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“ NUMERICAL ABILITY NOW AND THEN ”



Rajendra Badhe

Maths & Statistics Dept. , Burhani College, Mumbai.

Short Profile

Rajendra Badhe is a Maths & Statistics Department, Burhani College, Mumbai.



ABSTRACT:

Given the precarious and entirely personally variable nature of this disorder, Dyscalculia calls for personal attention by the instructor. It is up to the ability of the instructor to get through to the slow learner purely on a personal basis to bring about any incremental improvement in his receptivity - medical progress notwithstanding.

KEYWORDS

Numerical Ability, academic achievement, technical knowledge, logical reasoning.

INTRODUCTION

Dyscalculia is perhaps only a medical term unknown to the vast majority but a challenging truth for those who experience it. Dyscalculia is the general term used to describe a specific learning disability in understanding functions involving numbers. Individuals with dyscalculia have significant problems with numbers: learning about them and understanding how they work. There is wide-spread misunderstanding of the importance of numerical ability in everyday life and a lack of appreciation of how important learning calculation is for young children. Researchers have begun to look at kindergarten skills as effective predictors of future academic achievement. Children's early numerical knowledge is said to be important because it fosters future abilities not only in calculation but also in reading. Even otherwise, the importance of understanding functions involving numbers in everyday life cannot be overestimated. Have a look at how numerical ability is an indispensable part of daily existence –

- 1.Setting an alarm involves calculating the number of hours of sleep required.
- 2.Using the bathroom scale involves calculating the number of calories to be shed.
- 3.Administering medicinal dosages requires calculation in grams/millilitres.
- 4.Vehicle usage requires calculation of fuel usage per unit.
- 5.Air travellers need to understand departure times and arrival schedules to organise their personal schedules.
- 6.To understand time expanses of decades, centuries or eras in history, students require calculative imagination.
- 7.Grocery purchases require an understanding of the cost and affordability of items.
- 8.Sportsmen require to understand basic win-loss ratios, batting averages or pitchers' earned-run-averages.

The list of the importance of numerical ability can run endlessly but what remains unquestionable is its indispensability just as much as of reading skills. Just as reading skills are critical for succeeding in school and in life, there has been increased recognition during the past few years of the importance of acquiring basic numerical skills that set the stage for more advanced technical learning required for higher education and employment. There is no question that the failure to develop competencies in calculation during the school years can seriously handicap both daily living and vocational prospects for young people and adults alike. In today's world, technical knowledge, logical reasoning and numerical problem-solving skills are no less important than reading ability. That brings us to our primary concern viz. Dyscalculia. Researchers have not yet identified the primary cognitive deficits that underlie disabilities in understanding numerical calculation (i.e., dyscalculia). Difficulties in calculation appear not to be linked to a specific disability, but rather, may be the result of weaknesses in other related cognitive skill areas such as language, attention, memory and skills related to perceiving and imagining space. Nevertheless, an understanding of the problem, its extent and possible remedies is very much in order.

Research Methodology : The researcher took samples of 20 students per class in a population of 12 classes each comprising 80 students. The results were tabulated from the outcome of a questionnaire

circulated among the students surveyed. Nearly 20% of the students surveyed had personally experienced learning disability and 35% of these had encountered victims of dyscalculia either as relatives or as friends. The one thing that all the samples had in common was a complete ignorance of the existence of such a disorder being a medical anomaly.

Interpretation : Dyscalculia is difficulty in understanding and grasping arithmetic, such as difficulty in understanding numbers, learning how to manipulate them and learning facts in technical calculations. It is generally seen as a specific developmental disorder like dyslexia. Dyscalculia can occur in people from across the whole intelligence quotient range, often, but not always, involving difficulties with time, measurement, and spatial reasoning. Mental disabilities specific to calculations were primarily identified in case studies with patients who had specific numerical disabilities as a result of damage to specific regions of the brain. More commonly, dyscalculia occurs as a genetically linked learning disability which affects a person's ability to understand, remember, or manipulate numbers or numerical facts. The term often refers specifically to the inability to perform functional operations involving calculations, but is also defined by some educational professionals and cognitive psychologists as a more fundamental inability to conceptualize numbers as abstract concepts of comparative quantities, which this researcher considers to be a foundational skill, upon which other mathematical and statistical abilities are built. Let us first have a look at the evident symptoms of dyscalculia –

- a) Poor understanding of or confusion with understanding mathematical and statistical signs and symbols.
- b) Difficulty with addition, subtraction, multiplication and division or in understanding the words "plus," "add," "add-together."
- c) Difficulty in understanding times tables.
- d) Poor mental arithmetic skills.
- e) Trouble with using a calculator due to difficulty in feeding in variables.
- f) Reversing or transposing numbers for example 63 for 36, or 785 for 875.
- g) Difficulty in judging the passing of time.
- h) Difficulty with everyday tasks like totalling change.
- i) Difficulty in keeping score during games.
- j) Inability to comprehend financial planning or budgeting, sometimes even at a basic level, for example, estimating the cost of the items in a shopping basket or balancing a cheque book.
- k) Inability to grasp and remember mathematical and statistical concepts, rules, formulae, and sequences.
- l) Poor sense of direction (i.e., north, south, east, and west), sometimes even with a compass.
- m) Difficulty in estimating the measurement of an object or distance (e.g., whether something is 10 or 20 feet away).

Let us now analyse the possible causes of this neurological condition. Researchers don't know exactly what causes dyscalculia. But certain factors have been identified that indicate that it could be a brain-based condition.

Some possible causes of dyscalculia may be enlisted as follows –

1. Genes and heredity: Studies on dyscalculia show it's more common in some families. Researchers have found that a child with dyscalculia often has a parent or sibling with similar issues of learning disability. Consequently, dyscalculia may be considered to be genetic.
2. Brain development: Researchers often use modern brain imaging tools to study the brains of people with or without numerical issues. Differences have been found in the surface area, thickness and volume of parts of the brain - specifically those areas which are linked to learning and memory, setting up and monitoring tasks and remembering numerical and quantitative facts.
3. Malfunction at birth: Dyscalculia has been linked to exposure to alcohol in the womb. Prematurity and low birth weight may also play a role in dyscalculia.
4. Brain injury: Studies show that injury to certain parts of the brain can result in what researchers call “acquired dyscalculia.”

For children with dyscalculia, it is not very clear how much their brain differences are shaped by genetics and how much by their experiences.

One more and an even more disturbing premise comes to light when we consider observations made and recorded by some eminent studies which must be mentioned here –

A study with fifty 11- to 12-year-old Spanish monolingual children reveals that the performance of children with Developmental Dyscalculia (DD) and those with Reading Difficulties and Dyscalculia (RDD) in tasks where short-term memory is involved is lower than that of the control group (Roselli et al., 2006). It concludes that this might be linked to a poor working memory and a lack of counting skills. Additionally, this research reveals that it “appears that the ability to retrieve arithmetical facts from long-term memory is defective” with children who have DD and RDD. Learners with dyscalculia may encounter difficulties with short-term memory, long-term memory (for mathematical information) and visual memory (Chinn, 2004). With regard to short-term memory, dyscalculic learners may find difficulty with beginning a given task because they cannot remember the instructions or because they cannot remember what they must do to see it through. In fact, Chinn (2004) states that educators should avoid giving a long string of instructions which will make dyscalculic learners struggle to keep up with the pace of the lesson. This should also be taken into consideration when word problems are given as tasks in the classroom (Geary, 1993). If a problem has too many questions, children might become confused as they might forget which question must be answered first. Even though working memory is mostly associated with mental work, it can also affect written work as children with a deficiency in memory would not be able to remember how to write out the 16 numbers. They may also forget the procedure to working out specific mathematical operations. Long-term memory related to mathematical information also plays a key role in the learning and remembering of important mathematical facts such as simple addition (e.g. $5 + 4$) and multiplication facts (e.g. 5×4). A study conducted by Chinn (1995) illustrates how a group of children with dyscalculia could not recall simple addition facts in 4 seconds whereas another group of same aged children who did not have such difficulties could. The study also reveals that children with dyscalculia could solve such addition sums in 12 seconds as they found alternative strategies of solving the tasks rather than relying on memory. This again illustrates that lack of working and long-term memory can have a ripple effect on other important skills needed for calculative abilities such as the speed at which learners carry out their tasks. Visual

memory may also be problematic for dyscalculic learners. Therefore as suggested by Chinn (2004), educators must avoid confusing the child with overcrowded textbooks and worksheets. They should allow enough space between written items (Chinn and Ashcroft, 1998). Attwood (2002) highlights that it is best to use double spacing in exercises and other written tasks. Moreover, Chinn (2004) underscores that print should be very clear, especially when presenting numerical symbols. The symbols + and x, and the symbols – and ÷ can be indistinguishable if written unclearly. He also states that educators should provide isometric paper when 3-D shape drawing is done as children with dyscalculia may find it difficult to represent 2-D shapes in 3-D form.

Evidently Dyscalculia is a clear and present challenge not to be ignored. We, therefore, now turn to the possible remedies for this disorder. The treatment of children and adolescents with dyscalculia is a complex matter because of the heterogeneity of the disorder and the co-morbid disorders often associated with it. For the best chance of a lasting therapeutic benefit, the treatment should be individually tailored to the findings of the diagnostic evaluation. It should be adapted to the patient's individual cognitive functional profile and may incorporate medications and psychotherapy as well, if these are warranted by severe accompanying psychopathological manifestations such as anxiety, depression, etc. No doubt, there have been some practical advances albeit not entirely conclusive –

1. Software intended to remediate dyscalculia has been developed.
2. Forms of educational therapy, such as neuro-sensory educational therapy, can be an effective treatment.
3. A study used trans-cranial direct current stimulation to the parietal lobe during numerical learning and demonstrated selective improvement of numerical abilities that was still present six months later.

CONCLUSION :

Given the precarious and entirely personally variable nature of this disorder, Dyscalculia calls for personal attention by the instructor. It is up to the ability of the instructor to get through to the slow learner purely on a personal basis to bring about any incremental improvement in his receptivity - medical progress notwithstanding.

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Contact-9595359435
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