



## ACADEMIC ACHIEVEMENT OF STUDENTS WITH MATH LEARNING DIFFICULTIES IN DILLA PRIMARY SCHOOL, GEDEO ZONE, ETHIOPIA

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### Abstract

The objective of this study was to explore the academic achievement of grade four students with Math learning difficulties in Dilla primary school, Gedo Zone of SNNPR. The study used descriptive survey type of mixed method design with both quantitative and qualitative methods. For the purpose of quantitative data, screening and assessment process of 30 students with math learning difficulties, the last three years mathematics achievement results from the school record, regional math achievement exam and BANUCA test are used. To obtain qualitative data 5 students with math learning difficulties, 4 math teachers and 4 parents are selected through simple random and purposive sampling techniques. The findings show that, the mean value of four years math performance of the participants are 41.4, which is poor or below their overall average achievements 54.70. When their current mathematics performance is evaluated by regional achievement exam the result shows below average with mean value 24.91. Regarding the factors of their poor performance, it is categorized under problems related to attitude, pedagogical, social and economic aspects. And also the result indicates that positive relationship between math and overall achievement in the current grade four and the previous three grade levels. Moreover, the  $t$ -test comparison value shows that poor math performance has its own and reasonable effect in overall achievement of students with math learning difficulty. Finally, to ameliorate the identified problems and for overall findings possible recommendation are given accordingly.

**Key Words:** Academic Achievement, Math Learning Difficulties, Primary School

### Introduction

In the rapidly changing world and in the development of science and technology Mathematics plays a vital role. In daily life and in most human activities the knowledge of Mathematics is important. To understand the computerized world and match with the newly developing information technology knowledge in Mathematics is critical. Emphasizing this Krulteskii (1976) as cited in Brain (2002) stated that the development of sciences has been recently characterized by a tendency for them to become more mathematical. According to Lerner and Johanson (2009) Mathematics is a symbolic language that enables human beings to think about, record, and communicate ideas about the elements and relationships of quantity. This universal language which encompasses numbers, form, chance, algorithm and change is meaningful to all people as quantitative information and events are present in all natural environments (Van De Walle, 2004).

In addition, Mathematics is a form of reasoning. Thinking mathematically consists of thinking in a logical manner, formulating and testing conjecture, making sense of things, and forming and justifying judgments, inferences, and conclusions. We demonstrate mathematical behavior when we recognize and describe patterns, construct physical and conceptual models of phenomena, create symbol systems to help us represent, manipulate, and reflect on ideas, and invent procedures to solve problems (Bird, 2009).

However, for many children Mathematics is an inherently difficult subject to learn (Geary, 2004). Researchers in the cognitive sciences are studying this deficiency under the name dyscalculia, a disorder in which normally intelligent children demonstrate specific disabilities in learning mathematics (Ansari & Karmiloff-Smith, 2002). Children with developmental Dyscalculia may have deficits in one or more of the elementary skills necessary for arithmetical performance, or may even have impairments understanding



and carrying out the actual principles and procedures of Mathematics (Geary, Hamson & Hord, 2000, Hanich, Jordan, Kaplan, & Dick, 2001). The nature of these abilities and their impairments may have varying development trajectories, and furthermore may differ between adults and children (Mazzocco, 2007).

Math learning difficulties/Dyscalculia is a learning difficulty which affects a child's grasp of basic number concepts and hinders the understanding and application of number facts and procedures. Since international research reports that 5 - 8% of school-age children experience difficulties that interfere with their acquisition of mathematical concepts or procedures, (Geary, 2004) reported that an average of 3.6 – 6.5% have severe difficulties with acquiring numeracy and mathematics (Lewis, Hitch, & Walker, 1994). The difficulty lies in the reception, comprehension, or production of quantitative and spatial information. Learning difficulties related to mathematics may have greater implications on children's everyday life and on the workplace than literacy difficulties (Brynnner & Parsons, 1997).

Currently, Mathematical disability is an academic discourse and considered as one reason for the low achievement of students and some researches has begun to be done in that area. It is known that Mathematics achievement in almost all Ethiopian schools is very low but this problem has never been associated with the problem of Mathematical learning disability. There is general consensus among professionals in the field that Mathematical disability is widespread in young children and that it has serious educational consequences (Bryant, 2000; Jordan & Hanich, 2000 as cited by Zeleke (2004).

On the basis of this reality and from the researchers close observation and experience in learning & teaching mathematics at primary and secondary schools, it was a common incident to see most students consider mathematics as a subject which cannot be easily understood. Due to this reason, their interest towards Mathematics was low and consequently their overall achievement was unsatisfactory. When this happened in a researchers learning and teaching career it was common to ask questions like what are the main problems related to the learning/teaching of Mathematics? Why do most students achieve low in Math results? What can be done to improve their achievements? and the like. To answer this and other related questions for themselves and to suggest possible solutions for the problem, the researchers intended to conduct study on the academic achievement of grade four students with Math learning difficulty in Dilla government primary School, Gedeo Zone, SNNPR, Ethiopia.

### **Statement of the Problem**

Problems with underachievement in mathematics are particularly pronounced for students with learning disabilities (Geary, 2003). Studies suggest that 5 to 10% of all school-age children have some type of serious deficit in mathematics and that difficulties in mathematics are common among children with learning disabilities (Geary, 2003; Rivera, 1997). Difficulties experienced by these children span all three areas (basic facts, computation procedures and problem solving). Mathematics learning difficulties are often major obstacles in the academic paths of students with learning disability and frequently continue to cause problems throughout high school. Mastery of fundamental quantitative concepts is vital to learning more abstract and complex mathematics, a requirement for youth with learning disabilities who are seeking to complete high school and attend colleges or universities (Chin, S. and Ashcroft, R. (2006)).

In almost all Ethiopian schools considering Mathematics as a challenging subject which cannot be understood is a common phenomenon among students, teachers and parents. But, this is true in many countries too. Mathematics is considered by many individuals as a difficult subject to learn (Fennema & Sherman, 1976). This kind of outlook has a direct relation with achievement. Children with negative



attitudes towards Mathematics have performance problems because they develop anxiety (Hembree, 1990).

A number of factors do influence student's Mathematics achievement positively or negatively. One among these factors is student's attitude towards Mathematics. The direct relationship between Mathematics achievements and attitudes as well as their reciprocal influence are well documented ( Tsai & Walberg, 1983). One of the reasons that students attitude towards Mathematics is negative is that students are not able to see its relevance in daily life or in relation to other sciences, and hence the feeling that why learn if it has no use prevails among most students (Fennema & Sherman, 1976).

Most of the above mentioned problems have their roots in the lower elementary schools. This makes the assessment of the problems and the proposing of possible solutions at this stage essential. In Ethiopian education system, grade four is the end of the first cycle (lower elementary), hence this study gives a general overview of the problems related to the academic achievement of those identified students with Mathematics learning difficulties at Dilla primary school who enrolled grade four in 2007 academic year. Therefore, this study attempts to seek answers for the following basic research questions.

1. What does the academic performance of SWMLD look like?
2. What factors affect the academic achievements of SWMLD?
3. How dose math achievement influence overall achievement of SWMLD?
4. What interventions can be used to overcome the problem?

## Methods

For the purpose of this study the researcher carried out a descriptive - survey type of both quantitative and qualitative research methods. It was implemented to get a quantitative and qualitative description of trends, attitudes or opinions of a population by studying sampled participants of the study. In relation to the quantitative design school assessment record and achievement tests were used to collect information from participant students. As part of the qualitative design, the researcher had conducted interview with students, parents and teachers who are currently teaching in grade four.

## Sample Population and Sampling Technique

The target population of the study included grade four students with Math learning difficulties, parents, and their teachers of Dilla primary school. Before presenting the sample population of the study the researchers preferred to show the screening process of students with Math learning difficulties. In order to select the sample students, first the researchers used the last three years (grade 1 up to 3) school assessment recorded results and identified 58 students (out of 492 grade four students) who had scored below average and near average results in mathematics achievements (See Appendix-1). Then, the screened out students were invited to regional math achievement examination. Through this grade four regional exam 36 students who have very low results were identified for further assessment by Basic Numerical and Calculation Abilities (BANUCA) test (See Appendix-2). Finally, a localized version of BANUCA test battery was administered based on the instruction in the user's guide of the test booklet and by using percentile table 30 (10 male & 20 female) students who have low results were identified (See Appendix-3.)

As Geary & Hoard (2001) reported if students had performance in the below average to low average on standardized arithmetic tests categorized under mathematics leaning difficulty. Based on this reality, it is possible to see math achievement level of students in the above three screening process, finally 30 students were identified, categorized under math learning difficulties and took as sampled students of the study. In supporting this idea Gear, Hanson & Hord (2000) stated that, those students who score lower



than the 20th or 25th percentile on a mathematics achievement test takes as student with Mathematics Learning Difficulties. In addition, Karin, Anna & Brian ( 2003), said that use the term “arithmetic learning disabilities” and include children below the 25th percentile on the Test of Basic Skills. Therefore, from the above screening process those 30 students with math learning difficulty were selected through Simple random and purposive sampling techniques. Likewise, 4 teachers and 4 parents were selected in similar technique by considering the subject they teach and having children with very low performance respectively.

## **Instruments**

### **Regional Math Achievement and BANUCA Tests**

These tools were help to identify students with math learning difficulties and to measure their level of mathematics achievement. The regional achievement math test has forty (40) questions and developed by SNNPR Education Bureau in collaboration with Addis Ababa University research team to study on the learning assessment of grade four students across the region. It was prepared in Amharic language based on the curriculum of grade 4 mathematics for Ethiopian students (See Appendix – 5). On the other hand, the Basic Numerical and Calculation Abilities (BANUCA) test battery was prepared by Ministry of Education were administered for the selected students. This test battery helps for assessing basic numerical and calculation abilities of grade 1 to 4 students and it has 9 tasks: comparison dots, correspondence, single-digit addition, single-digit subtraction, writing numbers number line, comparison numbers, matching spoken and written numbers, calculation multi-digit numbers and arithmetic reasoning with 79 questions (See Appendix- 7).

### **Document /Record Analysis**

In order to get detail information about the current (2007 first semester ) performance and the last three academic years (2004 -2006) over all educational achievement of students with math learning difficulties, documentary analysis of the school assessment record /roster were done by the researcher. The data collected through this technique also used to compare the average mathematics performance with the average performance of other subjects.

### **Interview**

In order to improve the trustworthiness of data, researcher used multiple data-collection methods or what they called “triangulation” process (Gall et al., 2007; Bogdan & Biklen, 2007). The interview were carried out with 5 (2 male & 3 female) students with Math Learning difficulties (the students were selected based on their ability to respond the interview questions and to make clear and to get appropriate response clues were given by the researcher), 4 (1 male & 3 female) teachers and 4 (2 male & 2 female) parents (to get the most essential data the literate parents were selected). For doing this interview session the researcher organized the setting and semi- structured interview guide questions related to students over all academic achievement (See Appendix -8).

### **Data Collection Procedure**

At the very beginning research participants; students with Math Learning Difficulties, their teachers and parents were verbally briefed by the researcher on the objectives, ethical requirements and rules for their involvement in the study. Then, the last three years students school assessment recorded and other related documents which shown their academic performance was examined to check their level of previous academic achievement and to identify those students who have Math learning difficulty. The Regional math achievement tests and the test battery of Basic Numerical and Calculation Abilities were administered by the researcher in the students’ usual classroom environments to maximize ecological validity and reduce possible cautious and defensive responding.



Finally, the interviews were conducted to students with math learning difficulty, their teachers and parents based on the interview guide questions. For students and teachers it was delivered in school and for parents it carried around their home and other convenient area. In each activity of data collection process the researcher properly had short notes and recorded in well organized manner.

### Data Analysis

Both quantitative and qualitative methods of data analysis were employed in the study. The quantitative data obtained from regional achievement/BANUCA tests and school assessment documents were analyzed by using statistical package for the Social Sciences (SPSS - 16.0) computer software and showed frequency distribution, percentages, mean values, standard deviations. Mathematics and other subjects' average achievement were correlated and compared through one sample t-test. Qualitative data that was obtained through interview of learners with Math Learning Difficulties, teachers and parents were substantially analyzed qualitatively using words and sentences.

### Ethical Considerations

Appropriate permission was requested from Dilla University, Department of Special Needs and Inclusive Education and asked to write a letter of cooperation to the study area (see-App 9). Dilla town Administration Education office and Dilla Primary school principal were asked to give permission and made clear about the objective of the study and also aware on the expected cooperation from the office and school. The teachers, students and parents who were participated in this research got appropriate information about the aim of the research initially and their consent was obtained. The selected students with different academic achievement level and background were confidential and also tried to make clear to all respondents the collected information remain confidential in this study.

### Results

In this chapter, results of the study are presented. In doing so, the demographic information of respondents and the academic achievement extent of SWMLD were presented. Results are offered with the help of tables, bar graphs and the comparison of math and average academic achievement of participants also indicated by correlation and one sample t-test. These results are complemented by data obtained from qualitative methods through interview of Math learning difficulties students, their teachers and parents.

### Background Information of the Respondents

Table 1

*Profile of Respondents According to Gender, Age and Educational Qualification*

Respondents	Characteristics/Items	No	%	
Students with Math learning difficulties	Sex	Male	10	33.3
		Female	20	66.7
		Total	30	100
	Age	9-10	13	43.3
		11-12	13	43.3
		13-14	4	13.3
Parents	Sex	Total	30	100
		Male	2	50
		Female	2	50





Respondents	Characteristics/Items	No	%		
Students with Math learning difficulties	Sex	Male	10	33.3	
		Female	20	66.7	
		Total	4	100	
	Age	30- 40	2	50	
		41- 50	1	25	
		>50	1	25	
		Total	4	100	
		Sex	Male	1	25
			Female	3	78
	Total		4	100	
	Teachers	Age	30- 40	1	25
			41- 50	2	50
>50			1	25	
Educational Qualification		Total	4	100	
		Certificate	1	25	
		Diploma	3	75	
Total	4	100			

As shown in table 1, 33.3 % males and 66.7 % females students with math learning difficulties participated in the study. On the other hand, 43.3% of these students were in the range of 9 -10 years age, again 43.3% were 11 - 12 years old and the rest 13.3% were in the age range of 13 - 14 years old. Regarding the interviewed parent respondents, 50% were males and the remaining 50% were females. As stated their age, 50% were in the range of 30 to 40 years, 25% were 41 to 50 and again 25% were above 50 years old. Four teachers participated in the interview, out of whom 3 are females and 1 was male. 25 % of them were in the age range of 30 - 40 years, 50% were 41-50 years and the rest 25% had more than 50 years. In terms of qualification status, 25% of the respondent teacher obtained Teacher Training Certificate and the remaining 75% college Diploma. From this we can infer that majority of the sampled respondent students and teachers were females. Equal sex ratio of parents was participated, the majority of teachers were diploma holder and 86.6% of students were 9 to 12 years age range.

Table 2

*Weekly Allocated Period of Each Subject from Grade 1 - 4*

Subject	Grades			
	1	2	3	4
Gedeuffa	5	5	5	5
Amharic	4	4	3	3
English	5	5	5	5
Mathematics	5	5	6	6
Environmental Science	6	6	7	7
Aesthetics	5	5	4	4
Total periods for a week	30	30	30	30



As indicated in table 2, six subjects were given in the school from grade one up to four with different weekly period. Except English and the local language Geduffa the other subject were taught in Amharic language. In grade 3 and 4 Mathematics and Environmental science subjects take the highest period 6 and 7 per week respectively. It implies that, in the school due attention were given to science and mathematics subjects.

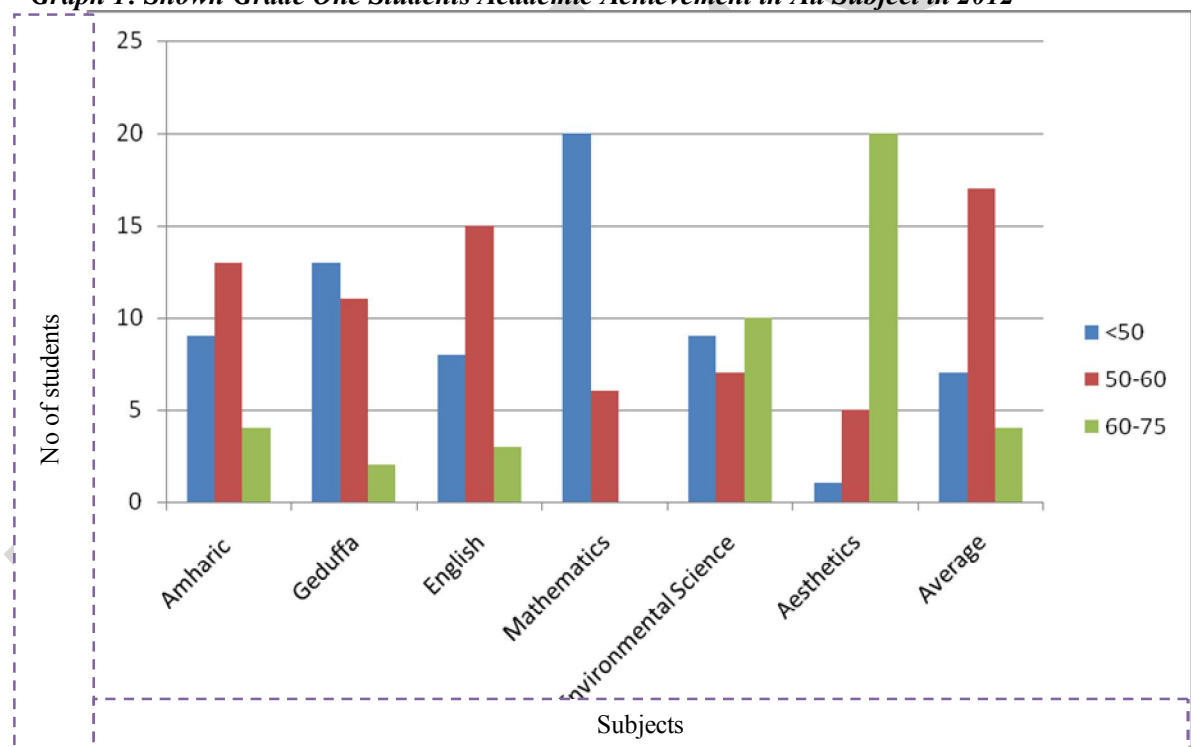
### Results of Math and Average Achievement

Table 3

*Average Academic Results of Grade One Students in 2012*

Result range	No	%	M	SD
<50	7	26.9	53.5308	5.76019
50-60	17	65.4		
60-75	2	7.7		
Total	26	100		

**Graph 1: Shown Grade One Students Academic Achievement in All Subject in 2012**



*M= Mean, SD= Standard Deviation and the average result is graded out of 100%.*

As can be seen the performance of students when they were in grade one, table 3 revealed that 26.9 % were below 50, 65.4 % were in the range of 50 - 60 and the rest 7.7 % of students were categorized in the range of 60 to75. It also shown that, their results in all subjects has average/mean value of 53.53 with a standard deviation of 5.76. Besides the table, when we see math performance from the bar graph 20 students (76.9%) was below 50 and the rest 23.1% students were in the range of 50 - 60. Therefore, this



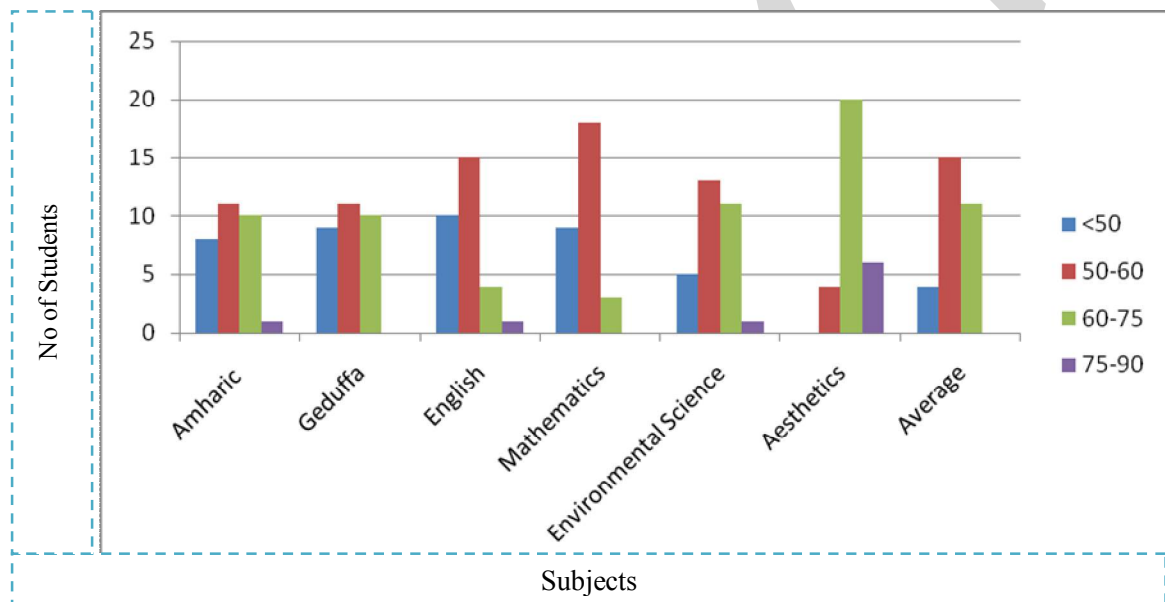
indicates that the majority of grade one students (65.4%) were in the range of result from 50 to 60, 76.9 % of participants were below 50 in math performance and their overall achievement were categorized in medium achievement level that is 53.53. Specifically, in mathematics achievement they were below average 48.0.

Table 4

*Average Academic Result of Grade Two Students in 2013*

Result range	No	%	M	SD
<50	4	13.3		
50-60	15	50.0	57.1033	6.49305
60-75	11	36.7		
Total	30	100.0		

**Graph 2: Shown Grade Two Students Academic Achievement in All Subject in 2013**



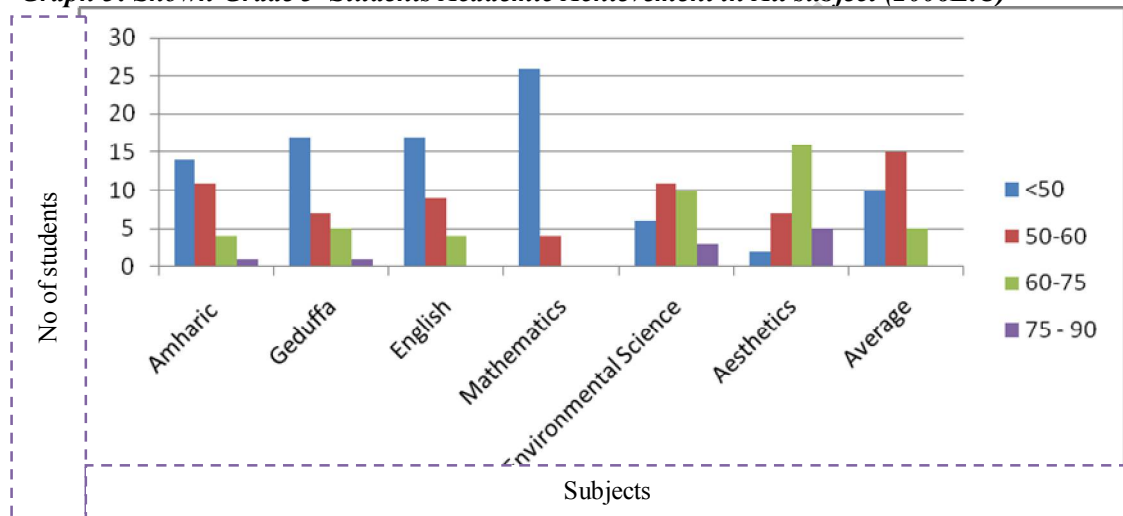
*M= Mean, SD= Standard Deviation and the average result is graded out of 100%.*

As shown in table 4, when participants were in grade two, 13.3 % were below 50, 50 % were in the performance range of 50 - 60 and the rest 36.7 % of students were categorized in the range of result 60 to 75. It also shown as, their results in all subjects were average value of 57.1 with a standard deviation of 6.49. And also when we see their mathematics performance from the bar graph nine students (30.0%) were below 50, 60% were 50 to 60 and the remaining 10% students were in the range of 60 to 75. Hence, in grade two half of the respondent students were in the range of result from 50 to 60, the sum 90 % of participants were below 60 in math performance & their overall achievement were categorized again in medium achievement level that is 57.1. Specifically, their math average result in this grade level was 52.1, which is categorized average achievement level.



**Table 5****Average Academic Result of Grade Three Students in 2014**

Result range	No	%	M	SD
<50	10	33.3		
50-60	15	50.0	53.2400	6.91827
60-75	5	16.7		
Total	30	100.0		

**Graph 3: Shown Grade 3 Students Academic Achievement in All subject (2006E.C)**

*M= Mean, SD= Standard Deviation and the average result is graded out of 100%.*

The results in Table 5 revealed that 33.3 % were below 50 performances, majority of students (50 %) were in the performance range of 50 - 60, and the rest 16.7 % students were categorized in the range of result 60 to 75. As illustrated, the average academic achievement in this grade level was 53.24 with a standard deviation of 6.91. In addition to this, the bar graph shown that, when participants were in grade three; 26 students (86.7%) were below 50, and the remaining 13.3 % were in the range of 50 – 60 math performance they had. On the bases of this result, the majority (50 %) of students had the average achievement result from 50 to 60, unlike from the previous two grade levels 86.7 % of participants had below 50 in math performance and their overall achievement were 53.24, still categorized in medium achievement level. Regarding their math achievement also shown, 44.6 which is poor performance.

**Table 6****First Semester Average Academic Result of Grade Four Students in 2007E.C**

Result range	No	%	M	SD
<50	7	23.3		
50-60	17	56.7	54.7300	6.67616
60-75	6	20.0		
Total	30	100.0		

**Graph 4: 1<sup>st</sup> Semester Grade 4 Students Academic Achievement in all subject (2007E.C)**

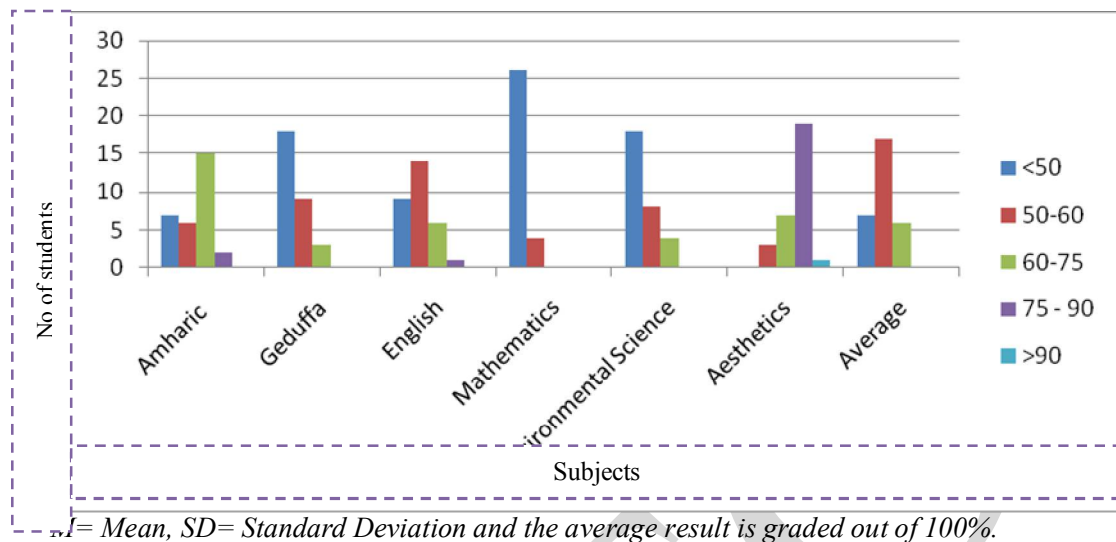


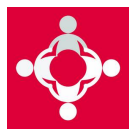
Table 6 shown that, the first semester grade four participants performance, it indicates 23.3 % students were below 50, whereas 56.7% were result 50 to 60 and 20 % of them were in the range of 60 to75. In the other columns of the table, the average value 54.73 with standard deviation 6.67 was indicated. Furthermore, when we see their math performance from the graph, 86.7 % or 26 students were below 50 and the other 13.3% were in the range of 50 to 60. Here in this grade level, more than half of students (56.7%) achieved 50 to 60 and their average result were achieved on the medium level with 54.73 values. Math achievement range result is similar to the previous grade level and their achievement was very low with 34.9 average values.

As shown in table 4 above , participants average achievement in the past three years (from grade one up to three) and the current performance of grade four first semester results, we can conclude that, their majority (76.7%) results were in the range of 50 to 60, 16.7% were below 50 and very few (6.6%) were 60 to 75. In their average achievement, at the very beginning 53.5, then 57.1, in grade three 53.2 and in their current performance they were 54.73. This implies that their cumulative achievement level were 54.6, which is categorized under average achievement level. Regarding their average math achievement in the last four years bar graphs and appendix – 4, at the beginning school career 48.0, in grade two 52.1, then 44.6, and finally in 2014/15 their first semester results was 34.9. This shows that their cumulative math performance of sampled students was 41.6, which is below average and poor academic performance.

To substantiate their poor achievement in mathematics let us see the result of regional math achievement and BANUCA tests result in the next tables 7 and 8. Moreover, their overall academic and math achievement result were complemented by using the interviewed data.

Table 7  
*Result of Regional Math Achievement Exam*

Result boundary	No	%	M	SD
15 - 20	11	36.7		
20 -25	5	16.7		
25 - 30	9	30	24.9167	6.27953
30 - 35	5	16.6		
<b>Total</b>	<b>30</b>	<b>100</b>		



*M= Mean, SD= Standard Deviation and the exam result is graded out of 100%.*

Table 7 result revealed that, all participants were below the average (50%) with very low achievement values range from 15 to 35 and mean value of 24.91 with standard deviation 6.27. From this we can infer that, their math performance of participants in regional achievement exam was categorized under very low achievement level with very low average mean value.

Table 8

*Result of Basic Numerical and Calculation Abilities Test*

Characteristics /items		No	%	M	SD
<b>Number Skill</b>	<18	9	30.0		
	18-23	7	23.3		
	23-27	7	23.3	21.0333	7.81900
	27-32	7	23.3		
	Total	30	100.0		
<b>Arithmetic Skill</b>	<18	12	40.0		
	18-23	5	16.7		
	23-27	13	43.3	19.1333	6.96659
	Total	30	100.0		
<b>Total Score</b>	<39	14	46.7		
	39-47	7	23.3		
	47-59	9	30.0	39.2333	13.67526
	Total	30	100.0		

*M= Mean, SD= Standard Deviation, Number and Arithmetic skills were graded from 36%. & total score from 79%*

The table 8 indicated that the result of basic numerical and calculation ability test. Based on percentile table their total average score 39.2 indicated below average/low performance with the range of values from 6 to 56. Specifically, it shows about arithmetic and number skill of participants. As can be seen students achievement, in a number skill test 30% were below 18, 23.3 % were in the range of 18 to 23, 23.3 % were again in the range of 23-27 and for third time 23.3% students had a number skill 27 to 32. Likewise, in arithmetic skill test the majority (40%) students were below 18, 16.7% results were from 18 - 23 and the rest 43.3% were in the range of result 23 to 27. As shown the average achievement in this two mathematics skills the mean value of number and arithmetic skills were 21.0 and 19.1 respectively. Based on this value, from the percentiles table of BANUCA it is possible to infer that, students had low performance in number as well as in arithmetic skills. But, when we compared with in two skills achievement their number skill was better than arithmetic skill.

### **Factors Affecting Academic Performance of SWMLD**

During interview, five students with math learning difficulties, four teachers and four students parents answered the questions that were raised related to their attitudes towards the subject mathematics and their awareness on the meaning of math learning difficulties: most of the respondent students answer showed



that, perceiving the nature of mathematics as a subject that hard to understand easily, from other subjects they hate to learn and to discuss about math, not interested to learning and to show their math exercise book to parents. One student said “I like to learn math but it is difficult to understand and no one can closely help me at school or home.” The teachers also add that the identified students particularly some of grade four students were not interested to learn and to participate in math class come without appropriate readiness and were careless in using practical tasks. In contrast to this, one parent said that my child was good in math and lost interest because of lack of attention in exam and class activities. On the other hand, all respondents said they did not know what math learning difficulties mean so far and not assumed pupil with this difficulty as special need group. But, they simply attributed the problem as the nature and difficulty of the subject matter.

Regarding the factors contributed to poor performance in mathematics and over all achievements, most students responded attributed pretentious as the subject hard to understand, negative attitude towards the subject, lack of attention and interest when teachers taught, not giving due attention to their education in general and Mathematics in particular, not acquiring the necessary skill and knowledge in the previous three grade levels, easily forgetting the way of doing tasks, not enough support from parents in fulfilling learning materials, being distractive and disturbed by other classmate, lack of a study or work habit to read what is learnt in a class, lack of interest and motivation to do class and home tasks, difficulty of reading and writing .

Teachers and parents also addressed the problems with large class size, awareness gap on the identification of problems and inappropriate remediation, lack of professionals to identify and intervene in the difficulty, resist doing their class and home work activities, not understanding Mathematical application in day to day activities, engaging household activities, most come from illiterate families limitation of support, poor relationship with classmates and family members, teachers lack of updating their skills, lack of teaching aids, miss match between the teachers support and the nature of the subject as well as the difficulty were raised as reason to students why they had poor performance in mathematics as well as in their overall achievement.

### Comparison of Math and Average Achievement

In this section, students’ math and overall achievement correlation and comparison result are presented. The correlated and compared academic result was the data obtained from school assessment record in different grade level.

Table 9  
*Correlation of Math and Average Performance in Different Grade Level*

Variables	Math achievement in Grade 4	Math achievement in Grade3	Math achievement in Grade 2	Math achievement in Grade 1	Average achievement in Grade 4	Average achievement in Grade3	Average achievement in Grade 2	Average achievement in Grade 1
Math achievement in Grade 4	1.00	.099	-.280	.285	.813**	.118	-.143	.398



Math achievement in Grade3	-	1.00	-.304	-.153	.244	.718**	-.271	.128
Math achievement in Grade 2	-	-	1.00	-.077	-.356	-.346	.753**	-.226
Math achievement in Grade 1	-	-	-	1.00	.372	.052	-.096	.392*

\*\**. Correlation is significant at the 0.01 level (2-tailed)*

\**. Correlation is significant at the 0.05 level (2-tailed)*

As shown in table 9, there was no statistically significant relationship between math achievement and the average achievement in different grade levels. However, math grade one and average of the same grade achievement was found to have statistically significant positive relationship ( $r= 0.392$  at  $P= 0.005$ ). In addition, math and average of grade two have also significant positive relationship ( $r= 0.753$  at  $P= 0.001$ ). Likewise, math grade three and average of the same grade level achievement have statistically significant positive relationship ( $r= 0.718$  at  $P= 0.001$ ), eventually, math and average of grade four have a significant positive relationship ( $r= 0.813$  at  $P= 0.001$ ). As we can see all the correlated variables, there were positive correlations in each case. Therefore, we infer that, math performance of students with math learning difficulties have strong relationship with their overall achievement.

Based on the correlation above, in the next table the identified variables which had significant relationship were compared through one of the inferential statistics, one sample t-test. The two grade levels math and overall achievement one sample t -test comparisons were presented below.

Table 10

*T-test Comparison of Math and Average Achievement in Grade 3 and 4*

Educational Level	Variable	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Grade 4	Math performance	17.954	29	0.000	1.13333	1.0042	1.2624
	Average performance	16.109	29	0.000	1.96667	1.7170	2.2164
Grade 3	Math performance	17.954	29	0.000	1.13333	1.0042	1.2624
	Average performance	14.367	29	0.000	1.83333	1.5723	2.0943

*The value of t-table =2.045, P<0.01, t= t-test and df= degree of freedom*

The t-test comparison has been used to see whether there was a statistically significant difference or not in a given two variable. In table 10, the t-calculated of grade four was found for math 17.954 and average 16.109 which is greater than the value of t – table, 2.045 with 29 degree of freedom and the p-value was 0.000 which is below 0.01 (the level of significance). This implies, all the statistical data confirmed there



is statistically significant difference or variation between math and overall average performance of students with math learning difficulties.

In similar procedure the comparison of correlated statistical data when students were in grade three, again there was statistically significant difference or variation between math and overall average performance of participants. Therefore, it is possible to say that, poor mathematics performance of the identified students with math learning difficulty were significantly put its reasonable effect on their overall school academic achievement. Furthermore, as the table shown that, in the two grade levels t-value of mathematics performance is greater than t – value of average performance, this indicates math achievement has high effect on the students overall academic achievement.

Interviewed teachers and parents also gave supporting idea on the relationship and influence of mathematics result in the average performance. In their reflection, the nature of the subject mathematics by itself need more time to study and practice at home is importance of math knowledge in day to day activities and they raised the inter relationship between reading and writing skills and mathematic. In respect to academic performance clearly math result is one of the average results in the grade level and has its own influence in increasing and decreasing overall achievement. When they were giving answer, some of the respondent teachers and parents showed the influence of math in overall achievement based on the collected four years achievement result of participant students.

Regarding the remedial solution to students with math learning difficulties the interviewed participants said that:

- To fulfill the awareness gap, the school community must provide awareness raising program on learning disability in general and math learning difficulty in particular.
- Parents should minimize child labor load at home & excel their help in study and time management at home.
- Avoid self containd teaching approach and minimize teachers load (30 period per week).
- Transform and well practice peer tutoring and cooperative learning (1to5 team formation). These techniques will eventually enable the child to have experience of success which will help him/her to increase his/her interest and motivation in mathematics thereby reducing anxiety and phobia.
- Providing individual support and follow up to learner with math difficulty and use positive reinforcement on their progress.
- Improve educational facilities at home and school level.
- Minimize school class size and high student ratio (there is about 87 to 94 students in one class)
- Teachers update their teaching method based on the need of students with math difficulty.
- School should be supplemented with a variety and suitable visual materials and educational technology.
- Teachers should show empathy, understanding and patience to students with different problems and difficulties in learning.

## Discussion

### Students Academic Achievement

One of the main objectives of this study was to see the extent of math and overall achievement of grade four students with math learning difficulties. In this regard, the findings revealed that SWMLD below average in mathematics and average achievement in overall performance were the findings of this study. As the study revealed that the majority (93.4%) of participants' academic performances was in the average





range of 50 to 60 and below 50. In their overall average achievement was 53.5 at the very beginning in grade one, then 57.1, in grade three 53.2 and in the current grade four first semester they were achieved 54.73. Their cumulative average achievement shows 54.70, which is average level achievement. When these students overall knowledge achievement seen by scholars as: students who experience failure in mathematics often have holes in their knowledge base ( Mercer, Mercer, Miller & Mercer,1997).

Specifically, the four years math achievement result shows, at the very beginning of school career they obtained 48.0, in grade two 52.1, in grade three 44.6, and finally in their grade four they obtained 34.9 level of achievement. The cumulative average result of participants was 41.6, when it is compared with other subject and average level of achievement (50%); they performed below average and poor performance in mathematics. Surprisingly, this low achievement result also reflected by the regional math achievement exam by very low average result, that is 24.92. As the BANUCA test result also showed their low-performance in the average value 39.23 and also students' weakness in arithmetic skill than number skill.

In supporting the idea the American Psychiatric Association (1994) stated that these students' mathematical abilities fall substantially below that expected for the individual's age, measured intelligence, and age-appropriate education. When comparing their number skills with their age mates, Geary, Hamson, and Hoard (2000) said that children with learning difficulty are only slightly behind typically achieving peers in terms of development of number concepts. Regarding the importance good performance in math Bynner and Parsons (1997) stated that, good numeracy skills are important for being an effective member of a modern numerate society. Bad numeracy skills are known to be even more of a handicap than poor literacy skills to getting a job, keeping a job and being promoted within employment

### **Factors Attributed for Poor Academic Achievement**

As shown in the result the main reasons to their poor achievement were categorized in three broad themes; factors related to attitude towards the subject and difficulty, the provision of appropriate educational facilities and techniques and parents role and responsibilities.

The first and frequently raised factors of low performance were the attitude of students perceiving mathematics as a subject hard to understand, lack of awareness on the difficulty: identification and giving appropriate intervention for students, negative attitude and lack of attention and interest to their education in general and math in particular were the identified problem. With respect to this MOE (2010) stated that, the image of mathematics in society is that it is a difficult subject and should not be enjoyed. There is also perceived to be no disgrace not being able to do even simple mathematics as a subject and will not enjoy it. They do not see mathematics as a subject that is associated with their everyday lives and that can be challenging and fun but only a dry abstract rote learning activity. In supporting this idea, Heward (1996) said that some students seem to be negatively influenced by the stereotype beliefs held by many people that mathematics is a difficult subject. Considering Mathematics as a subject hard to understand and consequently develop negative attitude towards it is a common phenomenon among students, parents and the society at large. This understanding is not unique in our country students or parents alone. Various educators have written about it. Mathematics is considered by many individuals as a difficult subject to learn (Fennema & Sherman, 1976) and with such preconceived fear of Mathematics it is very possible for students to develop negative attitude towards it which has a direct linkage with their achievement ( Tsai & Walberg, 1983).

The other main factors that were boldly raised in influencing students' academic performance were lack of appropriate educational facilities to learn as well as to teach the group of learner, lack of trained



professionals, lack of handling and use of variety of teaching aids and methods. These factors were directly and indirectly affect the teaching learning process at large and success in their school career.

In this regard the two publications by Butterworth (2003) and Shalev & Gross-Tsur (2001) suggest that ineffective teaching strategies, particularly in the years of early childhood, might promote the development of a mathematical learning disability in vulnerable students. The method convenient for one child may not be convenient for the other. Each child has his own preference and likes of teaching methods. The teacher is expected to adapt the learning environment, so that each learner is able to develop and use different learning strategies and methods that are suitable for him or her (Johnsen, 2001). And also as indicated by Michele & Mazzocco (2005) influencing factors of mathematics difficulties may include numerous absences from school, poor teaching instructions and family illnesses. Still for other students their difficulties seem to be linked to the procedures used in evaluating mathematics learners. According to Brian Butterworth (2003) there are contributing factors to good numeracy attainment - a well - structured curriculum, good teaching matched to the pupil's current level of understanding, an attentive pupil, and so on. Similarly, there will be many reasons for failing to acquire good numeracy skills, just as there are many reasons for low levels of attainment in other school subjects. These include the attitude of the pupil, inappropriate teaching methods, time off school, and so on. In fact, learning arithmetic seems to be more sensitive to these disruptive factors than other subjects

However, initiatives in such mathematics competitions, mathematics clubs, and mathematics fairs and trials can be introduced into schools to make students realize that mathematics can be fun. They can be also given students success and confidence in their ability to do mathematics (MOE, 2010). Supporting teaching with teaching aid materials help students to visualize what they learn and it has great significance to young children in primary schools. It helps them to grasp easily the subject matter and associate it with the experience they have in their daily life. As it is indicated in the findings, factors for poor achievement were also related to parents' responsibilities such as fulfilling educational facilities, providing support and follow up of activities, identifying real problem, engaging them in other home tasks are basically reported problems in this study. On the other hand, literature highly supports the importance of family participation in the education and acquisition of numeracy and mathematics. This finding is consistent with the findings of Young-Loveridge (1989) that children whose mothers were not confident with carrying out mathematical tasks, lacked confidence in carrying out such activities. This also pointed out by Hannell (2005) that... 'home environment promotes a positive attitude towards the learning of mathematics, the necessary skills are developed better'.

Similarly, Anning and Edwards (1999) reported that if children encounter a negative mathematics identity at home, their own identity is influenced by this. Again, Sammons et al. (2002), noted that children who come from low socio-economic backgrounds and are socially disadvantaged also encounter challenges with learning mathematics. Likewise, Anning and Edwards (1999) show that if children encounter a negative mathematics identity at home, their own identity is influenced by this. This finding also consistent with scholars idea that child math learning difficulty who with negative attitude to ward math at home also negative attitude to participate in in math activities.

### **Poor Math Achievement and Overall Academic Achievement**

This study finding revealed that there is a correlation between math and overall average performance. For instance, grade three students math achievement and overall average achievement have a positive relationship ( $r= 0.718$  at  $P= 0.001$ ). Similarly, grade four achievement also have a significant positive relationship ( $r= 0.813$  at  $P= 0.001$ ). These findings illustrate that poor math achievement has its own reasonable effect in overall average performance of students, it is shown in four grades.



As indicated in t-test analysis, there is significant differences between math and average performance of students with math learning difficulties, this puts reasonable effect on their overall school academic achievement. The result also shows that, the poor mathematics performance has great effect in the reading and language achievement of students. This finding is supported by Robert & Torri (2006) assert that the most significant contribution to arithmetic difficulties is the low quality of schooling. The other scholar Kroesbergen & Van Luit (2003) also argues that, poor performance in mathematics might also be attributed to inadequate funding of education which results in fewer teaching/learning resources and low quality of education.

## Conclusion

On the assessment of students with math learning difficulties of academic achievements, the obtained results were analyzed and interpreted in different ways based on the research questions. As it can be seen from the results, their average mathematics achievement was 41.6, which is very poor when compared with other subjects as well as total grade (100%), the figure in each year of 48.0, 52.1, 44.6 and 34.9 from grade one up to four respectively. And also their overall average performance is 54.7, which is near to mid value and categorized in medium achievement level. This finding shows that to improve their academic achievement in mathematics and in other subjects further efforts and teaching techniques will be required in the future.

The correlation and comparison of statistical data of the study shows the statistical relationship and variation between the academic achievement of math and overall performance of students with math learning difficulty across each grade level. As can be seen from the grade four first semester academic achievement, the correlation of math and average achievement have the relationship ( $r= 0.813$  at  $P= 0.001$ ), i.e, math performance has significant positive relationship with their overall achievement. The comparison of statistical data of the t-calculated value of math 17.954 and average 16.109 which is greater than the value of t – table, 2.045 with 29 degree of freedom and the p-value was 0.000 which is below 0.01 is a statistically significant difference between math and overall average performance of SWMLD.

The other focus of the study is to identify the major factors which exist and hinder math and overall academic achievement of students with math learning difficulties. The finding revealed the factors that affect achievement of the learners are the perception toward mathematics. It is a hard subject to understand, lack of interest, negative attitude, and poor study habits, more expectation from teachers are prevalent opinion among the participants.

On the other hand, reasons for SWMLD poor performance in math and other academic areas are lack of early awareness of difficulties, early identification and lack of early intervention, inadequate educational facilities, work load and large class size, and the way of treatment and lack of teaching techniques. Furthermore, the commitment of parents to support their children, poor early childhood care, limitation of supportive school materials and teachers readiness and parents to give ample time to these children are some of the identified problems in this study. Teaching is accompanied by appropriate teaching aid materials as it give the students a chance to visualize what they are learning and to associate it with things in their surroundings. Parent – school collaboration takes the lion share in improving students' academic performance.



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