

Errors Committed by Class-V Students in Addition and Subtraction

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ABSTRACT

It is important to know about the types of students' error in mathematics to take steps at crucial time for improving learning. Hence, the current study aims at identifying the different types of errors committed by the class -V students in mathematics. The data were collected from 25 class -V students by using a criterion-referenced test. The criterion-referenced test contained 41 items on addition and 49 items on subtraction. Reliability was checked by test-retest method. Content validity was checked by a panel of experts. Student's response sheets were examined on the basis of errors. While performing the task in the tool there were possibility of 25 students committing 1025 errors in addition and 1225 in subtraction. In the current study it is observed that there were 500 errors including 110 errors due to no responses for items in addition and 809 errors including 295 errors due to no responses to items in subtraction. All students' errors in addition and subtraction were categorised on the basis of error wise symptoms as per previous studies collected from review of literature under the 6 types of errors. These are careless error, factual error, procedural errors, conceptual errors, slips (careless error + factual error) and bugs (procedural error + conceptual error). Slips errors are 26.6% for addition and 18.79% for subtraction which are usually self-corrected by the students and it does not occur due to inherent misunderstanding. So, it is not an issue to the stakeholder but bugs errors are 51.4% for addition and 44.75% for subtraction which are more serious than slips and it occurs due to persistent misconceptions and students need help to overcome these. This finding may help to create awareness to all stakeholders to take necessary steps to improve mathematics learning.

Keywords: *Mathematics, Addition, Subtraction, Careless Error, Factual Error, Procedural Error, Conceptual Error, Slips, Bugs*

If we check carefully different mathematical written works of different students, it will be seen that different students make different kinds of mistakes or error due to different reasons. From earlier studies (Lai, 2012; Fisher & Frey, 2012; Riccomini, 2014; Brown, Skow & the IRIS Center, 2016) it is concluded that students' error in mathematics may be classified in four types or categories. These are careless error, factual error, procedural error and conceptual error. But Ginsburg (1987, cited in McCall, 1999), Ketterlin-Geller & Yovanoff (2009) classified the students' error only in two types or categories, one is slips and other is bugs. Careless error arises due to poor attention and carelessness (Stein, Silbert &

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Carnine, 1997) or and tiredness or fatigue (Fisher & Frey, 2012; Brown, Skow & the IRIS Center, 2016). Factual error occurs due to lack of factual information, lack of vocabulary and digit identification (Brown, Skow & the IRIS Center, 2016; Riccomini, 2016; Muthukrishnan, Kee & Sidhu, 2019). The most common reasons for procedural error are lack of understanding of an algorithm or incorrectly applying a rule to solve a problem or to complete a task (Brown, Skow & the IRIS Center, 2016; Muthukrishnan, Kee & Sidhu, 2019) or do not follow the correct steps or procedure to solve a problem (Lai, 2012). But conceptual error happens due to not understanding the specific mathematics concept (Ginsburg, 1987 as cited in Lai, 2012) or lack of understanding the relationship among the related concepts which are fundamental to solve a problem (Brown, Skow & the IRIS Center, 2016). In practical situation conceptual error may look like a procedural error (Ginsburg, 1987 as cited in Lai, 2012). So, it is difficult to distinguish between them (Rittle-Johnson, Siegler & Alibali, 2001; Riccomini, 2014). So, to differentiate those in practical situation teacher or educator should take clear concept about them. According to Bauer (2016), procedural mathematics knowledge gives us a knowledge of algorithm or a series of steps to solve a problem whereas conceptual math knowledge gives us the knowledge of instructions that clearly explain the reasons why the algorithm or operations work as they do. Hiebert & Wearne (1986) and Skemp (1976, cited in Sarwadi & Shahrill, 2014) discussed clearly that procedural understanding is the knowledge of rules and procedure that describes a process or the steps are taken to solve a mathematical problem whereas conceptual understanding is the knowledge of relationship between or among the related concept and understanding of why an algorithm or procedure works. It should be needed to know that procedural knowledge and conceptual knowledge are the two intertwined components such that they are complement to each other and they develop iteratively (Lai & Murray, 2012). The errors that are easily corrected or student can self-corrected (Ginsburg, 1997 as cited in Newton, 2015) and that are not the result of inherent misunderstanding in the domain (Ketterlin-Geller and Yovanoff ,2009) are called slips. Careless error and factual errors come under slips but the errors that are not easily corrected or students need help to correct (Ginsburg, 1997 as cited in Newton, 2015) and “represent persistent misconceptions about domain specific knowledge or skills that consistently interfere with students’ demonstration of their abilities”. (Ketterlin-Geller and Yovanoff ,2009) are called bugs. So, procedural error and conceptual error come under bugs.

Rationale of the study:

From the above discussion and study of An & Wu (2012, cited in Lai & Murray, 2014) it is concluded that identification and analysis of students’ errors in mathematics is a powerful tool or mechanism for understanding students’ mathematical thinking. So, if we are unable to identify the students’ error and also unable to find out the proper causes of their errors then it will be the potential threats to a child that creates multi faced difficulties to a child in learning mathematics. (Riccomini, 2005).

As a teacher or educator, our primary aim should be to investigate or test each and every students’ written work diagnostically and look for patterns or types of errors such that we can determine the proper reasons for their errors and misconceptions and take as well as develop proper strategies to overcome these errors and to make connections between new ideas and existing knowledge to overcome the error and misconception. Hence, it should be important to know the current status of errors patterns or types of errors made by the elementary school students in mathematics.

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Research Questions:

The current study aims at the following research questions

1. What are the error patterns in addition and subtraction committed by the students of class-V?
2. What is the present status of different kind of errors in addition and subtraction committed by the students of class-V?

METHOD

The present study is a part of a pre-test-post-test experimental research which is being conducted in West Bengal by the research scholar of RIE (NCERT), Bhubaneswar under Utkal University, Bhubaneswar. Here pre-test data is taken to address the above research questions.

Participants

Here the target population was class -V school students. One Junior High School, in Egra Sub-Division of Purba Medinipur district in West Bengal was selected for the study through purposive sampling method (non-probability sampling method) and all the twenty-five students of class -V were taken as a sample of size 25 from this selected school.

Tools

The research data were collected from the participants by a self-made criterion referenced test. The tool was constructed on addition and subtraction of class -I to class -IV mathematics curriculum of West Bengal Board of Primary Education. This tool was used on class -V students at early stage of their academic session. The mathematics criterion referenced test is constructed by the collection of 41 problem categories by 13 sub skills on addition and 49 problem categories by 14 sub skills on subtraction. Content validity was checked through a panel of experts. There were more items in this test at early stage but finally 41 items from addition and 49 items from subtraction were retained. After this test-retest are taken to establish reliability.

Data Collection

After acquiring permission from the Head Teacher of the selected school guardian consent was obtained from all the guardians of the class -V students for engaging them in the study. Once the date for the test was fixed in discussion with the subject teacher, students were informed detailed instruction about the test. The test was conducted in group under the invigilation of the subject teacher and the researcher. To avoid copying by students, the test booklet was partitioned and care was taken to see that no two participants sitting nearby got the same booklet. Adequate time was given to finish the test to the students. After finishing the test, the response sheets were collected.

Data Analysis:

The collected data were analysed in the following ways-

- 1) To find the patterns or types of error committed by the students in the response sheet of the criterion referenced test, the following error wise symptoms cited in Giri & Gowramma (2021) and previous studies and articles were considered.

Symptoms of Careless Error:

- i) Not follow the direction of the given problems. (Math Greek Mama, 2016; Wiens, 2007)

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- ii) Incorrectly copy the data from the given problems. (Math Greek Mama, 2016).
- iii) Skipped the easy problem completely. (Wiens, 2007)
- iv) Skip many steps at once or do not show all steps. (Khan Academy, n.d.)
- v) Do not use proper units. (The Asian Parent, n.d)
- vi) Wrong answer in the given blank. (Wiens, 2007)
- vii) Use incorrect label or skip the label. (Wiens, 2007)

Symptoms of Factual Error: (Riccomini, 2016; Brown, Skow & the IRIS Center, 2016)

- i) Do not remember mathematical vocabulary and terminology in proper time and situation.
- ii) Mistake in proper counting
- iii) Mistake in computing
- iv) Mistake to identifying digits and sign
- v) Mistake to identify place value
- vi) Mistake to use correct formula
- vii) Not mastered in basic number facts with relation to addition, subtraction, multiplication and division like $4+2=5$, $4\times 2=5$; $5-4=3$, $8\div 4=3$ etc.

Symptoms of Procedural Error:

- i) Do not follow correct steps or procedures. (Lai, 2012)
- ii) Unable to use a formula. (Riccomini, 2016)
- iii) Do not complete calculation. (Muthukrishnan, Kee & Sidhu, 2019)
- iv) Mistake to regroup (carry) when adding, subtracting etc. (Brown, Skow & the IRIS Center, 2016)
- v) Mistake to regroup with 0 (zero)
- vi) Mistake to correct alignment. (Riccomini, 2016)

Symptoms of Conceptual Error:

- i) Unable to use correct or proper logic to solve any problem. (Math Greek Mama, 2016).
- ii) All computations are correct but get wrong answer. (Math Greek Mama, 2016).
- iii) Misconception in place value. (Brown, Skow & the IRIS Center, 2016)
- iv) Always subtract less number from greater number without judging the facts or situation. (Brown, Skow & the IRIS Center, 2016)
- v) Improper generalization. (Irwin & Britt, 2004 as cited in Lai & Murray, 2014)
- vi) Avoid regrouping when required. (Muthukrishnan, Kee & Sidhu, 2019)
- vii) Use improper operations for word problems. (Tirosh & Glover, 1989; Graeber & Tirosh, 1990)

Careless error and factual error come under slips and procedural error and conceptual error come under bugs. So, their symptoms are not discussed separately.

- 2) To get the status of the students' error in mathematics the response sheets of the test of all students were checked on the basis of above error wise symptoms and data were arranged such that it should be meaningful to all.

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Findings:

After analysing the student's response sheets, it was found that the following types of errors were made by the students

- 1) Careless error
- 2) Factual error
- 3) Procedural error
- 4) Conceptual error
- 5) Slips
- 6) Bugs

According to the discussion in the introduction, it was found that careless error and factual error come under 'slips' and procedural error and conceptual error come under 'bugs'. Item wise errors were calculated to get the percentage of different types of errors and the results are given below in the table-1.

Table-1: Overall result of errors in addition and subtraction (Total number of participants = 25 and total number of items in addition is 41 and in subtraction is 49)

Type of error Skills	Maximum possible errors (total number of items × 25)	Total errors	Careless error(A)	Factual error(B)	Slips (A+B)	Procedural error (C)	Conceptual error(D)	Bugs (C+D)	No Response
Addition	41×25=1025	500 out of 1025 (48.78%)	21 out of 500 (4.2%)	112 out of 500 (22.4%)	133 out of 500 (26.6%)	121 out of 500 (24.2%)	136 out of 500 (27.2%)	257 out of 500 (51.4%)	110 out of 500 (22%)
Subtraction	49×25=1225	809 out of 1225 (66.04%)	20 out of 809 (2.47%)	132 out of 809 (16.32%)	152 out of 809 (18.79%)	130 out of 809 (16.07%)	232 out of 809 (28.68%)	362 out of 809 (44.75%)	295 out of 809 (36.46%)

From table-1 it is seen that total 500 errors out of 1025 i.e., 48.78% were made by 25 participants in 41 items of addition. Out of 500 error in addition, 21 errors i.e., 4.2% are careless error, 112 errors i.e., 22.4 % are factual error, 121 errors i.e., 24.2% are procedural error and 136 errors i.e., 27.2% are conceptual error. Since careless error and factual error come under slips and procedural error & conceptual error come under bugs, hence 21+112 errors = 133 errors out of 500 errors i.e., 26.6% are slips and 121+136 errors= 257 errors out of 500 errors i.e., 51.4 % are bugs. But 110 errors out of 500 errors i.e., 22 % arise due to not response of those items by the students.

Similarly, it is seen for subtraction that total 809 errors out of 1225 i.e., 66.04% were made by 25 participants in 49 items of subtraction. Out of 809 errors in subtraction, 20 errors i.e., 2.47 % are careless error, 132 errors i.e., 16.32 % are factual error, 130 errors i.e., 16.07 % are procedural error and 232 errors i.e., 28.68 % are conceptual error. Here 20+132 errors = 152 errors out of 809 i.e., 18.79 % errors are slips and 130+232 errors= 362 errors out of 809 i.e., 44.75 % errors are bugs. 295 errors out of 809 i.e., 36.46 % errors are due to not response to those items by the students.

Items and sub skill wise errors in addition and subtraction are given in table-2 and table-3 respectively.

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Table-2: Items and sub skill wise result of errors in addition (Total number of participants = 25 & total number of items in addition is 41 and total number of sub skills is 13)

S. L	Code of Sub skills	Item No	Total No. of error in Addition	Careless error		Factual error		Procedural error		Conceptual error		No Response		
				Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	
1	Add -1	1(a)	1(100%)		1 (100%)									
2		1(b)		1										
3	Add -2	1(d)	2(100%)					2	2 (100%)					
4	Add -3	1(f)	10(100%)			4	4 (40%)	6	6 (60%)					
5	Add -4	1(h)	11(100%)			2	4(36.36%)	4	7 (63.64%)					
6		1(i)			2	3								
7	Add -5	1(j)	18(100%)			3	6(33.33%)	6	12(66.67%)					
8		1(k)			3	6								
9	Add -6	1(l)	41(100%)			6	14(34.15%)	6	24(58.54%)				3 (7.31%)	
10		1(m)			4	6				1				
11		1(n)			2	6				1				
12		1(o)			2	6				1				
13	Add -7	1(c)	113(100%)	1	1 (0.89%)	2	51(45.13%)	2	43(38.05%)				18(15.93%)	
14		1(e)				3		1						
15		1(g)				4		6						
16		1(p)				9		8			1			
17		1(q)				11		7			4			
18		1(r)				7		6			5			
19		1(s)				8		6			4			
20		1(t)				7		7			4			
21	Add -8	2(a)	32(100%)	1	1 (3.13%)	1	20 (62.5%)		3(9.37%)			1	8(25%)	
22		2(b)				2					1			
23		2(c)				4		1			2			
24		2(d)				9		1			2			
25		2(e)				4		1			2			
26	Add -9	3(a)	29(100%)				3(10.34%)	6	21(72.41%)		2(6.90%)	1	3(10.34%)	
27		3(b)				6		1		1				
28		3(c)			3	9		1		1				
29	Add -10	4(a)	86(100%)	1	4 (4.65%)					15	55(63.95%)	6	27(31.40%)	
30		4(b)		1					14	7				
31		4(c)		1					13	7				
32		4(d)		1					13	7				
33	Add -11	5(a)	61(100%)			6	7 (11.48%)			9	37(60.66%)	7	17(27.87%)	
34		5(b)							14	5				
35		5(c)				1			14	5				
36	Add -12	6	8(100%)	4	4 (50%)					3	3 (37.5%)	1	1(12.5%)	
37	Add -13	7(a)	88(100%)	5	10(11.36%)	1	3(3.41%)	1	3 (3.41%)	2	39(44.32%)	5	33(37.5%)	
38		7(b)		4		1		1		8		5		
39		7(c)		1						9		6		
40		7(d)						1				5		9
41		7(e)										1		15	8
Total			500(100%)	21	21 (4.2%)	112	112(22.4%)	121	121(24.2%)	136	136(27.2%)	110	110(22%)	

*N.B-1 : Sub Add-1- Addition of 1- digits numbers; Sub Add-2- Addition of 2-digits numbers without carrying ; Sub Add-3- Addition of 2-digits numbers with carrying ; Sub Add-4- Addition of 3-digits numbers without carrying ; Sub Add-5- Addition of 3-digits numbers with carrying; Sub Add-6- Addition of 4-digits numbers with carrying; Sub Add-7- Addition of more than 2 numbers; Sub Add-8- Addition the numbers side by side; Sub Add-9- Addition the numbers put it after proper places ; Sub Add-10- Addition the fractions numbers; Sub Add-

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11- Fill the blanks in whole & fraction numbers addition; Sub Add-12- Make same numbers through addition by different ways; Sub Add-13- Solve the word problems involving addition.

N.B-2: Blanks in the table means number of errors is zero. The number in the parenthesis denotes number of errors according to percentage.

From the table-2, it is seen that there are 41 items in addition that are categories in 13 sub skills (*). Since there are 25 participants, maximum errors in each item are 25.

Table-2 also gives sub skills (*) wise total errors with percentage as well as item wise errors and their corresponding careless error, factual error, procedural error and conceptual errors including error due to no response to items. At the end of this table, it is seen that there is total 500 errors in addition whereas 21 errors i.e., 4.2% is careless error, 112 errors i.e., 22.4% is factual error, 121 error i.e., 24.2% is procedural error and 136 errors i.e., 27.2% is conceptual error. But 110 errors out of 500 errors i.e., 22% is due to no response to items.

Table-3: Items and sub skill wise results of error in subtraction (Total number of participants = 25 and total number of items in subtraction is 49 and total number of sub skills is 14)

S. L	Code of Sub skills	Item No	Total No. of error in Subtraction	Careless error		Factual error		Procedural error		Conceptual error		No Response	
				Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise
1	Su -1	1(a)	12(100%)	3	8 (66.67%)	3 (25%)	1	1 (8.33%)					
2		1(b)		2									
3		1(c)		3									
4	Su -2	1(d)	20(100%)			1	9 (45%)	1	3 (15%)	2	8 (40%)		
5		1(e)		5		1		3					
6		1(f)		3		1		3					
7	Su -3	1(g)	42(100%)		1 (2.38%)	3	15 (35.71%)	3	11 (26.19%)	3	9 (21.43%)		6 (14.29%)
8		1(h)		1		7		4		3		1	
9		1(i)				5		4		3		5	
10	Su -4	1(j)	16(100%)			1	1 (6.25%)	4	5 (31.25%)	3	6 (37.5%)	2	4 (25%)
11		1(k)						1		3		2	
12	Su -5	1(l)	39(100%)			7	14 (35.90%)	5	9 (23.08%)	3	6 (15.38%)	5	10 (25.64%)
13		1(m)				7		4		3		5	
14	Su -6	1(n)	21(100%)			2	4 (19.05%)	2	4 (19.05%)	2	4 (19.05%)	4	9 (42.85%)
15		1(o)				2		2		2		5	
16	Su -7	1(p)	36(100%)			7	13 (36.11%)	4	7 (19.45%)	2	4 (11.11%)	6	12 (33.33%)
17		1(q)				6		3		2		6	
18	Su -8	1(r)	35(100%)				5 (14.29%)	3	10 (28.57%)	2	6 (17.14%)	5	14 (40%)
19		1(s)				1		4		2		5	
20		1(t)				4		3		2		4	
21	Su -9	1(u)	57(100%)		1 (1.75%)	9	22 (38.60%)	4	12 (21.05%)	2	6 (10.53%)	5	16 (28.07%)
22		1(v)		1		5		4		2		5	
23		1(w)				8		4		2		6	
24	Su -10	2(a)	102(100%)			10	37 (36.27%)	7	40 (39.22%)	1	9 (8.82%)	3	16 (15.69%)
25		2(b)				7		7		1		3	
26		2(c)				4		6		1		4	
27		2(d)				4		6		2		2	
28		2(e)				7		7		2		2	
29		2(f)				5		7		2		2	
30	Su -11	3(a)	66(100%)		1 (1.51%)			1	4 (6.06%)	8	25 (37.88%)	12	36 (54.55%)
31		3(b)		1				1		8		12	

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S. L	Code of Sub skills	Item No	Total No. of error in Subtraction	Careless error		Factual error		Procedural error		Conceptual error		No Response		
				Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	Item wise	Sub skill wise	
32		3(c)						2		9	)	12)	
33	Su -12	4(a)	107(100%)				6		2	8	43	10	56	
34		4(b)					(5.60%)		(1.87%)	7	(40.19%)	11	(52.34%)	
35		4(c)								11	)	12)	
36		4(d)							1		11		12	
37		4(e)					6		1		6		11	
38	Su -13	5(a)	67(100%)	1	2	1	2	5	14	2	6	14	43	
39		5(b)		1	(2.98%)	1	(2.98%)	3	(20.90%)	2	(8.96%)	14	(64.18%)	
40		5(c)						6	)	2		15)	
41	Su -14	6(a)	189(100%)	4	7		1	2	8	6	100	8	73	
42		6(b)		3	(3.70%)		(0.53%)	2	(4.23%)	8	(52.91%)	6	(38.63%)	
43		6(c)						3		9	)	11)	
44		6(d)								13		7		
45		6(e)							1		14		8	
46		6(f)									11		8	
47		6(g)									12		8	
48		6(h)					1				13		7	
49		6(i)									14		10	
Total			809(100%)	20	2	13	132	13	130	23	232	29	295	
			)	(2.47%)	2	(16.32%)	0	(16.07%)	2	(28.68%)	5	(36.46%))	

****N.B-1 :** *Sub Su-1-* Subtraction of 1-digit numbers; *Sub Su-2-* Subtraction of 2-digits numbers without borrowing; *Sub Su-3-* Subtraction of 2-digits numbers with borrowing; *Sub Su-4-* Subtraction of 3-digits numbers without borrowing; *Sub Su-5-* Subtraction of 3-digits numbers with borrowing; *Sub Su-6-* Subtraction of 4-digits numbers without borrowing; *Sub Su-7-* Subtraction of 4-digits numbers with borrowing; *Sub Su-8-* Subtraction of 1,2,3,-digits numbers from 4-digits without borrowing; *Sub Su-9-* Subtraction of 1,2,3,-digits numbers from 4-digits with borrowing; *Sub Su-10-* Subtraction the numbers put in proper places; *Sub Su-11-* Subtraction the fraction numbers; *Sub Su-12-* Fill the blanks in whole & fraction numbers subtraction; *Sub Su-13-* Simplify the expression; *Sub Su-14-* Solve the word problems involving subtraction;
N.B-2: Blanks in the table means number of errors is zero. The number in the parenthesis denote number of errors according to percentage.

From the table-3, it is seen that there are 49 items in subtraction that are categories in 14 sub skills (**). Since there are 25 participants, maximum errors in each item are 25.

Table-3 also gives sub skill (**) wise total errors with percentage as well as item wise errors and their corresponding careless error, factual error, procedural error and conceptual errors including error due to no response to items. At the end of this table, it is seen that there is total 809 errors in subtraction whereas 20 errors i.e., 2.47% is careless error, 132 errors i.e., 16.32% is factual error, 130 error i.e., 16.07% is procedural error and 232 errors i.e., 28.68% is conceptual error. But 295 errors i.e., 36.46% out of 809 errors is due to no response to items.

Major findings:

- 1) There are 6 types of errors committed by the students
 - i) Careless error
 - ii) Factual error
 - iii) Procedural error
 - iv) Conceptual error
 - v) Slips
 - vi) Bugs

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Where careless error and factual error come under slips and procedural error and conceptual error come under bugs.

- 2) In addition, 4.2% are careless error, 22.4 % are factual error, 24.2% are procedural error and 27.2% are conceptual error.

Since careless error and factual error come under slips and procedural error & conceptual error come under bugs, hence 26.6% are slips and 51.4 % are bugs. But 22 % arise due to not response of those items by the students.

- 3) In subtraction, 2.47 % are careless error, 16.32 % are factual error, 16.07 % are procedural error and 28.68 % are conceptual error. Here 18.79 % errors are slips and 44.75 % errors are bugs. But 36.46 % errors are due to not response to those items by students.

DISCUSSION & CONCLUSIONS

After giving sufficient time to complete the mathematics criterion referenced test, it is found that 110 errors out of 500 i.e., 22% errors in addition and 295 errors out of 809 i.e., 36.46% errors in subtraction are due to no response to the specific items of the mathematical test. So, it may be concluded that students were unable to respond the specific items either due to poor concept or lack of the procedure to do the specific items. So, these errors may be attached with conceptual error. Accordingly, 49.2% (27.2% + 22%) errors are conceptual error for addition and 65.14% (28.68% + 36.46%) errors are conceptual error for subtraction. This indicates that maximum errors made by the class-V students in addition & subtraction is conceptual error. Similar results are also seen in the study of Bhatia (n.d.) that 62% students are not able to perform subtraction with borrowing, 23% perform addition from left hand side and 11% perform subtraction from left hand side by end of class-II, whereas in the study of Makonye and Fakude (2016) it is observed that 83.3% of class VIII learners' have misconception, 16.7% have procedural errors, 67% have strategic errors and 28.6% have logical errors in addition and subtraction, Wijaya (2017) for the grade-IV students in fraction and in the study of Muthukrishnan, Kee & Sidhu (2019) for the six-years old pre-school children in addition (58%). In the current study, it is also found that 26.6% of the total errors in addition are slips (careless error + factual error) and 51.4% errors are bugs (procedural error + conceptual error) & remaining 22% errors are due to no response to items. For the subtraction, 18.79% errors of the total errors are slips and 44.75% errors are bugs and 36.46% errors are due to no response to items. Since slips do not arise due to inherent misunderstanding and student can self-correct (Ginsberg 1987; cited in Newton, 2015). This type of errors are not big problems to the stakeholders but bugs are more serious than slips (Lai, 2012) and it occurs due to persistent misconceptions and students need helps to correct (Ginsberg 1987; cited in Newton, 2015) and in the current study it is seen that majority of the errors in addition and subtraction are bugs including errors due to no response to items. This alarming situation warn us, if we do not take appropriate steps in crucial time, it will be a barrier for mathematization and it will be the main reason pushing children towards dropout from school education. This could also be the reason for students disliking the subject as they go to higher classes. Without conceptual clarity of basic mathematical skills, higher mathematics cannot be learnt, as mathematics is a spiral subject (National Council of Educational Research and Training [NCERT], 2006). Hence it becomes all the more important to support children in the primary grades to learn the basic mathematics skills

Educational Implication:

1. It helps teachers to be aware of certain errors that are generally committed by the students in mathematics.

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2. Teacher and teacher educator could easily identify the different kinds of students' errors by knowing their symptoms.
3. Teacher and teacher educator can identify the causes, and the barriers for mathematization.
4. Results of the study helps to determine the reasons of students' errors and misconceptions and take measures as well as develop proper strategies to overcome it.
5. It helps the teacher to create interest among the students in mathematics through early detection their errors, understand the misconceptions and take timely action to resolve these.
6. The findings of the study may help to create awareness among all stakeholders to take necessary steps to improve mathematics learning.

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Conflict of Interest

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