

Vedic Maths in Education

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Abstract

India's next gift to the world could be Vedic mathematics"- Narendra Damodardas Modi. Present Prime minister of India.

Mathematics plays a significant role in our day to day life. The younger generation who is victim of dyscalculia (Dyscalculia is difficulty in learning or comprehending arithmetic, Dyscalculia range between 3 and 6% of the population). who often find themselves have problems with the most basic parts of mathematical concepts .Such as Counting, Reading and writing numerals, Number magnitudes, Number facts, Numerical procedures and so on. The implementation of Vedic maths in our regular academic curriculum will improve the skills, knowledge and attitude of a student towards mathematics. Using Vedic maths we can strengthen ones mathematical skill which can bring about happiness and well-being. One need to know the tables only till 9 and the 16 sutras forms the basis to solve even the most complex problems. For example you can multiply 994 and 996 in less than 10 seconds .Vedic mathematics is a source that boosts one's confidence, increases the memory skills and becomes a stress buster to those who have maths phobia. It will take children to places where they never dared to go for mathematical experiences. Each child is genetic code for the intellectual property of the nation. Children are passionate, provocative and full of big ideas who have to be challenged to show them the endless possibilities to learn maths.

Vedic Maths not only helps people with maths phobia, it also plays vital role in competitive exams which makes ORDINARY STUDENT TO EXORDINATRY STUDENT We should sincerely consider taking the Vedic maths in our present education system to transform our children as maths whiz! Therefore the problems faced by children with dyscalculia in our country can be addressed at a national level on war footing.

Keywords: Vedic Maths, Dyscalculia, competitive exams

Aim:

To help students to have better command over mathematical concepts and boost up their self-confidence level towards the subject.

Objective :

- ❖ Help the parents and teachers to understand the need of Vedic Maths intervention in the curriculum of the students.
- ❖ Help students use their Vedic maths skill in doing mental maths, rechecking the answer and also excel in competitive exams which makes ORDINARY STUDENT TO EXTRAORDINARY STUDENT

Target Group:

- ❖ Students, Teachers and Parents

Inclusion criteria

- ❖ One or both parents
- ❖ Parents who are willing to participate in the entire programme .
- ❖ Parents of children in the age group of 3-18 years
- ❖ Age group of the participants would be between 25-60 years
- ❖ Teachers of the institution.
- ❖ Other Educator and Principal of the Institution
- ❖ Students (In- Class Room)

Exclusion Criteria

- ❖ Parents of children above the age group of 18 years.

Ethics

- ❖ All the ethical considerations such as confidentiality, informed and prior general consent, debriefing, direction for any problem will be covered. .

Background of the study:

- ❖ Disability is considered as the functional consequence of an impairment or change in the body or human functioning. Learning disabilities are neurologically based processing problem. These processing problems can interfere with learning basic skills such as reading , writing , and/or maths . Experts believe that children with learning disabilities have problem with the way the brain handles information. According to (ICLD-1988), Learning Disabled children can be referred as the children who have difficulties in Listening, speaking, reading, writing, reasoning and mathematics
They can also interfere with higher level skills such as organization, time planning abstract reasoning, long or short time memory. It is important to realize that learning disabilities can affect an individual's life beyond academics and can impact relationships with family friends and in the work place.

Specific learning disability – Dyscalculia

Dyscalculia is a broad term that includes many different kinds of difficulties in learning mathematics. Dyscalculia is also used for naming general difficulties in learning basic mathematics.

SOME OF THE DIFFERENT DEFINITIONS INCLUDE:

Developmental dyscalculia: according to a number of researchers (Kosc, 1974, Shalev & Gross-Tsur, 1993, 2001, Wilson & Dehaene², 2007) this type of dyscalculia originates from a specific impairment in the brain function. However, this definition has not always been fully acknowledged by the research community. The neuroscience research field has though progressed, where studies are conducted concerning the brain (Wilson & Dehaene, 2007).

Dyscalculia: where a person has lost all sense of meaning of numbers or where the person still understands numbers but is unable to perform basic calculations like addition and multiplication, due to a neurological damage.

Pseudo-dyscalculia: finding math difficult, based on emotional blockage or a confidence problem. There are also several different theories of causes of dyscalculia:

The Core deficit hypothesis: analogies are made between dyslexia and dyscalculia. Even though “the knowledge of its behavioural manifestations is incomplete” (Wilson & Dehaene, 2007), neuroimaging results point to a specific region in the brain when it comes to numerical handling. Some types of dyscalculia are caused by an impairment of function in different regions in the brain (Butterworth, 1999; Gersten & Chard, 1999; Robinson, Menchetti & Torgesen, 2002).

THE ROOT CAUSE OF DYSCALCULIA

Why is the brain functioning differently in dyscalculic individuals? There are many possible causes, including both genetic and environmental, and an interaction of the two. The cause for one individual may not be the same as for another, and in many cases it may not be obvious.

HOW COMMON IS DYSCALCULIA?

If you hadn't heard of dyscalculia until recently, you're not alone. It isn't as widely discussed as dyslexia, and it's not as well understood. However, some researchers are beginning to think it may be almost as common as dyslexia.

DEVELOPMENT OF STANDARDIZED TEST FOR DYSCALCULIA

Development of standardized test to screen the dyscalculia children is a very tedious job. By over viewing the international practices we can reach at the conclusion that there is no common test and content of test or problems to be included in the test. Most of the standardized tests for dyscalculia include dot counting, identification of numbers, perceptual quantity estimation and simple arithmetic. These all can be categorized in the following areas of mathematic in which most of the researchers agreed to use for the screening for dyscalculia children between the age 7-14 which are; computation (Fuchs, et. al, 2005; Griffin, 2007; Foegen, 2008b), comparison (Jordan, 2007; Holloway & Ansari, 2009; Markovits & Sowder, 1994; Wilson and Dehaene, 2007) and estimation (Siegler & Booth, 2004 and 2005; Schneider, Grabner, & Paetsch, 2009; Penner-Wilger, et. al., 2009).

Computation:

Computation tasks are the most traditional way of measuring mathematical competence in students. Asking them to add, subtract, multiply and divide whole numbers, fractions and decimals is the standard method of determining proficiency in math.

Comparison:

Comparison is another measure that determines the ability of students to think on a larger scale and in terms of numerical magnitude. Number comparison requires recognition and judgment of magnitudes of numbers (Penner-Wilger, et. al.,2009). Comparison tasks come in both symbolic and non-symbolic representations of numbers, as appropriate for different age groups.

Estimation:

Estimation is “a process of translating between alternate quantitative representations at least one of which is inexact” (Siegler &Booth, 2005).

On the basis of these international developed standardized test. The test was divided on two parts. The first part included the simple dot counting, estimation of numbers, number comparison and identification of numbers and some mathematical facts like no. of days in week, no. of months in a year etc.. The second part included the simple arithmetic problems of addition, subtractions, multiplication and division (used Vedic Maths method).The test only contained the problems up to the four classes.

Conventional Method

The diagram shows the addition of 1001, 2341, 4322, and 4653. The result is 12317. The process involves adding from right to left, carrying over 1 from the first column to the second, and 3 from the second to the third.

Conventional Addition

retain 1 on right and the carry over the other 1

retain 3 on right and carry over the 1 to the other side

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The above method is the usual method we learn at school i.e; adding each column from right to left and carrying the extra's to the next column to get our final answer.

Addition in Maths using DOTS

Addition - the Vedic Way

The diagram shows the addition of 1001, 2341, 4322, and 4653. The result is 12317. The process involves adding from right to left, using dots to represent carry-over, and counting back for the final answer.

$3 + 2 + 1 + 1 = 7$

$5 + 2 + 4 = 11 \rightarrow 1 + 0 = 1$
being greater than 10, keep the 1 as DOT and pass the 2 forward

one DOT
 $1 + 6 + 3 = 10 \rightarrow 0 + 3 + 0 = 3$
being two digit ≥ 10 , keep 1 as DOT and pass the 0 forward

one DOT
 $1 + 4 + 4 + 2 = 11 \rightarrow 1 + 1 = 2$
keep the 1 as DOT from 11 and pass the other 1 forward and place before 1

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From the above, we see that the 1's on the left side of the two-digit number are replaced as DOTS and then counted back for the addition operation for the next column

VEDIC MATHS IN EDUCATION

Vedic math was rediscovered from the ancient Indian scriptures between 1911 and 1918 by Sri Bharati Krishna Tirthaji (1884-1960), a scholar of Sanskrit, mathematics, history and philosophy. He studied these ancient texts for years, and after careful investigation was able to reconstruct a series of mathematical formulae called sutras. Tirthaji, who was also the Shankaracharya (Pontiff) of the holy eastern Indian city of Puri, delved into the ancient Vedic texts and established the techniques of this system in his pioneering work - Vedic Mathematics (Motilal Banarasidas, 1965). The Shankaracharya has acknowledged the contributions of the Vedas as the source Vedic math, especially the Atharva Veda - the last of the four Vedas that deal with the existential issues of architecture, mathematics, engineering and medicine.

Dyscalculia children are very frustrating and discouraging due to the social and emotional component. These children have the prevention due to inability to remember numbers. Likewise the social component, emotional component also hampers the mental well-being of dyscalculia children. Anxiety is the of the most frequent emotional symptom reported by dyscalculia children and adults.

For many children, mathematics is an inherently difficult subject to learn. Between 5 and 8 percent of children between the ages of 6 and 14 have a particular type of cognitive deficiency that limits their aptitude to acquire knowledge and understanding of fundamental ideas in numeracy (Geary, 2004). Since learning Mathematics skills are the skills we need to deal effectively with the challenges in everyday life, whether at school, at work, or in our personal lives. In everyday situation we come across many situations where we have to use mathematical concepts like making change, keeping score in a game, or estimating the passage of time, performing age-appropriate. Dyscalculia range between 3-6% of the population and 5-15 % of school going children. Dyscalculia can't be "cured," or fixed; it is a lifelong challenge. However, with appropriate support, intervention of Vedic maths and other educational therapy will definitely help people with dyscalculia and they can achieve success in school, at work, in relationships, and in community. Within this frame work , the aims of the paper are exploratory

in nature , in discovering the classroom intervention strategies, and their ethical consequence under premise of “freedom from coercion and competence” used on children suffering from dyscalculia.

There are no medications that treat dyscalculia, at the same time medication could help children deal with co-occurring issues like ADHD or anxiety There are many non-medical ways to help children with dyscalculia which can be successful. We have to explore educational therapy, speech therapy ect. In educational therapy we can include Vedic maths which makes learning maths fun, fast and fantastically easy. " Master Mind Vedic Maths program have been changing lives of individuals who had fear from mathematics initially, but are now fond of it. The more you and your child’s teachers work together to provide support and accommodations, the better the odds that your child will work through his challenges and succeed in math. Learning to self-advocate is a skill that can offer benefits throughout his/her lifetime .Integrating Vedic Mathematics with modern mathematics which will develop competence among children to solve mathematical problems faster than computers and calculators, When you use Vedic Maths you use both your left and the right brain hemisphere. The left side of the brain is the seat of language and processes in a logical and sequential order. The right side is more visual and processes intuitively, holistically, and randomly which boosts memory and concentration. Since we are doing calculations mentally without the use of pen or paper we are actually concentrating which develops the concentration abilities This will help dyscalculia children This is a common misconception that brain cannot undergo changes –which is completely untrue. Every time you learn a new piece of information or a new skill, your brain changes. If you practice a new skill considerably your brain can show quite large changes. We call this ability to change "plasticity". The brain is at its most plastic during childhood, but it shows much plasticity in adulthood as well .Since dyscalculia is related to brain function, with continues practice of Vedic maths with regular mathematics , will definitely will bring change in dyscalculia students. But it could be changed by experiences in the home (an environment which encourages attention to number), by teaching in school, and by intervention programmes. Intervention programmes show particular promise for severe learning disabilities. We know from research on dyslexia that auditory training programs can result in significant improvement in reading which is associated with changes in brain function Going by the view that training in the skills not only helps minimize high risk behavior but also builds young people's confidence engaging in creative problem

solving to overcome the social and economic barriers to self-development. Learning Vedic maths is the capacity for manifesting and redesigning positive behavior that enable individuals to deal successfully with the demands and challenges of daily life. Children who have difficulty in remembering numbers and working with numbers (for example, with adding up, multiplying, fractions) have a major difficulty in life. For such people not only have problems in passing maths exams at school, but they also often have difficulty with handling money, telling the time, using a calculator, and checking their online banking. Vedic Maths is applicable in various industries

A FEW MAJOR AREAS WHERE WE CAN IMPLEMENT THE VEDIC MATH FORMULAS.

1. Education

The use of Vedic Math is most commonly seen in the education industry. It helps the small school going children's by allowing them to recheck and confirm the answer quickly through *Vedic math tricks*. The children preparing for competitive exams use this system for increasing their speed and accuracy by practicing *mental math*.

2. Information Technology

Vedic Maths has been discovered as a very useful tool for the computer age. Most of the people have been using this system across the globe to derive its benefits in Digital Signal Processing, High Speed Low Power VLSI arithmetic, Designing Micro Chips etc. by using operations like multiplication, division, squares, cubes and their roots.

3. Space Technology

One of the formulas in Vedic Math helps in using the value of PI by 10 to 32nd place. This kind of accuracy can be achieved by the system and so is adopted in artificial intelligence and space technology. Even the scientist named **Dr. Rick Briggs** has made use of *Vedic Mathematics* in **NASA**, An American Research Centre for Space technology.

VEDIC MATHS EDUCATION ADVANCEMENT CAN BE ESTABLISHED THROUGH ACTION RESEARCH

STEPS FOR ACTION RESEARCH FOR VEDIC MATHS EDUCATION

- ❖ Analysis the data collected through questionnaire about the awareness of dyscalculia among parents and teachers.
- ❖ Educating parents and Teacher about benefits and need of Vedic Maths intervention in the school curriculum.
- ❖ Used standardized test to screen the dyscalculia and
- ❖ Assessment

Objective assessment: Used Multiple choices because Multiple choice tests assess various levels of learning outcomes, from basic recall to application, analysis, and evaluation. Because children are choosing from a set of potential answers

Authentic Assessment: Makes children just not to learn the content for their grade level. It also makes them to know how to use the acquired knowledge and skills in the real life. Authentic assessment which tends to focus on contextualized tasks and make my children to demonstrate their ability in a more reliable situation.

Oral questions: Strategy in between the session and end of the session which elicit the immediate information about my learner's learning. And also now days many children just regurgitate the textbook on written exams, but on an oral exam, the line between knowledge and understanding is much clearer.

- ❖ Followed Different Strategies

Strategy 1:Curiosity as Hook (Since motivation is a primary motivator at the beginning of a lesson .so started by asking a thought provoking question.

Strategy 2 : An atmosphere for question(create an atmosphere where student will fell comfortable about raising question .This not only fostered the curiosity, but it also helped to build their confidence.

Strategy 3: Right amount of stimulation given keeping in mind the individual differences in children.

Strategy 4:Time- Allocation of adequate time for exploration for each topic .

Strategy 5: Visual stimuli : Incorporated animation video and demonstration to the class so that children can visualize and relate to a particular concept to real life situation–

Strategy6: Kinesthetic Skill: Instead of purely focusing on information children are given the opportunity to have a hand on experience to master the content thought.

Strategy 7: Collaborative learning Learner is given opportunities to work in pair.

Strategy 8: Research Skills: This skill teaches how to sort through the many resources available to select relevant and reliable information. Children found this method useful as they are given a chance to consolidate their knowledge as well as the confidence that they have mastered the content.

Strategy9: Practical application with through drill and practice speed and accuracy can be increased by creating interest in child towards mathematics.

Strategy 10: Feedback from children, observers.

This paper looked into how intervention of Vedic Maths strategies in the school curriculum would bring in a difference in children (including children with dyscalculia), in their ability to understand the mathematical concepts and at the same time boost up their confidence towards the subject and also describes the procedures adopted by in my school for identifying and classifying children with dyscalculia in primary schools. We had 14 children from grade 2, 3 and 4. We found they are not familiar with basic concept of maths of their grade level and they are very poor when comes to number concepts. For determining the presence of dyscalculia both inclusionary and exclusionary criteria were used. When other possible causes of arithmetic failure had been excluded, figures for dyscalculia came out as 6.45 % (14 cases out of 217).

Upon analyzing the data collected through questionnaire from parents and teachers, feedback from children and observers , I also discovered there isn't a "one size fits all" model. Children are all very individual with regards to their preferences so we cannot continually rely on a single type of activity. There must be a good variety so that all children could be satisfied at one stage or another to understand the concept. The large variety will also stretch some of them out of their comfort zones and take risks with their learning. In doing so they discover more about themselves and may even learn a better way of doing things.

Another striking result got from the data collected through questionnaire is that 76% of the teachers reported not to have dealt with dyscalculia during their academic training, neither at graduate nor at post-graduate level. By contrast, more than half of the teachers had dealt with dyslexia even at graduate level. Clearly, dyslexia is a much better known disorder than dyscalculia. The scores on the questions with correct or wrong answers, on average, were only slightly above the mean, and unlike for other questions scores were not better in teachers with a longer teaching experience. Also scores were not better in the teachers that had claimed to know what dyscalculia is. This could suggest that answers had been arrived at by deduction from the context rather than being based on previously existing knowledge.

I remembered a Chinese proverb ‘ When you eat a fruit , think of a the person who planted the tree, and thank him for giving the such a wonderful fruit to us .Like while doing this paper I really thank from my heart to the person who designed the Vedic Maths sutras - Sri Bharati Krishna Tirthaji . Because his sutras and sub sutras gave me a wonderful opportunity and provided me a chance to my little ones who is struggling with maths concepts and also help high achievers to score highest marks in their competitive exams .Vedic Maths methods will gave them the confident that maths is not a night mare at all. Only little more hard work and regular practice they can achieve their goal.

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