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"THE EFFECT OF VEDIC SYSTEM OF MATHEMATICAL OPERATIONS ON LOGICAL REASONING OF THE LEARNER"

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ABSTRACT

This research paper tries to go through the Vedic mathematics system to understand its process. Mathematical operations of Vedic mathematics are quite simple and easy to comprehend and apply. These mathematical operations are based on some sutras and once you understand its system you find the difference in speed of your calculation work. Its very interesting and useful system based on Indian mathematics system.

Keyword: Vedic Mathematics, Sutras, Mathematical operations.

I. INTRODUCTION

Mathematics is a study of measurements, numbers, and space, which is one of the first sciences that humans work to develop because of its great importance and benefit.

Mathematics reveals hidden patterns that help us to understand the world around us. Now, much more than arithmetic and geometry, mathematics today is a diverse discipline that deals with data, measurements and observations from science, with inference, deduction, and proof; and with mathematical models of natural phenomena, of human behavior, and of social systems. The literal meaning of mathematics is "things which can be counted" now you can think that counting has vital role in our daily life; just imagine that there were no mathematics at all, how would it be possible for us to count members of the family, number of students in the class, rupees in the pocket, runs in a cricket match, days in a week or in a months or years? On a basic level you need to be able to count, add, subtract, multiply, and divide.

As for mathematical inventions, they are numerous throughout the ages. Some of them were tangible, such as counting and measuring devices. Some of them are not as tangible as methods of thinking and solving. The symbols that express numbers are also one of the most important mathematical inventions.

Math encourages logical reasoning, critical thinking, creative thinking, abstract or spatial thinking, problem-solving ability, and even effective communication skills.

II. VEDIC MATHEMATICS

Vedic mathematics is the name given to the ancient Indian system of mathematics that was rediscovered in the early twentieth century from ancient Indian scripture namely Atharvaveda. We use mathematics in our all endeavors; therefore it becomes a part of our life. Our imaginations do involve mathematics

Atharvaveda – supposedly contains a set of sixteen sutras that describe all of mathematics. Sutra is often translated word formula and is short and easily memorized and recited. Vedic Mathematics is a system of mathematics based on

these sixteen sutras. These sixteen sutras are given below.

III. THE 16 SUTRAS OF VEDIC MATH

1. *Ekadhikina Purvena*
   (Corollary: Anurupyena)
   Meaning: By one more than the previous one
2. *Nikhilam Navatashcaramam Dashatah*
   (Corollary: Sisyate Sesasamjnah)
   Meaning: All from 9 and the last from 10
3. *Urdhva-Tiryagbyham*
   (Corollary: Adyamadyenantyamantyena)
   Meaning: Vertically and crosswise
4. *Paraavartya Yojayet*
   (Corollary: Kevalaih Saptakam Gunyat)
   Meaning: Transpose and adjust
5. *Shunyam Saamyasamuccaye*
   (Corollary: Vestanam)
   Meaning: When the sum is the same that sum is zero
6. *(Anurupye) Shunyamanyat*
   (Corollary: Yavadunam Tavadunam)
   Meaning: If one is in ratio, the other is zero
7. *Sankalana-vyavakalanabhyam*
   (Corollary: Yavadunam Tavadunikritya Varga Yojayet)
   Meaning: By addition and by subtraction
8. *Puranapuranabyham*
   (Corollary: Antyayordashake'pi)
   Meaning: By the completion or non-completion
9. *Chalana-Kalanabyham*
   (Corollary: Antyayoreva)
   Meaning: Differences and Similarities
10. *Yaavadunam*
    (Corollary: Samuccayagunitah)
    Meaning: Whatever the extent of its deficiency
11. *Vyashtisamanstih*
    (Corollary: Lopanasthapanabhyam)
    Meaning: Part and Whole
12. *Shesanyankena Charamena*
    (Corollary: Vilokanam)
    Meaning: The remainders by the last digit
13. *Sopaantyadvayamantyam*
    (Corollary: Gunitasamuccayah Samuccayagunitah)
    Meaning: The ultimate and twice the penultimate
14. *Ekanyunena Purvena*
    (Corollary: Dhvajanka)
    Meaning: By one less than the previous one
15. *Gunitasamuchyah*
    (Corollary: Dwandwa Yoga)
    Meaning: The product of the sum is equal to the sum of the product

16. *Gunakasamuchyah*
(Corollary: Adyam Antyam Madhyam)
Meaning: The factors of the sum is equal to the sum of the factors

Here is an example to show how fast the results can be achieved using Vedic mathematical operations-

Example-1:

Present/ Conventional System: Find 109^2=

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        1 0 9
      x 1 0 9
        9 8 1
      0 0 0 x
    1 0 9 x x
    1 1 8 8 1
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Vedic Mathematical Operation:

Find 109^2 = (109+9)/9x9 = (118)/81 = 11881

First step: 109 is added by 9 and 118 is put as one part of the answer.
Second step: 9 is multiplied by 9, other part of the answer comes as 81. The product thus comes 11881.

This calculation is based on *Nikhilam Sutra (Corollary)* which means "whatever the extent of its deficiency, lessen it still further to that very extent, and also set up the square (of that deficiency)".

But for numbers above 10 We work exactly as before; but, instead of reducing still further by the deficit, we increase the number still further by the surplus. In above example 9 is surplus from 100 then 9 is added to 109 and becomes 118. After that that surplus 9 is squared and becomes 81. Putting 81 after 118 we get the answer 11881 which is the square of 109.

IV. VEDIC MATHEMATICS AND LOGICAL REASONING

Mathematics teaching is very important for intellectual developments there is no other subject in the curriculum likes mathematics which makes students' brain active. Problem solving help in the development of mental faculties.
Mental work is needed to solve mathematical problems. If a child, has a mathematical problem her/his brain becomes active in solving that problem. Each problem of mathematics posses such sequence which is necessary for constructive and creative process. In this way, all-mental abilities of child are developed through mathematics.
Historically, learning mathematics and teaching it to all students at the school stage has been motivated by the belief that a study of mathematics helps students to learn to reason and apply such reasoning to everyday problems.
Vedic Mathematics is based on more logical basis than present system of Mathematics.

V. REVIEW OF RELATED LITERATURE

Archana V Katgeri (2017) highlighted the effectiveness of Vedic mathematics in the classrooms. The researcher concluded that there is a significant difference in the pre-test and post-test scores with respect to the students' performance in square and square root after implementation of the Vedic Mathematics technique. Thus, students could solve more number of sums accurately making lesser errors by using the Vedic Mathematics technique in comparison to the traditional factorisation method for square and square roots. There is a significant difference in the pre-test and post-test time taken by the students for solving the sums of square and square root after implementation of the Vedic Mathematics technique. Thus, students took lesser time to solve by using the Vedic Mathematics technique in comparison to the traditional of factorisation method for square and square roots.

Evon M. O. Abu-Taieh (2018) research work presents Mirrored Vedic Vertically and Crosswise Multiplication Technique (MVVCMT) which is an algorithm based on Vedic Vertically and Crosswise Multiplication Technique. Vedic Vertically and Crosswise Multiplication Technique is an ancient Indian technique used to shorten the process of

mental multiplication especially for big numbers. In India, the multiplication technique is still taught to kids to enhance their skills in mental multiplication. The proposed algorithm in this research was inspired by this ancient yet practical, easy to understand and apply multiplication technique.

Dr. Amulya Kumar Behera (2021) believed that India, the saga of sacred land, has a high cultural heritage. The findings of Rishis in ancient India can show the path to the world. The knowledge of the Vedas and other ancient texts is an everlasting source of knowledge. Vedic Mathematics is one of such gifts of ancient India. It helps us to solve almost all mathematical problems with less time with only mental calculation. The need for paperwork is very less. In the modern competitive world, every fraction of a second is important in competitive Exams where power tests are used for mathematical and arithmetical aptitude, numerical and nonverbal reasoning. In this present study, the Vedic method of multiplication has been used as an independent variable in order to know the effect on the achievement of students in an experimental setting of 58 students of Class – VI. For the present study, 58 students (both Boys and girls) were randomly selected from the four Upper Primary schools of Raruan Block of Mayurbhanj district.

It has been concluded that the teachers should encourage the students to learn Vedic Mathematics. In the school curriculum, Vedic mathematics should be included especially at the elementary level as a supplementary subject to mathematics and some period should be allotted for practice the tricks. As a result, students will actively engage in problem-solving. The artistic abilities and talents of the students can also be developed by Vedic mathematics. It can undoubtedly create interest in mathematics among the students who have generally feared mathematics

VI. NEED FOR THE STUDY

The present world is changing rapidly, every sphere of human life is getting affected by this change. Growing young generation is required to cope-up with this change. They need to be quicker and sharper in every field of life. As it has been discussed above, that effective knowledge of mathematics can play a vital role in making a student more reasoned, seasoned and sharper.

It has been observed recently that students are not taking interest in mathematics subject at primary and upper primary level and thus the enrollment in class IX in science stream especially maths stream is reducing markedly. Government is serious to bring change in this scenario because if this scenario doesn't change India will lag behind in the field of science and technology.

Going through the review of related literature and looking at the fact that students' interest is reducing in mathematics, the researcher thought that if mathematics is made interesting and easier for learners there interest can be regenerated. Besides, the researcher found that dependency on calculator is also affecting the calculation ability of the students especially at primary and upper primary level. The researcher also found that it appears that vedic mathematical pattern can be easily understandable for the students. It also appears that if students find it easy to do arithmetical calculations their interest in mathematics can also be regenerated. Thus the researcher decided to undertake a research work on the below given topic.

VII. STATEMENT OF THE TOPIC

"The effect of Vedic System of Mathematical operations on Logical Reasoning of the Learners."

VIII. OBJECTIVE

To study the effect of Vedic System of Mathematical operations on Logical Reasoning of the Learners.

IX. HYPOTHESIS

There will be no significant difference in the ability of Logical Reasoning between the students learning Mathematical Operations from Vedic System and Present System.
Research Type: The present study is Descriptive research.
Population: Class VIII Students of the Lucknow city have been the population of the study
Sampling & Sample Size: Simple Random Sampling has been done in the proposed research.

Tool: 1. A standardized non verbal logical reasoning test.
Statistics: t-test has been applied.

X. RESULT AND DISCUSSION

Objective
To study the effect of Vedic System of Mathematical operations on Logical Reasoning of the Learners.
Hypothesis.
There will be no significant difference in the ability of Logical Reasoning between the students learning Mathematical Operations from Vedic System and Present System.

Table-1 (Pre-Test)

Logical Reasoning Ability	N	M	Sd	t
Pre-Test of Students taught with Vedic System	20	12.7	1.49	.75 p>.05
Post-Test of Students taught with Present System	20	12.8	1.51	

Result:
Table 1(Pre-Test) shows that the mean values of scores of test on Logical Reasoning Ability of students taught with Vedic System and Students taught with Present System are 12.7 and 12.8 respectively, with S.D. value of 1.49 and 1.51 respectively. 't' value between two means is .75, which is statistically not significant ($p > .05$).

Table-1 (Post-Test)

Logical Reasoning Ability	N	M	Sd	t
Post-Test of Students taught with Vedic System	20	35.1	3.01	4.23 p<.01
Post-Test of Students taught with Present System	20	28.1	3.32	

Result:
Table 1 (Post-Test) shows that the mean values of scores of test on Logical Reasoning Ability of students taught with Vedic System and Students taught with Present System are 35.1 and 28.1 respectively, with S.D. value of 3.01 and 3.32 respectively. 't' value between two means is 4.23, which is statistically significant ($p < .01$). Thus the Hypothesis is rejected. The Mean value of the score of students taught with Vedic System is higher than the Students taught with Present System, it means that students taught with Vedic System shows marked improvement in Logical Reasoning Ability.

XI. CONCLUSION

The result shows that the students taught with Vedic System of mathematical operations showed marked improvement in Logical Reasoning Ability than the students taught with present system of mathematical operations.

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