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Exploring Teacher Trainees' Perceptions and Performance with Vedic Mathematics Techniques

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Abstract: This study explores the influence of Vedic Mathematics on problem-solving efficiency among teacher trainees at Dr. H.R. Gajwani College of Education. Participants completed two sets of worksheets—one using traditional methods and the other after a session on Vedic Mathematics. The results reveal that 62.1% of participants solved problems in under 5 minutes using Vedic Mathematics, compared to 0% with traditional methods, while 75.8% achieved perfect accuracy compared to 40.9%. Additionally, the study evaluates trainees' perceptions of Vedic Mathematics, focusing on its perceived usefulness, ease of understanding, and appeal. The findings highlight how integrating this ancient mathematical system into modern educational practices could significantly enhance teaching and learning experiences.

Keywords: *Vedic Mathematics, Problem-Solving, Traditional Methods, Teacher Trainee's Perception, Comparative Analysis,*

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I. INTRODUCTION

While foundational, conventional approaches to mathematics education can sometimes inadvertently hinder the cultivation of profound conceptual understanding and genuine enthusiasm for the subject. For numerous learners, the emphasis on procedural adherence and rote memorization may render mathematics a formidable endeavor, potentially impeding the development of creative problem-solving abilities and flexible thinking. Traditional methodologies, while essential, may prioritize the attainment of a correct solution through a prescribed algorithm, at times overshadowing the underlying conceptual rationale. Furthermore, an over-reliance on external aids can potentially limit the development of robust mental calculation proficiencies.

In contrast, Vedic Mathematics, with its inherent emphasis on intuitive and often more concise methodologies, presents an alternative pedagogical avenue. This system has the potential to transform mathematical computation from a perceived obligation into a more engaging intellectual exercise, potentially fostering heightened interest and motivation. By offering diverse strategies for addressing mathematical problems, it may also facilitate a deeper comprehension of the interconnectedness of mathematical principles, moving beyond mere procedural execution.

This research endeavors to examine the experiences of teacher trainees – the future architects of mathematical learning for subsequent generations – with Vedic Mathematics. By exploring their engagement with this ancient system, this study seeks to ascertain its potential to contribute to a more accessible, enjoyable, and ultimately, more thoroughly understood mathematical experience for their future students.

II. RESEARCH METHODOLOGY

This study employed a pre-test/post-test design involving a group of teacher trainees to explore the impact of a Vedic Mathematics session on their problem-solving efficiency and perceptions. The research was conducted at Dr. H.R. Gajwani College of Education and involved all participating teacher trainees.

➢ *Research Objectives:*

- To evaluate the perceived potential of integrating Vedic Mathematics as an innovative teaching tool for enhancing student engagement and performance.
- To analyze the perceived potential of Vedic Mathematics in fostering confidence and mental agility in problem-solving among teacher trainees.

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- To compare the time efficiency and accuracy of teacher trainees in solving mathematical problems using traditional methods versus Vedic Mathematics.
- To understand teacher trainees' perceptions of Vedic Mathematics in terms of its perceived usefulness, ease of understanding, and appeal.

➢ *Scope of the Study:*

The study included 66 teacher trainees from Dr. H.R. Gajwani College of Education in Gandhidham. The participants comprised a diverse group of first-year and second-year Bachelor of Education (B.Ed.) students, ranging in age from 20 to 30 years. Their prior mathematical experience varied from basic proficiency to more advanced problem-solving skills, and they also presented a range of prior teaching experiences and learning styles. The findings of this study are specific to this group of teacher trainees within this particular educational context.

➢ *Procedure:*

- *Initial Problem-Solving Activity with Traditional Maths Method (Pre-Test):*

All participating teacher trainees were given Worksheet 1. This worksheet contained a set of problems focusing on subtraction, multiplication, and squaring, solved using traditional mathematical methods. Under the supervision of facilitators, participants solved the problems. The time taken to complete the worksheet and the accuracy of their answers were recorded for each participant.

- *Vedic Mathematics Session (Intervention):*

A 40-minute interactive session was conducted for all participants, introducing them to fundamental principles and techniques of Vedic Mathematics. The session specifically focused on three core concepts:

✓ Addition: Techniques for faster addition.
✓ Multiplication: Specific Vedic methods for efficient multiplication.
✓ Complement Numbers: Understanding and utilizing the concept of complement numbers for simplification.

Facilitators employed demonstrations, group discussions, and problem-solving activities to ensure active engagement and understanding of these Vedic techniques.

- *Post-Session Problem-Solving Activity with Vedic Mathematics Method (Post-Test):*

Participants were provided with Worksheet 2. This worksheet contained problems of a similar type and difficulty level to those in Worksheet 1 (subtraction, multiplication, and squaring). Participants were instructed to solve these problems using the Vedic Mathematics techniques they had learned in the preceding session. The time taken for each participant to complete Worksheet 2 and the accuracy of their solutions were recorded.

- *Feedback Collection:*

Following the post-test, participants completed a structured feedback questionnaire administered via a Google Form.

- *The Questionnaire Included:*

✓ *Likert Scale Questions:*

To assess their perceptions regarding the usefulness, ease of understanding, interest/engagement, time-saving potential, accuracy improvement, confidence boost, and overall reception of Vedic Mathematics.

✓ *Open-Ended Questions:*

To gather qualitative data on their experiences, the most helpful techniques, challenges faced, and suggestions for incorporating Vedic Mathematics in education.

✓ *Observation:*

Throughout the Vedic Mathematics session, facilitators observed the participants' engagement levels, attentiveness, and enthusiasm. Anecdotal notes were taken to supplement the quantitative data.

➢ *Data Collection Tools:*

- *Worksheets (Worksheet 1 & Worksheet 2):*

These standardized worksheets served as the primary tools for measuring problem-solving efficiency (time taken) and accuracy before and after the Vedic Mathematics intervention. The problems in both worksheets were designed to be of equivalent difficulty and covered the same mathematical operations: subtraction, multiplication, and complement Number.

- *Feedback Form (Google Form):*

This structured questionnaire, comprising both Likert scale and open-ended questions, was used to collect data on participants' perceptions and experiences with Vedic Mathematics.

- *Observation:*

Facilitator observations provided qualitative insights into participant engagement during the intervention.

➢ *Addressing Potential Bias:*

It is important to acknowledge the potential for bias in this study. As participants were introduced to a new method and then asked to use it, the novelty effect could have influenced their performance and perceptions. Their awareness of being part of a study exploring a new teaching technique might have also led to socially desirable responses in the feedback questionnaire.

➢ *Sample Size Considerations:*

The sample size of 66 teacher trainees from an institution provides valuable insights within this specific context. However, generalizations to a broader population of teacher trainees should be made with caution. Future research with larger and more diverse samples would be beneficial to further validate these findings. The statistical analyses

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conducted will be appropriate for this sample size, but the power of the tests and the generalizability of the results are considerations.

III. DATA ANALYSIS

The collected data, including problem-solving time, accuracy scores from both worksheets, and feedback responses, were analyzed using statistical methods to draw meaningful comparisons. A paired analysis was conducted to compare the pre- and post-session scores. Feedback data were categorized and analyzed to identify trends in participants' perceptions of Vedic Mathematics.

- *Comparative Study: Traditional Maths Vs. Vedic Mathematics*

- *Time Efficiency Analysis :*

The comparative data reveals that Vedic Mathematics significantly improves problem-solving speed compared to the traditional method. While 53% of respondents using the traditional method took 10-15 minutes, only 4.5% needed the same time with Vedic tricks. Furthermore, 62.1% of respondents solved the test in less than 5 minutes using Vedic techniques, whereas none achieved this speed with the traditional method. Overall, Vedic Mathematics proved to be far more efficient, with 92.4% completing the test in under 9 minutes compared to 42.4% using the traditional approach.

Table 1 Completion Time

Completion Time	Traditional Maths Method	Vedic Maths Method
Less than 5 Minutes	0 %	62.1%
5 – 9 Minutes	42.4 %	30.3 %
10 – 15 Minutes	53 %	4.5 %
More than 15 Minutes	4.5 %	3 %

- *Accuracy Analysis:*

The comparative analysis shows that Vedic Mathematics significantly enhances accuracy compared to the traditional method. With Vedic methods, **75.8%** of respondents achieved a perfect score (100%) compared to only **40.9%** with the traditional method. Additionally, **22.7%** scored between 75-99% using Vedic techniques, compared to a higher **47%** in the traditional approach. For lower accuracy ranges (50-74% and below 50%), the traditional method had **12.1%** of respondents in this range, while only **1.5%** fell into this category using Vedic methods. This indicates that Vedic Mathematics not only improves speed but also leads to higher accuracy among learners.

Table 2 Accuracy Analysis

Accuracy Level	Traditional Method	Vedic Maths Method
100 % Score	40.9% (27 Responses)	75.8% (50 Responses)
75 - 99 %	47 % (31 Responses)	22.7 % (15 Responses)
50-74 %	10.6 % (7 Responses)	1.5 % (1 Response)

- *Session Overview and Participant Demographics :*

The session on Vedic Mathematics received overwhelmingly positive feedback, with 74.2% of respondents rating it as Excellent (5 points). Additionally, 9% rated it as Very Good (4 points), showing that the session was well-received by a majority of participants. A small portion, 3% (1.5% each for 3 and 2 points), rated it as average or below average, while 13.6% gave the lowest rating of 1 point, indicating some dissatisfaction. This feedback highlights the session's overall success but also indicates the need to address the concerns of the minority who rated it poorly.

Table 3 Rating

Rating (Points)	Number of Responses	Percentage
5 (Excellent)	49	74.2 %
4 (Very Good)	6	9%
3 (Average)	1	1.5%
2 (Below Average)	1	1.5%
1 (Poor)	9	13.6%

- *Most Helpful Techniques in the Vedic Mathematics Session*

The most helpful part of the Vedic Mathematics session, according to the responses, was Multiplication with Number 9, with 22 responses (the highest), indicating that this technique stood out as the most useful for the participants. Following this, the Square technique was found to be helpful by 19 respondents, and Subtraction by 17 respondents, both showing strong interest. The technique on Multiplication with Number 11 received the least number of responses, 8, suggesting it was less impactful or more challenging for the participants compared to the other methods.

- *Understanding of Vedic Mathematics Concepts*

The majority of participants, 90.9% (60 responses), confirmed that they understood the basic concept of Vedic Mathematics very well, indicating the effectiveness of the session in conveying the core principles. A small portion, 7.6% (5 responses), reported understanding the concept only somewhat, while 1.5% (1 response) remained neutral, suggesting a slight challenge in grasping the concept for a few individuals.

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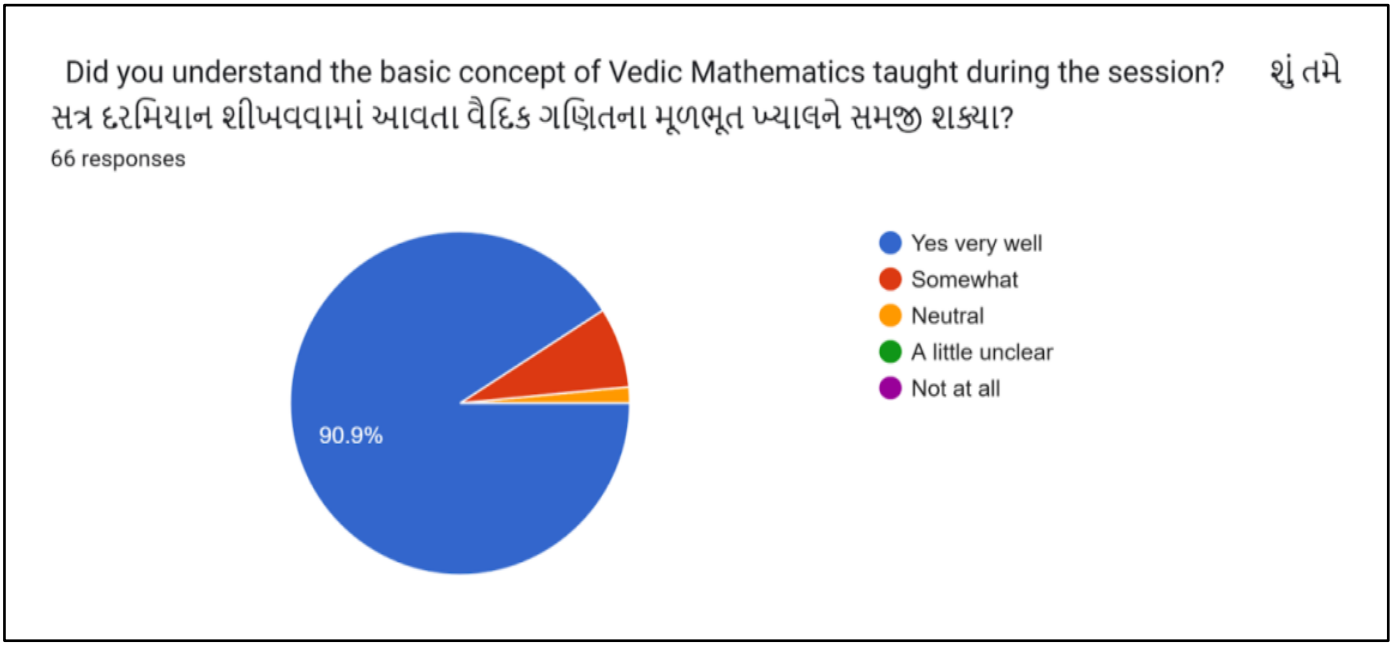

Fig 1 Basic Concept of Vedic Mathematics Taught During the Session.

- *Perceived Ease of Understanding Vedic Mathematics*

The majority of respondents, 56.1% (37 responses), strongly agree that Vedic Mathematics is easier to understand compared to traditional methods, reflecting a strong positive reception to the approach. Additionally, 40.9% (27 responses) agree, further supporting the perception that Vedic techniques offer a more accessible understanding. Only 1.5% (1 response each) were neutral or disagree, indicating minimal opposition to the ease of understanding Vedic Mathematics over traditional methods.

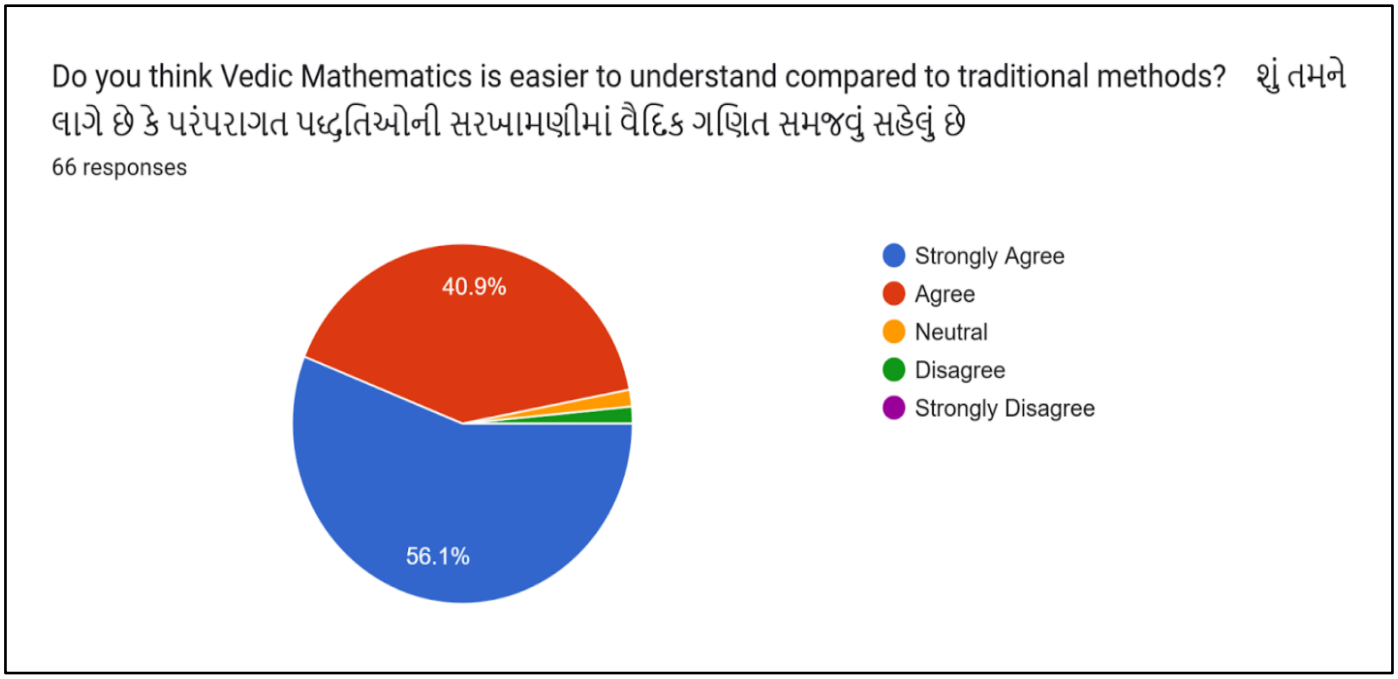

Fig 2 Vedic Mathematics is Easier to Understand Compared to Traditional Methods.

- *Overall Reception and Perceived Benefits of Vedic Mathematics*

The survey results clearly indicate a strong positive reception towards Vedic Mathematics, with the majority of respondents strongly agreeing or agreeing with the statements about its benefits. Below is a breakdown of each aspect:

✓ *Interest Comparison (Vedic Mathematics vs. Traditional Methods):*

Strongly Agree (41 responses) and Agree (22 responses) suggest that Vedic Mathematics is perceived as more interesting than traditional methods by the majority of participants (approximately 95.5%). This highlights the engaging nature of Vedic techniques compared to conventional methods, suggesting higher engagement and curiosity among learners.

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✓ *Usefulness for Exams:*

A significant number of respondents, 49 strongly agreed and 15 agreed, indicating that Vedic Mathematics is regarded as extremely useful for exams. The presence of only 1 neutral response and 1 strongly disagree response reinforces the strong consensus on the practical advantages of Vedic techniques in exam preparation.

✓ *Time-Saving:*

49 respondents strongly agreed and 3 agreed that Vedic Mathematics helps save time while solving problems, emphasizing its efficiency in problem-solving. The low number of neutral responses (3) further corroborates the general consensus on its time-saving advantages.

✓ *Improvement in Accuracy:*

47 respondents strongly agreed and 16 agreed that Vedic Mathematics improves accuracy in calculations. This suggests that participants feel Vedic methods contribute to better precision in their mathematical work. The 1 strongly disagree response indicates a very small fraction who may not have found the accuracy improvement as impactful.

✓ *Ease of Understanding and Application:*

48 respondents strongly agreed and 16 agreed that Vedic Mathematics is easy to understand and apply, which reflects its accessibility. The 1 neutral and 1 disagree responses suggest that while the majority find it easy, there may be a small proportion of learners who faced some difficulty.

✓ *Enhancement of Problem-Solving Skills:*

With 42 respondents strongly agreeing and 20 agreeing, it's clear that Vedic Mathematics is perceived to enhance problem-solving skills. This shows that participants associate Vedic methods with developing their ability to approach and solve mathematical challenges more effectively.

✓ *Increased Confidence:*

The highest proportion of responses came from the statement regarding confidence in solving problems, with 51 strongly agreeing and 13 agreeing. This reflects the belief that Vedic Mathematics significantly boosts learners' confidence in tackling mathematical problems, with only a small percentage (1 neutral, 1 strongly disagree) not fully agreeing.

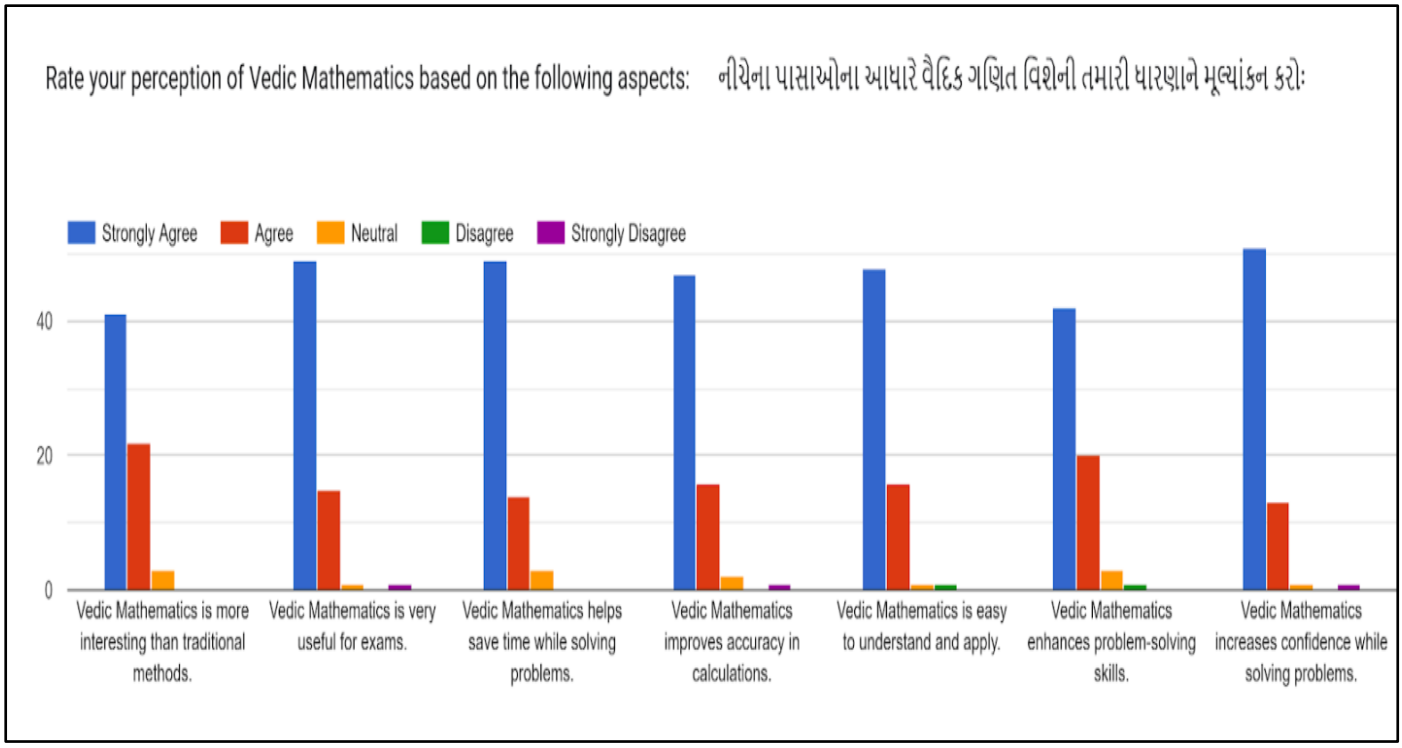

Fig 3 Rate Your Perception of Vedic Mathematics Based on the Following Aspects.

- *Support for Incorporating Vedic Mathematics in School Curriculums*

The overwhelming majority of respondents, 49 strongly agreeing (73.1%) and 15 agreeing (22.7%), believe that incorporating Vedic Mathematics in school curriculums would be highly beneficial for students. This indicates a strong consensus that the adoption of Vedic Mathematics can enhance the learning experience for students. Only 1 respondent (1.5%) was neutral, and another 1 respondent (1.5%) disagreed, suggesting minimal opposition to this idea.

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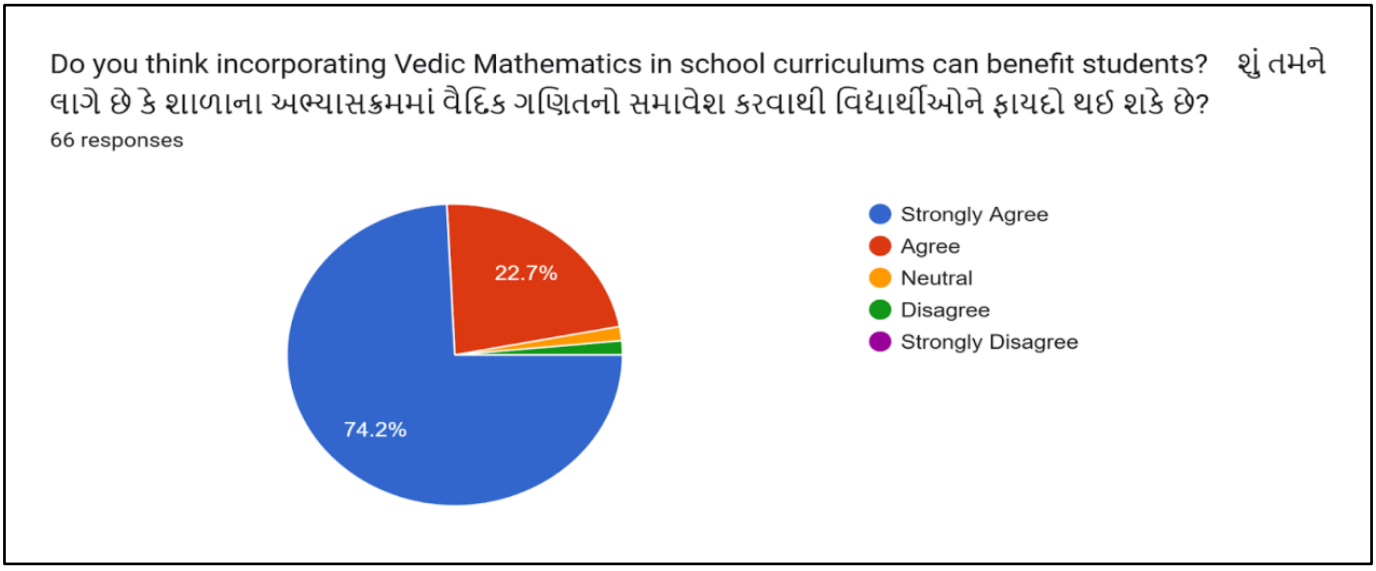

Fig 4 Incorporating Vedic Mathematics in School Curriculums Can Benefit Students.

- *Improvement in Worksheet Difficulty with Vedic Mathematics*

The majority of respondents, 56 (84.8%), found solving the second worksheet much easier using Vedic Mathematics compared to the first worksheet. A smaller group, 7 respondents (10.6%), felt it was slightly easier, while 3 respondents (4.5%) felt that the difficulty level was about the same as the first worksheet. This indicates that Vedic Mathematics significantly improved the ease of solving the worksheet for most participants.

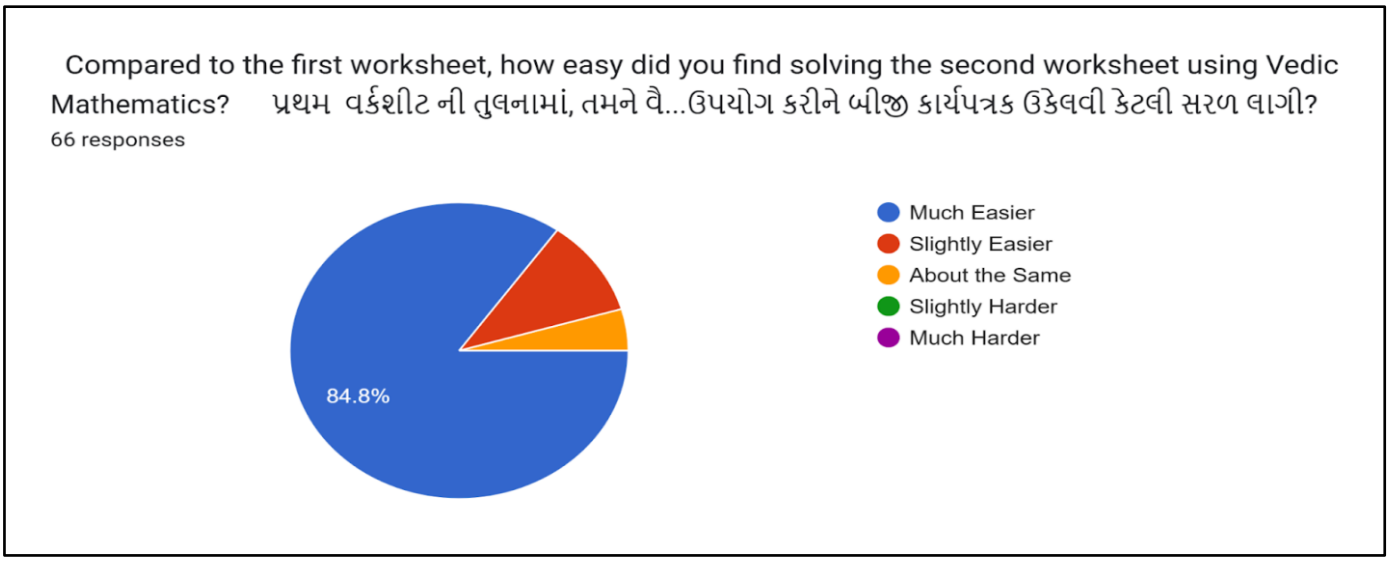

Fig 5 Compared to the First Worksheet, How Easy Did you Solving the Second Worksheet using Vedic Mathematics.

- *Time Efficiency of Vedic Mathematics*

The overwhelming majority of respondents, 65 (98.5%), found that Vedic Mathematics took less time to solve the worksheets compared to traditional mathematics. Only 1 respondent (1.5%) felt that traditional mathematics was easier and quicker. This strongly indicates that Vedic Mathematics is perceived as a much more time-efficient method for solving mathematical problems.

- *3.11 Preference for Time Efficiency: Vedic Mathematics vs. Traditional Methods*

The data shows a clear preference for Vedic Mathematics in terms of time efficiency, with 98.5% of respondents agreeing that it is faster than traditional methods. This suggests that Vedic Mathematics is highly effective in improving the speed of problem-solving, which is a valuable benefit for learners aiming to complete mathematical tasks efficiently.

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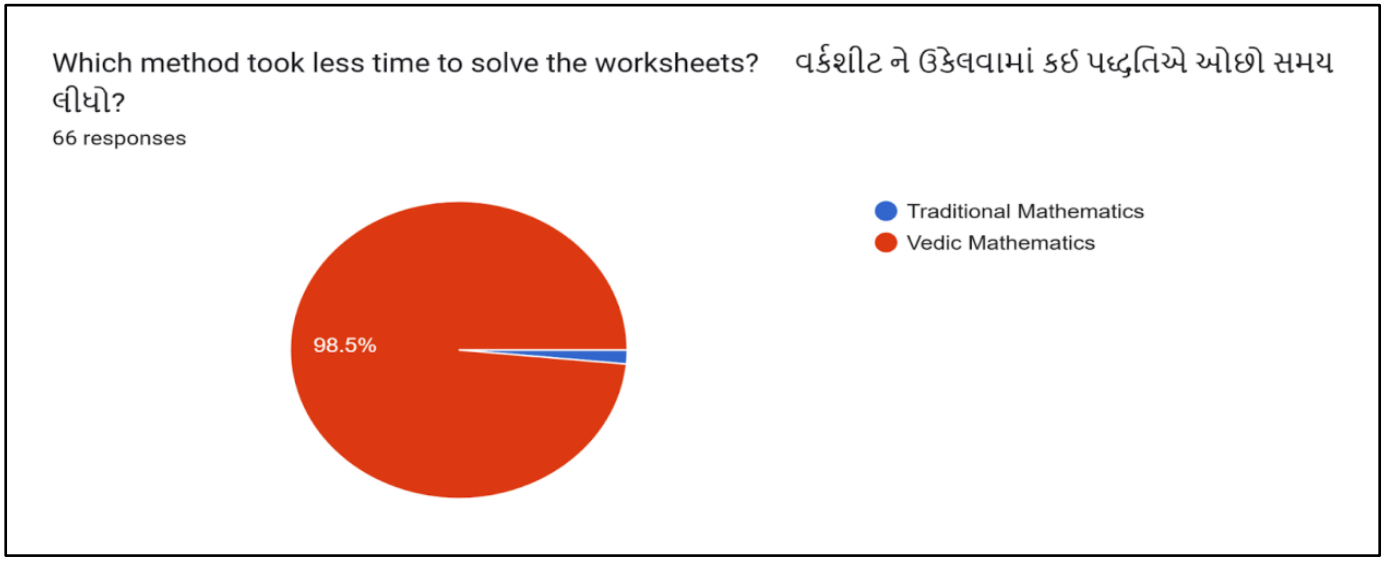

Fig 6 Method Took Less Time to Solve the Worksheets.

- *Boost in Confidence: Vedic Mathematics vs. Traditional Methods*

The majority of respondents, 61 (92.4%), reported that Vedic Mathematics gave them more confidence in solving problems. In contrast, only 5 respondents (7.6%) felt that traditional mathematics provided them with greater confidence. This highlights a strong preference for Vedic Mathematics in boosting confidence during problem-solving tasks.

- *Mental Calculation Efficiency with Vedic Mathematics*

An overwhelming majority of respondents, 63 (95.5%), reported that they were able to solve the questions mentally using Vedic Mathematics without relying on paper and pen. A small number of respondents, 3 (4.5%), indicated that they were not able to solve the problems mentally using this method. This suggests that Vedic Mathematics is highly effective in enabling learners to perform mental calculations, reinforcing its reputation as a time-saving and efficient approach.

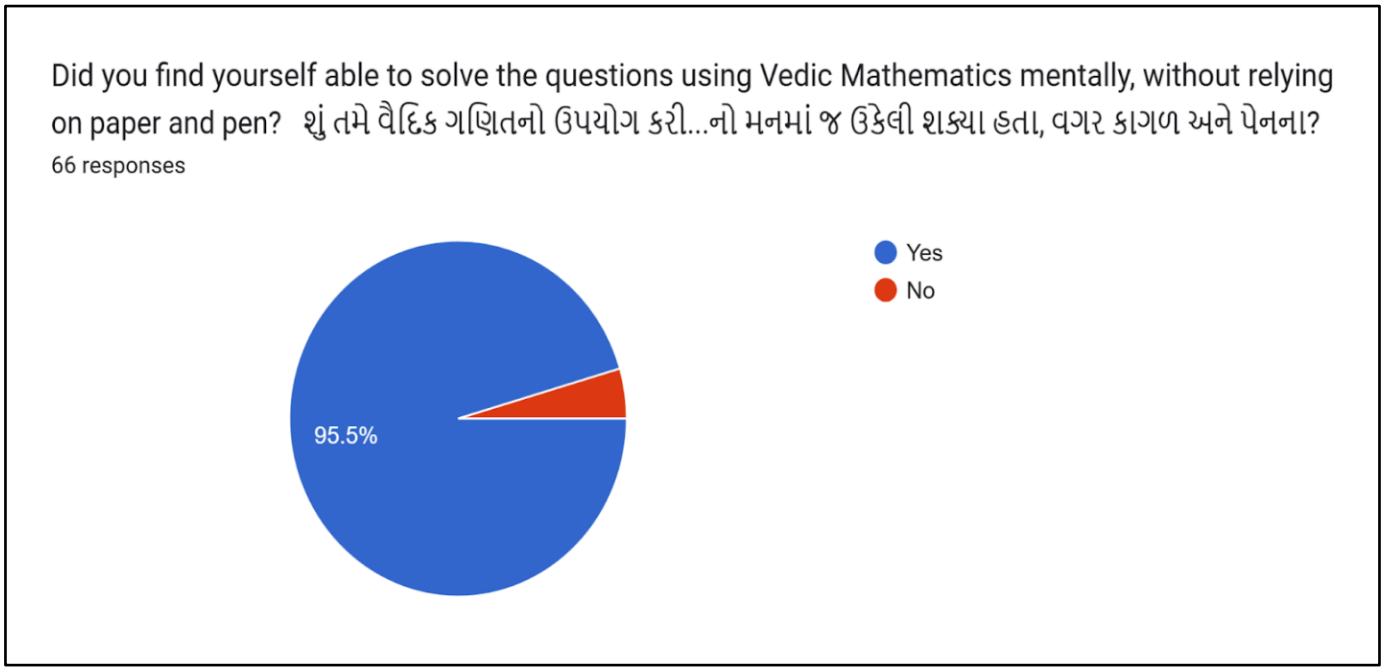

Fig 7 Solve the Questions using Vedic Mathematics Mentally, Without Relying on Paper and Pen.

- *Confidence in Solving Problems*

The data indicates a significant preference for Vedic Mathematics in enhancing confidence during problem-solving tasks. An overwhelming 92.4% of respondents reported that Vedic Mathematics provided them with more confidence in solving problems, compared to only 7.6% who felt that traditional mathematics was more confidence-boosting. This suggests that the participants found Vedic Mathematics not only more efficient but also more empowering in tackling mathematical problems, highlighting its positive impact on learners' self-assurance.

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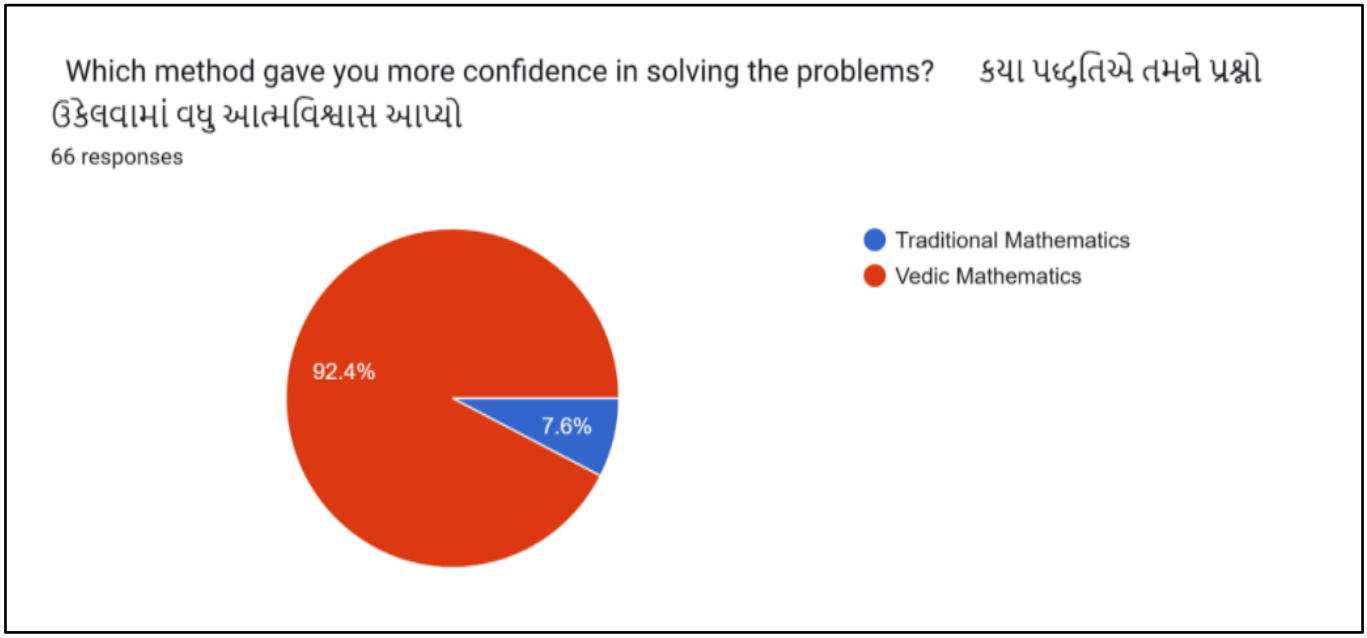

Fig 8 Which Method Gave You More Confidence in Solving the Problems.

IV. FINDING

- 84.8% of participants found Vedic Mathematics significantly easier for solving the worksheets.
- 98.5% of respondents solved problems faster using Vedic Mathematics compared to traditional methods.
- 92.4% of participants felt more confident solving problems with Vedic Mathematics.
- 95.5% of respondents were able to solve problems mentally without relying on paper or pen.
- 92.4% of participants found Vedic Mathematics highly useful for exam preparation.
- 92.4% of respondents found Vedic Mathematics more engaging and interesting than traditional methods.
- 4.5% of participants found no improvement in ease and faced difficulties in grasping new concepts quickly.84.8% of participants preferred Vedic Mathematics for its simplicity and structured approach to problem-solving.
- Vedic Mathematics reduced the mental load for 95.5% of respondents, making math problems more manageable.
- 98.5% of participants reported that Vedic Mathematics helped them solve problems more efficiently in terms of time.
- 92.4% of trainees expressed a strong belief that Vedic Mathematics would improve student performance in exams.
- The structured methods of Vedic Mathematics encouraged 92.4% of trainees to approach mathematics with more enthusiasm.
- 92.4% of participants agreed that Vedic Mathematics made mathematical concepts easier to understand.
- 92.4% of trainees perceived Vedic Mathematics as a tool for fostering critical thinking and improving mathematical skills.
- Some participants struggled to adapt to Vedic techniques, highlighting a need for more practice and gradual introduction to the methods.

V. CONCLUSION

The findings of this study underscore the transformative potential of Vedic Mathematics in enhancing both the efficiency and accuracy of problem-solving among teacher trainees. A notable shift in performance was observed when participants transitioned from traditional mathematical methods to Vedic techniques. The vast majority completed tasks more quickly and with higher precision using Vedic methods, suggesting a significant improvement in cognitive engagement and computational ease.

Moreover, feedback from participants reflects a strong positive perception of Vedic Mathematics across various parameters, including interest, usefulness in exams, time-saving capacity, and overall ease of understanding. The session was not only engaging but also instrumental in demystifying complex mathematical operations, as evidenced by the high percentage of trainees who rated the session as excellent.

Given these results, the integration of Vedic Mathematics into teacher education curricula appears both feasible and beneficial. Equipping future educators with this knowledge can have a cascading effect, enriching the learning experiences of countless students. However, attention must be given to the small group of trainees who found the session less effective, highlighting the need for differentiated instruction and extended practice sessions.

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