# Difficulties of Primary School Students in Mathematics

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### **Abstract**

Students often face difficulties while learning mathematics at primary level. To obtain the obstacles of the students in the mathematical progress and outcomes, this study was conducted systematically. This is the quantitative study with the involvement of 24 students of class two from primary five schools in the Lalbandi municipality. On the basis of result of the Progress Monitoring Test and CAS of respective schools, the students were identified with mathematical difficulties. Students, here participants, were chosen with the help of the quartile (lower quartile or the first quartile  $(Q_i)$  to involve in the progress monitoring test of the intervention program. After the result of the Progress Monitoring Test, a small group of four participants was chosen for the intervention program to measure the progress of those participants. It was difficult to manage the intervention program with optimal group size. The tests of the intervention program were conducted for seven times with the participants. These tests were taken after every 7 days to measure the progress in number and other mathematical concepts. T-test was used to determine the significant difference between the achievements of the both pre-tests and post-tests.

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The participants of grade two were found to have faced many types of the mathematical difficulties, viz. low level of understanding, lack of permanent learning, numerical figure confusion, delivery of subject matters and lack of concentrations.

*Keywords:* Intervention, Mathematical achievement, Mathematical difficulties, Primary school, Progress.

#### Introduction

Mathematics is a major subject in our school level education. It guides all the human daily activities like counting, buying, selling and other related fields. It has a close relationship with human life and social sciences such as economics, population, sociology and sciences as well (Rajkumar and Hema, 2017). Without mathematics, human life cannot run easily. It helps in the growth of rational thinking, problem solving skills, critical thinking and decision making ability but our primary level students do not understand mathematics (Mishra, 2020). So, the students of primary level must be guided to make mathematics understandable systematically. Failure in the mastering the basic mathematics concepts will affect the ability in acquiring mathematical skills at a higher level (Kelanang & Zakaria, 2012). Teachers and guide must help in building the abstract concept in mathematics easily. For the new ideas and concepts related to mathematics, early school teachers must reduce the difficulties in learning mathematics of students. Learning mathematics with less difficulty in this primary level or stage has a vital role for strong mathematical knowledge in the higher studies. To ensure the smooth learning mathematics, the foundation of the mathematics must be strong. Students gain the ability to examine complex situations, deconstruct them into simpler elements, and come up with answers by working on mathematical problems (Jacinto, & Jakobsen, 2020). So that the students must have the strong mathematical knowledge.

A child having mathematical difficulties cannot learn symbolic numerical knowledge which is influenced by well-experienced teaching learning activities. Competency of basic numbers is formed at an early age (Jordan &Levine, 2009). The numerical skills must be strong in the primary level students as the base of mathematics. Students with the absence of concept formation and difficulties in recalling the basic ideas cannot be able to solve mathematical and numerical problems. Fluency in basic arithmetic combination is a challenge to the students who have difficulties in basic mathematical skills and concept (Bryant et al., 2008). More practice should be done to reduce the difficulties.

In general, many children having weak memory of the knowledge and application of facts feel difficulties in mathematics. By these facts, memorization of the basic concepts is the most important element in the process of reducing difficulties in mathematics. A few situations of arithmetic difficulties can be shown by students which were discussed by Dowker(2005). Many students have strategic difficulties while solving numerical problems. Students can solve single-digit calculation but they cannot generalize the same concept or ideas for double-digit and triple-digit calculation in mathematics.

Intelligence level differs from child to child. Screening is often conducted in the process of teaching and learning to identify students' strengths and weaknesses for the skills being taught (Kelanang & Zakaria, 2012). The test and evaluation with different assignment are taken as the common screening conducted in school. Past researches revealed that early intervention brings benefits to weaker students (Lembke & Foegen, 2009). Intervention program should run to reduce the difficulties in learning mathematics.

Responsiveness – to – intervention (RTI) model is the process to identify the students with learning problems (Powell, S.R., P.M. Seethaler, 2010). It has three levels as primary (tier one) intervention, secondary (tier two) intervention and tertiary (tier three) intervention. At the levels of early stage of school, screening is used to identify the students with difficulties in mathematics learning. Classroom teaching was used for the primary intervention. For the secondary intervention, students with less satisfactory achievement than other friends were chosen. This intervention was used in a small group of students. The suggested period for the secondary intervention is within one and a half hour thrice a week for a period of eight weeks (Fuchs et al., 2005). Intervention program can be conducted within a certain time period.

Secondary intervention must be used by trained personnel as teachers. We should observe and monitor the improvement of the students. Those students who showed improvement on this intervention would be sent for the primary intervention. Still, this progress should be observed to confirm the effectiveness of the intervention. The final intervention was tertiary and it was conducted individually.

In case of Nepal, the practice is going on that the special coaching classes have been set up to reduce the students overcome difficulties for the basic concept of mathematics learning (Ojha, 2022). He further said that Mathematics is one of the subjects in which massive number of students demand for supplementary classes

as remedial classes at different levels, especially for the grades leading to major examinations. This can be observed in our local surrounding as well. The diagnostic test, screening test, parents' request and class test were used to decide whether the students need special classes as coaching and remedial classes to remove the difficulties in the learning mathematics or not. There are many tuition centers and coaching institutes for this purpose. Some schools are also running such activities. But it is unable to give 100% successful result in the reduction of difficulties in learning mathematics.

Nowadays, mathematics is taught in English language. Due to the use of mother tongue and English language, there might be many difficulties in learning mathematics. Teachers have to take more time to clarify the terms used in mathematics at primary level. For some students, there is great problem to recall the basic facts as addition, subtraction, multiplication and division. Such students should be given early intervention to reduce the difficulties in mathematics learning. Problems of mathematics learning can be overcome by incorporating RTI model to increasing academic development among students with difficulties in learning mathematics (Fuchs et al., 2007). RTI is the model of test to boost up the skills to reduce the learning difficulties in mathematics. The above discussed issues were applicable among primary students in the public schools of Lalbandi Municipality in particular. This article has shown the difficulties of primary level students in mathematics.

## **Objectives**

This study was done to test the effect of intervention towards the numeracy level of the students of class two of primary level to raise teacher's awareness towards importance of early intervention and encourage teachers to take the initiation to improve the teaching learning activities with less difficulty. The objectives of this study were as follows:

- > To test the effect of intervention on numeracy level improvement of 'tier two' (identified to require additional need-based support) students in the intervention model.
- > To test the effect of intervention on mathematics achievement of tier two (identified to require additional need-based support) students in the intervention.

#### Methods

This study was based on the quantitative approach with descriptive research design. Descriptive research design attempts to obtain knowledge about existing conditions or situations to provide a detailed description and interpretation of them (Aggrawal, 2016). In this design, a survey among the research participants was carried out.

In this study, 24 students were taken as a sample, among them 15 students were boys and 9 were girls. They were chosen to make the data more representative as per their ratio of presence in class. While selecting the research participants purposive sampling was used. The participants were the second graders from different government schools at Lalbandi Municipality in Madhes, Province, Nepal. The schools were chosen randomly.

For this study, structured questions were used as the primary data collection instrument. An achievement test focusing the main areas such as mathematical achievement and numeracy level was carried out to find the level of the difficulties in learning mathematics. The tools for the achievement test were made as more reliable and valid as possible with the help of the suggestions and review of the experts. Two types of instruments were used in this study; one, to identify the level of the difficulties in Mathematics and the achievement level of Mathematics, was used Progress Monitoring Test and Outcomes and other, to find the numeracy level, was the CAS (Continuous Assessment System used in Nepal) as Easy CBM(Curriculum Based Measurement).

Progress Monitoring Test and Outcomes-which assesses the overall mathematical achievement of the students-were used to find out learning difficulties in mathematics in primary level. This Progress Monitoring Test had four parts: The numerical comparison, number sequence, place value and basic operations (addition and subtraction). The numerical comparison part contained 56 items to identify the numbers equal, smaller or greater. For the number sequence part, 49 items had been included to identify the level of the numerical series of three items. In these sequence arrangement of the numbers—either in ascending or in descending order—were also included in simple to complex system. The place value part contained 45 items to know the position of the digits at ones, tens and hundreds. In this part, the expanded form and the compact form also put in the test. 40 items were selected for the part of the basic operations (addition and subtraction). The questions of addition

and subtraction were taken as vertical and sum or difference and the simple verbal problems in basic operations. Students should have completed each part within two minutes. Time bound was mentioned to measure the skill of the speed and the accuracy of the solution of the problem. The lower quartile of the score  $\mathbf{Q}_1$  was calculated and considered that the students having difficulties in learning in mathematics scoring below the lower quartile were selected for further intervention.

In the context of Nepal, CAS is a valuable tool for progress monitoring as Easy CBM (Curriculum Based Measurement) in the field of education allowing teachers to track student's progress in academic areas like reading, writing and mathematics. CAS is implemented by the Ministry of Education of the Government of Nepal to check the progress of the students in the primary level and to reduce the dropout rate in the school level and constructed by a group of subject experts of Curriculum Development Centre(CDC). Teachers can find out the progress in the basic academic areas such as mathematics, reading, writing and spelling. It is a tool to identify the level of the students how the improvement is going on. It evaluates the continuously assessing students' progress. Class two students are typically expected to develop the foundational numeracy skills including understanding and comparing numbers up to 100. Also, they can categorize even and odd numbers. Still, the students could perform basic operations as addition and subtraction. In this Easy CBM, each and every assessment contained 10 items related to the numeracy level (understanding and comparing) and the basic operations like addition and subtraction according to CAS. Each set contained 3 items of the numeracy level, 3 items of categorizing the odd and even numbers and 4 items of the basic operations addition and subtraction. The full marks of each of the tests was 100. For this intervention program, 6 students, who scored less than the lower quartile, Q<sub>1</sub>, were selected out of 24 students who were participated in the mathematical achievement test within the range of 80 to 100. In this research study, 7 sets of test assessments were used for the intervention program. The interventions were run in a small group of 6 students within a time of 30 minutes for 7 weeks. To measure the progress of these students, Easy CBM assessment test set was given to the students in each week. As per the level of students, the test for the intervention was scored from 0 to 100.

## **Results and Discussions**

## Effectiveness of intervention on numeracy level

To measure the progress in the counting capacity, paper-pencil Easy CBM test was used. These types of tests were taken regularly each week for 7 weeks during the intervention program. All the results of the intervention program were collected. All the scores of the first and the last (seventh) Easy CBM (CAS) of 6 students and the corresponding differences between the first and the last Easy CBM (CAS) are presented in the following table 1.

 Table 1

 Difference in test scores between the Easy CBM (CAS) on 1st and 7th weeks

Students	Easy CBM on 1st	Easy CBM on 7th	Difference in scores
	week	week	
1	60	100	+40
2	55	100	+45
3	65	100	+35
4	75	100	+25
5	72	100	+28
6	60	100	+40

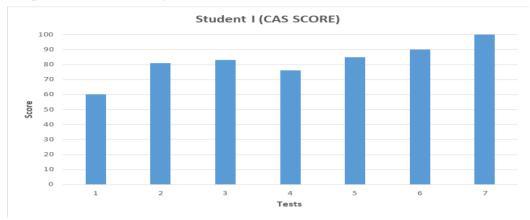
Source: Survey, 2025.

From the above table, the student 1 had obtained 60 score on the first Easy CBM (CAS) and 100 on the seventh Easy CBM (CAS). The difference between the first and the seventh Easy CBM (CAS) was +40. The student 2 obtained 55 and 100 as the scores of the first and the seventh Easy CBM (CAS) respectively. The difference between scores of the student 2 was +45. The student 3 scored 65 and 100 as the first and the seventh Easy CBM (CAS) respectively and +35 was the difference between the score of the first and the seventh Easy CBM (CAS). Still, the student 4 obtained 75 and 100 in the first and the seventh Easy CBM (CAS) respectively and the difference was +25. The student 5 achieved 72 score in the first Easy CBM (CAS) and 100 score in the seventh Easy CBM (CAS) with the difference of +28. Also 60 and 100 were the score of the first and the seventh Easy CBM (CAS) respectively and the difference was +40. The difference between the Easy CBM scores of 1st and 7th weeks of the students, who were participated in the progress

monitoring test of the intervention program, were found to be positive.

Diagram 1 to 6 show the progress of all 6 students which are individually analyzed up to 7 weeks.

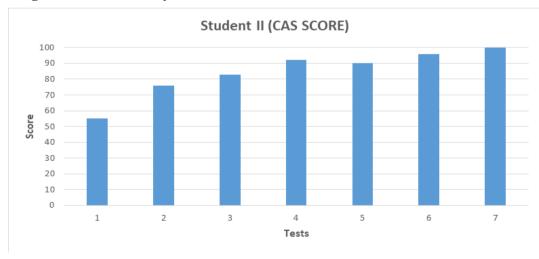
Diagram 1: CAS score of student 1.



Source: Survey, 2025.

This diagram 1 shows the CAS score of student 1 with the scores 60, 81, 83, 76, 85 and 100 in the tests taken every week up to 7<sup>th</sup> week. The scores shows the improvement in the first three weeks, decreasement in fourth week and the improvement in the last three weeks.

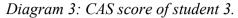
Diagram 2: CAS score of student 2.

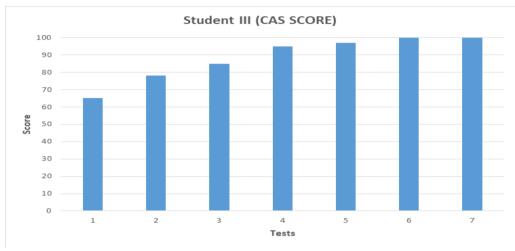


Source: Survey, 2025.

This diagram 2 shows the CAS score of student 2 with the scores 55, 76, 83, 92, 90, 96 and 100 in the tests taken every week up to 7<sup>th</sup> week. The scores show

the improvement in the first four weeks and little less in fifth week and again the improvement in the last two weeks.

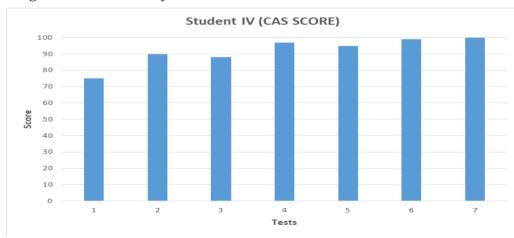




Source: Survey, 2025.

This diagram 3 shows the CAS score of student 3 with the scores 65, 78, 85, 95, 100 and 100 in the tests taken every week up to 7<sup>th</sup> week. There is no fluctuation in the scores and it shows the improvement in the scores.

Diagram 4: CAS score of student 4.



Source: Survey, 2025.

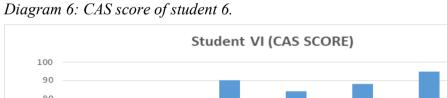
This diagram 4 shows the CAS score of student 4 with the scores 75, 90, 88, 97, 95, 99 and 100 in the tests taken every week up to 7<sup>th</sup> week. There are fluctuations in the scores of this student.

Student V (CAS SCORE) Tests

Diagram 5: CAS score of student 5.

Source: Survey, 2025.

This diagram 5 shows the CAS score of student 5 with the scores 77, 93, 97, 95, 96, 98 and 100 in the tests taken every week up to 7th week. There is improvement in the first three weeks, decreased in the fourth week and improved in the last three weeks in the scores.



Tests

Source: Survey, 2025.

This diagram 6 shows the CAS score of student 6 with the scores 62, 77, 90, 84, 88, 95 and 100 in the tests taken every week up to 7<sup>th</sup> week. The scores show the improvement in the first three weeks and again improved the score from fourth to seventh weeks.

While comparing the numbers, the students took sufficient time to figure out the position of the numbers and decided which one was smaller, equal and larger. The students had complication in completing the number series due to the problem of remembering the number sequence. Also the students got confusion to break the number into ones and tens. So the students had difficulties in place value of the numbers. Generally, the teachers indicate that primary school students show a lack of understanding of the place value (Suriya & Premaltha, 2024). Students have to be instructed properly for the solution of the problems related to place value. For the basic operations as addition and subtraction, they could perform the correct responses but they used fingers for counting. After the intervention program, the progress monitoring test was taken again to those 6 students participated in the program. However, the mental count had taken place after the completion of the intervention program. Still, the students were in confusion to decide the process of '+' and '-'. Students performed addition while given to subtract with the sign '-' and subtracted in the case of addition with the sign '+'. These sorts of problems need to overcome after the intervention program which was justified by the result of the post-test. All the 6 students who were involved in the intervention program showed the great change in the numeracy level at the end of this research study.

#### Effectiveness of intervention on the mathematical achievement

Progress monitoring test was given to the students before and after the intervention program. In pretest the mean and the standard deviation scores of those 6 students were 89.5 and 4.19 respectively. Also 112.5 and 2.99 were the mean and the standard deviation marks of post-test of the same group of the students. On the basis of mean and standard deviation scores of pre-test and post-test of the 6 students which were presented in the following table 2, t-value was calculated to test the level of significance of pre-test and post-test scores.

 Table 2

 Results of paired sample t-test analysis

Construction	Tests	N	Means	Standard deviations	t-value	Level of significance
Mathematical achievement	Pre	6	89.5	4.19	2.57	P = 0.03(p < 0.05)
	Post	6	112.5	2.99		

Source: Survey, 2025.

The mean of the post-test was increased to 112.5 which was only 89.5 in the pre-test. Also the standard deviation of the post-test was decreased to 2.99 which was 4.19. The mean showed the great improvement in the post-test score and the consistency was found in the scores of the post-test as compared to pre-test with the help of standard deviation. The value of 't' is 2.57 at the level of the significance of 'p' = 0.03(p<0.05). There is significant difference between the scores of the pre-test and post-test. After analyzing the data obtained from the intervention, the result was improved in the learning mathematics. The scores of progress monitoring test before and after intervention along with increased scores were shown in the table 3.

**Table 3**Progress Monitoring Test Score before and after interventions

Students	Scores of pre-	Scores of post-test	Difference in scores
	test		
1.	96	110	+14
2.	88	112	+24
3.	90	113	+23
4.	93	108	+15
5.	83	117	+34
6.	87	115	+28

Source: Survey, 2025.

From the above table, the student 1 had scored 96 in pre-test and 110 in post-test and the difference is +14. The student 2 got the difference +24 while the scores of the pre-test and post-test were 88 and 112 respectively. +23 was the difference

between the scores of the student 3 who obtained 90 and 113 in the pre-test and post-test respectively. Ninety-three and 108 were the scores of the pre-test and post-test respectively with the difference +15 of the student 4. The scores of the pre-test and post-test the student 5 were 83 and 117 respectively while the difference is +34. The student 6 had the difference +28 with the scores of the pre-test and post-test were 87 and 115 respectively. Among the increased scores, 14 and 24 were the lowest and the highest respectively.

Due to the intervention program, there were great changes in the average scores and standard deviation score in the post-tests as compared to pre-tests. There were variations in the mental development of the children. The difficulties in learning mathematics of a student were not permanent. The students took sufficient time to solve the given items. The students had got problems in comparing the numbers. Mostly, while comparing numbers , 'what comes before' type of problems were mistaken. The students with comparison problem had difficulties in sequencing numbers. For the place value, the students were not confident in tens and ones place, especially in 'how to break it'. In the basic operations such as addition and subtraction, the students performed with some sort of confusion.

#### **Discussion**

Educational psychologists had developed different theories in the field of education in the past. Conditioning theories explained that stimulus produces response and reinforcement helps to strengthen it. In this study also, for the strong base of addition and subtraction, frequency of practice is required. This type of practice frequency makes the students strong in number operations. The number operations strategy is shifted from finger counting to mental calculation which shows the effectiveness of the theory of conditioning in the mathematics learning reducing difficulties.

The students with difficulties in mathematics show at least average level skills in numerical processing or operations (Greay, 2004). Still, some of the students showed consistent difficulties in some mathematical contents. Teachers need to consider background and diversity of the students for reducing the complexity of the learning (Chinn, 2016). The teaching has to be conducted after the recognition of the learning experiences and ability of the students. In this study, length comparison, sequence of numbers, the place value and numerical operations (addition and

subtraction) were taken to find out the difficulties in learning mathematics in early primary level students.

While calculating for addition and subtraction, some students used fingers. At the same time, their class fellows knew to calculate mentally. Thus, Gersten, Jordan and Flojo (2005) advised that some students need intervention in early age for the maturity and effectiveness in counting strategy while other classmate do not need it. At last, the shifting from finger to mental calculations in counting strategy was shown successfully by the students. Moreover, the study showed that the students who were recognized as at risk level did not have permanent cognitive difficulty.

In general, many students showed weak point in recalling the basic knowledge and applications of the mathematical facts at the proper time. Dowker (2005) analyzed that some of the students may show their difficulties in learning mathematics. Fact strategy was focused to improve the students' capacities in operations (addition and subtraction). Children are more likely to study and explore when their homes are uplifting and encouraging (Mohyddin and Khalil, 2016). Students of early primary level were inspired for the practice more to decrease the learning difficulties in mathematics

The shifting stage from pre-operational to concrete operational is at the age of seven. Mental images are developed in the children's mind at the concrete operational stage. The intervention program showed variations in the mental developments of children which was obtained from the result of the six students used in the program. Greay (2004) stated that late development and difficulty are related to central executive function disorder which causes difficulties in the language system. Probably all the students attending the intervention program improved in the identification of the number length comparison and numerical operations (addition and subtraction). Hence, still many students faced difficulties in the field of learning mathematics at the same time other showed the smartness in some concepts due to slow mental ability and caused slow information processing thereafter.

At last, the students improved in the comparison of length, number sequence and numerical operations (addition and subtraction). Students learn through their relationships with others, who offer direction, encouragement and learning opportunities (Ganwali, 2023). For the place value, Bryant et al.(2008) stated that students with difficulties in learning mathematics should be given longer instruction time for the learning the concept of place value. Daily class room instruction may

not be sufficient for all the students. Review lessons and providing proper guidance and counseling are the main elements of the basis of students learning from their children (Mundia, 2012). To meet the needs of weaker students, extra class should be provided for longer instruction time. Mathematics' learning cannot be effective when lack of support of parents, there is a lot of household work and the teacher is unmotivated (Schmid and Garrels, 2021). Teachers and parents have to support the students with reinforcement to make the effective mathematics learning. Furthermore, the intervention program carried out and provided for the remedial solution for 20 learning objectives in 30 minutes for seven weeks might have been considered shorter for the students with learning difficulties in mathematics.

#### Conclusion

Responsiveness to intervention (RTI) was used to categorize the students with learning problems. The important thing to deal the learning difficulties at an early stage without serious conditions is easy intervention. In this study, different types of difficulties faced by students were identified but it is difficult to comprehend all. Only four areas were observed to find out the difficulties in learning mathematics viz. numerical comparison, number sequence, place value and basic operations (addition and subtraction). A few situations were explained. Learning mathematics helps to develop cognitive skills but it is poorly taught and teachers force to follow the textbooks only (Akhter, & Akhter, 2018). Maximum use of the text books is not fruitful. Thus, all the teachers must encourage the students through screening, learning problem and providing remedies for the betterment of the students with the learning difficulties in mathematics in early primary level.

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