

ERRORS COMMITTED IN ARITHMETIC BY HIGH SCHOOL STUDENTS WITH LEARNING DISABILITY

Dr. Ramaa S.
Reader in Special Education
Department of Education
Regional Institute of Education (NCERT)
Mysore

and

Dr. Gowramma I.P.
Research Associate, Indo-U.S. Psychological Research Project

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ABSTRACT

An analysis of errors in Arithmetic committed by three High School students with Learning Disability was attempted. These students are studying in a Remedial Education Centre at Mysore since June 1998. All of them have learning disabilities in reading, writing and arithmetic. In the beginning of their remedial education at the Centre their mathematics performance was assessed through standardized and teacher made tests in Mathematics. They were lacking clarity in mathematical concepts and were deficient in procedural skills of even primary grades. They committed characteristic errors. So the remediation at present is focussed on improving the concepts and skills of elementary grades. Continuous evaluation of the students proved the effectiveness of the remedial education programme. The details will be discussed in the final paper.

1.0 Introduction

The term 'learning disabilities' indicates limited ability in learning. The specific learning abilities are usually indicated as reading disability, writing disability, arithmetic disability, etc. There are various definitions of learning disability.

Board of the Association for Children and Adults with Learning Disabilities (ACALD, 1985) has specified following criteria for learning disabilities.

1. Specific learning disability is a chronic condition of presumed neurological origin which selectively interferes with the development, integration, and/or demonstration of verbal and/or non-verbal abilities.

2. Specific learning disability exists as a distinct handicapping condition in the presence of average to superior intelligence and adequate learning opportunities. The condition varies in its manifestations and, in degree of severity.

3. Throughout life, the condition can affect self-esteem, education, vocation, socialisation and/or daily living activities.

About 10% of our school population suffer from this disability. There are limited studies in India to identify, diagnose and remediate learning disabled children. Ramaa (1985) observed 3% of children with dyslexia in Kannada language. Srimani (1998) noticed 7% of children with language disabilities in Kannada. A study by Gowramma (1998) revealed the existence of 7% of children with arithmetic disabilities. Considering the Indian population, it is definitely a huge number. When we are aiming at universalization of elementary education, special needs of these children have to be understood and met with. The present

study restricts itself in analyzing the errors of secondary school children while doing arithmetic sums of primary grades as the subjects had difficulty at this level also.

2.0 Arithmetic difficulties faced by children with learning difficulties

Ramaa (1990) in her investigation report has observed that children with learning disabilities exhibit the following errors.

1. Rotation of numbers
2. Reversal of digits
3. Reading of numbers digit wise
4. Writing the numbers as it is said
5. Lack of knowledge of carry over
6. Subtracting greater number from lesser number always
7. Multiplying in a wrong sequence
8. Bizzare errors.

Similar errors were noticed by Wood (1980), Wagner (1981), Mcleod (1982), Rourke (1991). Gowramma (1998),

The above studies mainly dealt with elementary school children with learning disabilities. Here, errors committed by secondary school students with learning disabilities, while doing primary level arithmetic are analyzed.

3.0 Methodology

The sample, tools for data collection and method of analysis of errors are discussed in this section.

3.1 Sample

The sample includes three secondary level students with learning disabilities who are undergoing remedial education in a special education center for learning disabilities at Mysore. They are attending the remedial program in the center since June 1998.

They are in the age group of 13-14 and studying in 8th and 9th standard in the regular school. They have learning disabilities in reading, writing and arithmetic. They are referred from public schools for normal children.

3.2 Tools for Data Collection

When they entered the center, series of achievement and diagnostic tests were administered in order to understand their level of performance and strengths and weaknesses in spoken language, reading, writing, and arithmetic.

For understanding the level of performance in arithmetic - Grade Level Achievement Device (GLAD) (Narayan, 1994) was administered.

For diagnosing their specific difficulties in arithmetic - Arithmetic Diagnostic Test (ADT) (Ramaa, 1994) was administered. The ADT assess concept, arithmetic operation and problem solving among primary school children. Both the tests are meant for primary school children. The tests were administered individually and scored as per the norms given by the authors.

3.3 Analysis of Data

3.3.1

The scores obtained on GLAD test were converted into percentage.

The table 3.1 given below indicates the level of performance of the subjects in different grades of primary level in arithmetic.

Table 3.1

Percentage of performance in different grades of GLAD

Cases	Grades in GLAD			
	I Grade	II Grade	III Grade	IV Grade
D	100	98.90	95.78	97.89
K	97.4	95.23	73.68	67.36
R	100	94.28	84.20	85.28

Above table reveals that all the cases were in independent level in all the grades. However case one had not learnt all the concepts and skills required for primary level of arithmetic from second grade onwards. The second case had some problem in doing sums related to first grade also. Whereas the third case has difficulty from second grade onwards.

Table 3.2

Marks obtained by the subjects in
Arithmetic Diagnostic Test

Components of Arithmetic	Max. marks	Marks in GLAD		
		D	K	R
Number Concept	48	42 87.50%	37 77.08%	40 83.33%
Addition	58	52 89.65%	45 77.58%	54 93.10%
Subtraction	84	74 88.00%	59 70.23%	59 70.23%
Multipli- cation	48	35 72.91%	15 31.25%	24 50.00%
Division	44	40 90.00%	19 43.18%	16 36.36%
Total	282	243 86.17%	175 62.05%	193 68.43%

The above table reveals that all the children have difficulty in doing some sums of even primary level arithmetic.

3.3.2

The errors committed and deficiencies exhibited while doing sums in ADT were analysed qualitatively. Below are given types of errors, examples and probable causes for them.

1. Errors/deficiencies in Number Concept

1. Substituting some other digit while writing.

Ex: 408 as 418; 615 as 617, etc.

Probable reasons: May be due to deficiency in visual verbal association ability.

2. Omits a digit

Ex. 9300 as 930

Probable reason: Lack of place value concept

3. Changing the place of the digits

Ex. 5209 as 5029

Probable reason: Poor place value concept

4. Confusion between increasing order and decreasing order.

Ex: Wrote decreasing order when asked to write increasing order.

Probable reason: Confusion in the concept of increasing and decreasing orders.

II. Errors/deficiency in Fundamental Operations

a. Addition

1. Could not add numbers correctly when given horizontally.

Ex: $213 + 49 + 9 = 211$

Probable reasons: Lack of place value concept and/or lack of the skill of adding numbers when given horizontally.

b. Subtraction

1. Did not know to subtract zero from a number and a number from zero.

Ex: 1. $\begin{array}{r} 579 \\ 406 \\ \hline 103 \end{array}$

2. $\begin{array}{r} 7504 \\ 5412 \\ \hline 2112 \end{array}$

Probable reason: No concept of zero.

2. Difficulty in subtracting more than three digit numbers when given horizontally.

Ex: $476 - 57 = 429$

Probable reason: Lack of clarity in place value and/or lack of skill of subtracting numbers given horizontally.

c. Errors in Multiplication

1. Could not multiply by single digits.

Ex: $70 \times 8 = 420$

Probable reason: Do not know multiplication table.

2. Could not multiply by two or more digit numbers.

Ex: $586 \times 14 = 82045$ (correct answer is 8204)

Probable reason: Bizzare error

3. Do not know to multiply when zero is one of the factors.

Ex: $91 \times 40 = 364$

Probable reason: Lack knowledge of multiplication when zero is one of the factors.

d. Division

1. Could not divide when more than one step is involved in division.

Ex: $3 \overline{) 95}$

Probable reason: Do not have the knowledge and skill of dividing numbers when more than one step is involved.

2. Omitted when the divisor is greater than the first digit of the dividend.

Ex: $3 \overline{) 95}$

Probable reason: Do not have the knowledge and skill of dividing numbers when more than one step is involved.

III. Errors/deficiencies in Problem Solving

1. Difficulty in solving problems involving numerical and verbal relations (statement problem).

Probable reasons: (a) Does not know the operation to be adopted while solving the problem. (b) May be due to poor reading comprehension.

2. Difficulty in solving problems involving numerical and spatial relations.

Probable reasons: Does not know the operation to be adopted while solving the problem or due to poor reasoning ability.

3. Errors while solving numerical problems involving more than one operation.

Ex: 1. $12 + 17 - 17 = 46$

Add all the numbers

Ex: 2. $27 + 16 \times 3 = 129$

Added first and then multiplied

Ex: 3. $16 \times 10 + 20 = 36$

$18 \times 10 + 30 = 48$

Considered 10 as '0' or ignored 10 and sign of multiplication.

Ex: 4. $14 + 12 \times 4 - 8 = 96$

Added first, multiplied and then subtracted.

Ex: 5. $105 - 25 + 25 = 55$

Added 25 and 25, then subtracted from 105.

Probable reason: Do not know the skill of solving numerical problems when more than one operation is involved.

Discussion

Though the subjects are studying in secondary level, still they have difficulty in basic concepts and skills expected of by primary school children. Their major difficulty is in multiplication, division and problem solving involving different fundamental operations.

In a study by Ramaa (1991) and Gowramma (1998) dyscalculics of primary school children also committed similar types of errors in number concept and fundamental operations. But the difference is they did not attempt sums involving problem solving. The subjects of the present study, have attempted the sums involving problem solving, but they committed mistake.

The study emphasises the need for remedial education in arithmetic of primary level also among students with learning disabilities studying in secondary schools. Unless these deficiencies are rectified they will not be in a position to cope up with the higher concepts of mathematics. The remediation attempted in the center improved their performance in mathematics. The remediation was attempted in small groups and through individual instruction by following various principles and strategies for teaching children with learning disabilities.

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