The Effectiveness of Vedic Mathematics on Problem Solving Ability of Students at Middle Level

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ABSTRACT

In today's globalized era, personal intellectual advancement and development must go hand-in-hand with a broader goals and sustainable development. The aim of present study was to find "Effect of Vedic mathematics on problem solving ability of students at middle level. The researcher select 30 students of class VII from the target population and the sample were selected by purposive sampling technique. Quasi Experimental research of pretest - posttest single group design is used by the researcher in the present study. For determining the distribution of scores Shapiro-Wilk test was used under Numerical Method and Histogram & Q-Q Plot were used under Visual Method. Result reveled that students have higher mean value than the pretest scores. It means that after using teaching through Vedic mathematics students of pre- test and post- test differ significantly. The problem- solving ability test results of the pupils in the targeted group showed a substantial difference between pre-test and post-test when they were taught using Vedic mathematics. Students were able to improve their accuracy without any anxiety also enhance problem-solving skill because all of these associated tasks by the Vedic mathematics tricks.

Keywords: Vedic Mathematics, Middle level, Problem Solving ability

INTRODUCTION

Education provides to develop many skills, knowledge, beliefs, values through learning in teacher learning process. Vedic Mathematics Technique is used to solve mathematical problems in a fast and easy way. It deals with shortcut techniques that carry out numerical calculations in a faster way. Vedic Mathematics is Indian ancient systems of mathematical calculation or operational techniques develop in the year 1957 with sixteen sutras and some sub sutras (commonly known as formula or sub formula). These can be applied to the solving of problem in arithmetic, algebra, geometry, calculus, conics etc. Vedic mathematics is the name given to a supposedly ancient system of calculations which was rediscovered from the Vedas between 1911 and 1918 by **Shri Bharti Krishna Tirtha Maharaj (1884- 1960).** According to Tirtha, all of Vedic mathematics is based on sixteen sutras or Word formulae. So many students are giving disrespect to Mathematics and they don't have interest in Mathematics subject just only due to the conventional Mathematics teaching in classroom.

Vedic Maths methods come to us as boon for all competitions. Difficult arithmetic problems and huge sums can often be solved immediately by Tirtha's method. These striking and beautiful methods are a part of a system of arithmetic which Tirtha claims to be for more methodical than the modern system. Vedic Mathematics is said to manifest the coherent and unified structure of arithmetic and its method are complementary direct and easy. The simplicity of the Tirtha system means that calculation can be carried out mentally, though the methods can also be written down. There are many advantages is using a flexible mental system. Pupils can invent their own methods they are not limited to one method. This leads to more creative, interested and intelligent pupils. Interest in the Tirtha's system is growing in education where mathematics teachers are looking for something better and finding the Vedic system is the answer. Research is being carried out in many areas including the effects learning the Tirtha system has on children developing new powerful but easy application of these Sutras in arithmetic and algebra.

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The primitive treasure Vedic mathematics was reframed and brought to light again by the Indian monk Bharathi

Krishna Tirtha in the period between 1911 and 1918. Vedic mathematics arose out from Vedas, 'Veda' means knowledge, it is a Sanskrit word. Vedic mathematics involves sutras and techniques which helps in solving mathematics in an easier, faster way. The 16 sutras and 13 sub sutras in Vedic math makes the calculations easier. The expanding world of mathematics can still be captured by five thousand years old Vedic methods. Shakuntla devi quotes that "without mathematics, there's nothing you can do. Everything around you are numbers".

Formulas- There are sixteen sutras and thirteen sub sutras in Vedic mathematics.

Table 1. Sutras of Vedic Mathematic

S.N	Sutras	Sub-Sutras
1	EkadhikenPurvena	Anurupyena
2	NikhilamNavatacharamamDasatah	SisyateSesajnah
3	Urdhva-tiryagbhyam	Adyamadyenantya-mantyena
4	ParavartyaYojayet	KevalaihSaptakamGunyat
5	SunymaSamyasamuchaye	Vestanam
6	(Anurupye) Sunyamanyat	YavadunamTavadunam
7	Sankalana-vyavakalamnabyam	YavadunamTavadunikrtyaVargancaYojayet
8	Puranapuranabhyam	Antyayoradaskaepi
9	Chalana-Kalanabhyam	Antyayoreva
10	Yavadunam	Samuccayagunitha
11	Vyastisamastih	Lopanasthapanabhyam
12	SesanyankenaCaramena	Vilokanam
13	Sopantyadvayamantyam	GunitasamuccayahSamuccayagunitah
14	EkanyunenaPurvena	
15	Gunitasamuccayah	
16	Gunakasamuccayah	

Much research has been taken place in the past and present to hold up the fact. Vedic mathematics is more flexible, coherent, improves memory, promotes mental ability and creativity. On practicing Vedic mathematics, we can perform calculations in easy and efficient way. **Amulya (2021)** pointed out that Vedic method of multiplication is effective over the conventional method in terms of students' achievement**. Dipika (2015)** experiment on Vedic mathematics stood as evidence for the effectiveness of Vedic mathematics and it was found that Vedic mathematics was more effective than traditional approach. **O. P. Sawhney (2005)** Conducted free Vedic Mathematics classes for two weeks at the habitat learning center. The student was given individual attention and were also evaluated on the basis of their performance. He found that the students feel thrilled to know the time saving devices and have started preferring the Vedic ways for solving the sums involving big numbers and checking the correction of the answers within a couple of seconds. 1981 some British Mathematician like Keith Williams, Andrew Nicholas and Jeremy Pickles shown interest and deliver lectures on it in different place of London by extending the Bharti Krishna Tirtha introductory Book. Nowadays, some students still struggle in the subject of Mathematics. According to the report of PISA (2018), Filipino students achieved an average of 353 points in Mathematical Literacy. According to the Trends in International Mathematics and Science Study (2000) [5], Filipino students were found to have difficulties in solving problems that are different from the problems usually given in textbooks. The ASER (Annual statics of education report) reported in the year 2020 and 2021 shows a decline in the interest of student towards mathematics.

Problem-solving Ability is an integral part of all mathematics learning, and so it should not be an isolated part of the mathematics learning. By learning problem-solving in mathematics, students can acquire ways of thinking, habits of persistence and curiosity, and confidence in unfamiliar situations that will serve them well outside the mathematics, it can also be helpful for decreasing the anxiety to solve the mathematical calculations.

Objective of the Study

- To examine the effect of Vedic mathematics on problem solving ability of students at Middle level

Hypothesis of the study

- There will be a significant effect of Vedic mathematics on problem solving ability of students at middle level.

The outline of this research study has been organized as follows. Section 2 is a review of the literature and it is the process of finding, locating, arranging, and analyzing material regarding a study issue. In section 3 researcher talk about the Rationale of the Study, research method and analysis and results were given. Discussion on the obtained results was done in section 4 which ended with a conclusion. Section 6 has the implication of the present study.

REVIEW OF RELATED LITERATURE

Review of literature basically helps us to know what other researchers have reported what problem are as need to be explored and it also give us a clear insight about the problem. **Patel vishnubhai M (2023)** investigate Effectiveness of Vedic mathematics on mathematics ability of secondary level students. **Istiana, R. et.al (2023).** Investigated STEM Learning to Improve Problem Solving Ability on the Topic of Environmental Education. **Supinah,R.(2021).** Examined "Development of authentic assessment to improve students mathematical problem-solving ability**. Day-ongaoY.C & Tan D.A (2022**) Investigated effect of Vedic mathematics technique on students' motivation towards mathematics. **Syaiful et al. (2020)** aimed to identify the "problem solving abilities possessed by junior high school students". This was quantitative research in which survey method was adopted **Prabir Ghosh (2018)** investigate School students' perception of mathematics and its relation to their achievement in mathematics. **Bincy Titus (2017)** studied Effectiveness of Synectic model and gaming strategy on achievement and creativity in mathematics among secondary level students. **Minaxi Shivdas Bhagwat (2016)** Developing and implementing instructional strategy on the structure of observed learning outcomes SOLO taxonomy for mathematics of class ix. **Prasad, K. K. (2016)** investigated" An empirical study on role of Vedic mathematics in improving the speed of basic mathematical operations" **Bonifus, P. L., & George, D. (2013).** Examined encryption system using encoded multiplier and Vedic mathematics".

The aim of this project is the development of high performance ECC encryption system. **Kerur, S et.al . (2011**). "Implementation of Vedic multiplier for digital signal processing". In this research paper Vedic Mathematics gives us a clue of symmetric computation. **Jyoti bhalla (2010)** studied "Effectiveness of vedic mathematics on academic achievement of primary school student's sample. It can be inferred that the majority of the studies have indicated that teaching through Mathematics is effective in terms of students' academic achievement and in helping in increasing conceptual understanding. Moreover, it was found that students could learn at their own pace and they could get constant feedback which especially helped the weaker students. It is clear from the review of related literature that there is a disparity in the findings of the impact of Vedic Mathematics due to the gaps to conduct the study related to Vedic mathematics.

Rationale of the Study

Nowadays, some students still struggle in the subject of Mathematics. According to the report of PISA (2018), Filipino students achieved an average of 353 points in Mathematical Literacy According to the Trends in International Mathematics and Science Study (2000) [5], Filipino students were found to have difficulties in solving problems that are different from the problems usually given in textbooks. This suggests that the problem-solving skills of the students are not yet developed. It also shows that students deal only with solving routine problems and give emphasis on step-by-step procedures rather than meaningful learning. Student find difficult to solve the aptitude questions effectively with very less or small-time duration. Traditional and regular method of mathematics is very complex and time-consuming process. The ASER (Annual statics of education report) reported in the year 2020 and 2021 shows a decline in the interest of student towards

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RESEARCH METHODOLOGY

The aim of present study was to find effectiveness of Vedic mathematics on Problem solving ability of middle level students. Therefore, keeping in view the requirement of this research, Quasi experimental method is adopted by the researcher.

Variables of the Study

Independent Variable- Vedic Mathematics

Dependent Variable- Problem Solving Ability

Sample-Researcher select 30 students of class VII as sample of this present study from the target population because with the help of small Sample the quality can be enhance and it can also beneficial for build the conceptual understanding for the future so that is why researcher select 30 students as the sample by purposive sampling technique. The sample were representative of the population to ensure that researcher could generalize the findings from the research sample to the population as a whole.

Data Analysis

In the present study After collection of data, it was analyzed with the help of relevant tools and techniques and interpretations were made. Both descriptive and inferential statistics were used to analyze the data and to interpret the results. SPSS 20.0 was used for the purpose of the analysis of the data in the present study.

This assessment regarding nature of data can be done using both the numerical as well as visual metho

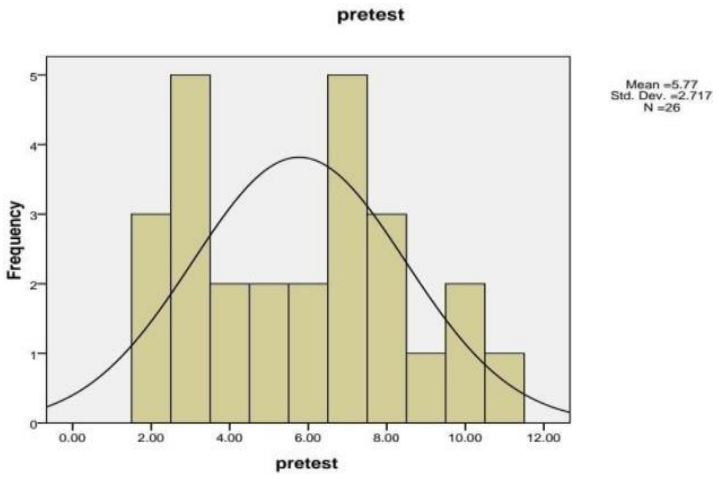

Fig 1 Histogram of Pre-Problem-Solving Ability Test Scores of a Single Group

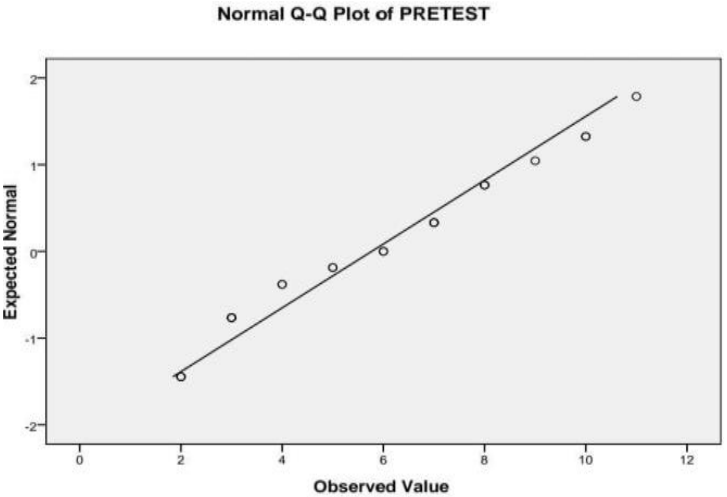

Fig 2 Q - Q Plot of Pre-Problem-Solving Ability Test Scores of a Single Group Scores of a Single Group

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The numerical testing of normality was done by using both theory-driven method and descriptive statistics. The study employed two visual approaches for the aforementioned data: histogram and Q - plot. The Histogram and Q-Q Plot of Scores obtained by students of Group on Pre-Problem Solving Ability Test have been shown in Graph.

It can be seen from Graph that obtained scores of Pre- Problem-Solving Ability Test Scores of a Single Group were slight Normal The Q-Q Plot shows deviation from normal line of theoretical distribution which indicates that Pre-Problem-Solving Ability Test Scores of a Single Group were slightly normal.

Visual Method for Analyzing the Distribution of Post-Problem-Solving Ability Test Scores of a Single Group

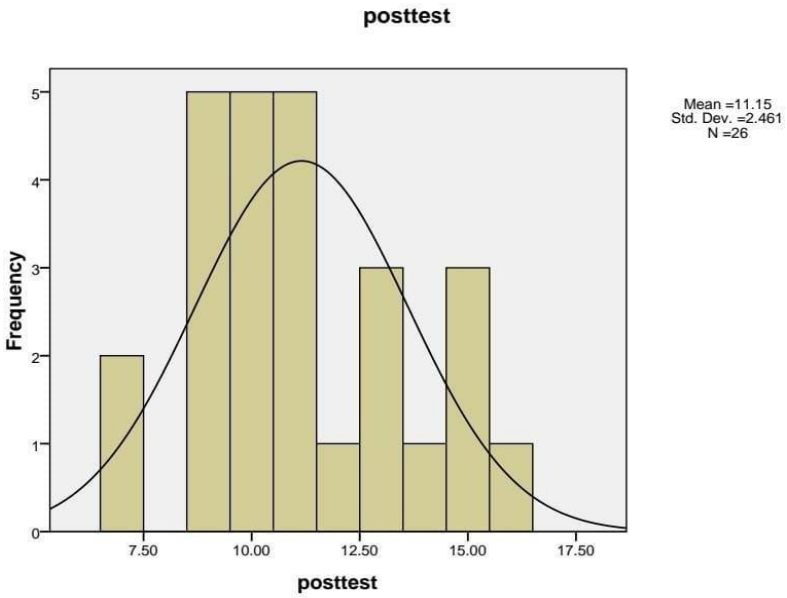

Fig 3 Histogram of Post-Problem-Solving Ability Test Scores of a Single Group

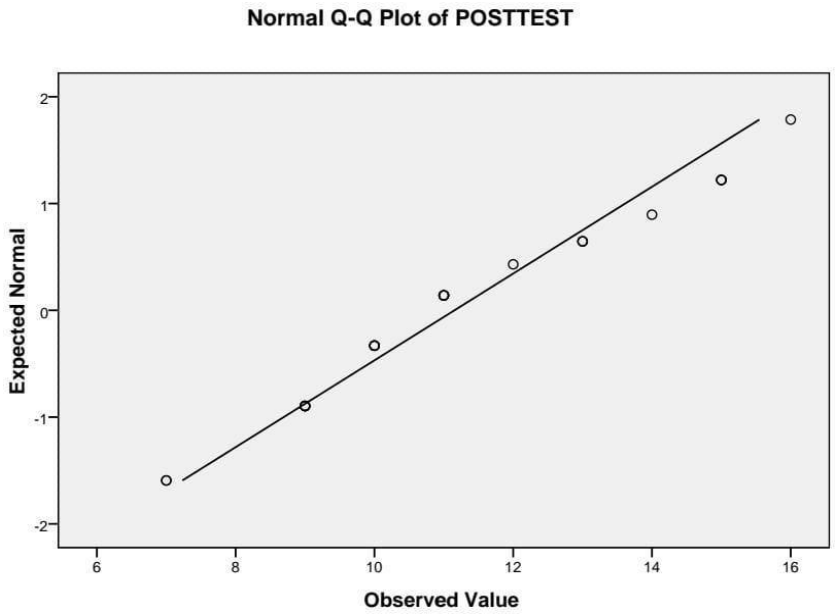

Fig 4 Q-Q Plot of Post-Problem-Solving Ability Test Scores of a Single Group

Numerical Method

The normality of data was determined through numerical methods as well that included skewness, kurtosis and Shapiro -Wilks test. The values of Shapiro-Wilk Test statistics obtained on Pre and Post Problem Solving Ability Test scores of a single group have been given in Table.

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Table 2. Shapiro-Wilk Test on Pre and Post Problem Solving Ability Test scores of single group

GROUP	Shapiro- Wilk	
	Statistics	Sig. (p value)
PRE-TEST	.936	.105
POST- TEST	.941	.145

The Shapiro-Wilk test produced a statistically significant (p=.105) result for the pretest scores, suggesting a deviation from normality at the traditional significance level of α =.05. On the other hand, the post-test scores showed a Shapiro-Wilk test statistic of .941 and a corresponding p- value of .145 indicating that the assumption of normality was valid because the p-value was higher than the .05. Accordingly, the Shapiro-Wilk test indicates that the post-test score distribution is normal,

Analysis and Interpretation of Data

The Pre- Problem-Solving Ability Test and Post-Problem-Solving Ability Test results of a single group were compared in order to accomplish the objective mentioned above. The group Students in the same group took the standardized Problem-Solving Ability Test (L.N. Dubey, 2011) twice: once before the experiment (pre-test) and once more after the experiment (post-test). Paired T test was used to examine the results of the Pre- and Post-Problem-Solving Ability Test.

Comparison of Pre and Post Problem Solving Ability Test Scores of Single Group

Students' baseline achievement on the Problem-Solving Ability Test was assessed by comparing pre- and post-test scores within the same group. the t-test scores for the pre and post test scores. The below Table shows the paired T- test analysis of the same group's pre- and post-problem-solving ability test results.

Table 3 Showing the paired t- test score for the Pre-test and Post test

Category	N	Mean	SD	r	T test value	df	Significance level	Interpretation
PRE TEST	30	5.77	2.717	.669	-12.963	25	At 0.05 level	0.05 level of significance
POST TEST	26	10.15	2.461				2.05954	

RESULTS AND DISCUSSION

The mean value of pre- test and post test scores obtained by the students were found to be 5.77 and 10.15 respectively. The standard deviation of both groups was 2.717 and 2.461 which indicates more deviation in post-test than the pre-test from their mean value. the obtained 't' value is 12.963 (negative) is more than the table value with df Is 25 at .0.05 level i.e 2.05954 It means that after using teaching through Vedic mathematics students of pre- test and post- test differ significantly. Hence, the Hypothesis H-0 ***"There will be no significant effect of Vedic mathematics on problem solving ability is rejected.*** These results point to a considerable difference between the pre- and post-test scores, suggesting that there is strong evidence to reject the null hypothesis.

In the initial phase the students were very anxious and have lot of anxiety while doing the calculation because it was very time taking and lengthy process but after giving the intervention by the researcher they were solve the questions in an accurate and effective manner.

So, the problem- solving ability test results of the pupils in the targeted group showed a substantial difference between pre- and post-test when they were taught using Vedic mathematics. As they watched experiments being conducted using Vedic mathematical methods. They were able to improve their accuracy without any anxiety also enhance problem-solving skill because all of these associated tasks by the Vedic mathematics tricks.

CONCLUSION

The findings revealed that teaching Mathematical operations through Vedic mathematics in resulted in positive and statistically significant change in student's behavior. The result has clearly stated that Vedic Mathematics helps to develop accuracy, problem solving and among students. There was significant difference in the mean scores of pre-test and posttest perception of students most of the students lies average ability after the intervention. The finding of the present study was supported by **Patel vishnubhai M (2023)** who finding revealed that it was significant effect was seen on the mathematical abilities of higher and lower achievers' students after the experiment treatment. (Teaching through Vedic mathematics). It deals with finding solution for those students who feel anxious while solving problems of mathematics and increase the level of accuracy among the students.

Implication of the Study

Vedic Math offers a number of procedures and rules that allow us to complete various arithmetic computations in a timely manner. It is effective not only for increasing focus, but also for avoiding dumb mistakes and allowing a person to answer mathematical problems in a single second, decreasing calculating time from 4 -5 minutes to a few seconds. It helps students in following way-

- It helps a person to solve mathematical problems 10 times faster
- It helps in Intelligent Guessing and It reduces burden It is a magical tool to reduce scratch work and finger counting
- It increases concentration.
- It helps in reducing silly mistakes
- Calculations become easy and short.
- Simplifications can be done in less time.
- Students undergo less mental stress.
- The possibility of committing errors by students using these sutras is negligible
- The use of sutras helps students to improve their knowledge and interest in the subject of mathematics.
- Vedic mathematics helps to solve hard problems using mental calculations.
- Vedic mathematics increase creativity and confidence hence it decreases rote learning.
- Vedic mathematics save time and improves the interest in learning more applications of Mathematics.

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