

Specimen Format for Thesis of the Month

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Department:	Education
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Sub Subject Heading:	-----
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Title of the Thesis:	Effectiveness of Vedic mathematics- based instruction on Achievement in Mathematics and Attitude towards learning Mathematics among primary and upper primary students.
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(ii) in Roman Script	----
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Abstract (within 300 words):

The study examined the effectiveness of Vedic Mathematics-based instruction on achievement, attitude, learning style, and computational speed among eighth- and third-grade students. Initially, the study was conducted with eighth graders, but it was later shifted to third graders due to insignificant results. The sample comprised 320 students, equally divided between grades, with 80 participants each in the control and experimental groups. The intervention was implemented in three schools: two government-aided and one private.

The study utilized a Pre-test-Post-test Control Group Design to evaluate the effectiveness of Vedic Mathematics-based instruction on achievement in mathematics, attitude towards learning mathematics, learning style, and computational speed among third- and eighth-grade students. Students were randomly assigned to both the experimental and control groups. The experimental group was taught using Vedic Mathematics-based instruction, while the control group received conventional instruction: the Active Learning Method (ALM) for eighth grade and Activity-Based Learning (ABL) for third grade. Both groups underwent a pre-test before the intervention and a post-test after the intervention.

For the eighth grade, the intervention lasted for 37 days, with three days allocated for pre-tests before the intervention, followed by post-tests conducted over three days immediately after the intervention. A delayed post-test was administered two weeks later. For the third grade, the intervention period was 20 days, with pre-tests and post-tests conducted over three days each. A delayed post-test was also conducted two weeks after the intervention.

The findings of the study highlight that Vedic Mathematics significantly contributes to developing a positive attitude toward learning mathematics. Furthermore, the results demonstrate that Vedic Mathematics enhances students' achievement in mathematics, emphasizing the importance of introducing innovative teaching methods at lower grade levels to promote better learning outcomes. Incorporating Vedic Mathematics alongside traditional instructional methods from an early stage can help students build greater confidence, improve computational speed and accuracy, and foster a deeper engagement with mathematics. This approach can transform mathematics into a more enjoyable and stimulating subject for learners.

Keywords:

Vedic mathematics, Achievement in mathematics, Attitude towards learning mathematics, Learning style, Computational speed, Primary and Upper Primary Students.

OBJECTIVES OF THE STUDY

Objectives of this study are categorized under three heads:

Development and Validation

- To construct and validate a package for Vedic Mathematics-based instruction (VMPBMO).
- To develop and validate a Previous knowledge test and Achievement test in Mathematics.
- To construct and validate a rating scale on Attitude towards learning Mathematics.
- To develop and validate a Learning Style Inventory.

Relationship Analysis

- To find out the relationship between Achievement in Mathematics and Attitude towards learning Mathematics of Eighth-grade students and Third-grade students.

Comparative Analysis

- To compare the effectiveness of Vedic Mathematics-based instruction on Achievement in Mathematics and Attitude towards learning Mathematics of both Eighth-grade students and Third-grade students and also with respect to gender and type of school.
- To analyze which categories of learners, achieve better scores in achievement test from instruction based on Vedic Mathematics.
- To compare the computing speed of students taught by Vedic Mathematics-based instruction and traditional methods of teaching.

HYPOTHESES

- There is no significant difference in the Achievement in Mathematics and Attitude towards learning Mathematics of eighth-grade and third-grade students taught by Vedic Mathematics-based instruction and the Traditional methods of teaching.
- There will not be any significant relation between Achievement in Mathematics and Attitude towards learning Mathematics of eighth-grade and third-grade students taught by Vedic Mathematics-based instruction.
- There is no significant difference in the Achievement in Mathematics and Attitude towards learning Mathematics of eighth-grade and third-grade students taught by Vedic mathematics-based instruction based on Gender and Type of school.

- There is no significant difference in the Achievement in Mathematics of eighth-grade and third-grade students taught by Vedic Mathematics-based instruction based on their Learning style
- There will not be any significant difference in the computing speed of students taught by Vedic Mathematics-based instruction and traditional methods of teaching.

METHODOLOGY

METHOD USED IN THE PRESENT STUDY:

The experimental method is chosen for the present study. An experiment is a procedure carried out to support, refute, or validate a hypothesis. Experiments allow for precise control of variables; it can be replicated. In the experimental method, researchers identify and define key variables, formulate a hypothesis, manipulate the variables, and collect data on the results. The data obtained through experiments are quantitative data that can be analysed using inferential statistical tests.

INDEPENDENT AND DEPENDENT VARIABLES

Independent variable: Vedic Mathematics based instruction and Traditional methods of teaching mathematics

Dependent variable: Achievement in mathematics, Attitude towards learning mathematics, computational speed.

Moderator variable: learning style.

FINDINGS OF THE STUDY

- Descriptive analysis was conducted for the pre-test and post-test scores obtained from the Achievement test in mathematics and attitude towards learning mathematics of the control and experimental group for the eighth grade and third grade. The calculated values for the measures of central tendency, dispersion, and normality show that the data is not so scattered. Furthermore, the data demonstrates the characteristics of normality.
- Correlation analysis indicated that there was no significant relationship between eighth-grade students' Achievement in mathematics and Attitude towards learning

mathematics, however a significant relation was observed among third-grade students.

- The analysis of pre-test scores revealed that there is no significant difference in the Achievement in mathematics and attitude towards learning mathematics between the control and experimental groups for both eighth-grade and third-grade students.
- The analysis of post-test scores of achievement in mathematics of control and experimental groups of eighth grade revealed no significant differences. In contrast, a significant difference was noted (t -value 9.51) in the post-test scores of achievement in mathematics of control and experimental groups of third-grade students, and the mean scores for the experimental group (15.29) is found to be greater indicating that Vedic mathematics based instruction enhanced the achievement scores of the third-grade students.
- There was no significant difference in the post-test score of attitude towards learning mathematics of the control and experimental group of eighth grade whereas for the third grade, the obtained t -value (8.562) shows there was a significant difference and the mean value (47.38) shows that the Vedic mathematics applied in the experimental group is effective in enhancing the attitude toward learning mathematics of third-grade students.
- The analysis revealed that there was a significant difference in pre-test and post-test scores of achievement in mathematics of the control group ($t = 16.437, 11.055$) and the mean value (22.03, 11.66) indicates that ALM was also effective in enhancing the achievement scores when the pre and post-intervention scores were compared for eighth and ABL method for third grade.
- The results show that there was a significant difference in pre-test and post-test scores of attitude towards learning mathematics of the control groups ($t = 2.005, 6.698$) of eighth and third grade and the mean post-test value is higher than the pre-test, which means the method of teaching mathematics through the conventional method followed in the control group has a considerable effect on the attitude towards learning mathematics.
- The t -values obtained for the mean pre-test and post-test achievement scores of the eighth-grade and third-grade experimental group were (14.365 and 31.646) which indicates that there is a significant difference. The mean values obtained for the post-

test ($M=22.03,15.29$) show that Vedic mathematics-based instruction helped the experimental group students to get better achievement scores.

- The results of the paired t-test comparing the pre-intervention and post-intervention test scores regarding attitude towards learning mathematics of eighth-grade and third-grade experimental group students reveal a significant difference ($t = 5.022,23.145$). The mean scores for the post-intervention ($M=99.65,47.38$) suggest that Vedic mathematics-based instruction has created a positive attitude among both grades towards learning mathematics.
- The computed t-value for the mean scores of post-tests and delayed post-test in achievement in mathematics of the control group of eighth-grade students was 6.503. The delayed post-test mean score was higher, indicating that the traditional teaching method had a significant positive effect on their achievement in mathematics. Conversely, no significant differences were found in the third-grade results. Additionally, there was no significant difference between the post-intervention scores and delayed post-test scores for attitudes toward learning mathematics in both the eighth and third grades.
- The paired sample t-test applied for the post-intervention test scores and delayed post-test scores for achievement in mathematics of the experimental group of eighth and third grade showed no significant difference.
- The t-value 2.518 for the post-intervention test and delayed post-intervention attitude scores of experimental group students in eighth grade indicates a significant difference. The mean score ($M=96.7$) for the delayed post-test attitude score shows a small reduction than the post-intervention mean score ($M=99.65$) of the experimental group. It reveals that the cessation of the Vedic mathematics-based method shows a decline in the attitude of students towards mathematics, whereas, for the third grade, there is no significant difference.
- Gender wise comparison of the post-test scores of achievement test in mathematics of control and experimental group of girls of eighth grade ($t=4.72$) shows that there was a significant difference. The mean achievement score of control group girls ($M=23.08$) is higher than the experimental group ($M =17.6$), which means, that the traditional method of teaching mathematics was effective for girls. For boys, the t

value (3.275) shows that there was a significant difference, and the mean value of the experimental group ($M=24.05$) was higher than the control group ($M=20.35$) which indicates that Vedic mathematics-based instruction was effective for boys.

- The computed t value for the post-test score of achievement in mathematics of third-grade control and experimental group girls is 7.014 and for boys is 6.965, which indicates that there is a significant difference. The mean value (girls $M=16.16$, boys $M=14.89$) of the experimental group is higher than the control group (girls $M=11.89$, boys $M=11.16$). This denotes that the Vedic Mathematics-based instruction applied in the third-grade experimental group has a considerable effect on the achievement in mathematics based on gender.
- The post-test t -values for attitudes toward learning mathematics show a significant difference between control and experimental groups for third-grade students by gender. For girls, the t -value is 6.456, and for boys, it is 6.346. The experimental group had higher mean scores (girls: $M = 50.36$, boys: $M = 46.02$) than the control group (girls: $M = 40.15$, boys: $M = 35.72$), indicating that Vedic Mathematics-based instruction positively impacted students' attitudes. No significant gender-based difference was found for eighth-grade students.
- The post-test t -values for achievement in mathematics show a significant difference between control and experimental groups in both government-aided and private schools. In government-aided schools, the control group ($M = 12.07$) outperformed the experimental group ($M = 5.5$) with a t -value of 6.878, indicating the traditional teaching method was more effective. Conversely, in private schools, the experimental group ($M = 15.08$) outscored the control group ($M = 11.25$) with a t -value of 6.662, demonstrating that Vedic Mathematics improved achievement in mathematics of third-grade students. No significant difference was observed for eighth-grade students.
- The t -value 2.782 for the post-test scores on attitudes toward learning mathematics of eighth grade in government-aided schools indicates a significant difference. The experimental group ($M = 103.6$) scored higher than the control group ($M = 95.38$), suggesting that Vedic Mathematics-based instruction improved students' attitudes toward learning. No significant difference was observed among private school students.

- In third grade, the experimental group in government-aided schools had a significantly higher post-test score ($M = 47.78$, $t = 8.031$) compared to the control group ($M = 36.60$). Similarly, in private schools, the experimental group ($M = 46.98$, $t = 3.715$) has a higher mean score than the control group ($M = 40.93$). This demonstrates that Vedic Mathematics has effectively improved third graders' attitudes toward learning mathematics in both government-aided and private schools.
- The F value (1.105,0.228) of the eighth and third grade obtained for the ANOVA shows that there is no significance which indicates that Vedic mathematics-based instruction are effective for students belonging to all the three learning styles namely visual, auditory, and kinesthetic.
- The t value obtained for Computation speed scores of the Control and Experimental Group for the VIII ($t = 4.423$) and III Grade ($t = 5.680$), shows a significant difference and the mean value of the experimental group of both grades ($M = 41.95, 42.82$) is higher than the mean value of the control group ($M = 55.31, 58.25$) which indicates that the students taught through Vedic mathematics have enhanced computational speed.
- A qualitative analysis was done by conducting a semi-structured interview with both the teachers and students. The responses suggest that teachers and students perceive Vedic mathematics as advantageous in various significant aspects, particularly in fostering student engagement and enhancing mathematical skills.

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