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RESEARCH ARTICLE

ASSESSMENT OF LEARNING DISABILITY (DYSCALCULIA) AMONG SCHOOL GOING CHILDREN:  
TODAYS CONCERN

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ABSTRACT

Learning disability (LD) is defined as the brain's inability to receive process, analyze or store information. Dyscalculia is difficulty in learning or comprehending arithmetic such as difficulty in understanding numbers, learning how to manipulate numbers, and learning math's facts. It is generally seen as a specific developmental disorder like dyslexia. Dyscalculia is a mathematical learning disorder where the mathematical ability is far below expected for a person's age, intelligence and education. This study explored assessment of learning disability (dyscalculia) among school going children. The study sample comprised 60 school going children (boys and girls) of different boards (CBSE, ICSE, UP) from three private schools at Lucknow city. The dyscalculia children were assessed through standardized Learning Disability Battery Part I was used to screen dyscalculia children. The reliability and validity of the scale was .82 and .69 respectively. The results revealed significant difference between type of board and category of dyscalculia. The study highlights the need to educate parents and teachers about learning disabilities (dyscalculia, dysdrachia, dyslexia etc), and to strengthen the social support network of these children's families.

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INTRODUCTION

The term 'Learning Disability' was first coined in 1963 by Dr. Samuel Kirk, a psychologist, while delivering a speech at an education conference held in Chicago. The National Joint Committee on Learning Disabilities (NJCLD) defines learning disabilities as "a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning and mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction (Jose, 2009). Learning disability (LD) is defined as the brain's inability to receive process, analyze or store information. By definition, individuals with learning disability have near normal to normal intelligence. Such individuals may have difficulty in reading or writing. Learning disabilities are described as two main types: verbal and nonverbal. People with verbal LD, have difficulty with words, both spoken and written. 'Dyslexia' is the most commonly and best known type of learning disability.

People with nonverbal learning disabilities have difficulty processing what they see (Lyon *et al.*, 2008)

Dyscalculia

The term Dyscalculia is derived from the Greek word- dys (difficulty) and from the Latin word- calculia (counting-stone)- A small stone or pebble used for calculation. Essentially it describes a difficulty with numbers which can be a developmental cognitive condition, or an acquired difficulty as a result of brain injury. While we recognize other definitions of dyscalculia, for our working practices the service will use the following definition of dyscalculia, which is currently recognized by the Department for Education:

A condition that affects the ability to acquire arithmetical skills". Dyscalculic learners may have difficulty understanding simple number concept, lack an intuitive grasp of number, and have problems learning number facts and procedures. Even if they produce a correct answer, or use a correct method, they may do so mechanically and without confidence.' DFES (2001). The term 'dyscalculia' is contentious. Does it relate to a discrete difficulty or part of a continuum? Should the criteria of discrepancy between IQ and mathematical ability be used?

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Should mathematical difficulties be seen as related to dyslexia and language difficulties (but evidence suggests that they can sometimes be dissociated) ... Arithmetic is NOT a single unitary ability'. Dowker (2009).

Dyscalculia is difficulty in learning or comprehending arithmetic such as difficulty in understanding numbers, learning how to manipulate numbers, and learning math's facts. It is generally seen as a specific developmental disorder like dyslexia. Dyscalculia is a mathematical learning disorder where the mathematical ability is far below expected for a person's age, intelligence and education. Current definitions are primarily descriptions of the characteristics of particular learners. They offer little help to practitioners in understanding the causes, but there is some evidence to suggest that dyscalculia is a brain-based disorder with a genetic predisposition (Shalev and Gross-Tsur (2001). There is some agreement that dyscalculic learners have a poor concept of numerosity, demonstrated by a deficit in subsidizing. This is the ability to know, from a brief glance and without counting, how many objects there are in a small group. It is an innate ability, present in human infants from birth. Some medical conditions are associated with dyscalculia: Turners Syndrome, a genetic condition more prevalent in females, is associated with mild dyscalculia; and Gerstmann's Syndrome, which also includes an inability to count fingers or point accurately, right/left disorientation, poor writing and inability to copy letters, is associated with severe dyscalculia. Individuals can also acquire dyscalculia through brain injury.

Numerosity is the foundation of numeracy and mathematics. Different authors use the latter two terms differently. For example, Sousa (2008) suggests that mathematics is the ability to "determine the number of objects in a small collection, to count, and to perform simple addition and subtraction, also without direct instruction" (p. 1). However, this idea is similar to what Dowker (2004) defines as numeracy, which she sub-categorizes into 10 components, namely:

- Counting verbally
- Counting objects
- Reading and writing
- Hundreds, tens and units
- Ordinal numbers
- Word problems
- Translation (changing objects to numbers, numbers to objects and number words to objects)
- Derived facts
- Estimation
- Remembered facts (Dowker, 2004 in Catch Up2009)

Calculation ability represents an extremely complex cognitive process. It has been understood to represent a multifactor skill, including verbal, spatial, memory, and executive function abilities (Ardila *et al.*, 1998). The loss of the ability to perform calculation tasks resulting from a cerebral pathology is known as *acalculia* or *acquired dyscalculia*. *Acalculia* has been defined as an acquired disturbance in computational ability (Loring, 1999). The developmental defect in the acquisition of numerical abilities, on the other hand, is usually referred to as *developmental dyscalculia* (DD) or *dyscalculia*.

## Types of Dyscalculia

Wadlington (2008) and Adler (2001) has given the following types of dyscalculia:

- **Verbal** (interpretation of verbal math terms)
- **Operational** (performing basic arithmetic operations)
- **Lexical** (reading written math terms, symbols)
- **Graphical** (symbol manipulation)
- **Ideognostic** (mental calculations)
- **Practognostic** (pictorial representation)

The primary aim of this research is to explore learning difficulties associated with mathematics, particularly dyscalculia and develop intervention module for achildren. Dyscalculia is a learning difficulty which affects a child's grasp of basic number concepts and hinders the understanding and application of number facts and procedures. Dyscalculia may arise because of a wide range of factors, from poor teaching, to low socio-economic status, to behavioral attention problems (Pandey *et al.*, 2014). Like most learning disabilities, if dyscalculia is not addressed in early childhood, a person may struggle with calculations throughout life.

**Objective:** To identify the children having dyscalculia.

**Hypothesis:** There exist no significant difference between type of board and category of dyscalculia.

## MATERIALS AND METHODS

An exploratory research design was used for the study. This study was carried out on school going students of Lucknow city. Three schools were selected for the study. All these schools were affiliated from CBSE Board, ICSE Board and UP Board. 60 respondents of class IX<sup>th</sup> and X<sup>th</sup> were randomly selected from different selected schools using simple random sampling. A standardized test was carried out to identify the dyscalculia children in the real class situation from 60 respondents. Statistical analysis was done by using SPSS version 20. In the present study frequency, percentage, mean and standard deviation were used to analyze.

## RESULTS AND DISCUSSION

**Table 1. Frequency distribution of respondent on the basis of Sex**

Sex	Frequency	Percentage
Boys	36	60.0
Girls	24	40.0
Total	60	100.0

Result in Table-1 showed that 60% boys and 40% girls were selected for the study. Table-2 depicts that equal number of respondents (33.3%) were selected from three different boards CBSE, ICSE and UP respectively. Result in Table-3 showed that 76.7% respondents were having no dyscalculia, 13.3% respondents were suffering from mild dyscalculia and 10% respondents were suffering from severe dyscalculia.

**H<sub>0</sub>:** There exist no significant difference between type of board and category of Dyscalculia

**Table 2. Frequency distribution of respondent on the basis of Board**

Board	Frequency	Percentage
CBSE	20	33.3
ICSE	20	33.3
UP	20	33.3
Total	60	100.0

**Table 3. Distribution of respondent on the basis of Category for dyscalculia**

Category for Dyscalculia	Frequency	Percentage
>60(No Dyscalculia)	46	76.7
40-59(Mild Dyscalculia)	8	13.3
5-39(Severe Dyscalculia)	6	10.0
Total	60	100.0

**Table 4. F-Test value between type of board and category for dyscalculia Descriptive Statistics**

Board	N	Mean	Std.Deviation	df	F	Sig.
CBSE	20	.45	.68	2	4.468	.016
ICSE	20	.00	.00			
UP	20	.55	.82			
Total	60	.33	.65			

Results in table 5 showed that as the  $F_{cal}$  value (.016) was found significant at 5% level of significance which means that null hypothesis was rejected. Mean values also showed significant difference, which means that the level of dyscalculia in children is influenced by the school board in which the children are studying.

## Conclusion

It was seen that there is strong relationship between type of board and category of dyscalculia (no dyscalculia, mild dyscalculia, severe dyscalculia). The results obtained also justify this scenario. The present study also shows that dyscalculia is not specific in any gender.

The following description gives a clear picture of the nature of learning disability (Dyscalculia). Many few of parents is aware about this term. It was also concluded that learning disability especially dyscalculia was prevalent in the children which is a issue of concern as these children need to be given special attention rather than punishment.

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