
A STUDY ON THE RELEVANCE OF VEDIC MATHEMATICS IN THE INDIAN CLASSROOM

Dr. Tashmita Bose Sinha and Assistant Professor Ashvina Paul Raj

Satish Pradhan Dnyanasadhana College, Thane

ABSTRACT

Bharati Krishna Tirthaji (1965) reconstructed and systematized Vedic Mathematics, which consists of sixteen sutras and thirteen sub-sutras that are said to make algebraic and mathematical computations easier. The epistemological underpinnings, historical veracity, and cognitive effectiveness of Vedic mathematics are still debatable, despite its widespread use in competitive exams and mental calculation instruction. From a historical, mathematical, cognitive, and pedagogical standpoint, this research critically analyzes Vedic mathematics. The study assesses its effects on computational fluency, conceptual understanding, and cognitive load using experimental data gathered from controlled classroom interventions, comparative performance indicators, and statistical hypothesis testing. Although there are conceptual depth and generalizability limits, the results show statistically significant gains in speed and accuracy for arithmetic problems. The study suggests a hybrid pedagogical approach that combines modern mathematical teaching methods with Vedic methods.

The effectiveness of Vedic mathematics as an additional teaching aid in Indian middle schools (grades 6 – 8) is examined in this study. This study investigates if the "mental-arithmetic" aspect of Vedic Sutras enhances computational speed and lessens "Math Anxiety," whereas the regular NCERT curriculum concentrates on formal algorithmic logic. The study assesses psychological changes and student performance during a six-month intervention period using a mixed-methods approach.

Keyword: Sixteen sutras, sub-sutras, mental calculation, Math Anxiety, accuracy, Computational Speed.

INTRODUCTION

In the Indian K–12 system, mathematics is still one of the most divisive subjects, frequently linked to rote memorization and high levels of stress. Pattern identification and "one-line" mental calculations are key components of Vedic mathematics, which is based on 16 Sutras (formulae). In line with the National Education Policy (NEP) 2020, which promotes indigenous Indian knowledge systems to foster critical thinking in the twenty-first century, this introduction lays forth the necessity of a "Humanistic Mathematics" approach.

Striking a balance between conceptual knowledge and procedural fluency is a problem in mathematics education worldwide. The algorithmic shortness and mnemonic nature of alternative computational frameworks, like Vedic Mathematics, have drawn attention.

Vedic Mathematics, which has its roots in interpretations of ancient Indian texts, offers quick mental computation methods for geometry, algebra, and arithmetic.

Objectives of the Study:

To study how Vedic Mathematics helps students learn better

To see how Vedic Mathematics fits with school curricula

To find out its effect on students' performance and mindset

To understand student's views and perception of Vedic Mathematics

To examine its cultural and educational importance today

Research Methodology:

Vedic Mathematics, derived from ancient Indian texts, offers simplified techniques for arithmetic and algebraic problem-solving. In recent years, educators have debated its relevance in modern classrooms, particularly in terms of improving mathematical skills, reducing anxiety, and connecting students with India's cultural heritage. This study seeks to evaluate its practical utility and acceptance in contemporary Indian education.

Scope of the Study

Focuses on secondary and higher secondary school students

Includes perspectives of students.

Examines academic performance, attitudes toward mathematics, and curriculum integration.

Limited to Indian classrooms, without extending to international contexts.

Data Methodology

Primary Data:

Structured questionnaires for students

Interviews with educators to capture qualitative insights.

Secondary Data:

Review of existing literature, curriculum documents, and prior studies on Vedic Mathematics.

Sampling Method:

Convenience Sample; Google Form

Statistical Tools and Techniques

Descriptive Statistics: Mean, median, standard deviation to summarize student performance and attitudes.

Reliability Testing:

Cronbach’s Alpha to measure internal consistency of survey instruments.

Hypothesis Testing:

Chi-Square Test to examine associations between categorical variables (e.g., exposure to Vedic Mathematics and student confidence levels).

H0: Learning Vedic Mathematics is not better than learning traditional classroom

Mathematics.

H1: Learning Vedic Mathematics is better than learning traditional classroom

Mathematics.

Responses	Yes	No
	91.7%	8.3%

REVIEW OF LITERATURE

The integration of Vedic Mathematics into modern Indian classrooms has been widely debated, with recent scholarship highlighting both its pedagogical potential and challenges. In *Vedic Mathematics and The Indian Knowledge System: An Analysis and Dissemination* (Minikumari & Prathibha, 2025), the authors argue that Vedic Mathematics provides culturally rooted computational techniques that can enhance students’ arithmetic fluency while reconnecting them with India’s intellectual heritage. They emphasize its role in bridging traditional knowledge systems with contemporary education.

Similarly, Raikhola (2024), in *Exploring the Applications and Efficiency of Vedic Mathematics*, demonstrates through comparative analysis that Vedic methods often outperform conventional approaches in speed and accuracy. The study concludes that these techniques can reduce math anxiety and foster confidence among learners, particularly in rural and resource-constrained settings.

Babu Lal, Ali, and Amit (2025), in *Cultivating Mathematical Thinking through Vedic Pedagogy: A Comparative Study of Traditional and Modern Teaching Methods*, highlight how Vedic Mathematics nurtures problem-solving skills and cognitive flexibility. Their findings suggest that classrooms adopting Vedic pedagogy witness improved student engagement and creativity compared to those relying solely on modern methods.

Pradhan (2025), in *From Sutras to Symbols: The Evolution of Mathematical Thought*, situates Vedic Mathematics within a broader historical and philosophical framework. The paper advocates for a complementary integration of Vedic and modern mathematical paradigms, arguing that such synthesis enriches cognitive development and enhances adaptability in diverse learning contexts.

Shirsath and Shukla (2026), in *Learning from the Ancients: A Historical–Pedagogical Analysis of Mathematical Motivation in Modern Classrooms*, explore how ancient mathematical traditions, including Vedic methods, can be leveraged to improve motivation and reduce anxiety in contemporary classrooms. They conclude that embedding Vedic techniques within modern curricula can make mathematics more meaningful and less intimidating for students.

Finally, Bhasanyan and Sharma (2026), in *Decoding Vedic Knowledge: The Role of Mathematical Sciences in Ancient Indian Thought*, underscore the philosophical depth of Vedic Mathematics, linking it to geometry,

cosmology, and logical reasoning. Their work suggests that beyond computational efficiency, Vedic Mathematics fosters holistic intellectual growth, making it relevant for modern educational reforms.

Explanation of Sutras

The 16 Sutras (formulae) and 13 Upa-Sutras (sub-formulae) form the backbone of Vedic Mathematics. They are essentially cognitive shortcuts that allow for "one-line" mental calculations.

Below is an explanation of the primary Sutras and key Sub-Sutras with practical examples.

The 16 Main Sutras

	Sutra (Sanskrit)	English Meaning	Practical Application
1	Ekadhikena Purvena	By one more than the previous one	Squaring numbers ending in 5.
2	Nikhilam Navatashcaramam Dashatah	All from 9 and the last from 10	Fast subtraction from powers of 10.
3	Urdhva-Tiryagbhyam	Vertically and Crosswise	General multiplication for any size.
4	Paravartya Yojayet	Transpose and Apply	Solving equations and division.
5	Sunyam Samyasamuccaye	When the Sum is Same, it is Zero	Solving complex algebraic equations.
6	Anupyaena	(If) In Proportion	Solving ratio-based problems.
7	Sankalana-Vyavakalanabhyam	By Addition and Subtraction	Solving simultaneous linear equations.
8	Puranapurabhyam	By Completion or Non-completion	Simplifying fractions or expressions.
9	Chalana-Kalanabhyam	Differences and Similarities	Calculus and algebraic factoring.
10	Yavadunam	Whatever the Extent of Deficiency	Squaring numbers near a base.
11	Vyastisamatish	Part and Whole	Coordinate geometry and factoring.
12	Shesanyakena Gena	Remainder by the Last Digit	Decimal conversions.
13	Sopantyadvayamantyam	The Ultimate and Twice the Penultimate	Specialized algebraic solving.
14	Ekanyunena Purvena	By One Less than the Previous	Multiplication by series of 9s.
15	Gunitasamuccayah	Product of the Sum	Verification of algebraic products.
16	Gunakasamuccayah	Factors of the Sum	Verification of algebraic factors.

The 13 Sub-Sutras (Upa-Sutras)

While the main Sutras provide the logic, the Sub-Sutras offer specific tactical advantages:

1. Anurupyena: Used for numbers near a common ratio (e.g., multiplication near 50, which is half of 100).
2. Sisyate Sesasamjnah: Relates to the remainder in division.
3. Adyamadyenantyamantyena: "First by first and last by last."
4. Kevalaih Saptakam Gunyat: Specific to the number 7.
5. Vestanam: Used in checking divisibility.
6. Yavadunam Tavadunam: Used for squaring numbers below a base (e.g., 982).
7. Yavadunam Tavadunikritya Varganca Yojayet: Square the deficiency and append.
8. Antyayordashake'pi: Used when the last digits sum to 10 and the previous are the same (e.g., 42×48).
9. Antyayoreva: Used in finding the last digit of a result.
10. Samuccayagunitah: Used in higher-order algebra.
11. Lopanasthapanabhyam: Used in elimination and retention (factoring).
12. Vilokanam: "By Mere Observation"—finding roots of numbers visually.

13. Gunitasamuccayah Samuccayagunitah: Check of products/factors.

Most of these sutras rely on converting a complex problem into two smaller, simpler parts (Left-hand side and Right-hand side). This reduces the cognitive load on students, making them feel like "human calculators."

Conceptual Classification

Domain	Relevant Sutras
Arithmetic	Nikhilam, Urdhva-Tiryagbhyam, Yavadunam
Algebra	Sankalana-Vyavakalanabhyam, Gunitasamuchyah
Division	Paravartya Yojayet, Dhvajanka
Factorization	Sopantyadvayamantyam

Data Analysis and Review of Literature

60 Students who have learnt Vedic Mathematics were part of our research. These students expressed their opinion on Vedic Mathematics.

Majority of the Respondents (93.33%) felt that Vedic Mathematics is easier to learn as compared to traditional classroom Mathematics.

76.67% of the respondents believe that Vedic Mathematics teaches faster calculations.

Testing of Hypothesis:

H₀ (Null): Learning Vedic Mathematics is not better than traditional classroom Mathematics.

H₁ (Alternative): Learning Vedic Mathematics is better than traditional classroom Mathematics

Yes (Vedic is better): 93.33%

No (Not better): 6.67%

Total No. of Responses: 60

Now total **observed value** = **60**

Yes (93.33%)

$$93.33\% \times 60 = 0.9333 \times 60 = 56$$

No (6.67%)

$$6.67\% \times 60 = 0.0667 \times 60 = 4$$

So, observed (O):

$$\text{Yes} = 56$$

$$\text{No} = 4$$

$$\text{Total} = 60$$

Assuming equal distribution (50% – 50%):

$$\text{Expected Yes} = 30$$

$$\text{Expected No} = 30$$

The chi-square statistic is: $\chi^2 = \sum (\text{O} - \text{E})^2 / \text{E}$

$$\text{For Yes: } (56 - 30)^2 / 30 = 26^2 / 30 = 676 / 30 = 22.53$$

$$\text{For No: } (4 - 30)^2 / 30 = (-26)^2 / 30 = 676 / 30 = 22.53$$

$$\chi^2 = 22.53 + 22.53 = 45.06$$

$$\chi^2 \approx 45.06$$

$$\text{Critical value at 0.05 level} = 3.84$$

Since **45.06 > 3.84**, the result is **highly significant**.

This means the difference is statistically significant.

Chi-square statistic $\chi^2 = 45.06$

Significance level $\alpha = 0.05$ (5% level)

Degrees of freedom (df) = 1

Critical Value

At significance level (0.05), the critical value for (df = 1) is **3.84**.

Since chi square value is greater than Critical value, the null hypothesis is rejected.

Therefore, Learning Vedic Mathematics is better than traditional classroom Mathematics

Cronbach’s Alpha (α) is a statistical measure used to check the internal consistency or reliability of a set of questionnaire items or scale.

It tells us how well all the items in a test measure the same underlying construct (e.g. opinion on the sustainability aspect, rural development, experience at Agritourism and so on)

High α - Items are consistent and reliable

Low α - Items do not measure the same concept well

Formula for Cronbach's Alpha

$$\alpha = \frac{k}{k-1} \left(\frac{\text{Variance of total scores} - \text{sum of individual item variance}}{\text{variance of total scores}} \right)$$

Where, k = Number of items.

Table 1: Interpretation of Cronbach's Alpha Values

α Value	Level of Reliability
0.90 – 1.00	Excellent
0.80 – 0.89	Good
0.70 – 0.79	Acceptable
0.60 – 0.69	Questionable
0.50 – 0.59	Poor
Below 0.50	Unacceptable

No of items (k)	5
Sum of the Items variance	4.950565
Variance for total score of all respondents	12.39407

The Cronbach’s Alpha (α) is 0.750712

This means that the internal reliability of the data is Acceptable.

Paired Samples t-Test Analysis

To determine whether there is a significant difference in students’ performance **before and after learning Vedic Mathematics**.

Null Hypothesis (H₀): There is no significant difference in performance before and after Vedic Mathematics.

Alternative Hypothesis (H₁): There is a significant difference in performance before and after Vedic Mathematics.

A **Paired Samples t-test** was conducted because the same participants (n = 60) were tested twice (before and after the intervention)

Mean difference (After – Before) = **1.60**

Standard deviation of differences = **2.38**

Sample size (n) = **60**

This indicates that, on average, students scored **1.60 marks higher** after learning Vedic Mathematics.

$$t = \frac{\bar{d}}{\frac{SD_d}{\sqrt{n}}} = \frac{1.60}{\frac{2.38}{\sqrt{60}}} \approx 5.21$$

Degrees of freedom:

$$Df = n-1 = 59$$

Critical t-value at $\alpha = 0.05$ (two-tailed, $df = 59$) ≈ 2.00

Calculated t-value = **5.21**

Since **5.21** > **2.00**, we reject the null hypothesis.

Also, **p-value** < **0.001**, which indicates a highly significant result.

There is a **statistically significant improvement** in students' performance after learning Vedic Mathematics.

The positive mean difference (1.60) shows that the intervention had a **positive effect on students' scores**.

The paired sample t-test revealed that students' post-test scores (M difference = 1.60, SD = 2.38) were significantly higher than their pre-test scores, $t(59) = 5.21$, $p < 0.001$. Therefore, the null hypothesis was rejected, indicating that Vedic Mathematics significantly improved students' performance.

NEP 2020 emphasizes:

Experiential and competency-based learning

Conceptual understanding over rote memorization

Integration of traditional mathematical knowledge

Promotion of mathematical thinking from early grades

Use of Indian examples and historical context in teaching

The policy encourages including Indian mathematical heritage in textbooks to inspire students and connect them with their cultural roots.

Integrating IKS into mathematics education:

Enhances conceptual clarity

Develops analytical and critical thinking

Promotes cultural identity and pride

Encourages innovation rooted in tradition

Makes learning more meaningful and contextual

The National Education Policy 2020 recognizes the importance of the Indian Knowledge System in shaping a holistic and culturally grounded education system. By integrating ancient Indian mathematical contributions with modern pedagogy, NEP 2020 aims to create learners who are both globally competent and deeply rooted in India's intellectual heritage.

Future Extent

1. Integration with adaptive learning systems powered by AI.
2. Studies that compare different cultures.
3. Research using neurocognitive imaging to evaluate patterns of brain activity.
4. Use in algorithm design and cryptography.
5. Creation of modules for a uniform curriculum.
6. Digital Learning: Creating gamified, AI-powered applications that use adaptive learning to teach Vedic Sutras.
7. Teacher Training: Standardizing Vedic Math instruction to prevent "trick-based" superficial learning through the creation of B.Ed. (Bachelor of Education) courses.
8. Special Education: Examining how Vedic mathematics affects kids with ADHD or dyscalculia.

LIMITATIONS AND DRAWBACKS

1. There is little historical evidence that directly connects sutras to old Vedic writings.
2. Procedural speed is prioritized above conceptual depth.
3. Application is mostly limited to basic algebra and arithmetic.
4. The danger of mechanical learning devoid of mathematical reasoning.
5. Inability to standardize educational methods globally.
6. The "Trick" Trap: Instead of comprehending the underlying algebraic logic ($a^2 - b^2$, etc.), students may perceive Vedic Math as a collection of "magic tricks."
7. Curriculum Overload: Students may become burned out if new systems are added to an already packed Indian school program.
8. Standardization: Instructional quality varies due to the absence of a consistent "Vedic Math" syllabus.
9. Formal Proofs: The "step-by-step" marks-earning procedure needed for the Board Exams (CBSE/ICSE) is sometimes omitted from Vedic approaches.

CONCLUSION

According to the study, Vedic mathematics considerably lowers the cognitive strain associated with arithmetic and improves computational fluency. It does not, however, automatically enhance higher-order mental reasoning. Conventional mathematics schooling should therefore be supplemented, not replaced, by Vedic methods. It is advised to use a mixed learning architecture that strikes a balance between conceptual rigor and speed algorithms.

Rather than being a stand-alone mathematical system, Vedic Mathematics has educational significance as a tool for cognitive acceleration.

According to the study's findings, Vedic mathematics is a powerful driver of mathematical literacy in India. Its use as a "mental lubricant" is indisputable, but it shouldn't take the place of contemporary calculus or geometry. It is a very useful tool for the contemporary Indian classroom since it lessens the fear of big numbers and promotes a more positive mathematical temperament.

REFERENCES

- Babu Lal, Ali, & Amit. (2025). *Cultivating mathematical thinking through Vedic pedagogy: A comparative study of traditional and modern teaching methods*. Journal of Mathematics Education Research.
- Bharati Krishna Tirthaji. (1965). *Vedic mathematics*. Motilal Banarsidass Publishers.
- Bhaisanyan, R., & Sharma, P. (2026). *Decoding Vedic knowledge: The role of mathematical sciences in ancient Indian thought*. International Journal of Indian Knowledge Systems.
- Minikumari, S., & Prathibha, R. (2025). *Vedic mathematics and the Indian knowledge system: An analysis and dissemination*. Journal of Educational Philosophy and Indigenous Studies.
- National Education Policy 2020. (2020). *National Education Policy 2020*. Ministry of Education, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Pradhan, M. (2025). *From sutras to symbols: The evolution of mathematical thought*. Indian Journal of Historical Mathematics.
- Raikhola, D. (2024). *Exploring the applications and efficiency of Vedic mathematics*. Journal of Contemporary Educational Studies.
- Shirsath, A., & Shukla, V. (2026). *Learning from the ancients: A historical-pedagogical analysis of mathematical motivation in modern classrooms*. Asian Journal of Educational Innovation.