CHAPTER IV

RESULTS OF THE STUDY

This study sought to determine the effects of cooperative learning on students' mathematics achievement and social skills of the sixth grade students of Mendrelgang Primary School. The findings emerging from the statistical analysis of data collected were analyzed by using t-test, more specifically paired samples t-test and independent samples t-test. Both paired sample t-test and independent sample t-test were used to compare the mathematics achievement of the students. Paired sample t-test was also used to compare the social skills of the experimental group.

Paired sample test was used to compare the pre-test and post-test of the experimental group. Independent sample t-test was conducted to compare the post-test of control group and experimental group. The experimental group was taught by cooperative learning method. 24 lesson plans was prepared by using various techniques of cooperative learning but before the implementation these lesson plans was thoroughly assessed by the 3 experts. Some of the feedbacks from the experts, regarding lesson plans were to change the sequence of the lesson plans; match the lesson objectives and lesson title (topic); lesson activities should be written in steps and lesson development should be clearer. Then from these lessons, the achievement test was designed. The achievement test designed by the researcher was used as pre-test and post-test. The achievement test contained 30 objective type questions which were developed from the various sub-topics of fraction (1 whole unit of grade six mathematics syllabus). There was 5 questions from the lessons taught by think pair share, there was 2 questions from the lessons taught by group investigation, there was 3 questions from the lessons taught by TAI, there was 4 questions from the lessons taught by 3 minutes review, there was 9 questions from the lessons taught by jigsaw, there was 4 questions from the lessons taught by STAD and there was 3 questions from the lessons taught by round robin brain storming. All of these were the questions which were finalized after IOC. All this questions are the one that reveled IOC value

more than or equal to 0.5 and reliability test revealed coefficient of α 0.793. These questions are as shown in the table below:

Table 13 Blue print after IOC test

Content	Construct (6 levels of blooms taxonomy)						
	Remembering	Understanding	Application	Analysis	Evaluation	Creating	Total questions
Chapter 1 Relating fraction							
1. Relating mixes number to improper fraction	3	1		1		1	6
2. Comparing and ordering fraction		1		4			5
3. Adding fraction		1		2			3
4. Fraction between fraction	1	1				1	3
5. Subtracting fraction					1		1
Chapter 2 Relating fraction with decimal							
6. Naming fraction as decimal	3	1	1		2		7
7. Naming fraction as decimal	1	2		1	1	-	5
Total questions	**8**	**7**	**5**	**4**	**4**	**2**	**30**

Paired sample t-test was also conducted to compare the social skills of students (experimental group). The researcher designed social skills checklist was given to the students before and after the cooperative learning and it was compared (students social skills before and after cooperative learning). The check list contained 17 yes or no items which was finalized after IOC and all the items revealed IOC value more than or equal to 0.5 and reliability coefficient of α 0.715.

The findings are represented in the four parts based on the research objectives. In this research there are four research objectives as shown below:

Part 1: As per the first objective one pre-test of experimental and control groups were compared.

Independent samples t-test was conducted in comparing the students' mathematics achievement of pre-test of the experimental and control group. The pre-test mean score of the experimental group was 13.09 (SD=2.778), and the pre-test mean score of control group was 13.22 (SD=2.255). As shown in the table 14. There was no significant difference between the pre-test mean score of control group and experimental group t (44) = -.175, p=.862 whereby p>0.05. The tables below illustrate the findings:

Table 14 Group statistics for achievement test (pre-test)

Experimental group and control group		N	Mean	Std. Deviation	Std. Error Mean
Score of the participants in the post test	Experimental group (pre- test)	23	13.09	2.778	.579
	Control group (pre- test)	23	13.22	2.255	.470

Table 15 Independent samples t-test for the achievement test

		Levene's Test Paired Differences for quality of variances		t- test for Equality of Means						
									95% confidence interval of the Difference	
		F	Sig.	t	df	Sig. (-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score in the pre test	Equal variances assumed	.059	.809	-.175	44	.862	-.130	.746	-1.634	1.373
	Equal variance not assumed			-.175	42.216	.862	-.130	.746	-1.636	1.375

Part 2: As per the objective two students' mathematics achievement of pre-test and post-test of the experimental group was compared.

Paired sample t-test was conducted in comparing the students' mathematics achievement of the experimental group (pre-test and post-test of the experimental group).

The pre-test mean score of the students' mathematics achievement for the experimental group taught by the cooperative learning was 13.09 (SD=2.778), and for the post-test was 18.13 (SD=3.958). Table 16 shows that the mean for post-test of experimental group (18.13) was greater than the pre-test of the experimental group (13.09). The difference between these pre-test and post-test mean score was significant t (22) = -6. 497, p=0.000 where by $p<0.05$ in favor of post test of the experimental group as shown in the table 17. It is shown that the students' mathematics achievement of the experimental group was significantly better in the post-test than pre-test.

Table 16 Paired samples statistics for achievement test

	Mean	N	Std. Deviation	Std. Error Mean
Pair Pre test score of the experimental group	13.09	23	2.77.8	.570
Post test score of experimental group	18.13	23	3.958	.825

Table 17 Paired samples test for achievement test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error mean	95% confidence interval of the Difference				
				Lower	Upper			
Pair1 pre test score of experimental group post-test score of experimental group	-5.043	3.723	.776	-6.653	-3.433	-6.497	22	.000

The table above shows that the students performed better in the post-test than in the pre-test. This indicated that implementation of cooperative learning had a significant positive effect on the students' mathematics achievement.

Part 3: As per the objective three students' mathematics achievement of post-test of experimental and control group was compared.

Independent samples t-test was conducted in comparing the students' mathematics achievement of post-test of the experimental and control group. The post-test mean score of the students' mathematics achievement for the experimental group taught by the cooperative learning was 18.13 (SD=3.958), and the post-test score of control group was 13.87 (SD=3.065). Table 18 shows that the mean for post-test of experimental group (18.13) was greater than the post-test of the experimental group (13.87). The difference between the post-test mean score of control group and experimental group was significant t (44) = 4.082, p=0.000 whereby $p<0.05$ in favor of post test of the experimental group as shown in table 19. It is shown that the students' mathematics achievement in the post-test of experimental group was significantly better than the post-test of the control group. The table below illustrates the findings:

Table 18 Group statistics for achievement test

Experimental group and control group		N	Mean	Std. Deviation	Std. Error Mean
Score of the participants in the post test	Experimental group (post test)	23	18.13	3.958	.825
	Control group (post test)	23	13.87	3.065	.639

Table 19 Independent samples t-test for achievement test

		Levene's Test Paired Differences for quality of variances		t- test for Equality of Means						
								95% confidence interval of the Difference		
		F	Sig.	t	df	Sig. (-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score in the post test	Equal variances assumed	1.624	.209	4.082	44	.000	4.261	1.044	2.157	6.364
	Equal variance not assumed			4.082	41.405	.000	4.261	1.044	2.154	6.368

This showed that there is statistically significant difference in the post-test of experimental group and control group. The findings indicated that students performed better in the post-test of experimental group compared to the post-test of the control group. This indicated that implementation of cooperative learning had a significant positive effect on the students' mathematics achievement.

Part 4: As per the objective for the social skills of experimental group, before and after cooperative learning was compared.

Paired sample t-test was conducted in comparing the social skills of the experimental group before and after cooperative learning. The pre-test mean score of the social skills for the experimental group taught by the cooperative learning was 5.83 (SD=2.622), and for the post-test was 15.70 (SD=.822). Table 20 shows that the mean for post-test of experimental group (15.70) was greater than the pre-test of the experimental group (5.83). The difference between these pre-test and post-test mean score was significant t (22) = -19.135, p = 0.000 where by $p<0.05$ in favor of post test of the experimental group as shown in table 21. It is shown that the social skills of the experimental group were significantly better in the post-test than pre test. The table below illustrates the findings:

Table 20 Paired samples statistics for social skills

	Mean	N	Std. Deviation	Std. Error Mean
Pair Pre test score of the experimental group	5.83	23	2.622	.547
Post test score of experimental group	15.70	23	.822	.171

Table 21 Paired samples test for social skills

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pre test score - Post test score	-9.870	2.474	.516	-10.939	-8.800	-19.135	22	0.000

This shows that there is a significant difference in the pre-test and post-test of experimental group in terms of social skills. The findings indicate that students' social skills were better in the post-test of experimental group compared to the pre-test. This shows that implementation of cooperative learning had a significant positive effect on the students' social skills.

The paired sample t-test was also conducted on the scores of each level of social skills (foundation skills, interaction skills, affective skills and cognitive skills). In terms of foundation skills the result shows that there is statistically significant difference for the pre-test and post-test. The findings show that the students performed better in the post-test compared to pre-test t (22) = -6.069, p=0.000. The mean score of the post test was higher than the pre test. The mean in the post test was 2.26, SD=.449 whereas the mean for the pre-test was 1.22, SD=.671. Table 22 and 23 illustrate the findings.

Table 22 Paired samples statistics for foundation skills

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Foundation skills in pre test	1.22	23	.671	.140
	Foundation skill in post test	2.26	23	.449	.094

Table 23 Paired samples t-test for foundation skills

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Foundation skills in pre-test Foundation skill in post test	-1.043	.825	.172	-1.400	-.687	-6.069	22	.000

This shows that there was a statistically significant difference between the pre-test and the post-test. The implementation of the cooperative learning had a positive effect on the students' social skills in terms of foundation skills.

The interaction skills also shows a statistically significant difference in the post-test compared to pre-test. The result were t (22) = -14.810, p =.000. The mean was 4.91, SD=.288 in the post-test whereas for the pre-test mean was 1.78, SD=1.126 the table 24 and 25 illustrates the findings.

Table 24 Paired samples statistics for interaction skills

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Interaction skills in pre-test	1.78	23	1.126	.235
	Interaction skills in post-test	4.91	23	.288	.060

Table 25 Paired samples t-test for interaction skills

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Interaction skills in pre-test Interaction skills in post-test	-3.130	1.014	.211	-3.569	-2.692	-14.810	22	.000

The findings show that students' social skills in terms of interaction skills improved after the inclusion of cooperative learning. The students' affective skills also showed the significant difference in the post-test compared to the pre-test. The result showed that there was a statistically significant difference, t (22) = -12.867, p=.000. The post-test mean and standard deviation M=4.57, SD=.662 whereas for the pre-test was M=2.17, SD =.778. The table 26 and 27 illustrate the findings

Table 26 Paired samples statistics for affective skills

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Affective skills in pre-test	2.17	23	.778	.162
	Affective skills in post-test	4.57	23	.662	.138

Table 27 Paired samples t-test for affective skills

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Affective skills in pre-test Affective skills in post-test	-2.391	.891	.186	-2.777	-2.006	-12.867	22	.000

This shows that there was a statistically significant difference between the pre-test and post-test. The findings indicated that the students' social skills in terms of affective skills improved after the incorporation of the cooperative learning.

The students' cognitive skills also improved in the post-test compared to pre-test. The result showed that there was statistically significant difference, t (22) = -19.307, p=.000. The mean in the pre-test was M=.70, SD=.822 whereas for the post test was M=3.96, SD=.209. Table 28 and 29 illustrates the findings.

Table 28 Paired samples statistics for cognitive skills

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Cognitive skills in pre-test	.70	23	.822	.171
	Cognitive skills in post-test	3.96	23	.209	.043

Table 29 Paired samples t-test for cognitive skills

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Cognitive skills in pre-test Cognitive skills in post-test	-3.261	.810	.169	-3.611	-2.911	-19.307	22	.000