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Mathematics difficulties in early primary children

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Abstract
This study "Mathematics errors among Primary School Children" was carried out to explore the mathematical difficulties in mathematical achievement in class1 children of Government and Private managements.
This study was quantitative in nature and involved 50 children from 1st class from government and private schools. An achievement test based on the syllabus of state textbook maths, Telangana was administered to the sample children. The administration of the above test took 30 to 40 minutes on an average. Each child's achievement was analyzed for the error patterns that were identified in different math concepts of class 1.
It was concluded from the analysis and interpretation of the data that children have difficulties mostly in conceptual and procedural errors followed by factual errors in number competence and basic mathematical operations. The Findings and analysis of this study will facilitate teachers to get insight into teaching methodologies to further mathematical learning and reduce the learning gap in children in the foundational years.

Keywords: Mathematical difficulties, error patterns, conceptual, factual and procedural errors

1. Introduction
Poor achievement in mathematics is a major concern for all educationists. Mathematics difficulties are cumulative and worsen with time. For example, difficulties with whole numbers are obstacles to learning fractions and lead to failure in algebra.

2. Methodology: To identify the error pattern, data was collected by administering math achievement test to 50 children from 1st class of Government and Private schools. Children were also observed and monitored closely while doing the test for the analysis of their errors.

3. Sample: The sample selected was children of 1st class from Private and Government schools in Hyderabad. The children are selected from three government schools and three private schools in Hyderabad that follow a common state curriculum. Further children are selected randomly from each school. The test was conducted almost at the end of the academic year to assess them in all the math concepts of 1st class.

4. Tool: The tool that was conducted on the sample was an achievement test that was designed carefully based on the objectives of the maths curriculum. The test aims to achieve skills on counting, recall of addition number facts, zero concept, the commutative properties of addition, adding tens and units with and without regrouping processes, and adding two or more addends. The math achievement test was constructed based on 20 questions in which the conventional type of vertical additions and also horizontal type of additions are included. Children were also assessed on place value and position of numbers in computation of additions and subtraction. The different ways of arriving at a number are also included to know the depth of conceptual and factual understanding of the concept. The children were also assessed on time, money measurement, arrangement of numbers from small to big and vice versa, pre- number concepts etc., to interpret the conceptual, factual, and procedural errors if any.

5. Data collection: The sample children were made to sit in a separate classroom and briefed about the tool. Children took almost 30 to 40 minutes on average to complete the test.

6. Data analysis: The children completed the achievement test, and the responses were scored. The data was analyzed inductively to identify the common patterns in errors. This is followed by the deductive approach to find out in which area the errors are and the identified errors are computed. The identified errors were categorized accordingly under three headings: conceptual errors, factual errors, and procedural errors. The errors are thus analyzed and recorded under each category.

7. Findings: The achievement test for the sample children was analyzed for errors. Item-wise errors and percentage of errors were calculated. The errors that were identified and analyzed for each item and the results are tabulated below table 1.

Table 1: Item-wise analysis of errors

Name of the item	Item description	Error	Percentage of errors	private	Error%
1) Prenumber concepts	Big/ small, long/short, more/less, positional words		Govt 6%	6%	3%
2) classification of color and shape	Identification of color, identification of shape, classification of shapes as per color		33%	12%	6%
3) count and match, relative comparison	Count the pictures and match the same number of pictures, find out the bigger number		10%	21%	10.5%
4) count, identify, match	Count, match with the number		21%	21%	
5) missing numbers	Write missing numbers		33%	16%	
6) write next number	”		32%	-	
7) write middle number	”		25%	-	
8) zero concept	Draw objects for zero concept		27%	2%	
9) number names	Number names in letters		47%	59%	
10) oral additions and subtractions	Additions and subtractions orally		40%	23%	
10 a) count & write	Count and write the number		23%	34%	
10 b) one to one correspondence	One to one matching		36%	21%	
10 c) count &write	Simple addition		19%	16%	
10 d) how many ways you can arrive at 10?	Simple addition application		39%	56%	
10 e) horizontal addition	Double digit addition		32%	44%	
10 f) vertical addition	Double digit addition		30%	59%	
11 a) horizontal subtraction	Subtraction		57%	53%	
11 b) vertical subtractions	Subtractions Vertical		44%	61%	
12) count by 10’s	Counting by sets		25%	38%	
13) money concept	Rupees, coins		17%	29%	
14) time concept	Day, night concept		7%	23%	
15 a) measurement: length	Measurement of bench		10%	55%	
15 b) weight	Light/heavy objects identification, estimation		42%	59%	

Table 1 shows the item wise percentage of errors in math concepts in 1st class children of government and private schools in Hyderabad. The total number of errors identified in government schools was 282 while that of private schools was 245. Table 1 shows that the percentage of errors is more in government school children in comparison to private school children.

Table shows that children across both the managements scored well in pre-number concepts, money and time concepts, and simple additions to some extent.

The table shows the lowest percentage of errors were found in pre-number concepts i.e., 6% across both the school managements.

Major percentage of errors were found in 57% of government school children and 53% of private school children in horizontal subtractions followed by number names where in 47% of government school children and 59% of private school children committed errors in the above concepts.

The spread of errors was major in the concept of vertical subtractions which contributed to 44% in government schools and 61% in private schools, respectively.

32% of government children and 44% of private school children showed errors in horizontal addition while 30% of government school children and 59% of private school children committed errors in vertical addition.

The majority of the children displayed errors in oral addition and subtraction, i.e., 40% of government school children and 23% of private school children committed errors in oral additions and subtraction.

Children showed less errors in simple additions like count and write – 23% of government school children and 34% of private school children showed difficulty in the above concept. However, children showed great difficulty in simple addition application – 39% of government school children and 56% of private school children committed errors in this concept. 36% of government school children and 21% of private school children committed errors in one-to-one matching concept.

Children also showed difficulty and displayed errors in writing missing numbers, next number, and middle number and zero concept. 33% of govt school children and 16% of private school children showed errors in identifying and writing the missing number, while 32% of govt children committed errors in writing the next number and in identifying and writing the middle number. 25% of govt children committed errors while 27% of govt school children showed error in zero concept.

Percentage of errors in number concept, number sense that involves numberless, number relation, sequence of numbers etc. (Ascending & Descending, missing numbers) is 25.6% in government schools while it is 11.6% in private schools.

27% of government school children showed errors in zero

concept while a meagre 2% in private schools.

The skill of writing number names in words accounted for high percentage (53%) across both the managements out of which, 59% errors observed in private school children.

Percentage of errors pertaining to basic math operations (Simple addition, subtraction, horizontal, vertical, count by 10's) there is not much variation across both the managements. 34.5% in government schools, and 32.4% in private schools. The percentage of errors across both the management is 33.4%. The percentage of errors where the item involved knowledge and skill of measuring is comparatively high in private schools though the overall percentage is low.

Based on the error patterns, the errors were categorized under three heads namely conceptual, procedural, and factual errors.

8. Conceptual errors: Conceptual knowledge is an underlying idea and principles and understanding when to apply or use them. It also involves an understanding of the relationships between ideas and principles. Conceptual errors occur when the child has misconceptions or lack of understanding of the underlying principles or ideas pertaining to a given problem. To check the error of conceptual knowledge, the teacher needs to ask the child to represent the problem with concrete examples/objects and explain the steps involved in solving the process. (e.g., the relationship between numbers, the characteristics, and properties of shapes.

Table 2: The conceptual errors that are observed in this analysis are

Conceptual Error	Error identified in the study
Misunderstanding of place value	7 + 4 = 5; 8 + 6 =7; 65 + 8 ___ 19

The above examples clearly showed that the child lacks understanding of the underlying principle involved in addition. This was accounted for a major percentage of the total errors in government school children.

9. Skipped regrouping when needed: Results showed that a certain percentage of children skipped regrouping whenever needed.

Table 3: Procedural Errors

Error Description	Error identified in the study - Regrouping
Added ones column correctly but did not carry over the one ten to the ten's column	493 + 28 _____ 4111 _____
Recorded each of the sums of the ones & tens without regrouping	36 + 86 _____ 1112 _____
Followed correct procedures but added ones column incorrectly	346 + 39 _____ 386 _____

10. Factual Errors: Factual errors occur when children lack information (example: vocabulary, digit identification, place value identification)

Table 4: Showing factual error and error identified in the study

Factual Error	Error identified in the study
Not mastered basic number facts	Error 1: 5 + 2 = 9 Error 2: 6 – 3 = 4
Makes counting errors	1, 2, 4, 5, 6, 8, 9

Table 5: Showing types of errors across management

S. No	Type of Error	Type of Management		Total %
		Govt %	Pvt%	
1	Conceptual Error	68	70.2	100
2	Procedural Error	8	8.2	100
3	Factual Error	24.5	22	100

11. Results and Discussion

Table 2 shows the type of errors, and a description of the errors that are common in early primary children. The research findings also unveiled the fact that the most prevalent errors were the conceptual errors across both the school managements which accounted for 68% in government schools, 70.2% in private schools. This is followed by factual errors with 24.5% in government schools and 22% in private schools and factual errors followed by the least percentage of procedural errors with 8% in government schools and 8.2% in private school

The present study concluded that most of the errors done by the children are conceptual errors which indicates the urgent need to improve current understanding of the math concepts in them. Vijaya in 2017 [4] identified similar findings in fourth grade children. This confirmed that the most consistent errors seen in 1st grade children were due to lack of conceptual understanding and competency. However, the current study contradicts with that of Riccomani (2014) wherein Procedural errors were found to be the most common error.

The cause for poor achievement in mathematics is a major concern in our education system. Mathematics difficulties in elementary school can be attributed to weakness in basic whole number competencies i.e., the understanding the meaning of numbers and number relationships

(Gesten, Jordan & Flojo, 2005; National Mathematics Advisory Panel, 2008) [5].

Though the error percentage in number competence across both the managements is as low as 18.6%, this basic understanding of number competence is the foundation for basic math operations.

Efforts to teach number competencies have resulted in significant gains on first grade mathematics outcomes (Baroody, Booth & Siegler, 2008, Coply, 2000) [6, 7] Children at this stage need a strong foundation for understanding numbers through several concrete experiences and variety of strategies like games, stories, songs, manipulates to involve in joyful learning.

Writing that involves (written computation) understanding and skill showed a higher percentage of errors which requires lots of practicing on the part of children.

As the concepts advance to basic math operations, which involve complex cognitive processes. Also, children's readiness skills to count is important for which number sense, numberless, number knowledge lays foundation for addition skill. Children need to be able to count at least 20, recognize numerals, count given number of objects correctly (place value). This laid the basis for later basic operations for multiplication & division. Measurement using indigenous tools is taught only through semi concrete and abstract experiences.

The current study identified difficulties among the children in understanding the terms "Place value", regrouping and 'carry forward '. This mathematical terms/vocabulary used in the classroom should be taken into serious consideration by giving undue focus on the children to use what we term it as 'math vocabulary' Vygotsky in 1978) [8] concluded that language is a powerful mediation of learning mathematics. The National curriculum framework 2020 recommends curricular transaction to ensure children for foundation for Numeracy.

12. Conclusion

Error analysis is important for the teacher

- To provide effective instruction to address the children's specific errors.
- To select an effective strategy to help the child's misunderstanding of the concept by modelling the instruction by demonstrating, thinking aloud, by guided practice offering positive feedback.
- Independent practice to encourage the child to do the problem independently

13. References

1. Nancy C Jordan, David Kaplan, Maria N Locuniak. Early Math Matters: Kindergarten Number Competence and Later Mathematics Outcomes
2. Brown J, Skow K. Vanderbilt University - Mathematics: Identifying and Addressing Student Errors
3. Acharya BR. Factors Affecting Difficulties In Learning Mathematics by Mathematics Learners.
4. Liu X, Vijaya Kumar BV, You J, Jia P. Adaptive deep metric learning for identity-aware facial expression recognition. InProceedings of the IEEE conference on computer vision and pattern recognition workshops; c2017. p. 20-29.
5. Gersten R, Jordan NC, Flojo JR. Early identification and interventions for students with mathematics difficulties. Journal of learning disabilities. 2005 Jul;38(4):293-304.
6. Siegler RS, Ramani GB. Playing linear numerical board games promotes low-income children's numerical development. Developmental Science. 2008 Sep;11(5):655-61.
7. Copley JV. The young child and mathematics. National Association for the Education of Young Children, 1509 16th Street, NW, Washington, DC 20036-1426; c2000.
8. Vygotsky LS, Cole M. Mind in society: Development of higher psychological processes. Harvard university press; c1978.