EFFECT OF VEDIC MATHEMATICS ON ACHIEVEMENT IN MATHEMATICS OF CLASS-VIII STUDENTS - A STUDY

DISSERTATION
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NCERT

REGIONAL INSTITUTE OF EDUCATION
(National Council of Educational Research & Training)
SHYAMLA HILLS, BHOPAL – 462013, (M.P.)

DECLARATION

I do hereby declare that the dissertation entitled "**Effect of Vedic Mathematics on the Achievement in Mathematics of Class-VIII Students – A Study**" has been carried out by me during the academic year 2012-2013 in partial fulfillment of the requirement for the degree of Master of Education (RIE) of Barkatullah University, Bhopal (Madhya Pradesh).

This study has been conducted under the guidance and supervision of Mr. Sanjay Kumar Pandagale, Assistant Professor, Regional Institute of Education, Bhopal.

I also declare that the research work done by me is original. This dissertation has not been submitted before either by me or by any other, for the award of any degree or Diploma in any University.

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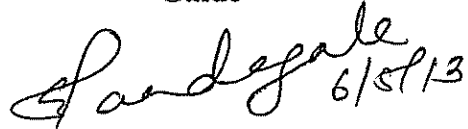
Date: 06/05/2013

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CERTIFICATE

This is to certify that Mr. Vikas Sharma, student of Master of Education (R.I.E) Course of Regional Institute of Education, N.C.E.R.T, Bhopal, for the academic year 2012-2013 has conducted a research work entitled "Effect of Vedic Mathematics on the Achievement in Mathematics of Class-VIII Students – A Study" under my guidance.

This work done by him is original and worthy of presentation in partial fulfillment of the requirement of Degree of Master of Education (R.I.E) of Barkatullah University, Bhopal (M.P.). The present study is outcome of his sincere efforts.

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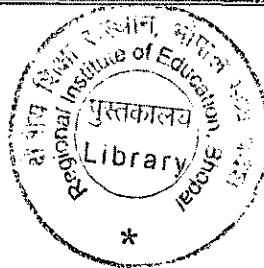
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INTRODUCTION

CHAPTER – 1

INTRODUCTION

1.1 INTRODUCTION

The school is an institution responsible for certain specialized services involved in inducting the young into social life. The school can never transmit the entire intellectual and social heritage. Choices must always be made about the knowledge to be transmitted, the intellectual and practical skills to be developed and the values to be stressed. These choices tend to be made according to values that prevail in society; those values that are dominant will be expressed in choices about purpose and programs of the school.

The school fulfills the educational needs of the community and translates the philosophy of the community into practice by educating the children accordingly. The schools prepare the children for taking up various jobs and services needed by the community and provides the children with new ideas, skills, knowledge of Math's, Science and technology needed for progress of the community.

The education in the school imparted through two subject areas i.e. scholastic subject areas and co-scholastic subject areas education. The scholastic subject area is basically concerned with school subjects. The school subjects consist of Languages, Mathematics, Science and Social Science mainly. Among all the above school subjects Mathematics is an important subject in school curriculum. If any subject area of study evokes wide emotional comment, it is mathematics. For the school going children there is a general opinion in our society that those students who score poor marks in mathematics are dull students, even if they score good marks in other subjects. On the other hand, if a student scores good marks in mathematics and poor marks in other subjects, he/she is considered to be intelligent and bright. That is to say that at school level child's intelligence is judged on the basis of marks obtained in subjects like Mathematics and science.

The Co-scholastic education is basically concerned with the several types of co-curricular activities can be organized in the schools. These co-curricular activities are Literary activities, Musical and Dramatic activities, Games and Physical exercise, Students' council, Social welfare activities, Social service, Scouting and Guiding, Girl

Guide, Junior red cross and First aid, Picnic/ Educational Tours/ Excursions, NCC, School day, Assembly and Exhibition etc. These activities have become more helpful in character building of students.

Regarding importance of Math's Indian Education Commission said-
"Education is science based and Mathematics is language of sciences and in coherence with Indian cultures and values can alone provide the foundation as also the instrument for the nation progress, security and welfare"

In the modern age of science and technology, the role of mathematics is the supreme one. In other branches of science, it is visible to everybody that one goes on changing the theories as discoveries are made one after another. It is not different in mathematics. The moment some findings are put in the form of formulas and sutras, unless the basic assumptions are also explained, one does not get a feeling that everything is perfect and beyond questioning.

Teacher's main job is to teach, there is not a method or methods of teaching Mathematics which could suit all conditions children differ from family to family and from locality to locality even in respect of their mental and physical development. Thus a teaching method is largely governed by these three factors – environment, teacher and pupil.

In the present study the researcher has tried to compare two Approaches of teaching Mathematics i.e. Traditional Approach and Vedic Mathematics approach of Teaching Mathematics.

Traditional method is one of the most popular methods of teaching in our schools. This is a method in which teacher used to solve fundamental operations such as Multiplication, Squaring of a number, cube of a number, square root, division, addition, subtractions, fractions and complex mathematical question in a numerous steps. This method takes a more time and made a fear of mathematics in the mind of the children.

In Vedic mathematics method, 'difficult' problems or huge sums can often be solved immediately. The simplicity of Vedic mathematics means that calculations can be carried out mentally (the methods can also be written down). By this method complex mathematical question which otherwise take numerous steps to solve problems can be solved with the help of few steps and in some cases without any intermediate steps at all and these methods are so simple that even pupil with an average knowledge of mathematics can easily understood them. Once the formula

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(which is called 'sutra' in Vedic Mathematics) is leant, it can be applied to a certain category of problems, such as Multiplication, squaring of a number, cube of a number, division, fractions and so on.

1.1.1 GUIDELINES OF NCF 2005 REGARDING MATHEMATICS EDUCATION

According to the guidelines of NCF 2005, "Developing children's abilities for mathematization is the main goal of mathematics education. The narrow aim of school mathematics is to develop 'useful' capabilities, particularly those relating to numeracy – number operations, measurements, product, and factorization. The higher aim is to develop the child's resources to think and reason mathematically to pursue assumptions to their logical conclusion and to handle abstraction". It includes a way of doing things and the ability and the attitude to formulate and solve problems. The cognitive abilities like open mindedness problem solving and reasoning plays an important role in the mathematics achievement of a student.

Vision for school Mathematics: According to the N.C.F (2005) school mathematics takes place in a situation where-

(i)   Children learn to enjoy mathematics rather than fear it.

(ii)   Children learn important mathematics. Mathematics is more than formulas and mechanical procedures.

(iii)   Mathematics is a part of children's life experience which they talk about.

(iv)   Children pose and solve meaningful problems.

(v)   Children use abstractions to perceive relationships and structure.

(vi)   Children understand the basic structure of mathematics.

(vii)   Teacher expects to engage every child in Class.

Some Problems in School Mathematics Education

(i)   A majority of children have a sense of fear and failure regarding mathematics hence they give up early on, and drop out of serious mathematical learning

(ii)   The curriculum is disappointing not only to this non-participating majority, but also to the talented minority by offering them no challenges.

(iii)   Problems, exercises and methods of evaluation are mechanical and repetitive, with too much emphasis on computation. Areas of mathematics such as spatial thinking are not developed enough in the curriculum.

(iv)   Teacher's lack confidence, preparation and support.

1.1.2   WHAT IS MATHEMATICS?

The term 'Mathematics' may be defined in a number of ways. It is an exact science that is related to measurement, calculation, discovering relationships and dealing with the problems of space. According to New English dictionary, "Mathematics in a strict sense is the abstract science which investigates deductively the conclusions implicit in the elementary conception of spatial and numerical relations". In Hindi we call Mathematics as "*Ganita*" which means the science of calculations. It is systematized, organized and exact branch of science. Mathematics is also called the science of reasoning. According to Locke, **"Mathematics is a way to settle in mind a habitat of reasoning"**.

Mathematics is considered as one of the important subjects in primary school curriculum. It is more closely related to our daily life as compared to other subjects. According to Benjamin Franklin, "What science can there be nobler, more excellent, more useful for men, more admirable, high and demonstrative than that of mathematics" Mathematics is the science of number and space. While, the other has defined it as **"the science of measurement, quantity and magnitude"**. Mathematics, the real sense is a science of space and quantity that helps up in solving the problems of life needing numeration and calculations. Therefore, Mathematics is the **"Queen of all sciences"** and **"Mother of all Technologies"**.

MATHEMATICS = ARITHMATIC + ALGEBRA + GEOMETRY

It is also highlighted in National policy an education (1986) as follows: - "Mathematics should be visualized as the vehicle to train a child to think reason, analyze, and articulate logically. Apart from being a specific subject it should be treated as a concomitant to any subject involving analysis and meaning."

1.1.3   ROLE OF AWARENESS IN MATHEMATICS EDUCATION

What is involved in awareness is not an issue of the degree of human's intelligent or knowledge. Nor it is an issue of the productiveness or success of any particular thinking process. Nor it is an issue of the specific matter with which the mind may be occupied. It is an issue of the basic regularity principle that directs the mind to be occupied. Every person uses mathematics in his/her day to day life. It's awareness that differentiates between a layman's uses of mathematics from a student

studying mathematics. The difference between the student studying mathematics is able to relate the formula's properties and other mathematical terms with his practice, that is to say a mathematics student should be aware of the concepts he is applying to solve the problems. Thus role of awareness cannot be rejected while teaching Mathematics.

1.1.4 ROLE OF APPLICATION IN MATHEMATICS EDUCATION

Some persons believe in that in schools we should do only mathematics and applications of mathematics can be done later. However, application provides a great deal of motivation for learning of Mathematics and historically each topic in school mathematics is developed to meet some needs of society. Impact in mathematics teaching, we should start with some practical problems formulated mathematically and show that we need some mathematics to solve those problems and then develop the necessary mathematics in classroom. This nearly developed mathematics should be used to solve new practical problems, which should require even more mathematics to solve them. This alternate discussion of practical problems, necessary mathematics and again practical problems and necessary mathematics should continue throughout the learning of Mathematics in schools.

1.1.5 WHAT IS VEDIC MATHEMATICS?

Vedic Mathematics is the collective name given to a set of 16 mathematical formulae's discovered by Jagadguru Swami Shri Bharati Krishna Tirthaji Maharaj. Each formula deals with a different branch of Mathematics. These 16 formulae's can be used to solve problems ranging from arithmetic to algebra to geometry conics to calculus. The formulae's are complete by themselves and applicable to virtually any kind of mathematical problems. Complex Mathematical questions which otherwise take numerous steps to solve can be solved with the help of a few steps and in some cases without any intermediate steps at all! And these systems are so simple that even people with an average knowledge of mathematics can easily understood them. Once the formula is leant, it can be applied to a certain category of problems, such as multiplication, square of a number, cube of a number, square root, divisions fractions and so on.

The most striking feature of the Vedic system is its coherence. Instead of a hotchpotch of unrelated techniques the whole system is beautifully interrelated and unified.

In the Vedic system 'difficult' problems or huge sums can often be solved immediately by the Vedic method. These striking and beautiful methods of are just a part of a complete system of mathematics which is for more systematic than the modern 'system'. Vedic mathematics manifests the coherent and unified structure of mathematics and the methods are complementary, direct and easy.

The simplicity of Vedic Mathematics means that calculations can be carried out mentally (Though the methods can also be written down). There are many advantages in using a flexible, mental system. Pupils can invent their own methods; they are not limited to the one 'correct' method. This leads to more creative, interested and intelligent pupils.

Interest in the Vedic system is growing in education where mathematics teachers are looking for something better and finding the Vedic system is the answer. Research is being carried out in many areas including the effects of learning Vedic math on children, developing new, powerful but easy applications of the Vedic sutras in geometry, calculus, computing, etc.

"By doing Vedic maths the speed increases. We are not learning anything new, but we are learning the correct and fast way of doing the things".

But the real beauty and effectiveness of Vedic mathematics cannot be fully appreciated without actually practicing the system. One can then see that it is perhaps the most refined and efficient mathematical system possible.

1.1.6   TYPES OF TECHNIQUES USE IN VEDIC MATHEMATICS

In Vedic Mathematics, there are two types of techniques used to solve problems in a very few steps-

1)   Specific techniques

2)   General techniques.

Specific techniques are those which are fast and effective but can be applied only to a particular combination of numbers.

For example:- The technique of squaring number's ending with 5 is a specific technique because it can be used to square only those numbers that end with 5. It cannot be used to square any other type of number.

General techniques are those which have a wider scope of application than specific techniques because they deal with a wider range of numbers.

For example: - Criss Cross system, vertically and crosswise.

1.1.7   HISTORY OF THE TERM VEDIC MATHEMATICS

Ancient Indian Vedic Civilizations are known for being skilled in geometry, Algebra and computational mathematics complex enough to incorporate things like irrational numbers. Furthermore, all ancient Indian mathematics literature is composed completely inverse, there was a tradition of composing tense sutras, to ensure that information would be preserved even if written records were damaged or last.

The work entitled VEDIC MATHEMATICS or 'Sixteen Simple Mathematical Formulae from the Vedas' was written by His Holiness Jagadguru Sakaracharya Sri Bharati Krishna Tirthaji Maharaja of Govardhana Matha, Puri Orissa (1884-1960). It forms a class by itself not pragmatically conceived worked out as in the case of other scientific works, but the result of the intuitional Visualization of fundamental mathematical truths and principles during the course of eight years of highly concentrated mental endeavor on the part of the author and therefore appropriately given the title of "mental" mathematics appearing more as miracle then the usual approach of hard-baked science.

Swami Bharati Krishna Tirtha had the same Reverential approach towards the Vedas. The question naturally arises as to whether the sutras which form the basis of this treatise exist anywhere in the Vedic Literature as known to us. But this criticism loses all its force if we inform ourselves of the definition of Veda given by Sri Sankaracharya himself as quoted below:

"The very word 'Veda' has this derivational meaning i.e. the fountain head and illimitable store house of all knowledge. This derivation, in effect, means, connotes and implies that the Vedas should contain within themselves all the knowledge needed by mankind relating not only to the so called 'Spiritual' (or other worldly) matters but also to those usually described as purely 'Secular', 'temporal', or 'worldly' and also to the means required by humanity as such for the achievement of all round, complete and perfect success in all conceivable directions and that there can be no adjectival or restrictive epithet calculated (or tending) to limit that knowledge down in any sphere, any direction or any respect whatsoever."

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"In other words, it connotes and implies that our ancient Indian Vedic lare should be all round, complete and perfect and able to throw the fullest necessary light on all matters which any aspiring seeker after knowledge can possibly seek to be enlightened on."

It is important to note that the word 'Vedic' is used as an adjective in connection with the Vedas. We all know that there are four Vedas: Rigveda, Samaveda, Yajurveda and Atharvaveda. Each of these deals with a specific set of subjects. Out of these Vedas, the 'Atharvaveda' dealt with subjects of architecture, engineering and general mathematics. However, according to historians, what we generally call Vedic Mathematics in Parlance with the findings of Swamiji is not mentioned anywhere in the Vedas, not even the Atharvaveda which deals with mathematical subjects. Then, the obvious question arises why is the word Vedic used to describe this discovery when it has no direct relation with the Vedas?

In fact, the use of the word Vedic as an adjective to the systems of Swamiji has aroused a certain amount of controversy. However, the followers and disciples of Swamiji have strong arguments. According to Swamiji, the Word Veda means the fountainhead and illimitable storehouse of all knowledge. This means that the Vedas should have all the knowledge that is needed by a man for his perfect all-round success. Thus, the Word Vedic was used by Swamijis an adjective to his discovery.

It is said that Swamiji discovered these Vedic Formulae between 1911-1918. The discovery of Vedic Mathematics is very intuitive. Swamiji did not discover the formulae of Vedic Mathematics by deduction but he discovered them out of deep meditation in deep silence around the forests of Sringeri for a period of eight years, Where some higher source of intelligence revealed to him these 'Secrets' – Swamiji was a spiritually realized personality and so it was possible for him to gain insights through intuitive revelation. Swamiji also told his disciples that he had reconstructed the Sixteen Formulae from Atharvaveda after tireless research and deep 'tapas'. Thus, whereas one does not find the sutras in the Atharvaveda, they were actually reconstructed on the basis of intuitive revelation from scattered references of some content of the Atharvaveda.

"Mental" mathematics is different from the Orthodox methods of mathematicians all over the world. Arithmetical problems usually solved by 18, 28 on 42 steps in case of such Vulgar fractions as 1/19, 1/29, 1/49 are here solved in one simple line and that is possible to be done even by young boys. The truth of these

methods was demonstrated by this saintly teacher before many University audiences in India and in the U.S.A including learned professors and every one present was struck with their originality and simplicity.

Swami Sankaracharya that the contemplated to over all the different branches of mathematics such as arithmetic, algebra, geometry (plane and solid), trigonometry (plane and spherical), conics - geometrical and analytical, astronomy, calculus - differential and integral etc., with these 16 basic sutras. That comprehensive application of the sutras could not be left by him in writing but if someone has the patience and the genius to pursue the method and implications of these formulae he may probably be able to bring these various branches within the orbit of this original style.

Swamiji had written 16 manuscripts and each manuscript dealt with each of the sixteen sutras. These manuscripts were kept by him at the place of one of his disciples. However, the manuscripts were lost from their place of deposit. There was no other written evidence of the sutras apart from the lost manuscripts. Swamiji was not much disturbed at the loss and said that he could rewrite the whole Chunk of research again out of his memory.

In 1957, Swamiji wrote an introductory Volume to the sixteen sutras. He planned to write further volumes but he subsequently developed cataract in both eyes and his failing health did not allow him to fulfill his plans. As time passed, his health continued to deteriorate, and in 1960 he achieved 'mahasamadhi'.

Thus, because of the loss of the manuscripts the world was bereft of great knowledge which it would have otherwise greatly cherished. What Swamiji has left behind (in comparison to his research) is just the tip of the iceberg. He created the manuscript of his introductory work around 1958 in the USA and his introductory work has scattered references to the Sixteen Sutras and Sub Sutras.

Whatever little matter of Vedic Mathematics is available to us today is of such quality and genius that it has taken the world by storm, and people have literally been be wildered by the workings of the techniques. One can only wonder what would have happened to the mathematical world if his complete works were accessible to us.

1.1.8 SCIENCE OF LEARNING VEDIC MATHEMATICS

The 'science of learning Vedic Mathematics', as such is a distinct discipline, as it takes care of learning as a system inherently embedded into the creation process

itself. Vedic Mathematics as a system is of self referral features, as much as that it sequentially unfolds at its every Organization setup. This feature when followed chasing the working rules of Ganita Sutras will cover 'Science of Learning' being its inherent feature because of which it is to ensure the desired degree of perfection of intelligence for the minds being through the processes of the system of Ganita Sutras. As such, the science of learning is taken as running parallel to the sequence and order of the individual sutras (including Ganita of sutras).

With this, the beginning and starting point of science of learning is to be taken as beginning and starting of the Vedic mathematics system with first sutra, namely, Ganita Sutra - 1 'Ekadhikena Purvena'/ 'one more than before' and, it to be availed for approaching set up of the cube to initiate the process for perfection of Intelligence. Therefore, the comprehension and understanding of Ganita Sutra-1, is to be perfect, as it is in terms of its comprehension and understanding as that the index of attainments of the learning is to be ultimately charted. The 'Ganita Sutra-1' in fact is, like the article 1 is a 'full scripture' in itself.

The chase of whole range of Ganita Sutra-1 to 16, and also of Ganita Upsutra-1 to 13 may be chased in terms of the functional format of Ganita Sutra 1 itself, as the source sutra of Vedic mathematics system. As such, the focus of science of learning as well as of actual learning, and attainments of learning, is to be upon Ganita Sutra-1 is the source ordering principle which is to supply the basics, basis of basics, as well as the first principle for chase of basics on their basis. This chase of basics, basis of basics and first principle in terms of the ordering principle of Ganita sutras as sequential steps, of 'one more than before', is to, first take through the set up of linear order of 3-space/ cube.

This attainment of coverage of the domain of 3-space as linear order, at very next step of manifestation shall be taking from the linear order to the spatial order in terms of the ordering Principles of Ganita Sutra-1 as being 'one more than before'. This reaching at spatial order, in fact would amount to having transition from the linear order setup of a 30 space, and same shall be attaining 4-space as of spatial order.

This is as such, would mean transcending from 'the sensory domain' as attaining 'the intelligence field'.

It is this attainment, inherently imbedded in the process of learning, which is of a central focus. The young minds are to be constantly reminded about this feature

of science of learning as a process of learning inherently imbedded into the steps of actual learning in terms of the ordering principle of Ganita Sutras lively within the basics process of ordering while 'Counting'.

Accordingly, the science of learning which is to formally begin with skill of 'counting', the same also is to end with the values of counts as a process of ordering as a format. So the beginning, as well as the end of science of learning be taken being available at the same 'meant' as that the whole range in between as well silently gets manifested at the same value 'meant'.'

1.1.9 IMPORTANCE OF VEDIC MATHEMATICS:

Vedic mathematics deals with various Vedic mathematical formulae and their application for carrying out tedious and cumbersome arithmetic operations, and to a large extent, executing them mentally a regular practice of the multiple choice Vedic Ganit system shall help in the following ways:-

(i) The Sutras (aphorisms) apply to and cover each and every part of each and every branch of mathematics. In fact there is no part of mathematics, pure or applied, which is beyond their jurisdiction;

(ii) The Sutras are easy to understand, easy to apply and easy to remember; and the whole work can be truthfully summarized in one word "mental"!

(iii) Even as regards complex problems involving a good number of mathematical operations (consecutively or even simultaneously to be performed), the time taken by the Vedic method will be a third, a fourth, a tenth or even a much smaller fraction of the time required according to modern (i.e. current) Western methods;

(iv) And, in some very important and striking cases, sums requiring 30, 50, 100 or even more numerous and cumbrous "steps" of working (according to the current western methods) can be conserved in a single and simple step of work by the Vedic Method! And little children (of only 10 or 12 years of age) merely look at the sums written on the blackboard (on the platform) and immediately shout out and dictate the answers from the body of the convocation hall (or other venue of the demonstration). And this is because, as a matter of fact, each digit automatically yields its predecessor and its successor! And the children have merely to go on tossing off (or reeling off)

the digits one after another (forwards or backwards) by mere mental arithmetic (without needing pen or pencil, paper or slate etc.)

"THINK WITHOUT INK"

R. VENKATARAMAN

(v)   On seeing this kind of work actually being performed by the little children, doctors, professors and other "big-guns" of mathematics are wonder struck and exclaim: - "Is this mathematics or magic"? And we invariably answer and say: "It is both. It is magic until you understand it; and it is mathematics thereafter"; and then we proceed to substantiate and prove the correctness of this reply of ours! And

(vi) As regards the time required by the students for mastering the whole course of Vedic mathematics as applied to all its branches, we need merely state from our actual experience that 8 months (or 12 months) at an average rate of 2 or 3 hours per day should for completing the whole course of mathematical studies on this Vedic lines instead of 15 or 20 years required according to the existing systems of the Indian and also of foreign Universities.

1.1.10 CLASSIFICATION OF VEDIC MATHEMATICS

1)   With regard to every subject dealt with in the Vedic Mathematical Sutras, the rule generally holds good that the Sutras have always provided for what may be termed the 'General Case' (by means of simple processes which can be easily and readily - nay, instantaneously applied to any and every question which can possibly arise under any particular heading.

2)   But, at the same time, we often come across special cases which, although classifiable under the general heading in question, yet present certain additional and typical characteristics which render them still easier to solve. And, therefore, special provision is found to have been made for such special cases by means of special sutras, sub-sutras, corollaries etc., relating and applicable to those particular types alone.

3)   And all that the student of these Sutras has to do is to look for the special characteristics in question, recognize the particular type before him and determine and apply the special formula prescribed therefore.

4)   And, generally speaking it is only in case no special case is involved, that the general formula has to be restarted to. And this process is naturally a little

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longer. But it need hardly be pointed out that, even then, the longest of the methods according to the Vedic system comes nowhere (in respect of length, cumbrousness and tediousness etc.) near the corresponding process according to the system now current everywhere.

5) For instance, the conversion of a vulgar fraction (say 1/19 or 1/29 or 1/49 etc.) to its equivalent recurring decimal shape involves 18 or 28 or 42 or more steps of cumbrous working (according to the current system) but requires only one single and simple step of mental working (according to the Vedic Sutras)!

6) This is not at all. There are still other methods and processes (in the latter system) whereby even that very small (mental) working can be rendered shorter still! This and herein is the beatific beauty of the whole scheme.

7) To start with, we should naturally have liked to begin this explanatory and illustrative exposition with a few processes in arithmetical computations relating to multiplications and divisions of huge numbers by big multipliers and big divisors respectively and then go on to other branches of mathematical calculation.

8) But, as we have just herein above referred to a particular but wonderful type of mathematical work wherein 18, 28, 42 or even more steps of working can be condensed into a single-step answer which can be written down immediately (by means of what we have been describing as straight, single-line, mental arithmetic); and, as this statement must naturally have aroused intense eagerness and curiosity in the minds of the students (and the teachers too) and especially as the process is based on elementary and basic fundamental principles and requires no previous knowledge of any thing in the nature of an indispensable and inescapable pre-requisite chapter, subject and so on, we are beginning this exposition here with an easy explanation and a simple elucidation of that particular illustrative specimen.

9) And then we shall take up the other various parts, one by one of the various branches of mathematical computation and hope to throw sufficient light thereon to enable the students to make their own comparison and contrast and arrive at correct conclusions on all the various points dealt with.

1.1.11 ADVANTAGES OF VEDIC MATHEMATICS

Vedic Mathematics has become so popular and is rated so high by the users abroad by the following advantages:-

1) It is very original, totally unconventional and provides a new thinking and approach to mathematics that is so powerful, yet simple and fun to work with.

2) Its word-formulas lead to efficient and super fast calculations.

3) It encourages mental calculations since it handles the numbers involved digit by digit of small magnitudes.

4) It is easy, simple, direct and straight forward. The students are freed from committing to memory the multiplication tables and the like. They are enthusiastic in learning these methods and eagerly look forward to the mathematics classes. They also enjoy sharing their new-found knowledge with others.

5) Everyone laws variety and Vedic mathematics offers it in ample measure.

6) It is very comprehensive and is based on pattern recognition.

7) It is exceedingly flexible and offers a large number of alternatives for almost every kind of problem. It is this aspect that captivates t6he students and others the most. The weaker students gain mastery of the subject slowly and steadily by taking advantage of the flexibility and availability of alternatives for a given problem; in contrast, presently available blanket methods provide only two options: "to learn them or leave them" on the other hand, the bright students take full advantage of the flexibility by learning to be creative and challenge full in choosing the most appropriate and time-saving method that is consistent with the underlying pattern of a given problem.

8) Finally, all areas of modern mathematics, be it pure or applied, come under the scope of Vedic mathematics. This is because it provides a unified approach to different areas of mathematics by the application of the same word-formulas to diverse fields like trigonometry, analytical geometry, calculus, differential equations and so on. The present day researchers in Vedic mathematics have confirmed the enormous versatility that it has in this respect. The spin-off of this extendibility is that students who have been trained in the application of Vedic mathematics to arithmetic can easily move over to college and higher mathematics deriving the same benefits as they did in the case of arithmetic.

1.1.12 FUNDAMENTAL OPERATIONS

The process by which we connect one type of thing to another is known as operation. Thus process of carrying out rules of procedures, such as Addition, Subtraction, Multiplication and Division is termed as operations in Mathematics. The fundamental operations of arithmetic are Addition, Multiplication, Division, Subtraction and their inverses.

1.1.13 VEDIC SUTRAS USED

In Vedic mathematics, there are 16 Sutras was presented by Swami Bharti Krishna Tirthaji. But researcher has chosen 6 Sutra's for his study. These 6 Sutra's are present in the M.P. textbook syllabus of mathematics and teachers taught by both Vedic as well as traditional method. So, the researcher has chosen a CBSE school i.e. K.V. Ratlam (M.P.) where, the teachers are taught students only in traditional method. There are no Vedic sutras in the CBSE syllabus and the researcher has chosen K.V. Ratlam (M.P.) CBSE School to determine the "effect of Vedic mathematics on the achievement in mathematics of Class-VIII Students". The introductions of these 6 Vedic sutras are given below:-

[A]   **Square and Square Root.**

1)   Eknyunen Purven: It is used to find squares of the numbers formed by 9 as 9, 99, 999... etc.

Procedure: -   (a)   Left part of the answer one less than from the given number.

(b)   Right part of the answer one less preceding of given no. is subtracted from given number.

2)   Ekadhiken Purven: - It is used to find square of the numbers having 5 in one's place.

Procedure: -   (a)   Left part of the answer Ten's digit x one more than ten's digit.

(b)   Right part of the answer one's digit x one's digit

[B]   **Cube and Cube Root.**

(a)   Aanurupay Method: It is used to find cube of two digit number.

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Procedure: (a) Let $x = ab$, where, a is the ten's digit and b is one's digit of x. We shall form four Columns to find $(a\ b)^3$

(b) These four columns we put one's digit & add ten's and other digits in the next column.

(b) Nikhilam Sutra: It is used to find out cube of those numbers which are nearer the base 10, 100, 1000... etc.

Procedure: (a) Right part $= (\text{deviation})^3$

(b) Middle part $= 3 \times (\text{deviation})^2 \times$ carried over digit

(c) Left part $=$ No. x 2 x deviation x carried over digit.

[C] Algebraic Identities

(a) Urdhavtriyak Sutra: The algebraic expressions can easily be multiplied by using Urdhavtriyak surtra.

Procedure: a) Solution left to right vertical multiplication.

b) Left part of the product/ multiplication middle part of the product vertical multiplication.

c) Right part of the product.

(b) Adyan Ayden Antyam Antyen: It is used to find out the product of Trinomials.

Procedure: (a) Last by last (Division)

(b) First by first (Division)

1.2 NEED AND SIGNIFICANCE OF THE STUDY

In today's concern teaching is child centered as to minimize the gap between student and the teacher adopting different methods of teaching according to the child's style of learning improves the teaching learning process and also gives us chance for the better communication with the child. All the activities in approach are in accordance with the need of the student so it makes teaching as well as learning interesting for the child and a teacher.

The teaching of Vedic Mathematics should enhance the child's resources to think and reason, to visualize and handle abstractions, to formulate and solve problems.

The simplicity of Vedic mathematics means that calculations can be carried out mentally (though the methods can also be written down).Students use calculators or cell phones for the multiplication of two or more than two digit numbers. Usually they commit mistakes in these simple calculations and loose marks and finally develop a feeling that mathematics is tuff. Vedic mathematics sutras provides simple pattern for mental calculations. If the students learn and practice these sutras they develop interest in mathematics as mathematics governs life.

Many researchers have been done concerning pupil's achievement and performance but very few researches have been done regarding Vedic mathematics approach, and achievements in mathematics subject and this made researcher to take up the present research study.

1.3   STATEMENT OF THE PROBLEM

EFFECT OF VEDIC MATHEMATICS ON ACHIEVEMENT IN MATHEMATICS OF CLASS- VIII STUDENTS - A STUDY

1.4   OPERATIONAL DEFINITIONS OF THE KEY TERMS

Before proceeding further in any research the researcher should have a clear understanding about the problem. The terms, such as, Traditional approach of teaching, Vedic mathematic approach of teaching, Achievement in mathematics needs to be explained in the present study. This may results in an ambiguous understanding of the terms. Therefore to overcome this problem the researcher made an attempt to define the terms operationally so as to avoid confusion. In this study the researcher has given the understanding of the terms.

1.4.1   TRADITIONAL APPROACH OF TEACHING

Methods and techniques of teaching as auto merrily used by teachers in day to day teaching learning process can be called as traditional approach of teaching.

1.4.2 VEDIC MATHEMATICS APPROACH OF TEACHING

By doing Vedic Mathematics the speed increases. Learner are not learning any new thing, but learning the correct and fast way of doing the mathematical problems or huge sums.

1.4.3 ACHIEVEMENT IN MATHEMATICS

In this study the mathematics achievement is operationally defined as the score obtained by the students on the mathematics achievement test developed by the Investigator.

1.5 OBJECTIVES OF THE STUDY

1. To study the present achievement in mathematics of Class-VIII students of control group and experimental group.
2. To study the achievement in mathematics of Class-VIII students of control group taught by Traditional method.
3. To study the achievement in mathematics of Class-VIII students of Experimental group taught by Vedic mathematics method.
4. To study the effect of Vedic mathematics on achievement in mathematics of Class- VIII students.
5. To study the effect of Vedic mathematics on speed to solve mathematical problems of Class- VIII students.
6. To study the effect of Vedic mathematics on accuracy to solve mathematical problems of Class-VIII students.

1.6 HYPOTHESIS OF THE STUDY

1. There is no significant difference in the achievement of Class-VIII students of control group and experimental group.
2. There is no significant difference in the achievement of pre-test and post-test of Class-VIII students taught by Traditional method.
3. There is no significant difference in achievement of pre-test and post-test of Class-VIII students taught by Vedic Mathematics method.
4. There is no significant difference between achievement in mathematics of Class- VIII students taught by Traditional method and Vedic Mathematics method.

5. There is no significant difference between achievement in mathematics of Class- VIII students taught by Traditional method and Vedic Mathematics method in terms of speed.

6. There is no significant difference between achievement in mathematics of Class- VIII students taught by Traditional method and Vedic Mathematics method in terms of accuracy.

1.7 DELIMITATIONS OF THE STUDY

1) The study is delimited to Ratlam district of Madhya Pradesh State only.

2) The study is delimited to English Medium School only.

3) It is further delimited to students studying in VIII Std. only.

4) The study is delimited to the school affiliated to Central Board of Secondary Education.

5) This study delimited to the mathematics content only.

6) The study is delimited to one school only.

Summary

In the present chapter we have discussed about the introductory part of the proposed study which includes Introduction, Guidelines of NCF 2005 for mathematics education, what is mathematics, Role of awareness in mathematics education, Role of application in mathematics education, What is Vedic mathematics, Types of Techniques used in Vedic mathematics, History of the term Vedic Mathematics, Science of learning Vedic mathematics, Importance of Vedic mathematics, Classification of Vedic mathematics, Advantages of Vedic mathematics, Fundamental operations, Vedic Sutras used, Need and significance of the study, Statement of the problem, Operational definitions of the key terms, Objectives of the study, Hypothesis of the study, Delimitations of the study.

In the next chapter i.e. Review of Related literature, we are going to deal with different reviews of related literature concerning to the present research study.

CHAPTER – II

REVIEW
OF
RELATED LITEREATURE

CHAPTER – 2
REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

The review of related literature is an important part of the scientific approach and is carried out in all areas of scientific research whether in the physical nature or social sciences. In the field such as History, the review of literature only gives the scholar an understanding of previous work that has been done, but the results of review actually provides the data used in his/her research.

The review of the literature in educational research provides us with the means of getting the frontier in our particular field of knowledge. Until we have learned what others have done and what remains still to be done in our area, we cannot develop a research project that will contribute further exposure in our field. Thus the literature in any field forms the foundation upon which all future work must be built.

Therefore, the purpose of the reviewing of literature is to build up the context and background as well as provide a basis for formulation of hypothesis/ research questions since a good research is based upon the relevant evidences that are known in the area of research for comprehensiveness It is essential that the new work will be based and built on what has already been accomplished.

The review of research literature helps the researcher to delimit and define his/her problem duplicating well established findings. It gives the investigator an insight into the problem and research methodology.

2.2 RELATED STUDIES

The researcher gone through a number of research studies and found that very less studies were done an effect of Vedic mathematics. However, some studies were conducted to find out the effect of Vedic mathematics an achievement in mathematics of students and therefore an attempt is made to compile the researches related to the effect of Vedic mathematics an achievement in mathematics of students at doctoral & institutional level in the country.

2.3 REVIEW OF RELATED LITTERATURE

o **Agrawala, V.S. (1992)** Conducted a study entitled, Effectiveness of Vedic mathematics in the teaching of mathematics, Ph.D. (Edu.) New Delhi.

The main purpose of the study was to adopt the techniques of Vedic mathematics in the teaching of mathematics and also to analyze the reaction of pupils to the Vedic mathematics approach.

Objectives of the Study Were:

1. To study the influence of Vedic mathematics approach an children memorization.
2. To make the teacher aware of the new method.
3. To study the effect of Vedic mathematics approach on student's achievement.
4. To study the comparison of Vedic mathematics method and traditional method.

Major Finding of the Study Were:

1. There was a significant difference among the different strategy means the criterion on overall achievement. It was found that on the criterion of overall achievement the Vedic mathematics approach was better than the traditional approach. The Vedic mathematics method made easy than the traditional method of mathematics.
2. The difference between the two means of the experimental and control group was found to be significant at .01 levels.
3. Analysis of student's reaction towards the new approach indicates that students welcomed the new approach.

o **Dutta, (2002),** A study of the Relationship between Vedic mathematics medium of teaching and Achievement of students.

Objectives of the Study Were:

1. To find out the mean achievement of students taught by the Vedic mathematics method and traditional method.
2. To identify the degree of relationship between the Vedic mathematics approach of teaching and achievement of students.

Major Findings of the Study Were:

1. The students taught by the Vedic mathematics performed better as compare to the students taught by traditional method.

2. The correlation co-efficient between their scores in Vedic mathematics and Traditional method were significant.

3. The obtained Value of Correlation Co-efficient for Vedic mathematics students of the two different batches was significant.

4. For the4 Traditional method it was not significant.

- **Gupta, Atul (2004)**, To find out the effectiveness of Vedic mathematics Learning.

Objectives of the Study Were:

1. To make the teacher aware of the new method.

2. To study the feasibility of the Vedic mathematics teaching in terms of time and speed for the students.

Major Findings of the Study Were:

1. Vedic mathematics learning worked better than the conventional method of teaching mathematics.

2. Most of the students liked to work by this method.

3. Teacher were benefited by this method because the could get a picture of micro analysis of the subject.

- **Trivedi, S.M. (1965)**, Development and try out of Vedic learning sutra's on mathematics education for the students of Class-VIII.

Objectives of the Study Were:

1. To develop Vedic mathematics learning sutras on mathematics education for the students of Class-VIII.

2. To find out the effectiveness of the Vedic mathematics.

3. To assess the opinion of students about Vedic mathematics.

Major Findings of the Study Were:

1. Study of Vedic mathematics sutra's and formulas could bring tangible changes in student's knowledge.

2. Opinions of the participants regarding the quality of the mathematics were positive.

- **O.P. Sahwney (2005)** Conducted free Vedic mathematics classes for two weeks at the habitat learning centre. The students were given individual attention and

were also evaluated on the basis of their performance. He found that the students feel thrilled to know the time saving devices and have started preferring the Vedic way for solving the sums involving big numbers and checking the corrections of the answers within a couple of seconds.

- **Dr. Ramesh Kallure (2011)** conducted a study & found that Vedic mathematics offers an entirely different approach to mathematics. It can help overcome "Math anxiety" being faced by many kinds today.

- **Dr. S.C. Sharma (2009)** Ex. Head of Dep't. of Mathematics NCERT. Conducted a Study & found that Vedic mathematics sutra's are used to solve problems in a short time and in short space and they are interesting & encourage a young mind for learning mathematics as it will not be a bugbear to him.

- **K.V. Sudhakar (2008)** conducted a Study and found that Vedic mathematics does not just deal with numbers, but also with advanced mathematical theories, including calculus, solving differentiation and integration problems is child's play using Vedic mathematics.

- **Dutta (2003)** conducted a Study to find the effect of gender on mathematics achievement and the finding was that in rural areas, the performance of boys was better than girls. Further,, when he compared overall performance (both urban and rural) again boys surpassed girls in mathematics achievement.

- **Kaur, Sharma (2011)** Conducted a research to study the effect of abacus techniques on achievement in mathematics. On the sample of 120 students (60 boys and 60 girls) of grade VIII. The hypothesis of the study was. There is no significant effect of gender, intelligent & there interaction on achievement in mathematics of students of experimental group and found that gender has do not differ significantly. The achievement scores of boys & girls of different schools of experimental group show that gender has no significant effect on the achievement in mathematics of students.

Mathematics Achievements

Achievement in Mathematics has been studied in relation to a number of variables, both cognitive and affective. Studies in the past decade have confirmed that intelligence and socio-economic background are major contributors to mathematics

achievement. Language mastery was an important factor in the acquisition of concepts in Mathematics.

1.   Vyas, C.S.

"Development of Symbol Picture Logic Programme and to Study   its   Effect on Mathematics Achievement - A System Approach."

Objectives:

1. To develop a symbol picture logic programme (SPLP) on the basis of the fundamentals of symbolic logic.
2. To study the effectiveness of the SPLP on the achievement in Mathematics.
3. To identify the effect of the SPLP in the context of variables like intelligence and syllogistic reasoning ability.
4. To find the effectiveness of the SPLP in the context of other variables like parent education, sex and the choice of Mathematics course at the S.S.C. level.

Major Findings:

1) The students of the experimental group who were given a treatment of the SPLP showed better achievement in Mathematics than the control group students.

2) The students with high intelligence benefited more by the SPLP by better achievement in Mathematics than those who possessed low intelligence.

3) The student possessing high reasoning ability benefited more by the SPLP by better achievement in Mathematics than those who possessed low reasoning ability.

4) There was no interaction between the programme (treatment) and intelligence.

5) There was no interaction between the programme and syllogistic reasoning ability.

6) There was no interaction effect of intelligence and syllogistic reasoning ability of the students.

7) There was no interaction among the programme, intelligence and syllogistic reasoning ability.   This shows that achievement in Mathematics was independent of these three variables.

8) The students of control group possessing low general ability and low syllogistic reasoning were inferior to the students of the rest of the group.

9) The students of the experimental group possessing high intelligence and high reasoning did better in achievement in Mathematics than the student of control group possessing low intelligence and low reasoning ability.

10) There was no significant mean difference in achievement in mathematics of students whose parents' education was high and those whose parent's education was low.

11) There was no interaction effect between the programme and parents' education.

12) The students choosing higher Mathematics achievement after taking the SPLP than the students who chose commercial arithmetic.

13) There was no interaction between the programme and the choice of course.

14) There was no significant difference between the means of achievement in Mathematics of boys and girls taking the SPLP, and also there was no significant difference between the means of achievement in Mathematics of boys and girls who did not take the SPLP.

2. Rangapa, K.T.

"The relationship between Self-concept, Reading Ability and Achievement in Mathematics." (1992)

Objectives:

1) To study self-concept and reading ability in relation to achievement in Mathematics of students of standard VII.

2) To identify the gender and local difference in the achievement in Mathematics of study.

Major Findings:

1) There was no significant difference in the achievement of students having different levels of self-concept.

2) There was significant difference in the achievement in mathematics of students having different levels of reading ability.

3) There was a significant difference in the performance of the students of Std. VII in Mathematics studying in rural and urban schools.

4) There was no significant difference between boys and girls of Std. VII in their achievement in Mathematics.

5) There was a significant interaction of self-concept and reading ability on achievement of students.

3. Singh, R.D. and Verma, S.C.

"Study the attitude towards Mathematics as a function of intelligence." (1992).

Objectives:

1) To study the attitude towards Mathematics as a function of intelligence.

2) To study the attitude towards Mathematics as a function of sex and age.

3) To study the attitude towards Mathematics as a function of age.

Major Findings:

1) The students of high intelligence had a more favorable attitude towards Mathematics than the students of low intelligence.

2) Attitude towards Mathematics was independent of sex.

3) Students of the age 13+ showed a more favorable attitude towards Mathematics in comparison to students of the 14+ and 15+ age.

4. Panchalingappa, Shahpur Nagapapa:

"An Investigation into the Causes of under achievement in Secondary School Mathematics/" (Ph.D.) (1995)

Objectives:

1) To identify the causes of underachievement in secondary school Mathematics.

2) To offer suggestions for the improvement of achievement of underachievers in Mathematics in the light of identified causes of underachievers..

Major Findings:

1) It is found that poor attitude towards mathematics is the cause of underachievement in Mathematics Higher general anxiety and examination anxiety is the cause of underachievement in Mathematics.

2) Lack of educational adjustment, poor study habits and low achievement motivation are also contributed to underachievement in Mathematics.

5. Chakrabarti, Bhupal Prasad:

"A Study of Performance of Students in Mathematics Through the use of 'Comprehension Type Test' (CTT)"

Objectives:

1) To examine the impact of Comprehension Type Test (CTT) in gradual improvement of Mathematical performances of the students in different classes.

2) To examine whether the 'CTT' helps the students in answering the traditional questions.

Major Findings:

1) It was found that the comprehension ability increases with the age.

2) The students of both the genders and grades scored high in traditional test as compared to CTT, because of their acquaintance with the nature of traditional test.

3) It was revealed that the frequent use of CTT in Mathematics could foster the ability of comprehension in Mathematics.

2.4 CONCLUSION OF REVIEW OF RELATED LITERATURE

By studying the above researches it gets clear that though studies have been conducted in the field of mathematics especially at elementary level in a broad sense. Whatever research has been done is not directly related with the present study. There are many researchers which have been conducted to see the effect of different teaching methodology on the achievement of the students, but no research study has been done relating to teaching methodology and achievement. Hence above mentioned researches are the bases for the present study.

In the present Chapter we have discussed about the very important part of the research i.e. Review of related literature. In this chapter many reviews have been given which are directly or indirectly related to present research study. In next chapter we will discuss about the methodology which is followed for carrying out the present research study.

CHAPTER – III

METHODOLOGY

CHAPTER - 3
METHODOLOGY

3.1 INTRODUCTION

The purpose of the educational research cannot be completed without detailed design of investigation. Research methodology involves systematic procedures by which the researcher starts from initial identification of the problem to its final conclusion. The role of methodology is to carry on the research work in scientific and valid manner. This chapter deals with the method employed to achieve the objective of the study.

In this chapter the methodology steps such as selection of the sample, variable of the study design of the study, administration of tool and statistical techniques used for the data analysis have been discussed.

On the basis of research findings certain generation can be made which will provide insight towards the study effect of Vedic mathematics approach of teaching on mathematics achievement of the students.

This chapter deals with the methodology to achieve the objectives of the study mentioned in the chapter one keeping in view the nature and objectives of the study appropriate sample was selected and tools were developed or adopted.

The purpose of educational research cannot be completed without a detailed design of investigation. Research methodology involves a systematic procedure which starts from the identification of problem to analyzing the obtained data.

This Chapter deals with:-

1. Research Design
2. Population
3. Sample
4. Variables
5. Tools
6. Administration of Tools
7. Scoring
8. Statistical Techniques

3.2 RESEARCH DESIGN

The research design is the detailed plan of an investigation. In fact it is the blue print of the detailed procedure of testing the hypothesis and analyzing the obtained data. The research design may be defined as a sequence of those steps taken ahead of the time to ensure that the relevant data permits objective analysis of the different hypothesis formulated with respect to the research problem.

Research design refers to the systematic scheduling of the time in which treatment is administered to the students and at which observations are made on the performance of the subject. This careful scheduling of the treatment and observation will be very helpful in reducing the threats to the internal validity of the research.

3.3 DESIGN OF THE STUDY

The design followed for the present study is experimental two group post test design. The input given to both the groups were the two approaches of teaching mathematics. The investigator used post test design for control and experimental group to find out the effect of Vedic mathematics approach on achievement of VIII grade students.

Two groups of the students were equated on the basis of their academic achievement marks. One of the group called the experimental group was exposed to the Vedic mathematic approach of teaching and another group called control group was exposed to the Traditional approach of teaching mathematics. The post test had taken to see the achievement of the students taught by two different approaches of teaching mathematics. The whole procedure of the research design is shown in the figure.
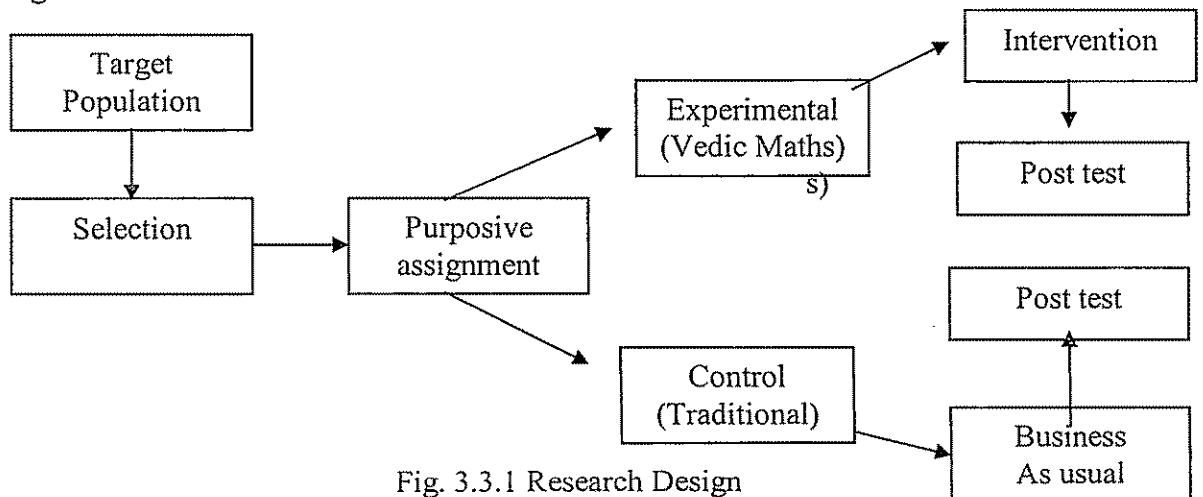

Fig. 3.3.1 Research Design

The research design is further explained in the table 3.3.2

Characteristics	Control Group	Experimental group
Treatment	Traditional Approach of Teaching	Vedic Mathematics Approach of teaching
Terminal status	Post Test	Post Test

According to Borg and Gall (1983) – "Research design refers to procedure used by the researcher to explore relationship between variable to form subject into groups, administer the measure apply treatment conditions and analyze the data".

3.4 POPULATION

Population or universe means the entire mass of observations which is the parent group from which a sample is to be formed. In the study the students of Class-VIII of two sections of Kendrya Vidhyalaya of Ratlam district forms the population.

Population of the Study:-   Class-VIII ('B' & 'C')

Name of the School:- Kendriya Vidhyalaya Ratlam (M.P.)

3.5 SAMPLE

Most of the educational phenomena consist of large number of units. It would be impractical to observe each unit of the population under controlled conditions in order to arrive at principle having universal validity. Some population is so large that their study would be expensive in terms of time, money effect and Man power. Sampling is a process by which a relatively small number of individual objects of events are selected in order to find out something about entire population from which it was selection.

An appropriately chosen sample size enhances the reliability and validity of the research findings. Commonly used sampling techniques are random sampling, stratified sampling and purposive sampling.

For conducting the present research study keeping in a view the limitation and resources available with the researcher the method of purposive sampling has been used for sample selection. In purpose sampling we sample with a purpose in mind. That is, we have certain predefined group(s) in mind and attempt is made to seek members of this group to be included in the sample.

Purposive sampling can be very useful for situations where you need to reach a targeted sample quickly. Purposive sampling allows the researcher to select those

participants who will provide the richest information, those who are the most interesting, and those who manifest the characteristics of most interest to the researcher.

Sample of the study is drawn from one school that is:-

Kendriya Vidhyalaya School, Ratlam (M.P.)

Preliminary samples of 82 Students of two sections of Class-VIII (i.e. 'B' & 'C') were obtained to which tools were administered.

Details of the Sample

Group	Boys	Girls	Total
Experimental	25	16	41
Control	23	18	41
Total:-	**48**	**34**	**82**

3.6   VARIABLES

A variable is something that varies. It is a property that takes in different values. Variables are the conditions or characteristics that the researcher manipulates, control or observes. There are following two types of variables.

Independent Variable

The independent variables are the conditions or the characterization that the researcher manipulates, controls and observes. The independent variables in the present study are the two different approaches of teaching Mathematics. i.e. Vedic Mathematic Approach and Traditional Approach. The Experimental group was taught by Vedic mathematics Approach and the control group was taught by the Traditional approach of teaching.

Dependent Variable

The dependent variable is the conditions or characteristics that appear or change as the experimenter removes or change the independent variables. The dependent variable in the present study is Achievement in mathematics.

3.7   TOOLS USED

Tool is device through which data is collected. It is always better to use standardized tools or instruments because their reliability and validity is established by the test makers in order to find a suitable standardized achievement test. Various

books were searched, but no suitable achievement tests but they could not be used for the purpose of this research. In addition to books other standardized achievement tests were also examined and were found unsuitable for this study. Therefore, the researcher decided to develop a tool in accordance with the needs of this study. So, self-constructed achievement test was used.

For the study "Effect of Vedic Mathematics on achievement in mathematics of Class-VIII standard students – A Study", the following tools were developed by the Investigator himself and then administered on students of Class-VIII ('B' & 'C') of the selected sample.

Pre-test:- To determine the previous knowledge of students based on computation and numeracy.

Post-test:- To determine the achievement of students in mathematics based on computation and numeracy by using Traditional approach & Vedic mathematics approach.

Table Showing the details of Pre-test and Post-test:

S. No.	School	Pre-test	Classes	Post-test
1.	K.V. School, Ratlam (M.P.)	16/01/2013	17/01/2013 to 23/01/2013	24/01/2013

3.7.1 MATHEMATICS ACHIEVEMENT TEST

(i)   Construction of tools (Traditional Method)

For Pre-test and Post-test.

Achievement test in mathematics consisted of following lessons:-

(i)   Square and Square root

(ii)   Cube and cube root

(iii)   Algebraic Identities

In the first draft the researcher constructed the items. These were given to two teachers who were teaching mathematics to Class-VIII in the school. The two teachers suggested certain modification to the constructed tool which in turn discussed with the supervisor.

On the basis of suggestion it was reconstructed by making suggested modification. Hence the modified version contained 17 items. The time limit was 1 hour. The final format of the achievement test consisted of Choose the correct option, Fill in the blanks, Solve the following (very short), Solve the following (short) and Solve the following (long answer type).

Tool Description

S. No.	Name of the Section	No. of questions	Marks
1.	Multiple Choice Question	05	10
2.	Fill in the blanks	05	10
3.	Solve the following (very short type)	02	06
4.	Solve the following (short type)	03	12
5.	Solve the following (long type)	02	12
	Total:-	17	50

(ii) **Construction of tools (Vedic method) for Post-test:**

In Vedic mathematics, there are 16 Vedic Sutras was presented by Swami Bharti Krishna Tirthaji Maharaj. But the researcher has chosen 6 sutras for his study. The chapter-wise introduction of these 6 Sutra's are given below-

(1) Square and Square root.

    a)   Eknyunen Purven:- It is used to find squares of the numbers formed by 9 as 9, 99, 999, ..., etc.

          For example:

          Find 99^2

Sol: - 99×99 **Procedure:-**

Left Part	Right Part	
$99 - 1$	$99 - 98$	(i) Left part of the answer One less than $99 = 98$.
98	01	(ii) Right part of the answer $99 - 98 = 01$
9801		

    b)   Ekadhikena Purven:- It is used to find square of the numbers having 5 in one's place.

For example:-

Find 85^2

Sol: - 85 x 85 **Procedure:-**

Left Part	Right Part
8 x 9	5 x 5
72	25

7225

(i) Left part of the answer
Tens digit x one more than tens digit

8 x 9
72

(ii) Right part of the answer
5 x 5
25

(2) Cube and Cube root

a) Aanurupay method: It is used to find out the cube of two digit number.

For e.g.:-

Find 423
Here a = 4, b = 2

C-I	C-II	C-III	C-IV
a^3	$3a^2 \times b$	$3z \times b^2$	b^3
4^3	$3 \times 4^2 \times 2$	$3 \times 4 \times 2^2$	2^3
64	96	48	08
10	+4	+0	
74	100	48	
74	0	8	8

Procedure:-

Let X = ab, where, a is the ten's digit and b is one's digit of X. We shall form four columns to find $(ab)^3$ These four terms of the expansion

$(a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$

In each column we put one's digit and add ten's and other digits in the next column.

$\therefore 42^3 = 74088$

b) Nikhilam Sutra: - It is used to find cubes of those numbers which are near the base 10, 100, 1000, ..., etc.

For e.g.:-

Find 13^3

Solution:-

13	+	3
13	+	3
13	+	3
21	9	7
2	2	

Procedure:-

(i) 13 is near the base 10 & is 3 more than 10. Thus deviation is +3.

(ii) Answer will have three parts left part/ middle part/ right part

(iii) Middle part = 3 x (deviation)2 + carried over digit

$= 2197$ Ans

$= 3 \times (3)^2 + 2$ carried over

$= 3 \times 9 + 2$

$= 27 + 2$

$= 29$

(iv) Right part $= (\text{deviation})^3$

$= 3 \times 3 \times 3 = 27$

Left part $=$ No. $+ 2 \times$ deviation $+$ carried over

$= 13 + (2 \times 3) + 2$ carried over

$= 13 + 6 + 2$

$= 19 + 2$

$= 21$

(v) Then right part & middle part of the answer should have as many digits as the number of zeros in the base

3) Algebraic Identities

a) Urdhavtriyak method:- The algebraic expressions can easily be multiplied by using Urdhavtriyak sutra.

For eg:-

Solution:-
Multiply $(2x+1)$ by $(3x+2)$

$2x + 1$

$\times\ 3x + 2$

$6x^2 + 7x + 2$

Procedure:-

(i) Solution left to right

$2x$

$\times\ 3x$ (Vertical multiplication)

$6x^2$

(ii) $2x + 1$ Left Part of the Product
$3x + 2$ oblique multiplication

$(2x \times 2) + (3x \times 1)$

$= 4x + 3x = 7x$

(iii) 1 Middle part of the product. Vertical
$\times\ 2$ multiplication
----- Right part of the product
2

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b) Adyam Adyen Antyam Antyen:- It is used to find out the product of Trinomials i.e. last by last and first by first when a factor of a trinomial is given.

For eg: - If a factor of $x^2 + 5x + 6$ is $(x + 2)$. Find the other factor.

Sutra Adyam Adyen Antyam Antyen. On dividing first by first and last by least, we get other factor.

$x^2/x = x$ and $+6/+2 = +3$

Thus, second factor is $x + 3$.

Achievement test in Vedic mathematics consisted of following lessons:

(i)   Square and Square root

(ii)   Cube and cube root

(iii)   Algebraic Identities

For the achievement test in Vedic mathematics the researcher constructed the items. There were again given to two teachers who were teaching mathematics to Class-VIII in the school. The two teachers suggested certain modification to the constructed tool which in turn discussed with the supervisor.

On the basis of suggestion it was reconstructed by making suggested modification. Hence the modified version contained 22 items. The time limit was 1 hour. The final format of the achievement test consisted of Multiple choice questions, Fill in the blanks, Solve the following (very short type), Solve the following (short type), Solve the following (long type).

Tool Description

S. No.	Name of the Section	No. of questions	Marks
1.	Multiple Choice Question	10	10
2.	Fill in the blanks	05	10
3.	Solve the following (very short type)	02	06
4.	Solve the following (short type)	03	12
5.	Solve the following (long type)	02	12
	Total :-	**22**	**50**

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3.8   DATA COLLECTION

Administration of Research Tools

Data was collected with the help of the tools described in the preceding section.   The tools were administered personally by the researcher spread over a period of 10 days time.

After developing the tool, the researcher personally met with Principal of the School and acquainted with the teachers concerned and established the rapport with the student.   After taking the students into the confidence they were motivated to answer the questions asked with care and honesty. The students were psychologically prepared by the researcher to do their utmost too sincerely respond to the items of the tools and leave no unresponded. They were also assured that the whole process has nothing to do with their required examinations.

An illustration of each question was given on the test sheets but these were further reinforced by having them read out the students before they start answering. An example of each item which was given in the test was illustrated on the blackboard to make sure that the students understands it fully and don't make mistakes.   The time given to the students was according to the need of the tool administered.

On the day one researcher administered the Pre-test to identify the previous knowledge of mathematics. Students were given proper instructions before administrating the tools. Time of 30 minutes was given to the student to complete the Pre-test and after the completion the data was collected by the researcher.

As mentioned in the research design, the sample was divided into two groups i.e. the Control Group and Experimental group.   Out of these two groups the experimental group was given treatment with Vedic mathematics approach of teaching and control group was given treatment with Traditional approach of teaching. Both the groups were taught the same content for the same period of time by the researcher himself. After giving treatment to both the groups for a time period of 10 days by two different methods of teaching i.e. by Vedic mathematics approach and Traditional Approach of Teaching, the Post-test was conducted at the end to find out the achievement of students from both the groups.

With the completion of field work, now next work was to score the test sheets and *tabulate the obtained data for* statistical processing and analysis. The score of each student was tabulated in the data sheet for further statistical treatment.

3.9   SCORING

Maximum Marks for Pre-test and Post-test was 50 and scoring for various items of the two tests was as follows:-

Table no. 3.9.1 Scoring Scheme for Pre-test

Items No.	Marks	Items No.	Marks
Question 1		Question 3	
(i)	2 Marks	(i)	3 Marks
(ii)	2 Marks	(ii)	3 Marks
(iii)	2 Marks	**Total:-**	**6 Marks**
(iv)	2 Marks	Question 4	
(v)	2 Marks	(i)	4 Marks
Total:-	**10 Marks**	(ii)	4 Marks
Question 2		(iii)	4 Marks
(i)	2 Marks	**Total:-**	**12 Marks**
(ii)	2 Marks	Question 5	
(iii)	2 Marks	(i)	6 Marks
(iv)	2 Marks	(ii)	6 Marks
(v)	2 Marks	**Total:-**	**12 Mark**
Total:-	**10 Marks**	--------------------	--------------------
		G. Total:-	**50 Marks**

Table no. 3.9.2 Scoring Scheme for Post-test

Items No.	Marks	Items No.	Marks
Question 1		Question 3	
(i)	1 Mark	(i)	3 Marks
(ii)	1 Mark	(ii)	3 Marks
(iii)	1 Mark	**Total:-**	**6 Marks**
(iv)	1 Mark	Question 4	
(v)	1 Mark	(i)	3 Marks
(vi)	1 Mark	(ii)	3 Marks
(vii)	1 Mark	(iii)	3 Marks
(viii)	1 Mark	**Total:-**	**9 Marks**
(ix)	1 Mark	Question 5	
(x)	1 Mark	(i)	6 Marks
Total:-	**10 Marks**	(ii)	6 Marks
Question 2		**Total:-**	**12 Marks**
(i)	2 Marks		
(ii)	2 Marks		
(iii)	2 Marks		
(iv)	2 Marks		
(v)	2 Marks		
Total:-	**10 Marks**		

Scoring for Pre-test was strictly as per the scheme in Table No. 3.9.1 scoring for Post-test Vedic mathematics was also as per the scheme in Table No.3.9.2. But in few questions step-wise marks were considered as follows:-

Full Correct Solution – Full Marks

Partial Correct Solution – between zero to full marks of the item as per the appropriateness of the steps.

Full incorrect solution – Zero marks

3.10 STATISTICAL TECHNIQUES

The tabulated data was then processed for obtaining Mean, Standard deviation and "t" Value of the components wise score to analyze the difference as aimed in the objective of the study. The statistical techniques used in the present study are Mean, Standard deviation and t-test.

In the present chapter we have discussed about the methodology which is followed for carrying out the entire research study. In the next chapter we will discuss about the Analysis of data and Interpretation of results.

Summary: - This chapter has been devoted to description of experimental design, Variables, Sampling, tools, data collection and statistical treatment.

CHAPTER – IV

ANALYSIS OF DATA
&
INTERPRETATION OF RESULTS

CHAPTER - 4

ANALYSIS OF DATA
&
INTERPRETATION OF RERSULTS

4.1 INTRODUCTION

After discussing the uses of Vedic Mathematics and taking brief review of researches conducted in the brief area to support the rationale of the present study detailed plan of the study was presented in the third chapter.

Raw data is worthless without analysis. However valid reliable and adequate the data may be, it does not serve any worthwhile purpose, unless it is carefully edited, systematically classified and tabulated, scientifically analyzed, systematically interpreted and rationally concluded. Good research has been characterize by what care has been taken in the analysis and interpretation of the data after careful and depth answers to the research questions of decision makers and information users.

Analysis of data means studying the tabulated material in order to determine the inherent facts or factors in a simple parts and putting the parts together in a new arrangements for the purpose of interpretation. The process of interpretation is essentially one of the stating that the result finding show what do you mean? What is their significance? What is the answer to the original problem? This part is the heart of the research. It calls for critical examination of results of one's analysis in the light of all the limitations of data gathering. This chapter includes the data collected from the above mentioned school.

The data thus collected was subjected to the appropriate statistical procedure to test the hypothesis with which the study was initiated. These details of the statistical technique employed for the analysis of the data, results obtained through this analysis and decisions regarding the rejection or non-rejection of the hypotheses are presented in this chapter.

Statistical techniques are used for organizing, analyzing and interpreting numerical data. Statistics method goes to the fundamental purposes of description and analysis. By applying statistics we can analyze and interpret the data and can draw conclusions. If the collective data are systematically arranged and analyzed

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through the appropriate scientific and statistical technique, the results obtained are scientific and correct.

Interpretation of data refers to that important part of the investigation which is associated with the drawing of inference from the collected facts after an analytical study. It is the interpretation that makes it possible for us to utilize collected data in various fields.

According to the hypothesis of the study the collected data was analyzed on the basis of scores of different tests conducted on the sample. The statistical method serves the fundamental purpose of the description and analysis, and their proper application involves answering the following questions.

1. What facts need to be gathered to provide the information necessary to test the hypothesis?

2. How are these data to be gathered, organized and analyzed?

3. What assumption underlies the statistical methodology to be employed?

4. What conclusions can be validity drawn from the analysis of the data?

Analysis of the Hypothesis:

"Analysis is the Ordering - the breaking down of the data into constituents parts in order to obtain answer to research questions"

F.N. Kerlinger (1964)

There are three hypotheses in the study. All this hypotheses are tested and the results are interpreted as per the problem under the investigation. These hypotheses are pertaining to the effect of teaching method. The results of the hypothesis are presented in the following pages.

4.2 TECHNIQUES USED IN THE DATA ANALYSIS

This study has undertaken a comparative effect of two approaches of teaching i.e. Vedic mathematics approach and Traditional approach on achievement of VIII grade students with different learning styles.

Independent Variable: - Traditional approach and Vedic Mathematics approach.

Dependent Variable: - Achievement in Mathematics.

The mean scores and standard deviations for each of the group were computed and the mean scores were compared using 't' test.

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4.3   ACHIEVEMENT ANALYSIS

Hypothesis 1:- There is no significant difference in the Present achievement of Class-VIII students of control group and experimental group.

The Hypothesis is tested by using 't' test. The mean standard deviation and 't' values are calculated and the results are shown in the table 4.3.1.

Category	N	Mean	Standard Deviation	't' value	Degree of freedom
Control group	41	13.125	7.20		
Experimental group	41	12.62	7.51	0.30*	80

* 't' value is significant at 0.01 level of Significance.

ANALYSIS

Table No. 4.3.1 gives the mean difference of the present Achievement score in mathematics of students.

The calculated value of 't' is found to be 0.30. The calculated value of 't' is smaller than that of table value of 't' at 0.01 level. The value of 't' is not significant at 0.01 level. Hence the null hypothesis is not rejected at 0.01 level of significance.

INTERPRETATION

From the above table it is found that there is no significant difference in the mean achievement score in mathematics of the students .The comparison of both means show that the students present achievement are same.

CONCLUSION

There is no significant difference in the Present achievement of Class-VIII students of control group and experimental group.

Hypothesis 2: There is no significant difference in the Achievement of pre-test and post- test of Class- VIII students taught by Traditional method.

The hypothesis is tested by using 't' test. The mean standard deviation and 't' value are calculated and the results are shown table 4.3.2

Category	N	Mean (M)	Standard Deviation	't' value	Degree of freedom
Control group	41	16.3	3.50		
Experimental group	41	24.76	2.70	13.53*	80

* 't' value is significant at 0.01 level of Significance.

ANALYSIS

The table 4.3.2 gives the mean difference of the achievement score of students in mathematics studying through by Traditional and Vedic mathematics approach.

The Calculated Value of 't' is found to be 13.53. The calculated value of 't' is greater than that of table value of 't' at 0.01 level. The value of 't' is significant at 0.01 level. Hence the null hypothesis is rejected at 0.01 level of significance.

INTERPRETATION

From the above table it is found that there is a significant difference in the mean Achievement score of students in mathematics studying through Traditional and Vedic mathematics Mathematics Approach.

CONCLUSION

The comparison of the means of both the approaches show that the experimental group achievement exposed to the Vedic mathematics approach is better than those exposed to the Traditional approach. So we can conclude and saying that Vedic mathematics Approach of teaching mathematics is better than the Traditional Approach of teaching.

Hypothesis 3: There is no significant difference in the Achievement of pre-test and post- test of Class- VIII students taught by Vedic method.

The hypothesis is tested by using 't' test. The meant standard deviation and 't' value are calculated and the results are shown in the table 4.3.3

Category	N	Mean (M)	Standard Deviation	't' value	Degree of freedom
Traditional Approach	16	17	374	8.98*	32
Vedic math's Approach	18	23.07	2.54		

* 't' value is significant at 0.01 level of Significance

ANALYSIS

The table 4.3.3 gives the mean difference of the achievement score of students in mathematics studying through by Vedic mathematics approach.

The Calculated Value of 't' is found to be 8.98. The calculated value of 't' is greater than that of table value of 't' (2.68) at 0.01 level. The value of 't' is significant at 0.01 level. Hence the null hypothesis is rejected at 0.01 level of significance.

INTERPRETATION

From the above table it is found that there is a significant difference in the mean Achievement score of students in mathematics studying through Vedic Mathematics Approach

CONCLUSION

The comparison of the means of both the approaches show that the students achievement exposed to the Vedic approach. So we can conclude & saying that Vedic Mathematics Approach of Teaching Mathematics is better than the Traditional Approach of teaching.

Hypothesis 4: There is no significant difference between achievement in mathematics of Class-VIII students taught by Traditional method and Vedic mathematics method.

The hypothesis is tested by using 't' test. The meant standard deviation and 't' value are calculated and the results are shown in the table 4.3.4

Category	N	Mean (M)	Standard Deviation	't' value	Degree of freedom
Control group	41	15.72	3.07	10.30*	80
Experimental group	41	24.42	2.83		

* 't' value is significant at 0.01 level of Significance

ANALYSIS

The table 4.3.4 gives the mean difference of the achievement score of students in mathematics studying by Vedic mathematics approach and traditional approach.

The Calculated Value of 't' is found to be 10.30. The calculated value of 't' is greater than that of table value of 't' at 0.01 level. The value of 't' is significant at 0.01 level. Hence the null hypothesis is rejected at 0.01 level of significance.

INTERPRETATION

From the above table it is found that there is a significant difference in the mean Achievement score of students in mathematics studying by Vedic Mathematics Approach and Traditional Approach.

CONCLUSION

The comparison of the means of both the approaches show that the students achievement exposed to the Traditional approach. So we can conclude & saying that Vedic Mathematics Approach of Teaching Mathematics is better than the Traditional Approach of teaching.

Hypothesis 5: There is no significant difference between achievement in mathematics of Class-VIII students taught by Traditional method and Vedic method in terms of Speed.

The hypothesis is tested by using 't' test. The meant standard deviation and 't' value are calculated and the results are shown in the table 4.3.5

Category	N	MEAN (M)	Standard Deviation	't'value	Degree of freedom
Control group	41	67.5	10.88	4.61*	80
Experimental group	41	48.38	23.85		

* 't' value is significant at 0.01 level of Significance

ANALYSIS

The table 4.3.5 gives the mean difference of the achievement score of students in mathematics studying by Vedic mathematics approach and traditional approach in terms of speed.

The Calculated Value of 't' is found to be 4.61. The calculated value of 't' is greater than that of table value of 't' at 0.01 level. The value of 't' is significant at 0.01 level. Hence the null hypothesis is rejected at 0.01 level of significance.

INTERPRETATION

From the above table it is found that there is a significant difference in the mean Achievement score of students in mathematics studying by Vedic Mathematics Approach and Traditional Approach in terms of speed.

CONCLUSION

There is a significant difference between the mathematics achievement of both experimental group and control group in terms of speed.

Hypothesis 6: There is no significant difference between achievement in mathematics of Class-VIII students taught by Traditional method and Vedic method in terms of Accuracy.

The hypothesis is tested by using 't' test. The meant standard deviation and 't' value are calculated and the results are shown in the table 4.3.6

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Category	N	MEAN (M)	Standard Deviation	't'value	Degree of freedom
Control group	41	76.66	8.45	5.34*	80
Experimental group	41	56.33	12.09		

* 't' value is significant at 0.01 level of Significance

ANALYSIS

The table 4.3.6 gives the mean difference of the achievement score of students in mathematics studying by Vedic mathematics approach and traditional approach in terms of accuracy.

The Calculated Value of 't' is found to be 5.34 The calculated value of 't' is greater than that of table value of 't' at 0.01 level. The value of 't' is significant at 0.01 level. Hence the null hypothesis is rejected at 0.01 level of significance.

INTERPRETATION

From the above table it is found that there is a significant difference in the mean Achievement score of students in mathematics studying by Vedic Mathematics Approach and Traditional Approach in terms of accuracy.

CONCLUSION

There is a significant difference between the mathematics achievement of both experimental group and control group in terms of accuracy.

In the present chapter we have analyzed the data by giving statistical treatment and thus arrived at the findings of the study. In next chapter we will discuss about summary, conclusion and suggestions.

CHAPTER – V

SUMMARY, CONCLUSION & SUGGESTIONS

CHAPTER – 5

SUMMARY, CONCLUSION AND SUGGESTIONS

5.1 INTRODUCTION

In the past, education was for the elite and then knowledge was less important than values. But today we have to recognize rightly the fact that education is for the masses and this has resulted in a situation where knowledge is more important values. Today we find, that the education departments are managed with yesterday's tools for tomorrow's life. It is our duty to give a new orientation to education to face the new challenge.

Children in today's advance society are growing up in an educational environment that is struggling to overcome the teacher centered classrooms in which student's achievement is based on the traditional way of learning, memorization and recitation of the material contained in a single content area text book. In order for a students to succeed in today's competitive society they must be given the opportunity and guidance to develop not only the knowledge level skills but they should graduate from high school with the ability to use that knowledge in the real world situations.

Teachers are slowly realizing that traditional methods of teaching are no longer capable of providing an education foundation that is strong enough to withstand the pressure of such advance speedy society.

Our Vedas are perennial sources of inspiration the concept of Vedic Mathematics is an outstanding phenomenon. We are stunned at the modernity of the ancients. Vedic Mathematics deals mainly with various Vedic mathematical formulae and their applications for carrying out tedious and cumbersome arithmetical operations, and to a very large extent, executing them mentally. In the field of mental arithmetical operations the works of the famous mathematicians Trachtenberg and Lester Meyers (High Speed Maths) are elementary compared to that of Jagadguruji.

In the Vedic mathematic system 'difficult' problems or huge sums can often be solved immediately by the Vedic method by doing Vedic mathematics the speed increases. Learner are not learning any new thing, but learning the correct and fast way of doing the problems.

The most striking feature of the Vedic system is its coherence. Instead of a hotch-potch of unrelated techniques the whole system is beautifully interrelated and unified. Vedic mathematics sutras are complement, direct and easy. So, it is-

"Mathematics without tears"

The traditional concept of the teacher as the transmitter of the knowledge. This approach is likely to be motivationally and instructionally ineffective. It is also unsuitable for helping students achieve higher level learning objectives. Not all methods are suitable for all the situations the choice of the method will have to depend among other things like the children being taught, the teachers own abilities, facilities available.

Knowledge → Teacher → Student

The present study has investigated into in teaching mathematics. The achievement in mathematics of Class-VIII Students studying through Vedic mathematics approach and compare its achievement with traditional approach which is currently used in the classroom as the study intended to see the relative effectiveness of the traditional approach and Vedic mathematics approach on the achievement in mathematics.

5.2 STATEMENT OF THE PROBLEM

EFFECT OF VEDIC MATHEMATICS ON ACHIEVEMENT IN MATHEMATICS OF CLASS-VIII STUDENTS – A STUDY

5.3 OBJECTIVES :

(i) To study the present achievement in mathematics of Class-VIII students of control group and experimental group.

(ii) To study the achievement in mathematics of Class-VIII students of control group taught by Traditional method.

(iii) To study the achievement in mathematics of Class-VIII students of Experimental group taught by Vedic mathematics method.

(iv) To study the effect of Vedic mathematics on achievement in mathematics of Class- VIII students.

(v) To study the effect of Vedic mathematics on speed to solve mathematical problems of Class- VIII students.

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(vi)   To study the effect of Vedic mathematics on accuracy to solve mathematical problems of Class-VIII students.

5.4 HYPOTHESIS OF THE STUDY

i)   There is no significant difference in the achievement of Class-VIII students of control group and experimental group.

(ii)   There is no significant difference in the achievement of pre-test and post- test of Class-VIII students taught by Traditional method.

(iii)   There is no significant difference in achievement of pre-test and post- test of Class-VIII students taught by Vedic Mathematics method.

(iv)   There is no significant difference between achievement in mathematics of Class- VIII students taught by Traditional method and Vedic Mathematics method.

(v)   There is no significant difference between achievement in mathematics of Class- VIII students taught by Traditional method and Vedic Mathematics method in terms of speed.

(vi)   There is no significant difference between achievement in mathematics of Class- VIII students taught by Traditional method and Vedic Mathematics method in terms of accuracy.

5.5   VARIABLES

A variable is something that varies; it is a property that takes in different values.   Variable are the conditions on the characteristics that the experimenter manipulates, controls and observes. These are the following two types of variables.

Independent Variables:

The independent variables in the present study are the two different teaching approaches i.e. Traditional Approach and Vedic mathematics Approach of Teaching.

Dependent Variables:

In the present study the dependent variable is achievement in mathematics.

5.6   SAMPLE

In the present study the sample was taken from Kendriya Vidhyalaya School, Ratlam (M.P.) and purposive sampling technique was used for the selection of sample.

In this research work 82 students were taken from the VIII grade which was then divided into two groups of 41 each named as experimental group and control group.

5.7   TOOLS USED   D-407

1)   Mathematics Achievement Pre-Test (Combine)

2)   Mathematics Achievement Post-Test (Traditional method)

3)   Mathematics Achievement Post-Test (Vedic method)

5.8   STATISTICAL TECHNIQUES USED

This tabulated data was processed for obtaining mean, standard deviation and 't' values of the components wise score to analyze the difference as aimed in the objectives of the study.   First of all Means of all the scores are taken and then its standard deviation score is calculated which is then subjected to the t-test and correlation among the two groups were obtained.

5.9   DELIMITATIONS OF THE STUDY

1)   The study was delimited to Ratlam District of Madhya Pradesh State only.

2)   The study was delimited to English Medium School only.

3)   It was further delimited to students studying in VIII Std. only.

4)   The study was delimited to the school affiliated to central board of secondary education.

5)   This study was delimited to the mathematics content.

6)   The study was delimited to one school only.

5.10   MAJOR FINDINGS OF THE STUDY

1)   There is significant difference in Achievement of Class-VIII students taught by Vedic Mathematics approach and Traditional approach.

2) There is significant difference in Achievement of Class-VIII Boys students taught by Vedic Mathematics approach and Traditional Approach.

3) There is significant difference in achievement of Grade VIII Girls students taught by Vedic Mathematics approach and Traditional Approach.

5.11 CONCLUSION

By analyzing the data it was found that Vedic Mathematics approach is better than the Traditional approach as far as achievement in mathematics is concerned. So, Vedic Mathematics is beneficial and it should be adopted by the teachers so as to increase the speed of doing huge or complex problems in a fastest way with accuracy.

5.12 EDUCATIONAL IMPLICATIONS

Vedic Mathematics is now regarded as a super speedy with accuracy technique, its use in education has been tried as an innovation and it has proved its teaching efficiency in many abroad countries. Vedic Mathematics has been helping teachers and students in following areas:-

1) It is very original, totally unconventional and provides a new thinking and approach to mathematics that is so powerful, yet simple and fun to work with.

2) Its word-formulas lead to efficient and super fast calculations.

3) It encourages mental calculations since it handles the numbers involved digit by digit.

4) It is easy, simple, direct and straight forward. The students are freed from committing to memory the multiplication tables and the like. They are enthusiastic in learning these methods and eagerly look forward to the mathematics classes. They also enjoy sharing their new-found knowledge with others.

5) Every one loves variety and Vedic Mathematics offers it in ample measure.

6) It is very comprehensive and is based a pattern recognition.

7) Vedic Mathematics provides immediate feedback to the students for better interaction and feedback.

8) It is exceedingly flexible and offers a large number of alternatives for almost every kind of problem.

9) The weaker students gain mastery of the subject slowly and steadily by taking advantage of the flexibility and availability of alternatives for a given problem; in contrast, presently available blanket methods provide only two options: "learn them or leave them".

10) The bright students take full advantage of the flexibility by learning to be creative and challengeful in choosing the most appropriate and time-saving method that is consistent with the underlying pattern of a given problem.

11) Since most pupils have got habituated with the calculator, it is a good opportunity to tune our mind to mental calculations.

12) The most suitable purpose, namely, the eliminating from the children's minds of all fear and hatred of mathematics and the implementing there in a positive feeling of exuberant love and enjoyment thereof!

13) The sutras are easy to understand, easy to apply and easy to remember and the whole work can be truthfully summarized in one word 'mental'.

14) Finally, all areas of modern mathematics, be it pure or applied, come under the scope of Vedic Mathematics. This is because it provides a unified approach to different areas of mathematics by the application of the same word – formulas to diverse fields like trigonometry, analytical geometry, calculus, differential equations and so on.

15) The present day researchers in Vedic Mathematics have confirmed the enormous versatility that it has in this respect. The spin-off of this extendibility is that students who have been trained in the application of Vedic Mathematics to arithmetic can easily more over to college and higher mathematics deriving the same benefits as they did in the case of arithmetic.

5.13 RECOMMENDATIONS FOR TEACHERS, PARENTS AND STUDENTS

Teachers:

(i) Teachers can practice Vedic mathematics sutras in the Class to improve the speed and accuracy of the students in doing calculations.
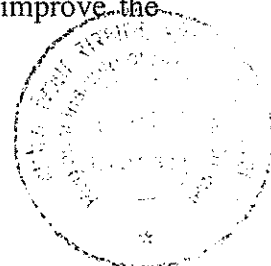
(ii) Teachers can enforce the students to practice the new techniques i.e. Vedic mathematics daily for half an hour.

(iii) Teachers can use Vedic mathematics to improve the mental calculations for multiplying the big numbers in a simple way.

(iv) Teachers can give the fruits of Vedic system to all the students it is necessary to conduct workshops for the teachers on Vedic system as it is still in growing stage.

(v) Teachers can use Vedic mathematics in solving huge or complex problem sums.

Parents:

(i) Parents can create learning environment of Vedic mathematics at home.

(ii) Parents can suggest school organizations to include Vedic mathematics in the curriculum from upper primary classes to high school.

(iii) Parents can provide other books which are related to Vedic system to his/her daughter and son.

(iv) Parents themselves can also use Vedic mathematics sutras in daily life calculations.

(v) Parents recommend to the school authority to arrange one period daily for Vedic mathematics.

Students:

(i) Students can be motivated to learn mathematics interestingly if the Vedic system of mathematics will be included into school curriculum.

(ii) Students can come out of the confinement of the 'Only one correct way' and make their own methods under the Vedic system.

(iii) If the students learn and practice this sutra's they develop interest in mathematics as mathematics governs life.

(iv) Vedic mathematics helps a student to solve mathematical problems 10 to 15 times faster.

(v) Vedic mathematics helps a student to reduce burden in intelligent guessing.

(vi)   Vedic mathematics improves student's confidence, mental calculation and concentration.

(vii)   In turn, it will prepare them to solve the mathematical problems with speed and accuracy in various competition exams.

5.14 SUGGESTION FOR THE FURTHER RESEARCH

The present study was an effort to critically compare the use of Vedic mathematics approach in mathematics with traditional approach of teaching at elementary level on VIII Class students only.. The survey of the related literature revealed that only few studies have been conducted in the area of Vedic mathematics in Indian context. Here the results of present study bring out certain points for further study which are as follows:-

1) To replicate the study the researcher can conduct a similar study with large sample of students and teachers in other districts of Madhya Pradesh and other state.

2) The effect of Vedic mathematics on achievement of mathematics at elementary level can also be studied.

3) Evaluation of Vedic mathematics on children can be done.

4) Effect of Vedic mathematics teaching on the mental health of children's and their attitude towards mathematics can be studied.

5) The results of the Pre-test Traditional method can be used as a starting point from which further research can be conducted as to how the learners use knowledge about his/her problem solving skill to further enhance his/her approach of saving mathematical problems.

6) The research itself can be duplicated in other schools and other settings, with learners of different ages, in order to evaluate the usefulness of teaching Vedic mathematics.

7) It will be interesting to study the effect of the Vedic mathematics keeping in focus the following variables-

    (i)   Mental age and educational age of the students.

    (ii)   Social and economic background of the students

    (iii)   Parents educational qualifications

    (iv)   Personality adjustment and emotional intelligence of the students.

8)   A parallel study may be carried out with bigger groups of students in order to see whether similar results are obtained.

As schools and colleges of future will be increasingly asked to prepare children and youth to face uncertainties in the complex and competitive society of tomorrow, in order to enable students to cope up with challenges of the change, the teacher must use such methods which solicit greater involvement of the pupils and encourage them.

Keeping in view the above point's further research can be undertaken for the improvement of teaching of mathematics, thus bringing into existence, new dimension of effective mathematics teaching.

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APPENDICES

APPENDIX-I

MATHEMATICS ACHIEVEMENT TEST

Pre –Test (Combine)

Name:

Name of the school: **Duration:60**

Class: VIII   **Max Marks: 50**

Q.1 Choose the correct Option in the following.   **(5x2=10)**

   (i)   The Square root of 900 is -

        (a) 30   (b) 90   (c) 120   (d) 150

   (ii)   The Value of 999^2 is -

        (a) 9801   (b) 998001   (c) 9980001 (d) 981

   (iii) The Value of 42^3 is -

        (a) 748   (b) 248   (c) 74088   (d) 74068

   (iv) Find Cube root of 343 is -

        (a) 5   (b) 4   (c) 7   (d) 8

   (v)   The value of (x+2) x (x+3) is -

        (a) x^2+5x+6 (b) x^2+4x+8 (c) x^2+3x+6 (d) x^2+3x+5

Q.2 Fill in the blanks: **(5x2=10)**

   (i)   The Cube of 11 is...................

   (ii)   The Square of 12 is......................

   (iii) The Value of (2x +1) x (3x + 2) is   ....

  ·(iv)   The Value of (2x-1) and (3x-2) is...................

   (v)   If one factor of x^2-5x+6 is (x-2) then the other factor will be.....

Q.3 Solve the following: **(2x3=6)**

   (i)   Find the square of 99

   (ii)   Find 997^3

Q.4 Solve the following: **(4x3=12)**

   (i) $(2x^2-3x+4)$ (x^2+2x+1)

   (ii) If one factor of $x^2+7x+12$ is (x+3), find the other.

   (iii) (2x-2y) (3x-y)

Q.5 Solve the following: **(2x6=12)**

   (i) (x^2+2x+3) $(2x^2+3x+1)$

   (ii) If one factor of $6x^2-5x-21$ is 2x+3 find the other.

Post Test (Vedic Method)

Name: -

Class: - VIII   Duration: 60min.

Name of the school:—   Max.marks:- 50

Q1. Choose the correct option by using Vedic sutras.   (1X10=10)

(i)   The square of 99 is -

(a) 98001   (b) 9801   (c) 9901   (d) 9811

(ii)   The value of 85^2 is -

(a) 7235   (b) 7245   (c) 7225   (d) 7215

(iii)   The value of (2x+1) x (3x+2) is -

(a) $6x^2+7x+2$ (b) $6x^2+8x+4$ (c) $6x^2+5x+6$ (d) $5x^2+2x+3$

(iv)   If one factor of x^2-5x-6 is (x+1) then other factor will be -

(a) (x-6)   (b) (x-4)   (c) (x-5)   (d) (x-8)

(v)   The cube of 42 is -

(a) 74098   (b) 74088   (c) 74888   (d) 74588

(vi)   The product of (ax+b) x (cx+d) is -

(a) $acx^2+bcx+adx+bd$ (b) ax^2-bx^2 (c) $acx^2+bdx+c^2$ (d) $a^2 d^2$

(vii)   The value of 999^2 is -

(a) 99801   (b) 998001   (c) 998091   (d) 998081

(viii) The square of 65^2 is -

(a) 3225   (b) 4225   (c) 1225   (d) 2225

(ix)   If one factor of a^2-b^2 is (a+b) then the other factor be -

(a) (a-b)   (b) (a+b)   (c) (b-c)   (c) (c+d)

(x)   The product of (a+b) x (a+b) is -

(a) $a^2+2ab+b$ (b) $a^2+2ab+b^2$ (c) a^2+b^2+ab (d) a^2+ab-b^2

Q2.   Fill in the blanks by using Vedic Sutras -   (5X2=10)

(i)   The cube of 12 is _____.

(ii)   The square of 115 is -_____.

(iii)   The value of 32^3 is -_____.

(iv)   The product of (x+y) and (x+2y) is - _____.

(v)   If one factor of x^2+5x+6 is (x+2) then the other factor will be _____

Q.3 **Solve the following: -** (2x3=6)

(1) If one factor of x^2-5x+6 is (x-2). find the secand factor by using Adyam Adyen Antyam Antyen.

(2) Multiply (x+2) and (x+3) by using Urdhavtiryak formula.

Q.4 **Solve the following :-** (4x3=12)

(1) Find 9999^2 by using Eknyunen Purven Sutra ?

(2) Find 45^3 by using Nikhilam Sutra?

(3) Multiply (2x+2y) and (3x+3y) by using Urdhavtiryak formula.

Q.5 **Solve the following :-** (2x6=12)

(1) If one factor of $2x^2+11x+15$ is x -3 find the other by using Adyam Adyen Antyam Antyen Sutra.

(2) Find the square of 95 by using Ekadhikena Purven.

Post Test (Traditional Method)

Name :-

Class :- VIII   Duration :- 60 Min.
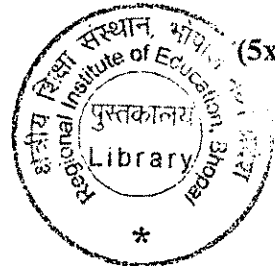
Name of the school-:-   Max.marks :- 50

Q1. Choose the correct option :-   (1x10=10)

(i)   The square of 99 is -

    (a) 98001   (b) 9801   (c) 9901   (d) 9811

(ii)   The value of 85^2 is -

    (a) 7235   (b) 7245 (c) 7225 (d) 7215

(iii)   The value of (2x+1) x (3x+2) is -

    (a) $6x^2+7x+2$ (b) $6x^2+8x+4$ (c) $6x^2+5x+6$ (d) $5x^2+2x+3$

(iv)   If one factor of x^2-5x-6 is (x+1) then other factor will be -

    (a) (x-6)   (b) (x-4)   (c) (x-5)   (d) (x-8)

(v)   The cube of 42 is -

    (a) 74098   (b) 74088   (c) 74888   (d) 74588

(vi)   The product of (ax+b) x (cx+d) is -

    (a) $acx^2+bcx+adx+bd$ (b) ax^2-bx^2 (c) $acx^2+bdx+c^2$ (d) a^2d^2

(vii)   The value of 999^2 is -

    (a) 99801   (b) 998001   (c) 998091   (d) 998081

(viii) The square of 65^2 is -

    (a) 3225 (b) 4225   (c) 1225   (d) 2225

(ix)   If one factor of a^2-b^2 is (a+b) then the other factor be -

    (a) (a-b)   (b) (a+b)   (c) (b-c)   (c) (c+d)

(x)   The product of (a+b) x (a+b) is -

    (a) $a^2+2ab+b$ (b) $a^2+2ab+b^2$ (c) a^2+b^2+ab (d) a^2+ab-b^2

Q2.   Fill in the blanks :-   (5x2=10)

(i)   The cube of 12 is ....

(ii)   The square of 115 is -..............

(iii)   The value of 32^3 is -.............. .

(iv)   The product of (x+y) and (x+2y) is - ....

(v)   If one factor of x^2+5x+6 is (x+2) then the other factor will be ....

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Q.3 **Solve the following :-** (2x3=6)

(1) If one factor of x^2-5x+6 is (x-2). Find the second factor.

(2) Multiply (x+2) and (x+3).

Q.4 **Solve the following :-** (4x3=12)

(1) Find 9999^2

(2) Find 45^3

(3) Multiply (2x+2y) and (3x+3y).

Q.5 **Solve the following :-** (2x6=12)

(1) If one factor of $2x^2+11x+15$ is x -3 find the other.

(2) Find the square of 95.

APPENDIX-II

ANSWER KEY

ANSWER KEY

Pre –Test (Combine)

Q.1   Choose the correct option in the following:-

(i)   30

(ii)   998001

(iii)   74088

(iv)   7

(v) $x^2 + 5x + 6$

Q.2   Fill in the blanks:-

(i)   1331

(ii)   144

(iii) $6x^2 + 7x + 2$

(iv) $6x^2 - 7x + 2$

(v) $x - 3$

Q.3   Solve the following:-

(i)   9801

(ii)   991026973

Q.4   Solve the following:-

(i) $2x^4 + x^3 + 5x + 4$

(ii) $x + 6$

(iii) $6x^2 - 8xy + 2y^2$

Q.5   Solve the following:-

(i) $2x^4 + 7x^3 + 13x^2 + 11x + 3$

(ii) $3x - 7$

ANSWER KEY

Post –Test (Vedic Method)

Q.1 Choose the correct option in the following by using Vedic Sutra's:-

    (i)   9801

    (ii)   7225

    (iii) $6x^2 + 7x + 2$

    (iv)   x - 6

    (v)   74088

    (vi) $acx^2 + bcx + adx + bd$

    (vii)   998001

    (viii)   4225

    (ix)   (a - b)

    (x) $a^2 + 2ab + b^2$

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Q.2 Fill in the blanks by using Vedic Sutra's :-

    (i)   1728
    (ii)   13225
    (iii)   32768
    (iv) $x^2 + 3xy + 2y^2$
    (v)   x + 3

Q.3 Solve the following by using Vedic Sutra's :-

    (i)   x - 3
    (ii) $x^2 + 5x + 6$

Q.4 Solve the following by using Vedic Sutra's :-

    (i)   99980001
    (ii)   91125
    (iii) $6x^2 + 12xy + 6y^2$

Q.5 Solve the following by using Vedic Sutra's :-

    (i)   2x - 5
    (ii)   9025

ANSWER KEY

Post –Test (Traditional Method)

Q.1   Choose the correct option in the following:-

    (i)   9801

    (ii)   7225

    (iii) $6x^2 + 7x + 2$

    (iv) $x - 6$

    (v)   74088

    (vi) $acx^2 + bcx + adx + bd$

    (vii) 998001

    (viii) 4225

    (ix) $(a - b)$

    (x) $a^2 + 2ab + b^2$

Q.2   Fill in the blanks:-

    (i)   1728
    (ii)   13225
    (iii) 32768
    (iv) $x^2 - 3xy - 2y^2$
    (v) $x - 3$

Q.3   Solve the following:-

    (i) $x - 3$
    (ii) $x^2 - 5x - 6$

Q.4   Solve the following:-

    (i)   99980001
    (ii)   91125
    (iii) $6x^2 + 12xy - 6y^2$

Q.5   Solve the following:-
    (i) $2x - 5$
    (ii)   9025