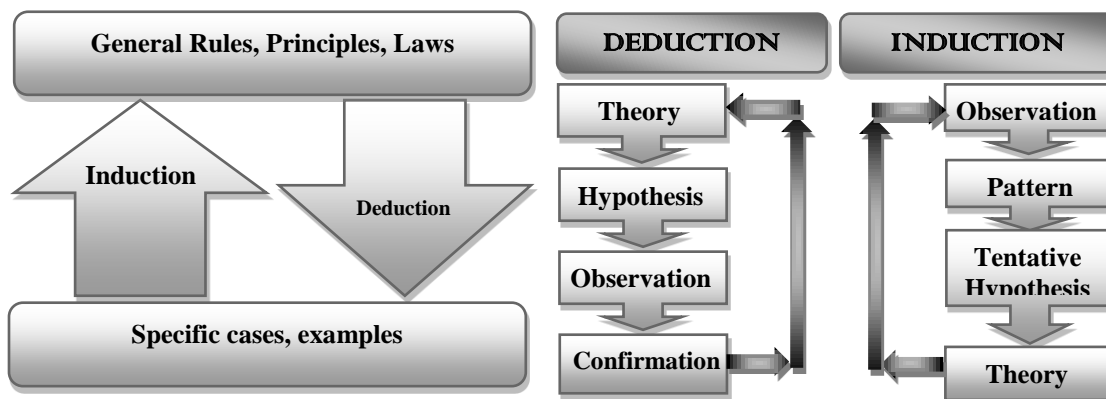
Silas (2012) Inductive method of teaching model is found to be more effective for teaching circle geometry and trigonometry than Transmitter of Knowledge teaching model, considering the results obtained. So, it is recommended that Inductive method of teaching model should be used in the teaching of circle geometry and trigonometry (Pp.33-46). Landmark College, (2005) Deductive meth of teaching is much less constructivist and is based on the idea that a highly structured presentation of content creates optimal learning for students as compared to inductive method of teaching which is more suitable in the teaching learning process.

Shoaib (2010) the deductive method is used in a large classroom setting while the inductive method is effective when used on small groups or numbers of students. The deductive method is traditional, structured, and predictable while the inductive method is personalized and the concepts are easily remembered and understood. The deductive method is a method of verification and comes from a source while the inductive method is an approach of discovery and relies on a student's perspective or understanding of a concept.

Nicole (2007) Inductive method of teaching is appreciated to recognize design patterns from within the practice, but deductive method of teaching support the pronunciation of outlines. By using deductive method of teaching we cannot develop the thinking of the students but in the use of Inductive method of teaching we can develop the thinking and curiosity of the students. Nejla (2000) regarding this research study the main purpose of the investigator was to compare the effectiveness of inductive-

deductive method of teaching on students' chemistry achievement, attitude toward chemistry and academic self-concept. The result of this research study shows that inductive method of teaching play very important role as compared to deductive method regarding students' achievement and attitude.

Zdravko Kurnik (2008) a math teacher need not be a scientist in order to apply the science principles and scientific methods in teaching. This occurs in math teaching without much interference. Solving a math problem implies some research and development and this work can be done by using inductive method. By using inductive method a teacher can create the spirit of curiosity in his students, the inclination for independent mental work and to show them ways to new discoveries. A creative and inductive method user math teacher develops students' creative characteristics. (p. 429)



METHODOLOGY OF THE STUDY

Population of the Study

All elementary school students of D.I.Khan, Khyber Pakhtunkhwa consists of the Population of the research study.

Sample of the Study

Following sample was selected by using simple random sampling technique as a research technique.

1. Five Government elementary Schools D.I.Khan.
2. 30 Students of 8th class were selected for this research study.

Six students were selected from each school on the basis of their past performances. In this research study the students were divided into two groups (control group and experimental group).

Instruments

Following two instruments used in this research work:

- Pre-Test
Pre-test was used to know the performance of experimental group and control group at initially.
- Post-Test
Post-test was used to know the performance of experimental group and control group at the end of experiment.

Procedure of the Study

To analyse the performance of students pre-test was distributed among the students before the experiment. Two equal performance groups of students were selected on pre-test. After checking the performance of students through pre-test, from the text book a sample of two chapters of Mathematics was selected and taught to 8th class students. The control group was taught by deductive method while experimental group was taught by inductive method and both the groups were kept away from each other so, that one could not influence the performance of other. The duration of the classroom teaching was thirty minutes and seven days for whole experiment. Both groups were taught by the same type, qualification and experience of educators. The experimental group was provided inductive method facility while the control group was provided deductive method facility. After that specific period teaching a post test was given to the students. The marks of both tests were arranged and compared by using t-test and coefficient of variation (CV).

Statistical Analysis

To calculate the significant effect of inductive-deductive method of teaching on the academic performance of students, t-test and coefficient of variation (CV) was used.

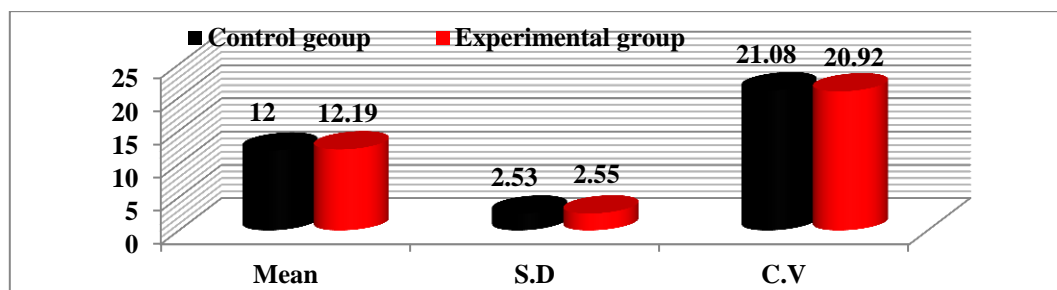
Chaudhary (1996), "Compare the ability of two candidates co-efficient of variation was used" (p.106).

Alam (2000), "Consistency or stability in the variables is used as terms opposite to variation or dispersion i.e. more stable will be the data if it has less variation similarly less stable will be the data if it has more variation". (p.151)

ANALYSIS & INTERPRETATION OF DATA

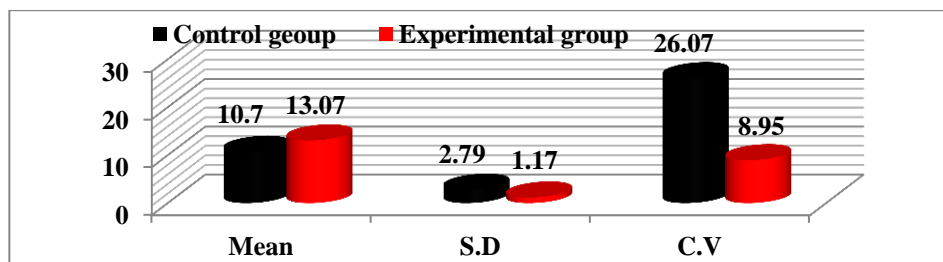
Table#1: Showing the pre-test scores of control and experimental group

Group	n	Mean	S.D	C.V	d.f	Level of Significance(α)	t-tabulated	t-calculated
Control	15	12	2.53	21.08	28	0.05	+2.048	-0.00723
Experimental	15	12.19	2.55	20.92				



Table#2: Showing the post-test scores of control and experimental groups

Group	n	Mean	S.D	C.V	d.f	Level of Significance(α)	t-tabulated	t-calculated
Control	15	10.7	2.79	26.07	28	0.05	+2.048	+3.91
Experimental	15	13.07	1.17	8.95				



RESULTS

Table#1 indicates that the mean of control and experimental group is 12 and 12.19, standard deviation of control and experimental group is 2.53 and 2.55 simultaneously. The t-calculated value -0.00723 is less than the t-tabulated +2.048, so we accept H_0

and conclude that there is no significant difference between the performance of control and experimental group.

Table#2 indicates that the mean of control and experimental group is 10.7 and 13.07, standard deviation of control and experimental group is 2.79 and 1.17 simultaneously. The t-calculated value +3.91 is greater than the t-tabulated +2.048, so we accept H_1 and conclude that there is significant difference between the performance of control and experimental group. The co-efficient of variation (C.V) of controlled and experimental group is 26.07 and 8.95 respectively. Since C.V of experimental group is less than the controlled group so there is consistency in the performance of experimental group.

CONCLUSION OF THE STUDY

In the light of findings it is concluded that there is a difference between the achievement of control and experimental group's students. The students of experimental group were taught by inductive method performed significantly better than the control group in which deductive method was used, so Inductive method is better method than the deductive method for teaching of mathematics at elementary level.

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