



PRIMARY SCHOOL STUDENTS' ERRORS ON ADDITION AND SUBTRACTION OPERATIONS

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Students face several issues with the learning process of mathematics. In particular, primary school children have trouble with their mathematics operations, such as addition, subtraction, multiplication, and division. There is much research on this type of problem. Children's interventions in mathematics are relevant to their future lives. The main objective of this study was to identify the types of errors made in the skills of addition and subtraction of Grade Three students. For this study, 30 questions containing mathematic problems were given to 250 students in 13 schools of the Walapana Zonal division. The students' answers were marked by the researcher, and the wrong answers made by the students were categorised and analysed. The incorrect responses, of 60 students (24%), were selected as a random sampling method to identify the systematic errors made by the students. Among the systematic errors, recall, direction, symbol, zero, concept-related, and incomplete errors were made by the students. Data collection methods included questionnaires, interviews, and discussions. Some of the findings are lower-level performance, ignorance, and differences in ignorance of the students, as well as weaknesses in traditional teaching methods. Therefore, teachers should change their teaching methods from traditional to modern, and provide problem-solving methods and well-planned teaching methods.

Keywords: Mathematic errors, Systematic errors, Addition errors, Subtraction Errors

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Introduction

In primary mathematical processes there are four main operations: addition, subtraction, multiplication and division. Primary mathematics is the elementary level preceding secondary mathematics.

Primary mathematics consists of six main topics – Numbers, Mathematical Operations, Measurement, Money, Space and Shapes, and Data Handling. These concepts start at Grade One and are developed up to Grade Five at the primary school level (Mukunthan, 2013).

Addition and subtraction are important for the next step of mathematical operations, such as multiplication and division as each of these processes contains addition and subtraction operations. For the skills of addition and subtraction, Grade Three students use two or three-digit numbers, which will be developed as more digits are added to the mathematical processes of future study.

A school should consider the variety of learners such as gifted students, special need learners, slow learners etc. According to Wong, Omar, and Mak (2004), learners struggle to meet the academic demands of all subjects, but learning the concepts of mathematics is more challenging for learners due to its abstract nature. As reported at primary school level, this subject appears to be confusing for learners but not appalling. The fundamentals of mathematics, such as the concept of numbers, time, money, fraction, numerical classifications, and word problems, is taught in primary level classes, and develop as the individual grows (Flinter, 1979).

Literature Review

A lot of research on primary mathematics indicated several types of mathematical errors. According to Cox (1975), we can identify major three mathematical errors made by primary students. These are (1) Careless Errors, in which a student misses one or two problems out of the five problems of a given process with no pattern being apparent; (2) Random Errors, in which a student misses three or more problems out of the five problems of a given type, with no pattern being apparent; and (3) Systematic Errors, in which a student misses three or more problems out of the five problems of a given type, using the same incorrect process as evidenced by the presence of a repeated pattern.



A mistake could be made for many reasons. It could be the result of carelessness, the misinterpretation of the symbols of a text, the inability to comprehend what the task is asking, misunderstanding of the initial instructions, errors in transforming a word problem into a mathematical problem, misunderstanding a keyword, an error in selecting the correct information to use, taking into account the problem's context without regard to the mathematics, using incorrect operations, a lack of relevant experience or knowledge related to the mathematical topic/ learning objective/ concept, errors in providing the solution in the correct context, leaving a task unfinished, a lack of awareness or inability to check the solution given, or a misconception (Wijaya, 2014).

According to Radatz (1980), students' errors are causally determined, and very often systematic. Systematic errors are usually a consequence of student misconceptions. These can include failure to make connections with what they already know. There are instances where students connect new information with pre-conceived knowledge, but those preconceptions are wrongly understood. Students may connect patterns with a misconception and thereby learn an erroneous procedure.

Methodology

The main objective of this study was to identify the errors in mathematics by primary level students in the skills of addition and subtraction. In the selected zonal division, there are four types of schools: 1AB, 1C, Type II, Type III. The teaching-learning process in these schools is in the Sinhala and Tamil medium. The Walapane zonal division schools were selected as a convenience sampling method and 13 schools of the zonal division were selected as the stratified sampling method. The 60 students (24%) who indicated errors in the responses to the mathematics problems given to 250 Grade Three students were selected as an objective sampling method

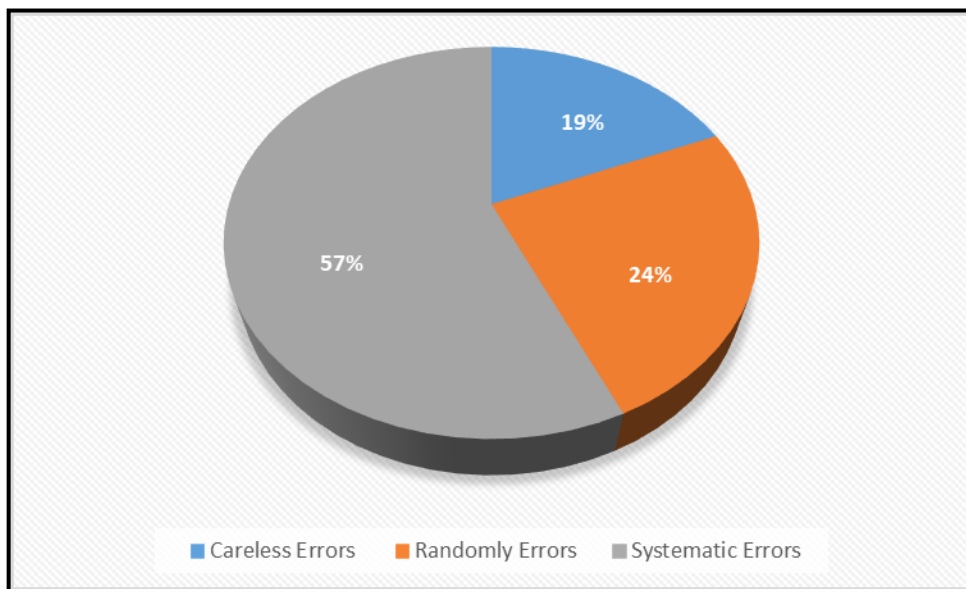
Aim Objective

The objective of this study was to identify the type of errors made in the skills on addition and subtraction by Primary level students. The specific objectives of this study were to identify the type of errors made on addition and subtraction by the selected students; to explore the reasons for these errors; and to find suggestions to prevent these errors being made by students.

Firstly, a prepared paper with 30 questions was given to 250 Grade Three students. The incorrect responses to the problems then selected and analysed. This analysis found some problems in the mathematical processes used for addition and subtraction according to systematic operations. Therefore, the responses of 60 students were selected based on these incorrect responses. Five principals and teachers were also selected randomly for interviews.

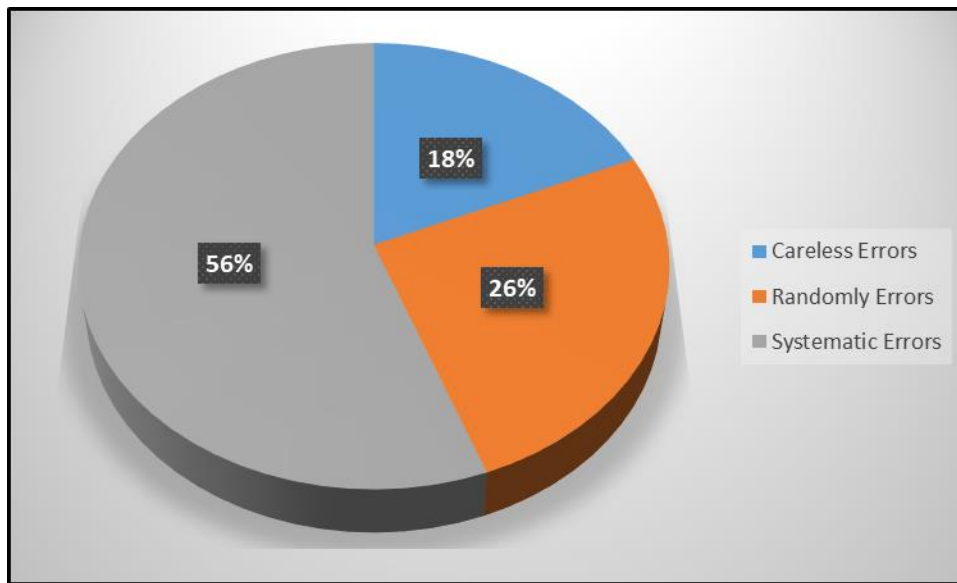


Analysis and Discussion



Errors made by the Students in Addition

The data on error types in addition reveals significant insights into the accuracy of calculations. The table shows that Careless errors 18.64%, random errors 24.60%. However, the most critical concern is the systematic errors, which constitute 56.76 of the total errors.



Errors made by the Students in Subtraction

The analysis of error types in subtraction shows 18.42% careless errors, 25.89% random errors. However, the most alarming figure is the systematic errors, which account for 55.69% of the total errors. All the errors indicate the students' level of skill and knowledge (Yetkin, 2003).

According to the above mentioned information, the following errors show the systematic errors made by the students:

Addition	Subtraction
15	35
27	27
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32	18

Errors made by the Students in Recalling Operations

Addition	Subtraction
55	35
83	43
<hr/>	<hr/>
39	91



Errors made by the Students in Direction Operations

Addition (As multiplication)	Subtraction (As division)
$\begin{array}{r} 55 \\ 3 \\ \hline 165 \end{array}$	$\begin{array}{r} 33 \\ 3 \\ \hline 11 \end{array}$

Errors made by the Students in Symbols Operations

Addition	Subtraction
$\begin{array}{r} 55 \\ 35 \\ \hline 81 \end{array}$	$\begin{array}{r} 55 \\ 40 \\ \hline 10 \end{array}$

Errors made by the Students in Zero Operations

Here, we can observe the total number of errors made by students in this study:

Error type	Addition	Subtraction
Recalling Errors	25.64	20.14
Direction Errors	24.23	22.36
Symbols Errors	26.12	28.00
Zero Errors	24.01	29.50
Total	100.00	100.00

Systematic errors made by the students:



The analysis of Systematic error types in addition highlights several areas of concern that can significantly impact the accuracy of calculations. Such as recalling errors 25.64%, direction errors 24.23%, symbol errors 26.12% and zero errors 24.01%, highlight issues related to significant miscalculations, especially in larger figures.

The analysis of Systematic error types in Subtraction Mentions several areas, such as recalling errors 20.14%, direction errors 22.36%, symbol errors 28% and zero errors 29.50%, highlight issues related to significant miscalculations, especially in different level numbers.

Conclusion & Recommendations

In conclusion, errors in mathematical operations can be categorized into three main types. systematic, careless, and random errors. Systematic errors, in particular, often arise from specific misunderstandings or misapplications of mathematical concepts, such as recalling operations incorrectly, misinterpreting directional operations, misusing symbols, or neglecting zero operations. These systematic errors highlight the importance of addressing foundational knowledge and ensuring clarity in mathematical procedures to improve overall accuracy in student calculations.

A comprehensive approach that includes refining measurement techniques, regular calibration, and staff training is essential to minimize all Systematic error types include addition and subtraction.

The analysed several areas of systematic errors such as recalling, direction errors, symbol Should solve immediately. Collectively, these error types underscore the need for targeted interventions, such as improved training in numerical operations, enhanced cognitive strategies for recalling numbers, and clearer instructional materials to mitigate confusion over symbols and directions.

The reasons behind the mathematical errors, especially for addition and subtraction operations, was demonstrated in this study. Mainly the students' cognitive ability affected them. Secondly, the outside world such as the school, teachers, parents, friends, and general environment, as well as the nature of the subject, and the not following of special pedagogical strategies in the classroom affected the learning process of students.

Therefore, teachers must use a variety of teaching methods, including inclusive education, and try to implement both modern and traditional teaching methods, as well as different teaching methods for each student. Moreover, continuous overall monitoring and supervising are needed.



Teachers can play an important role in helping students master mathematical problems by providing adequate training. Parents can also play a role in this by giving their children adequate exposure to mathematical addition and subtraction problem solution videos on YouTube, mobile applications on the Play Store, and education channels on the television. The government's stated aim can only be achieved when students are able to correctly interpret and answer mathematical word problems.

Teachers could try some alternative methods of teaching, using technology and other teaching strategies or approaches, such as games as this creates a sense of fun, making students become more focused on the teaching. Further, continuous assessment can be carried out by the teacher to overcome mistakes that pupils make by students being guided by the teacher immediately. Moreover, teachers should be aware of the students' interest in the subject matter, and maths teachers can provide students with direct experience of numbers by conducting a study visit and other such activities. Experience can be used through mathematical problem-solving scenarios, and teachers can ask students to retell their experiences and situations in solving math problems in their daily lives. Developing a Math-like attitude (A positive engagement with mathematical concepts) is really necessary to deliver a lesson in school in a meaningful way. Therefore, teachers can plan interesting, engaging activities, and take their students to attend talks, campaigns, or competitions related to mathematics to nurture attitudes of curiosity towards mathematics in students.

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