



**A STUDY ON THE LEARNING PROBLEMS OF MATHEMATICS IN DYSCALCULIA
(SLOW LEARNERS) CHILDREN IN VISAKHAPATNAM**

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ABSTRACT

Dyscalculia is a mathematics disability resulting from neurological dysfunction. It is the name given to the condition that effects the ability to acquire mathematical skills. The object of the present study is to investigate the learning difficulties of mathematics in dyscalculia affecting primary school children of Visakhapatnam. The data were collected different primary school children and mathematics teachers of the city. The sample of the study consisted of 100 children with ages between 5-10 years and various difficulties in pupils understanding basic computation, sequential counting, and lack of confidence were calculated by identifying the numbers (5,1, 5,9,8,97 etc..), simple additions ($2+2= ?$), simple subtractions ($4 -2 =?$), finding out the place values (ones, tens, hundreds etc..), remembering the tables, simple divisions ($20 \div 5 = ?$), finding out the big numbers and small number and solving the problems of integers. Dyscalculia caused significant effects on the mathematic learning abilities of the school children. It was found that various difficulties were observed when the students were treated by different mathematical problems based on their IQ levels. It was recommended that pupils should practice number concepts, involve themselves in mathematical games, use calculators, and engage in problem-solving so as to improve on their skills, help reduce anxiety, arouse interest, bridge the gender gap and enhance achievement in mathematics and the mathematical sciences at school.

Key words: *Disability, Dyscalculia, Learning, Mathematical disability*

INTRODUCTION

Mastery of mathematics is a key literacy component that influences children's success in education and future society (Engle, Grantham, Mc Gregor, Black and Wachs, 2007). It is a universal language which comprises different domains such as arithmetic problem solving numbers, measurement, probability, statistics and algorithm. It is meaning full and purpose full to all people as quantitative information. Pupils with difficulties in any of these ability are in their coordination may experience mathematical learning difficulties (Dyscalculia). Dyscalculia is the name given to the condition that effects student's ability to acquire arithmetic skills and is an impairment of the ability to solve mathematical problems, usually resulting from brain dysfunction. Generally all the children have the ability to respond to the numerical structures of their visual world (Butterworth. 2003 a, P.5). Numerosity defined as an invariant property of a collection of objects specifying its numerical size (Van Loosbreek and Smitsman, 1990). Dyscalculia can affect may different areas of mathematics learning and performance. Researchers have found that a child with dyscalculia often has a parent (or) sibling with similar mathematical issues. So dyscalculia may be genetical (Fletcher, 2007). Math



difficulties were identified at the stage of Childs scholastic development. Basing on the previous information it is suggested that the prevalence of mathematical disability to be between 4% and 7% within the school age children (Badian, 1983). Dyscalculia can affect many different areas of mathematics learning and performance. Different kids have different challenges. The most common problem is with “number sense.” Studies show that even babies have a basic sense of numbers. Butterworth (2003) compares number sense to being colour-blind. He says some people are born with number blindness. This makes it hard to tell the difference between quantities.

Mathematical learning difficulties (MD): Dyscalculia is characterized by specific difficulties with certain types of mathematics, and this is what differentiates it from other mathematical learning difficulties. If a child has problems with the four basic types of calculation, this will indirectly affect their ability in higher mathematics. If there are difficulties in understanding basic numerical facts, more complex calculations will also be affected. Math difficulties were identified at the stage of child’s scholastic development. These difficulties include how mastery and fluency with, retrieval of arithmetic, contribution, digit naming speeds, inefficient counting strategies, weak number sense. Researchers have suggested the prevalence of MD to be between 4% and 7% within school age children (Badian, 1983; Gross-Tsur, Manor, &Shalev, 1996; Kosc, 1974; and Lewis, Hitch, & Walker, 1993).

Factors which cause learning disability in mathematics

1. Difficulty in processing language
2. Visual – spatial confusion
3. Not remembering math facts
4. Inability to estimate
5. Emotional blocks to think

Number facts are the foundation for the basic computation; students are to memorize these at primary stage. Remembering these facts in difficult, since it makes the students to think mathematically. Students inconsistent at computing commit errors in signs, miswrite numbers. These can be rectified in remedial classes. Students find difficulties in connecting the abstract or conceptual objects of math with reality. Students’ learning will be meaningful when the real situation is given. Students have difficulty in making connections with mathematical experiments. To make students understand numbers and quantities they represent, they should be connected with objects.

Difficulties with reading and comprehension

- Mixing up similar-looking numbers in reading e.g. 6 and 9 or 3 and 8.
- Inability to comprehend the space between numbers, so that for instance 9 17 is read as nine hundred and seventeen.
- Difficulty in recognizing and therefore using calculation symbols i.e. plus, minus, multiplication and division symbols.
- Difficulty with reading numbers containing more than one digit. Numbers with zeroes can be especially difficult, e.g. 1004 or 7069.



- Confusion of reading direction, i.e. reading numbers in such a way that 12 becomes 21. It is not unusual for some children to shift the direction of reading so that some numbers are read accurately, from left to right, while others are read back to front.
- Problems reading maps, diagrams or tables.

Difficulties with writing:

- Written symbols, often numbers, are reversed or rotated.
- Problems copying numbers, calculations or geometric figures from a set picture.
- Problems recalling numbers, calculations and geometric shapes from memory. Difficulties remembering how numbers and calculations are written. In this case it can be easier for the student to spell the number with letters.
- Difficulties remembering how mathematic symbols are written, e.g. “+” or “-”.
- Inability to correctly write down numbers containing more than one digit. Just as with reading problems, it might occur that zeroes are lost, e.g. that **one thousand and seven** is written as **107**, or that **seventeen** is written down with the seven first as **71**, or that **four thousand five hundred and thirty five** is written as four separate numbers: **4000, 500, 30, 5**, i.e. the number has been divided into its component parts.

Statement of the problem:

In Visakhapatnam, children are having trouble with mathematics at primary level of the schooling. In this context it is necessary to find out the mathematical problems affecting primary school level in computation, sequential counting and lack of confidence. No work has been done on dyscalculia at the primary school level in Visakhapatnam.

Material and Methods

The aim of the present study was to explore mathematics learning difficulties and suggest the remedial measures suitable for primary school children. The study was carried out in government and Aided primary schools of Visakhapatnam after obtaining the permission of the Heads of the institutions. The investigator gave instructions on Personal data; the students were given ten minutes to fill in the personal data sheet. Screening test and mathematical achievement test were administered. Clear instruction and directions as how the items should be responded were given to the students. However the respondent was expected to independently decide and complete the test.

The choice of government primary school is because of the social, economic, political and religious diversities that I have in Visakhapatnam. The study use the survey design, precisely the sample survey was found appropriate in that it enabled the researcher to study a large population by making use of representatives of all the primary school pupils having mathematical problems (Dyscalculia) and its impact on their achievement in Visakhapatnam Municipality.

In the study sample consisted of 100 Childrens (45 – males, 55 females) disproportionately drawn from Government schools group I, Aided school group II in Visakhapatnam. A questionnaire was constructed for data collection. The questions were related to the occurrence of the topic dyscalculia during the primary school education. The questionnaire was divided into three sections; sequence counting, lack of confidence, and the computation of mathematical facts. The questions were



related to the occurrence of the topic of dyscalculia during their primary school education. The 4-point Likert scale was used (Strongly Agree, A = 4; Agree, SA = 3; Disagree, D = 2; and Strongly Disagree, SD = 1) for positively cued items and the reverse weightings for negatively cued items.

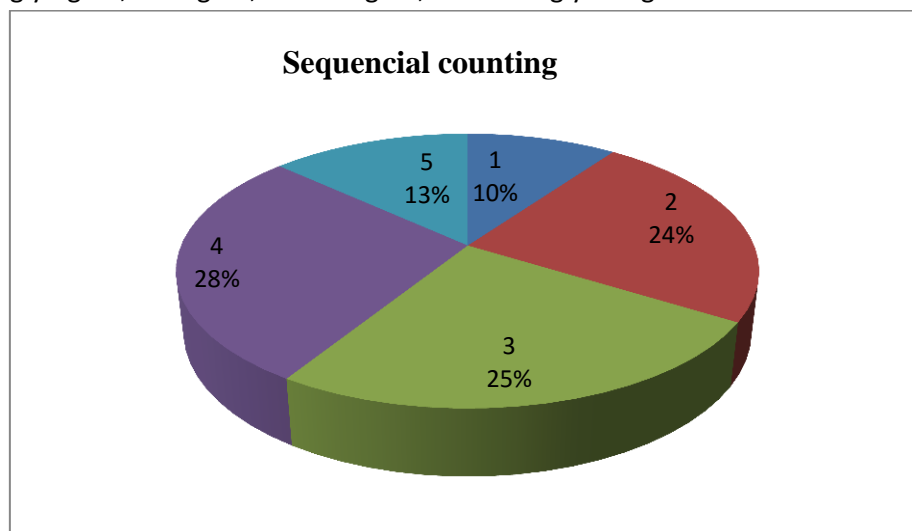
Results and Discussions

Developmental dyscalculia is a disorder that affects mathematical skills and is probably caused by a specific disturbance of cerebral functioning (Wilson et al, 2006, Cohen et al, 2007, Gross – Tsur et al, 1993). It is characterized by specific difficulties with certain types of Mathematics. In the present study the sequential counting has no significant effect on the primary school children of the Visakhapatnam throughout the study.

Sequential counting (Table -1):

| S.No | Items | SA | A | D | SD |
|--------|---|-----|-----|----|-----|
| 1. | I face difficulties when write numbers (Wrong way round eg. 23 for 32) | 48 | 17 | 7 | 26 |
| 2. | I have difficulty when counting - backwards. | 38 | 26 | 10 | 26 |
| 3. | I have difficulty telling time on a round- clock | 28 | 27 | 20 | 25 |
| 4. | I have difficulty when understanding Place value. | 40 | 25 | 15 | 20 |
| 5. | I struggle to remember the name and tables. | 48 | 30 | 12 | 10 |
| Total: | | 202 | 127 | 64 | 107 |

SA: Strongly Agree, **A:** Agree, **D:** disagree, **SD:** Strongly Disagree



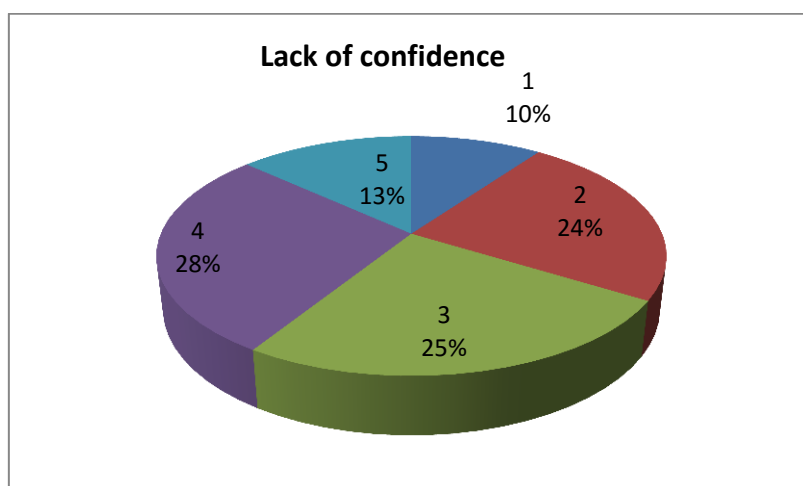
The respondents opined that they face difficulties when counting backwards, that they face difficulty when write numbers etc. The result of the sequential counting shows that 24% students have face difficulties when write numbers, 23 % students have struggled to remember the name and tables



(memory difficulties), 20% pupil have face difficulty in understanding the place value, 19% pupils have face difficulties in backward counting and 14% have the difficulty to telling time on round clock. Conclusively, sequential counting greatly affects primary school pupils' achievement in Visakhapatnam municipality. Hatton (2014) holds that students with difficulties in sequencing and organizing detailed information often have difficulties remembering specific facts and formulas for completing mathematics calculations. Badian (1983) explained that dyscalculics exhibit difficulties in attention sequential counting as seen in multiplications tables and sequencing procedures. Badian added that learning of mathematic is so sequential but to successfully complete many mathematics problems a very strict sequence must be followed. In dyscalculics pupils, sequential memory is very limited and mathematics memory is too short to hold a complex chunk, which is why most of them cannot even keep track when counting 100 coin pieces

Lack of confidence (Table -2)

| S.No | Items | SA | A | D | SD |
|--------|--|-----|----|----|----|
| 1. | I put up my hands to answer mathematics questions in class | 74 | 19 | 4 | 3 |
| 2. | I enjoy solving on the board in front of my mates. | 56 | 22 | 13 | 9 |
| 3. | I can tackle my mathematical exercise - alone | 40 | 14 | 17 | 29 |
| 4. | In group work I participate actively | 46 | 24 | 8 | 22 |
| 5. | I panic at the sight of my mathematics teacher | 35 | 14 | 20 | 31 |
| Total: | | 251 | 93 | 62 | 94 |



The respondent agreed that they put up their hands to answer mathematics questions in class (30%); that they enjoy solving mathematical problems on the board in front of their mates (20%); that they can tackle many mathematical exercises alone; that they actively participate in group work; and that they panic at the sight of their mathematics teacher when solving



problems. Conclusively, the lack of confidence is a very great mathematical problem that may hamper pupils' achievement in primary schools in Visakhapatnam.

The United Kingdom Department for Education and Skill (U.K. DES, 2001) sees dyscalculia as: A condition that affects the ability to acquire arithmetical skills. Dyscalculics learner may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning numbers facts and procedures. Even if they produce a correct answer or use a correct method they may do so mechanically and without confidence. The issue of confidence or trust in one's self remains a very regretful issue to dsyscalculics. When they lack confidence they are prone to mistakes and at times fail even simple exercises they could do without stress. Dyscalculics lack confidence and practice avoidance strategies which are often manifested in their behaviour. Bandura (1986) holds that, self-efficacy is the most important thing that people need to accomplish in a task.

Computation of Mathematical facts (Table -3)

| S.No | Items | SA | A | D | SD |
|--------|---|-----|----|-----|-----|
| 1. | I have difficulties find it hold to remember Names and messages | 15 | 13 | 18 | 54 |
| 2. | Sometimes I carry a number the wrong way | 36 | 17 | 22 | 25 |
| 3. | Multiplying decimals and fractions is problem to me | 38 | 15 | 19 | 27 |
| 4. | I cannot divide numbers by Zero | 42 | 16 | 25 | 17 |
| 5. | Mixup symbols eg: + , × etc. Disturbs me | 20 | 19 | 28 | 33 |
| Total: | | 151 | 80 | 112 | 156 |

The respondents were of the view that there is no difference in the length and width of their class which means that they have good mathematical knowledge of estimation; majority of the pupils have difficulties subtracting negative figures, in multiplying decimals and performing operations that involve fractions (BODMAS), and cannot divide numbers by zero; But stated that reading mathematical signs like +, -, /, x does not disturb them. Conclusively, computations of mathematical facts averagely affect primary school pupils' achievement in Visakhapatnam. According to Spinney (2009), the computation of mathematical facts continues to be a problem with dyscalculics pupils as they have weak, inexact numbers system. This is because in observing for instance two orange trees, it is the approximate number system that helps one to know which tree has got more oranges. So dyscalculics pupils may not know which tree has more oranges because with a strong approximate number system (ANS) you need not count before knowing that. Spinney also stated that dyscalculics pupils may find fractions and fractional operations very confusion: they may not understand that $\frac{1}{2}$ is greater than $\frac{1}{20}$ when previously they have learned that 20 is greater or bigger than 2.

Conclusions/ Recommendations

Dyscalculia is defined as difficulty acquiring basic mathematical skills that is not explained by low intelligence or in inadequate schooling. About 5% of children in primary schools are affected. A child



who has been identified with dyscalculia may be given extra time for tests or letting him or her use a calculator. Response to intervention (RTI) is a program some schools use to provide extra help to students who are falling behind. Such children receive small-group instruction either within or outside of their regular classroom. Informal supports are strategies teachers often use to help struggling students. The teacher should keep a journal of how the pupils respond to different strategies or mathematics-related activities. Parents and guardians should do the same at home and check notes. Some common strategies teachers use to help kids with dyscalculia are:

- Using concrete examples that connect mathematics to real life, to strengthen children's number sense. Examples: sorting buttons or other familiar objects.
- Using visual aids when solving problems, including drawing pictures or moving around physical objects - which teachers refer to as "manipulative."
- Assigning manageable amounts of work so that the pupils would not feel overloaded.
- Supervising work and encouraging pupils to talk through the problem-solving process. This can help to make sure he or she is using the right mathematics rules and formulas.
- Letting your child use graph paper to help keep numbers lined up. Using an extra piece of paper to cover up most of what is on a mathematics test or text so that your child can focus on one problem at a time.
- Playing mathematics-related games designed to help children have fun and feel more comfortable with mathematics (Flora, 2013; Henderson, 2012; Kaufmann, Liane, and Michael von Aster, 2012).

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