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Vedic Mathematics - an Instructional Strategy for enhancing Mental Computation among Visually Challenged Students

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Abstract

The present paper shares the experiences of an initiative taken towards developing skills among Visually Challenged Students through our intellectual traditions of Vedic Mathematics. Visually Challenged are a potential Human Resource. It is time to look at them in that light. Our perspective needs to shift from merely providing for them to investing in them. There is an urgent need for investing and upgrading the education that the blind child receives. These blind children need to grow up with dreams and desires to be part of the mainstream rather than to be reconciled to a reserved position in the Public Sector. In visually impaired children, this exercise could start with the learning of the rich treasure of Vedic Mathematics. The findings indicate that instructional strategies based on Vedic Mathematics Mental Computation for blind children can help to support and develop their intellectual capabilities, thus helping to close the gap between sighted and blind children.

Keywords: Vedic Mathematics, Mental Computation, Visually Challenged.

Introduction

Mental Computation

Mental computation is viewed as an essential prerequisite to the successful development of thinking faculties (The Australian Association of Mathematics Teachers Inc., 2000). Mental computation act as powerful means for promoting thinking, conjecturing, and generalising based on conceptual understanding. The ability to compute mentally with truncated and rounded numbers is a prerequisite for computational estimation. Additionally, mental strategies used to refine estimates may assist in the development of flexible approaches for calculating exact answers; getting closer may ultimately result in turning approximate answers into exact.

Number sense depends upon, and contributes to, the development of a deeper understanding of the structure of numbers and their properties. Further, nevertheless, despite the ongoing advocacy for an increased emphasis on teaching rather than testing mental computation, this has yet to significantly translate into classroom practice. For school mathematics to be useful, it needs to reflect the computational techniques used in everyday life.

Visually Challenged are Potential Human Resources

Blind person feels worthlessness and thinks that he or she is only a heavy, useless burden for the family or society (Bauman & Kropf (1979)). But, it is achievable to adjust to blindness with the support of family and society so that the

life becomes joyful and interesting. They require certain skills to support themselves. Doing mathematics with numerals is important for children with and without sight since numerals are the symbolic notations for mathematics.

Visually Challenged are a potential Human Resource.

It is time to look at them in that light. Our perspective needs to shift from merely providing for them to investing in them. There is an urgent need for investing and upgrading the education that the blind child receives. It might be difficult to setup an inclusive schooling system but the special schools can certainly be upgraded. There is a great need for quality teachers who deliver learning with passion and purpose. These blind children need to grow up with dreams and desires to be part of the mainstream rather than to be reconciled to a reserved position in the Public Sector.

Since no single device would be exclusively useful for visually impaired children for their calculations in mathematics, it is quite reasonable to look into the task of developing mental arithmetic abilities in them. Like all other activities, this too needs systematic instruction, practice and application. In visually impaired children, this exercise could start with the learning of the rich treasure of Vedic Mathematics.

Vedic Mathematics

In an attempt to find a better approach to learning mathematics, as an alternative option it is possible to apply calculation by using Vedic mathematics. Vedic mathematics is a calculation system based on 16 sutras (Sanskrit formulas) the basic feature of which is a simplicity of calculation without the written computation, which can stimulate the students' interest in mathematical thinking and creativity in finding solutions to mathematical problems (Miloloza, 2008.).

According to Sri Bharati Krsna Tirthaji, Vedic Mathematics is based on sixteen Sutras. With the help of Vedic mathematics any one can solve 'difficult' problems or huge sums without much difficulty. The problems can be calculated by mentally is one of the simplicities of Vedic mathematics. By using Vedic mathematics we have many advantages. One can use or discover his or her own method to solve their problems.

There are many methods to solve problems. One can select any method according to his/ her convenience. This helps the students to be more creative. Modern mathematics has established methods and allows the use of calculators. In the case of Vedic math, it is flexible and encourages the use of arithmetic, geometry & trigonometry.

This may contribute to brain development in children. It is the duty of teachers to preserve our traditions as well as lead our students to be self-dependent & solve the mathematics problems with confident. Mathematics being a compulsory subject of present curriculum and also getting basic mathematics education is each and every child's right. It is the duty of the teacher to give quality education to all students by teaching them the way they learn

Vedic Mathematics not only helps to boost the arithmetic and calculation skills but also actively engage the brain and strengthens concentration. Similar to all the other programmes offered to children, Vedic Mathematics classes too have therapeutic benefit on the children and are an excellent means of teaching the differently-abled children in a special way. The knowledge and practice of Vedic Mathematics helps them acquire skills that enhance their employability. Vedic One line mental computation sutras can be surely taken as a catalyst for special-needs education tools for students without sight.

Thus the application helps in creating a bright and sustainable future for visually impaired children through holistic education, skill development and self-empowerment. This enables to empower differently abled individuals to take their

place in society as confident, productive citizens and to stand on their feet and create a brighter future for themselves. The practice and application of Vedic Sutras helps them acquire confidence in securing good government jobs and a stable income and thus become independent and contributing members of society.

Research Framework

The present study aims at testing the effectiveness of an Instructional Strategy using Vedic Mathematics for enhancing Mental Computation among visually challenged students. The selected Vedic Sutras were "**Ekadhikena Purvena",** "**Antyayordasakeapi" and ''Urdhva Tiryagbhyam''**

Thus, the **main questions** addressed here are:

Can Vedic Mathematics be considered as an alternate strategy in enhancing Mental Computation among visually challenged students?

Do Vedic Mathematics applications enhance the computational speed through Mental Computation among visually challenged students?

In an attempt to answer these questions the following **objectives** were sought:

The Specific Objectives of this Study are:

1. To review what is known from the research and professional literature about teaching mathematics to visually challenged students.
2. To develop an Instructional Strategy using Vedic Mathematics for enhancing Mental Computation among visually challenged students.
3. To test to what extent an Instructional Strategy using Vedic Mathematics skill training improve the computational speed of Visually Challenged students.
4. To evaluate the effectiveness of the Instructional Strategy using Vedic Mathematics by analysing the outcomes.

The following **hypothesis** was formulated by the investigator to lead the study

Vedic Mathematics applications are very much effective in enhancing Computational Speed of Visually Challenged students

Purpose and Method of study

The present study aims at testing the effectiveness of the Instructional Strategy using Vedic Mathematics with the application of Vedic Sutras for enhancing Computational Speed through Mental Computation among Visually Challenged students. The investigator selected the Single Group Pretest-Posttest Design (Gay, 1987).

Participants

The participants were 80 secondary school students from Kristu Jyothi Blind School, a well-known blind school in an urban area of Thiruvananthapuram District of Kerala State, India. These students had been diagnosed with severe visual impairedness as per the school authorities. Head Teacher and other teachers of the blind school were also participated in the intervention process for monitoring the classes. Fifty-five participants were male (68.8%) and twenty-five were female (31.2%).

Materials

The tools used for the study were:

1. Modules prepared on Vedic Mathematics "**Ekadhikena Purvena",** "**Antyayordasakeapi", and** ''**Urdhva Tiryagbhyam''** Sutras for multiplication.
2. Computational Speed Test

Teacher Training

The four mathematics teachers who taught the experimental groups attended a 3-day instructional program (15 hours of class instruction and 30 hours of home practice) on Vedic Mathematics. The content included (a) format of Modules, (b) basic knowledge of Number system and base numbers, (c) basic computational skills (addition, subtraction, multiplication, and division), (d) Sutras on "Ekadhikena Purvena", "Antyayordasakeapi", and ''Urdhva Tiryagbhyam'' for multiplication. A master teacher (a professor in Curriculum and Instruction), and a researcher on Vedic Mathematics conducted the training program.

Intervention Stage

Before beginning the Intervention, students were randomly assigned to four experimental groups with n= 20 in each group. Each group was taught by different teachers with the help of the prepared Modules and as per the instructions given at the period of Training. The study therefore consisted of 4 experimental groups. The intervention started with a rapport creation with the students by the Research Team Members followed by an oral pre-test. The pre-test on Mental Computation includes twenty questions on basic fundamental Multiplication as per the select sutras which have a scoring weightage of one mark each. The time taken to complete each question correctly was noted. After recording the Pre-test scores, the intervention has started and it continued for one week. On the final day, the same Mental Computation Speed Test was administered as Post-test. The scores were collected.

Data Analysis

T-Tests were performed to determine whether there were statistically significant differences between the Pre and Post scores of the experimental groups in Mental Computation skills including achievement and speed. (See Table 1 for comparisons means of the pre-test and post-test scores).

Table 1 - Results of T-Tests on Pretest and Posttest Scores for Experimental Group

Skill Area	Pretest (N=80)		Posttest (N=80)		t- Value
	M	S.D.	M	S.D.	
Achievement	8.6	2.4	17.4	1.6	49.16*
Computational Speed (Minutes)	34	4.2	18	2.3	64*

*significant at 0.05 level

T- Tests showed significant differences in Achievement Scores (49.16; $p<0.05$) and Mental Computation Speed scores (64; $p<0.05$). The findings with regard to Computational Speed are probably the most salient feature of this study. Statistical analyses reveal significant differences between the Pretest and Posttest scores of experimental group (M1= 34

Minutes and M2=18 Minutes) in the Computational Speed. Also the Achievement scores also differ significantly (M1=8.6 and M2=17.4) which again reveals the effectiveness of the strategy.

The extent to which a curriculum that includes Vedic One line mental computation skill training improves the computational abilities of visually challenged students was investigated in the study. These results suggest that having Vedic One line mental computation fully embedded into the existing math curriculum, it had a positive impact on computation. Results of this study are consistent with previous research in which Vedic mental calculation was found to be a powerful technique in enhancing students' computational skills (Nicholas, Williams & Pickles (1984), Hope (1987), Muchlman (1994), and Haridas (2004)) who concluded that "Vedic Mathematics provides very easy, one line, mental and superfast methods".

Findings

1. The Vedic Method of multiplication is effective in improving Mental Computation speed among Visually Challenged students.
2. Application of Vedic Sutra is more effective than the existing system of Mathematics instructional procedure in improving computational speed and positive mathematics attitude.
3. The Vedic Sutra for Multiplication is effective for the Secondary School Students in retaining their Computational Speed and positive mathematics attitude.

Educational Implications

Objectives for educating visually impaired students have been dealt with and often revised over the years as understanding of the educational implications of the impairment became more universal. Lowenfeld (1973) stated that: Education must aim at giving the blind child knowledge of the realities around him, the confidence to cope with these realities and the feelings that he is accepted as an individual in his own right. (p. 158). Education is a process of human enlightenment and empowerment for the achievement of a better quality of life. Mathematics education is crucial to the entire developmental process of the country. Mathematics is poorly tough and badly learnt, it is little more than burdening the mind with dead information, and it could degenerate even into a new superstition. Mathematics has added a new dimension to education and to its role in the life of the nation, but central to all this is the quality of education. This finding of the great applications of Vedic Mathematics should enlighten educational authorities to devise instructional strategies across the curriculum to enhance the Mental Computational abilities of Visually Challenged students. This, in turn, will go a long way in the uplifting the society and enriching education through our rich cultural heritage of Vedic applications.

Conclusion

Overall, the results of this study support the contention that Vedic mental calculation skill training has positive effects on visually challenged students' learning. It can be used to develop number concepts, increase efficiency in mathematical calculations, and improve students' ability to apply mathematical skills to real-life situations. Imbedding Vedic mental computational training into all aspects of a math curriculum is an innovative strategy in the current math curriculum reform for the visually challenged. Vedic one line mental calculation permits children to find different ways to perform computation and can meet the needs of students with special disabilities (Richards, 1994).

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