

## Reviving Ancient Indian Heritage: The Impact of Vedic Mathematics Sutras on Third Graders' Attitudes Towards Mathematics, with a Gender-Based Perspective

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### Abstract:

Education is the bedrock of any nation, shaping future generations and establishing the foundation for a thriving society. In this context, a paradigm shift towards skill-based education, instead of rote memorization, is imperative for nurturing critical thinking, problem-solving abilities, and lifelong learning skills. Mathematics, often perceived as a daunting subject by many students, necessitates a transformative approach to foster a deeper understanding and skill development.

Despite its importance, Mathematics is often seen as one of the most difficult subjects in the school curriculum. Many students find it challenging because it involves abstract concepts, and logical reasoning, and requires building upon prior knowledge. This perception leads to a significant number of students developing a negative attitude towards the subject, often resulting in avoidance and poor performance. Consequently, there is an imperative need to probe innovative teaching methods that will make learning mathematics an enjoyable and engaging experience.

Vedic Mathematics, an ancient system of mathematical principles derived from the Vedas, offers a hidden treasure trove of techniques that can simplify and enhance the learning of mathematics. These sutras, or aphorisms, provide students with strategies that are both intuitive and efficient, enabling them to solve complex mathematical problems with ease and confidence. The simplicity and elegance of Vedic Mathematics not only facilitate a more profound comprehension of mathematical concepts but also transform the learning process into an enjoyable and blissful experience.

This study seeks to explore how teaching methods based on Vedic Mathematics sutras influence students' attitudes toward learning mathematics, specifically focusing on gender differences. By examining the enduring efficacy of this instructional approach, we seek to determine whether Vedic Mathematics can foster a more positive attitude towards mathematics among eighth-grade students. Our goal is to provide insights into how gender influences the receptiveness to and benefits from Vedic Mathematics, ultimately contributing to the development of more productive, inclusive, and engaging strategies to teach mathematics.

The study involved 160 third-grade students, including a control group and an experimental group. A 'Pre-test and post-test nonequivalent control group design' was adopted in this study. The Vedic mathematics instruction applied in the experiment group employed for girls and boys separately indicates a significantly higher mean Attitude score.

**KEYWORDS:** Vedic mathematics, Attitudes towards learning mathematics, Third-Grade students.

### Introduction:

Education is the means to unlock the inherent potential within individuals, making them more productive in their actions. Mathematics plays a crucial role in education, serving as the foundation for logical reasoning, abstract thinking, and the development of analytical skills. Given its importance, learning mathematics is essential as it underpins every subject. The effectiveness of learning mathematics is highly dependent on the methods used in teaching.

According to the National Curriculum Framework for School Education (2005), "The school curriculum aims to enable learners to acquire knowledge, develop understanding, and inculcate skills, positive attitudes, values, and habits conducive to the all-round development of their personality." While the current curriculum embodies these values, there is room to emphasize diverse methods that make learning mathematics enjoyable and effective.

Many students perceive mathematics as difficult due to the time, patience, and effort required to solve problems. As a result, a significant number of students tend to avoid engaging with the subject. Vedic Mathematics, an ancient system, offers an approach that simplifies and accelerates the learning process, making mathematics more accessible and enjoyable.

This study examines the impact of Vedic Mathematics on the attitudes of third-grade boys and girls towards learning mathematics, aiming to determine its impact on their performance and creating a positive attitude towards the subject.

#### **Vedic Mathematics:**

Vedic Mathematics was revitalized by Indian monk Swami Bharati Krishna Tirthaji Maharaj. The term 'Veda' is derived from Sanskrit, meaning 'knowledge'. Vedic Mathematics comprises sixteen sutras and thirteen sub-sutras, which facilitate the joyful execution of all mathematical calculations. Complex mathematical problems involving many formulas and numerous steps can be solved in just a few steps using Vedic Mathematics. This approach applies not only to basic arithmetic operations but also to higher mathematics, including algebra, trigonometry, calculus, integration, differentiation, and more. However, since this study involves only third-grade students, only basic arithmetic operations were taught.

Several studies have explored the effectiveness of Vedic Mathematics in enhancing students' mathematical abilities. Smitha (2014) conducted research focusing on the ancient Indian treasure of the Vedic Algorithm, specifically the 'Anurupyena' method. This study involved 240 secondary students selected using cluster sampling. The results indicated that the Vedic sutra 'Anurupyena' significantly increased students' computational speed compared to traditional methods. Rajesh (2015) analyzed the effectiveness of Vedic Mathematics in secondary students' achievement. The study involved 200 students, equally divided between boys and girls from grades 9 and 10, using stratified random sampling. The results showed that both boys and girls achieved higher scores in mathematics when taught using Vedic methods than the traditional method. Dhivyadeepa (2014) investigated the effect of Vedic Mathematics on subtraction performance in 24 fourth-grade students using a parallel group experimental method. The post-test scores of the experimental group compared to the control group showed a significant difference, indicating the effectiveness of Vedic methods. Vyas (2020) studied the impact of Vedic Mathematics on ninth-grade students' mathematical achievement using a post-test equivalent group experimental design with 160 students. The findings indicated that Vedic Mathematics was more effective than conventional methods, particularly for lower-achieving students and boys. Amulya (2021) explored the impact of the Vedic method on multiplication for the sixth standard in an experimental setting with 58 sixth-grade students. Randomized pre-test and post-test equivalent group design was used in this study. The results showed that the Vedic method significantly improved students' multiplication skills compared to traditional methods and on gender analysis there was no difference in the students taught through Vedic methods. These studies collectively demonstrate the potential of Vedic Mathematics to enhance mathematical learning and performance across different grade levels and genders.

#### **Attitude toward learning mathematics:**

Learning mathematics is often perceived as challenging by many students due to the complexity of formulas and methods. The learning method has a significant impact on one's attitude towards the subject. A positive attitude towards learning mathematics empowers students to understand concepts more deeply and attain higher proficiency in the subject. This study explores the attitude towards learning mathematics among third-grade students, examining the impact of Vedic methods on their attitude towards the subject.

Allport specifies attitude as "a mental or neural state of readiness organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related." Attitude is a state of readiness to act that is either favorable or unfavorable. A person's attitude towards mathematics reflects their feelings about the subject. As the subject of Mathematics plays a crucial role in life, proficiency in mathematics is advised to be more essential both socially and individually.

The learning of mathematics is influenced by various aspects, which include attitude toward the subject, teaching methods, and the surrounding environment. Positive attitudes towards mathematics are essential for achieving expected proficiency. A lack of a positive attitude can lead to aversion to the subject. A positive attitude serves as a catalyst, enhancing cognitive function and enabling intelligent problem-solving. It brings achievement closer and drives individuals towards excellence.

Mensah (2013) conducted a study to investigate the attitudes of both students and teachers toward mathematics and discovered a significant relationship between students' attitudes toward mathematics and their performance in the subject. Mzomwe (2019) pointed out that while attitude towards the subject is important, it is not the only factor influencing the learning of mathematics. Other factors, such as the strategies used by teachers to convey instructions, also play a crucial role. Kumar (2020) investigated the relationship between attitude toward mathematics and achievement in mathematics and found it to be significant. Das (2015) also found a significant relationship between students' attitudes towards mathematics and their achievement in the subject. Sujata (2017) attempted to examine the significant variation in attitudes based on gender and found no such variation, but found a significant correlation between achievement in mathematics and attitude towards the subject.

**Methodology:**

The experimental method is a scientific approach to addressing research problems. This study employs specifically a Pretest-Post-test Non-Equivalent Group Design, to achieve its objectives. Grade III students were selected using a convenient sampling technique.

**Sample:**

A total of one hundred sixty students from III standard were taken for this study. The selection process utilized a convenient sampling technique, which involves choosing participants based on their availability and ease of access. This method, while not random, is practical for initial exploratory research where ease and speed of sampling are prioritized.

The sample was partitioned into two groups the experimental group, which received instruction using Vedic methods, and the group, which continued with the standard curriculum is the control group. Both groups underwent a pretest to establish baseline measures of their attitudes toward mathematics. After the intervention period, a post-test was conducted for the two groups to assess any difference in their attitudes.

Table 1:

*Sample Distribution of the Study*

| Gender | Experimental group | Controlled group | Total |
|--------|--------------------|------------------|-------|
| Boys   | 39                 | 25               | 64    |
| Girls  | 41                 | 55               | 96    |
| Total  | 80                 | 80               | 160   |

**Tools:**

The researcher developed a comprehensive instructional module and an "Attitude Towards Learning Mathematics" scale. The module, aligned with the Tamil Nadu State Board syllabus for third grade, elucidates the concepts and procedures necessary for understanding basic arithmetic operations such as addition, subtraction, and multiplication.

Initially, the "Attitude Towards Learning Mathematics" scale comprised 45 items. After receiving feedback from two education experts, it was reduced to 36. The scale was standardized by conducting a pilot study, during which item analysis and item discrimination were performed. This process resulted in the scale being further refined to 20 items.

**Objectives:**

1. To examine the impact of Vedic mathematics-based instruction on the attitude towards learning mathematics of the control group and experimental group for the sample employed for girls and boys separately.
2. To compare the difference in the mean post-test score of attitude toward learning mathematics of third-grade students based on their gender for both the control and experimental groups separately.

#### Hypothesis:

1. Vedic mathematics-based instruction does not affect the attitude towards learning mathematics of the control group and experimental group for the sample employed for girls and boys separately.
2. There exists no significant difference in the mean post-test score of the attitude toward learning mathematics of third-grade students based on their gender for both the control and experimental groups separately.

#### Need of the study:

Attitude is a critical factor that measures the level of one's success. It encompasses one's mindset, outlook, and disposition towards various tasks and challenges. A positive attitude of a person will enable him to approach a task with enthusiasm, persistence, and confidence. Consequently, a positive attitude not only enhances the quality of effort put into action but also significantly increases the likelihood of achieving excellence. The study was conducted to create a fearless and enjoyable learning environment to learn mathematics. Vedic mathematics is instrumental in helping students understand concepts easily, enabling them to learn mathematics without fear or dislike. This approach aims to foster a positive attitude towards learning mathematics.

#### Limitation of the study:

The generalizability of the findings is restricted by these limitations:

- The selected samples were limited to Gudalur.
- The samples included in the study were only 160.
- Only students in third grade from primary schools were involved in the study.

#### Analysis:

**Hypothesis 1:** Vedic mathematics-based instruction does not affect the attitude toward learning mathematics of the control group and experimental group for the sample employed for girls and boys separately.

The researcher aims to determine whether there is a significant difference in the attitudes towards learning mathematics between the control group and the experimental group, based on the Vedic mathematics instruction, for the sample employed, separately for girls and boys.

Table 2

*Test of Significance in the Mean Post-test Scores of Achievement Test and Attitude Test of Control and Experimental Group for the subsample Gender*

| Sub Sample    | Variable | Group        | <i>n</i> | <i>M</i> | <i>SD</i> |        | <i>p</i>          |
|---------------|----------|--------------|----------|----------|-----------|--------|-------------------|
| Boys<br>Girls | Attitude | Control      | 55       | 40.15    | 6.66      | 6.456* | <i>p</i> < 0.0001 |
|               |          | Experimental | 41       | 50.36    | 6.32      |        |                   |
|               | Attitude | Control      | 25       | 35.72    | 7.60      | 6.346* | <i>p</i> < 0.0001 |
|               |          | Experimental | 39       | 46.02    | 6.29      |        |                   |

Note. \*\* denotes the value is significant at the .01 level

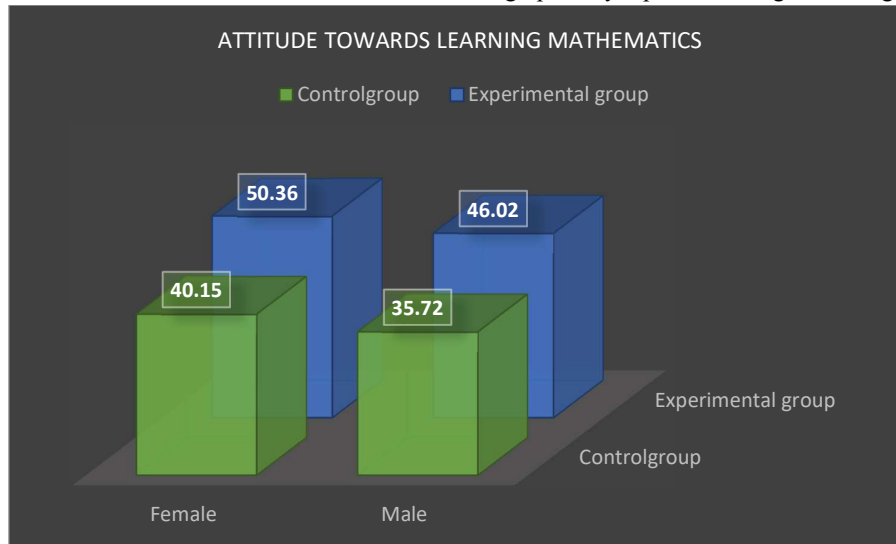
The *t* value calculated for the post-test score of attitudes toward the mathematics of the group taught through the conventional method and group taught through the Vedic method of girls is 6.456 which is greater than the table value and hence can be said that the difference is significant at 5 percent level of significance. It was found that the value of the mean of the experimental group was higher than the obtained value of the

control group.

It is also clear that the test of significance of the post-test score attitude of the students taught through the traditional method and students taught through the Vedic method for male students gives a  $t$  value of 6.346. The obtained  $t$  value is higher than the table value of 1.96 and hence the significance is said to be significant at a .05 level of significance.

**Discussion.** The significance test of the mean post-test value of attitude between the students taught through the traditional method and the students taught through the Vedic method employed for girls and boys separately shows that the experimental group obtains higher mean attitude scores. This denotes that the Vedic method applied in the III standard experiment group has a positive impact on the attitude toward mathematics. Hence Hypothesis 1 is rejected.

The difference in the mean score can be graphically represented as given in Figure 1.



**Hypothesis 2:** There exists no significant difference in the mean post-test score of the attitude toward learning mathematics of third-grade students based on their gender for both the control and experimental groups separately.

The impact of Vedic mathematics on the attitude towards the mathematics of school students for gender was compared using the test. The results are given in Table 3.

Table 3

*Test of Significance of Difference in the Mean Post-test Scores of Attitude based on gender*

| Variable |              |            |     |       |      |      |
|----------|--------------|------------|-----|-------|------|------|
|          | Group        | Sub sample | $n$ | $M$   | $SD$ | $p$  |
| Attitude | Control      | Girls      | 41  | 16.16 | 2.25 | .498 |
|          |              | Boys       | 39  | 14.89 | 2.22 |      |
|          | Experimental | Girls      | 41  | 50.36 | 6.32 | 1.44 |
|          |              | Boys       | 39  | 46.02 | 6.29 |      |

The table shows that there is no difference in the attitude towards learning mathematics of boys and girls instructed by conventional method and Vedic method. It is seen that the attitude of girls taught by the conventional method is better than that of boys, but there was no difference in the attitude based on gender taught by Vedic mathematics-based instruction. Hence hypothesis 2 is accepted.

**Findings of the study:**

1. The mean post-test score of girls in the students taught through the Vedic method is significantly greater than those of the students taught through the traditional method.
2. The mean post-test score of boys from the students taught through the Vedic method is significantly higher than the mean post-test score of the students taught through the traditional method.
3. The Vedic mathematics method is found to be significantly effective in contrast to the conventional method of mathematics teaching.
4. The Vedic method applied in the experiment group has a positive effect on the attitude toward mathematics
5. It is found that the attitude of girls taught by the conventional method is better than that of boys.

**Educational implications:**

This study was conducted to explore whether incorporating ancient Vedic-based math learning could make mathematics more engaging and create a positive attitude toward learning mathematics. The researcher found that Vedic-mathematics-based instruction has brought a considerable change in the attitudes of III-standard students toward learning mathematics. However, this study can emphasize the implementation of Vedic math strategies in schools. It may inspire some teachers or educators to delve deeper into Vedic mathematics and its potential benefits.

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