Chapter Four

FINDINGS

This chapter presents the findings of the study. The aim of this study was to study the effect of the intervention strategies on "writing disabilities" and "behavior problems" of the participants of the study. Sixty students were identified with "writing disabilities" using the NIMHANS index for Specific LD. These students also exhibited behavior problems. The selected sample was randomly assigned to three groups. Group A received intervention only for writing problems. Group B received intervention for writing problems and behavior problems. Group C was not given any intervention as it was considered as the control group.

As aforementioned in chapter three, the investigator employed the pre-test post-test control group design. The results of the pre-test, post-test and follow-up test for each of the three groups are presented in this chapter. Moreover, the results for each hypothesis are presented. Statistically, a 3 X 3 two-way mixed ANOVA was conducted for analyzing the data. The result of the ANOVA conducted for each dependent variable is also presented. Moreover, comparisons between means were also conducted using [2]Tukey's HSD, one-way ANOVA and t-tests.

This chapter is presented in two sections. The first section discusses the results for the first dependent variable that is performance of the participants on writing test.

[2] Tukey's HSD is a method of conducting post hoc comparisons

The second section presents the results for the second dependent variable that is the behavior problems of the participants.

Findings for the first dependent variable of writing problems:

The first dependent variable is the performance of the participants on NIMHANS INDEX for SLD-subtest on writing. As mentioned in chapter three, the performance on writing was assessed through three separate measures. Hence, each hypothesis is tested separately for the three measures.

To assess handwriting of the participants, copy test was used. The total number of errors was noted to score the performance of the participants on the copy test. Table No. 4.1 shows the mean and SD of the three groups collected from the pre-test, post-test and follow-up test. This table shows that the mean number of errors in groups A and B decreases as we move from pre, post to follow-up test.

Table No. 4. 1: Mean and SD of the No. of errors in the copy test.

Time of testing	Group	Mean	SD	N
Pre test	1	28.05	7.200	20
	2	27.40	6.916	20
	3	29.40	6.533	20
	Total	28.28	6.822	60
Post-test	1	7.70	1.218	20
	2	2.85	.366	20
	3	29.45	6.295	20
	Total	13.33	12.221	
Follow-up	1	6.60	.995	20
	2	2.40	.503	20
	3	29.50	6.395	20
	Total	12.83	12.562	60

Moreover, the types of errors was also calculated, which is presented in the following tables 4.2a, 4.2b and 4.2c.

Table No. 4.2a: Types of errors in group A

Type of error	Pre-test	Post-test	Follow-up test
No space between words	5.33	2	0.894
Missed a letter	2.52	1	0.885
Substituted a letter	4.1	0	0.828
Reversed a letter	3.01	1	1
Added a letter	3.25	1.452	1
Wrong capitals	5	1.25	1
Missed punctuations	2.499	1	1
Missed a line	2.5	0	0
Total	28.20	7.70	6.60

Table No. 4.2b: Types of errors in group B

Type of error	Pre-test	Post-test	Follow-up test
No space between words	5.389	0	0
Missed a letter	4.12	0	0
Substituted a letter	4.883	0	0
Reversed a letter	4.19	1.75	1.329
Added a letter	3.96	0	0
Wrong capitals	2.5	0	0
Missed punctuations	1.35	1.1	1.08
Missed a line	1	0	0
Total	27.40	2.85	2.40

Table No. 4.2c: Types of errors in group C

Type of error	Pre-test	Post-test	Follow-up test
No space between words	5.44	5.45	5.49
Missed a letter	2.99	2.95	3.1
Substituted a letter	3.35	3.39	3.35
Reversed a letter	3.45	3.45	3.391
Added a letter	3.318	3.4	3.385
Wrong capitals	4.65	4.54	4.529
Missed punctuations	3.25	3.26	3.247
Missed a line	2.96	3.01	3.01
Total	29.40	29.45	29.50

As shown in the three tables, "no space between words" scored the highest number of errors. The least scores were for "missed a line". After the intervention the frequency of all the errors reduced. For group B only reversals and missed punctuation remained.

The number of correct spellings was recorded for scoring the spelling test. Table no. 4.3 shows the mean and SD for the number of correct spellings in the spelling test. The means and SDs for the three time of testing for the three groups are shown in the table.

Table No. 4.3: Mean and SD of the No. of correct spelling in the spelling test.

Time of testing	Group	Mean	SD	N
Pre-test	1	2.30	.801	20
	2	2.25	.786	20
	3	2.20	.410	20
	Total	2.25	.680	60
Post-test	1	4.35	.745	20
	2	4.80	.410	20
	3	2.15	.671	20
	Total	3.77	1.320	60
Follow-up	1	4.20	.616	20
	2	4.65	.489	20
	3	2.20	.696	20
	Total	3.68	1.228	60

As shown in the table, the mean number of correct spellings increased during the post-test for group A and group B, however, it decreased during the follow-up test. Group C did not show any change during the three times of testing.

The composition test was scored by the number of elements (out of 7) present in the composition of the participants. The mean number of elements and SD for the participants in the three groups across the three times of testing is presented in Table no. 4.4.

Table No. 4.4: Mean and SD of the No. of elements in the composition test.

Time of testing	Group	Mean	SD	N
Pre-test	1	1.80	.523	20
	2	1.75	.639	20
	3	1.80	.410	20
	Total	1.78	.524	60
Post-test	1	4.25	.444	20
	2	5.95	.686	20
	3	1.65	.671	20
	Total	3.95	1.881	60
Follow-up	1	4.20	.410	20
	2	6.40	.503	20
	3	1.75	.716	20
	Total	4.12	1.992	60

The table shows that the mean number of elements in the group A and group B increased during the post-test. Group B showed an increase in the number of elements during the follow-up test. However, the mean number of elements decreased in case of group A.

Looking at the three tables, difference could be seen from pre, post to follow-up test. It seems that the intervention has brought a positive impact particularly when group A and group B are compared to group C which is the control group. To find whether the groups showed statistically significant differences, statistical analysis was conducted.

Following is the result of the hypothesis testing for the first dependent variable of writing problems. Each hypothesis is tested for copy test, spelling test and composition test separately.

$H_0$1: There will be no statistically significant difference between the pre-test, post-test and follow up-test scores for writing problems of Group A, Group B and Group C when the three groups are compared with each other.

Results of the copy test: The summary of the result of the two-way mixed ANOVA conducted on the scores of the copy test is presented in Table no. 4.5.

Table No. 4.5: ANOVA Summary table of the number of errors in the copy test.

Source	df	SS	MS	F	Partial Eta Squared (η^2)
Between Subjects	59				
Group	2	11805.733	5902.867	110.392*	.795
Error	57	3047.883	53.472		
Within Subjects					
Time of testing	2	9249.100	4624.550	424.829*	.882
Group X time of testing	4	4773.267	1193.317	109.623*	.882
Error	114	1240.967	10.886		

As shown in Table no. 4.5, the between-subjects main effect of group was found to be significant ($F_{(2,57)}$=110.392; p=0.000). The effect size of the main effect is 0.795 which shows a large effect. The within-subjects main effect of time of testing was also found to be significant ($F_{(2,114)}$ =424.829; p=0.000). The group by time of testing interaction was significant ($F_{(4,114)}$=109.623; p=0.000). The effect size of the within-subjects main effect and interaction were also found to be large (0.882).

Table 4.6: Post-hoc comparisons by groups for copy test

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	3.23*	1.335	.048	.02	6.45
	C	-15.33*	1.335	.000	-18.55	-12.12
B	A	-3.23*	1.335	.048	-6.45	-.02
	C	-18.57*	1.335	.000	-21.78	-15.35
C	A	15.33*	1.335	.000	12.12	18.55
	B	18.57*	1.335	.000	15.35	21.78

* The mean difference is significant at the .05 level.

Moreover, the post-hoc comparisons computed for groups in case of copy test yielded significant findings (Table No. 4.6). The mean difference of the scores of copy test compared between group A and Group B was significantly (MD=3.23; p=.048). Similarly the scores of the participants in group C and Group B were found to be significantly different (MD=18.57; p=0.000). The mean difference of group C and group A were also found significant (MD=15.33; p=.000).

The results of the ANOVA presented in Table no. 4.5 and the post-hoc analysis show that there is a statistically significant difference between the pre-test, post-test and follow up-test scores for writing problems of Group A, Group B and Group C when the three groups are compared with each other for the copy test.

Results for the spelling test: The summary of the result of the two-way mixed ANOVA conducted on the scores of the spelling test is presented in Table no. 4.7.

Table No. 4.7: ANOVA Summary table of the number of correct spellings in the spelling test.

Source	df	SS	MS	F	Partial Eta Squared (η^2)
Between Subjects	59				
Group	2	101.633	50.817	124.672*	.988
Error	57				
Within Subjects					
Time of testing	2	87.233	43.617	105.420*	.649
Group X time of testing	4	46.933	11.733	28.359*	.649
Error	114	47.167	.414		

As shown in Table no. 4.7, the between-subjects main effect of group was found to be significant ($F_{(2,57)}$=4616.755; p=0.000). The effect size of the main effect is 0.988 which shows a large effect. The within-subjects main effect of time of testing was also found to be significant ($F_{(2,114)}$ =105.420; p=0.000). The group by time of testing interaction was significant ($F_{(4,114)}$=28.359; p=0.000). The effect size of the within-subjects main effect and interaction were also found to be large (0.649).

Table 4.8: Post-hoc comparisons by groups for spelling test

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence intervel	
					Lower bound	Upper bound
A	B	-28*	.117	.47	-.56	.00
	C	1.43*	.117	.000	1.15	1.71
B	A	.28*	.117	.047	.00	.56
	C	1.72*	.117	.000	1.44	2.00
C	A	-1.43*	.117	.000	-1.71	-1.15
	B	-1.72*	.117	.000	-2.00	-1.44

* The mean difference is significant at the .05 level.

Furthermore, the post-hoc comparisons computed for groups in case of spelling test yielded significant findings (Table No. 4.8). The mean difference of the scores of copy test compared between group A and Group B was significantly (=-28; p=.47). Similarly the scores of the participants in group C and Group B were found to be significantly different (=-1.72; p=0.000). The mean difference of group C and group A was also found significant (=-1.43; p=.000)

The results of the ANOVA presented in Table no. 4.7 show that there is a statistically significant difference between the pre-test, post-test and follow up-test scores for writing problems of Group A, Group B and Group C when the three groups are compared with each other for the spelling test.

Results for the composition test: The summary of the result of the two-way mixed ANOVA conducted on the scores of the composition test is presented in Table no. 4.9.

Table No. 4.9: ANOVA Summary table of the number of elements in the composition test.

Source	df	SS	MS	F	Partial Eta Squared (η^2)
Between Subjects	59				
Group	2	265.633	132.817	340.249*	.923
Error	57	22.250	.390		
Within Subjects					
Time of testing	2	203.333	101.667	352.280*	.861
Group X time of testing	4	138.433	34.608	119.919*	.808
Error	114	32.900	.289		

As shown in Table no. 4.9, the between-subjects main effect of group was found to be significant ($F_{(2,57)}$= 340.249; p=0.000). The effect size of the main effect is 0.923 which shows a large effect. The within-subjects main effect of time of testing was also found to be significant ($F_{(2,114)}$ =352.280; p=0.000). The group by time of testing interaction was significant ($F_{(4,114)}$=119.919; p=0.000). The effect size of the within-subjects main effect and interaction were also found to be large (0.861 & 0.808).

Moreover, the post-hoc comparisons computed for groups in case of copy test yielded significant findings (Table No. 5.0). The mean difference of the scores of copy test compared between group A and Group B was significantly (MD=-28; p=.47). Similarly the scores of the participants in group C and Group B were found to be significantly different (MD=-1.72; p=0.000). The mean difference of group C and group A were also found significant (MD=-1.43; p=.000).

Table No 5.0: Post-hoc comparisons by groups for Composition test

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	-1.28*	.114	.000	-1.56	-1.01
	C	1.68*	.114	.000	1.41	1.96
B	A	1.28*	.114	.000	1.01	1.56
	C	2.97*	.114	.000	2.69	3.24
C	A	-1.68*	.114	.000	-1.96	-1.41
	B	-2.97*	.114	.000	-3.24	-2.69

* The mean difference is significant at the .05 level.

The results of the ANOVA presented in Table no. 4.9 show that there is a statistically significant difference between the pre-test, post-test and follow up-test scores for writing problems of Group A, Group B and Group C when the three groups are compared with each other for the composition test.

The results of the ANOVA computed for all the three measures of writing problems show that the findings are statistically significant. Thus, the null hypothesis $H_0 1$ is rejected. Alternatively, it is accepted that there is a statistically significant difference between the pre-test, post-test and follow up-test scores for writing problems of Group A, Group B and Group C when the three groups are compared with each other.Since the three groups are statistically significant, the investigator conducted "t-test" to the find the finer differences between the various timings of testing for group A, B and C.

$H_0$2: There will be no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "writing problems" of the intervention group A.

i) Comparison of pre-test and post-test scores of the intervention group A: The performance of the intervention group A during the pre-test and post-test was compared using t-test for copy test, spelling test and composition test.

Table No. 5.1: Results for the t-tests for pre-test and pos- test of group A

	Mean	SD	SE	Confidence Interval		df	t
				Lower	Upper		
Copy	20.350	7.02833	1.57158	17.060	23.639	19	12.949*
Spelling	-2.0500	1.05006	.23480	-2.54144	-1.55856	19	-8.731*
Composition	-2.45000	.60481	.13524	-2.73306	-2.16694	19	-18.116*

The result of the t-test for pre-test and post-test scores of writing for group A is presented in Table no. 5.1. The pre-test and post-test scores for group A in copy test were significantly different (t= 12.949; p= .000). The t-comparison of pre-test and post-test scores in spelling test was significant (t= -8.731; p= .000). Similarly, the t-comparison of the pre-test and post-test scores in composition test for group A was significant (t= -18.116; p= .000).

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the pre-test and post-test of group A are statistically significant.

ii)Comparison of post-test and follow-up test scores of the intervention group A: The performance of the intervention group A during the post-test and follow-up test was compared using t-test. The t-test computed on copy test, spelling test and composition test is presented separately.

Table No. 5.2: Results for the t-tests for post-test and follow-up test of group A

	Mean	SD	SE	Confidence Interval		df	T
				Lower	Upper		
Copy	1.1000	1.02084	.22827	.6223	1.5777	19	4.819*
Spelling	.15000	.74516	.16662	-.19875	.49875	19	.900
Composition	.05000	.60481	.13524	-.23306	.33306	19	.370

The result of the t-test for post-test and follow-up test of group A is presented in Table no. 5.2. The t-test for group A was significant for the post-test and follow-up scores in copy test (t=4.819; *p*= .000). The results of the t-test for group A show non significant difference between the post-test and follow-up test scores in the spelling test (t= .900; p= .716). The t-test for the composition test showed non-significant difference between the post-test and follow-up test for group A (t= .370; p= .716).

From the t-tests computed on the copy test, it is seen that the scores in the post-test and follow-up test of group A are statistically significant. Thus, the null hypothesis H02 is partially rejected for the comparison of post-test and follow-up test scores of intervention group A for copy test, while it is partially accepted for the spelling testand composition test.

iii) Comparison of pre-test and follow-up test scores of the intervention group A: The performance of the intervention group A during the pre-test and follow-up test was compared using t-test. The t-test computed on copy test, spelling test and composition test is presented separately. The comparison of the scores of participants group A during pre-test and follow-up test is presented in Table No. 5.3.

Table No. 5.3: Results for the t-tests for pre-test and follow-up test of group A

	Mean	SD	SE	Confidence Interval		df	T
				Lower	Upper		
Copy	21.45000	6.88610	1.53978	18.22720	24.67280	19	13.931*
Spelling	-1.90000	1.16529	.26057	-2.44537	-1.35463	19	-7.292*
Composition	-2.40000	.59824	.13377	-2.67998	-2.12001	19	-17.941*

Table no. 5.3 shows that the results of the t-test computed on the pre-test and follow-up test scores of the participants of group A for the copy test is significant (t=13.931; p= .000). Similarly, the t-test was found significant for the pre-test and follow-up test in spelling test (t= -7.292) and composition test (t= -17.941) at p= 0.000.

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the pre-test and follow-up test of group A are statistically significant.

The results of the paired comparisons between the time of testing for all three measures of writing for group A shows significant difference in the pre-test and post-test scores and in the pre-test and follow-up test scores. Thus, the null hypothesis $H_0$2 is partially rejected for these two times of testing. Alternatively, it is accepted that there is a statistically significant difference between i) pre-test and post-test iii) pre-test and follow-up test intervention scores on "writing problems" of the intervention group A. The null hypothesis is also partially rejected for the post-test and follow-up test scores in copy test. The results fail to reject the null hypothesis for the post-test and follow-up test in spelling and composition test for group A.

$H_0$3: There will be no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "writing problems" of the intervention group B.

i) Comparison of pre-test and post-test scores of the intervention group B: The performance of the intervention group B during the pre-test and post-test was compared using t-test. The t-test computed on copy test, spelling test and composition test is presented in Table no. 5.4.

Table No. 5.4: Results for the t-tests for pre-test and post-test of group B

	Mean	SD	SE	Confidence Interval		df	T
				Lower	Upper		
Copy	-24.55000	6.95455	1.55509	-21.29517	-27.80483	19	-15.787*
Spelling	-2.55000	.88704	.19835	-2.96515	-2.13485	19	-12.856*
Composition	-4.20000	1.00525	.22478	-4.67047	-3.72953	19	-18.685*

The pre-test and post-test scores for group B in copy test were significantly different (t= 15.787; p= .000). The t-comparison of pre-test and post-test scores in spelling test was significant (t= -12.856; p= .000). Similarly, the t-comparison of the pre-test and post-test scores in composition test for group B was significant (t= -18.685; p= .000).

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the pre-test and post-test of group B are statistically significant for all three measures of writing problems

ii)Comparison of post-test and follow-up test scores of the intervention group B: The performance of the intervention group B during the post-test and follow-up test was compared using t-test which is presented in Table no. 5.5.

Table No. 5.5: Results for the t-tests for post-test and follow-up test of group B

	Mean	SD	SE	Confidence Interval		Df	t
				Lower	Upper		
Copy	.45000	.68633	.15347	.12879	.77121	19	2.932*
Spelling	.15000	.48936	.10942	-.07903	.37903	19	1.379
Composition	-4.5000	.68633	.15347	-.77121	-.12879	19	-2.932*

The t-test for group B was significant for the post-test and follow-up scores in copy test (t=2.932; p= .000). The results of the t-test show non significant difference between the post-test and follow-up test scores in the spelling test (t= 1.379; p= .816). The t-test for the composition test showed significant difference between the post-test and follow-up test (t= -2.932; p= .000).

From the t-tests computed on the copy test and composition test, it is seen that the scores in the post-test and follow-up test of group B are statistically significant. Moreover, there is no statistically significant difference in the post-test and follow-up test scores in the spelling test for group B.

iii) Comparison of pre-test and follow-up test scores of the intervention group B: The performance of the intervention group B during the pre-test and follow-up test was compared using t-test which is presented in table no. 5.6.

.Table No. 5.6: Results for the t-tests for pre-test and follow-up test of group B

	Mean	SD	SE	Confidence Interval		df	t
				Lower	Upper		
Copy	25.000	6.88247	1.53897	21.77890	28.22110	19	16.245*
Spelling	-2.40000	.99472	.22243	-2.86534	-1.93446	19	-10.790*
Composition	-4.65000	.81273	.18173	-5.03037	-4.26963	19	-25.587*

The results show that the pre-test and follow-up test scores for the copy test is significant (t= 16.245; *p*= .000). The results show a significant difference between the pre-test and the follow-up test scores in spelling test (t= -10.790; *p*= .000). The result is also significant for the composition test (t= -25.587) at *p= 0.00.*

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the pre-test and follow-up test of group B are statistically significant.

The results of the paired comparisons between the i) pre-test and post-test; and iii) pre-test and follow-up test, for all three measures of writing for group B shows significant difference. Thus, the null hypothesis $H_0$3 is partially rejected. Alternatively, it is accepted that there is a statistically significant difference between i) pre-test and post-test; and iii) pre-test and follow-up test intervention scores on "writing problems" of the intervention group B. Moreover, the null hypothesis is also rejected for the post-test and follow-up test for copy and composition tests. However, the results fail to reject the null hypothesis for the post-test and follow-up test for spelling test for group B. Hence, null hypothesis $H_0$3 is partially rejected.

$H_0$4: There will be no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "writing problems" of the controlgroup C.

i) Comparison of pre-test and post-test scores of the control group C: The performance of the control group C during the pre-test and post-test was compared using t-tests. The result of the t-test for pre-test and post-test scores of writing is presented in Table no. 5.7. The pre-test and post-test scores in copy test were not significantly different (t= -.237; *p*=.815). Similarly, the t-comparison of the pre-test

and post-test scores in spelling and composition test was non significant (t= .252; *p*= .804 and t= .900; *p*=.379).

Table No. 5.7: Results for the t-tests for pre-test and post- test of group C

	Mean	SD	SE	Confidence Interval		df	T
				Lower	Upper		
Copy	-.05000	.94451	.21120	-.49205	.39205	19	-.237
Spelling	.05000	.88704	.19833	-.36515	.46515	19	.252
Composition	.15000	.74516	.16662	-.19875	.498705	19	.900

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the pre-test and post-test of group C are not significantly different.

ii)Comparison of post-test and follow-up test scores of the controlgroup C:

The performance of the control group C during the post-test and follow-up test was compared using t-test. The t-test computed on copy test, spelling test and composition test is presented in Table no. 5.8.

Table No. 5.8: Results for the t-tests for post-test and follow-up test of group C

	Mean	SD	SE	Confidence Interval		df	T
				Lower	Upper		
Copy	-.5000	.88704	.19833	-.46515	.36515	19	-.252
Spelling	-.5000	.82556	.18460	-.43638	.33638	19	-.271
Composition	-.10000	.85224	.19057	-.49886	.29886	19	-.525

The post-test and follow-up test scores for group C in copy test were not significantly different (t= -.252; *p*=.804). Similarly, the t-comparison of the post-test and follow-up test scores in spelling and composition test for group C was non significant (t= -.271; *p*= .789 and t= .525; *p*=.606).

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the post-test and follow-up test of group C are not significantly different.

iii) Comparison of pre-test and follow-up test scores of the controlgroup C:

The performance of the control group C during the pre-test and follow-up test was compared using t-test. The t-test computed on copy test, spelling test and composition test is presented in Table no. 5.9.

Table No. 5.9: Results for the t-tests for pre-test and follow-up test of group C

	Mean	SD	SE	Confidence Interval		df	T
				Lower	Upper		
Copy	-.10000	.44721	.10000	-.30930	.10930	19	-1.000
Spelling	.0000	.97333	.21764	-.45553	.45553	19	.000
Composition	.050000	.82558	.18460	-.33638	.43638	19	.271

The pre-test and follow-up test scores for group C in copy test were not significantly different (t= -1.000; *p*=.303). Similarly, the t-comparison of the pre-test and follow-up test scores in spelling and composition test for group C was non significant (t= .000; *p*=1.000 and t= .271; *p*=.789).

From the t-tests computed on the copy test, spelling test and composition test, it is seen that the scores in the pre-test and follow-up test of group C are not significantly different.

The results of the hypothesis testing for null hypothesis H04, it may concluded that the results fail to reject the hypothesis for group C for the times of testing. Therefore, it may be accepted that no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "writing problems" of the control group C.

$H_0$5: There will be no statistically significant difference in the post test scores for writing problems between i) Group A and group B; ii) Group B and Group C and iii) Group A and Group C.

To test this hypothesis, one way ANOVA was used to compare the means of the post test scores for writing between the three groups. Three one way ANOVA were used for the three separate measures (copy, spelling, composition) of writing problems. The results are discussed below.

Results for copy test: The result of the one-way ANOVA computed on the post-test scores in copy test for the three groups is presented in Table no. 6.0.

Table No. 6.0: ANOVA Summary table of the post-test scores in the copy test.

Source	Df	SS	MS	F
Between Subjects	2	8027.633	4013.817	291.933*
Within Subjects	57	783.700	13.749	
Error	59			

Table no. 6.0 shows that the between subjects effect for the post-test scores in the copy test is significant (F= 291.933; p= .000). Moreover, the post-hoc comparison between the three groups presented in table no. 6.1, show the pair wise comparison between the three groups on the post-test scores in copy test.

Table No. 6.1: Post-hoc comparison of the post-test scores in copy test.

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	4.850*	1.173	.00	2.03	7.67
	C	-21.750*	1.173	.000	-24.57	-18.93
B	A	-48.50*	1.173	.000	-7.67	-2.03
	C	-26.600*	1.173	.000	-29.42	-23.78
C	A	21.750*	1.173	.000	18.93	24.57
	B	26.600*	1.173	.000	23.78	29.42

* The mean difference is significant at .05 level.

The mean differences between the three groups in the post-test scores in the copy test are significant with a 95% confidence interval. From the table no. 6.1 it is clear that the post-test scores of group A and group B; group B and group C and group A and group C are significantly different.

Results for the spelling test: The result of the one-way ANOVA computed on the post-test scores in spelling test for the three groups is presented in Table no. 6.2.

Table No. 6.2: ANOVA Summary table of the post-test scores in spelling test.

Source	df	SS	MS	F
Between Subjects	2	80.433	40.217	102.796*
Within Subjects	57	22.300	.319	
Error	59	102.733		

Table no. 6.2 shows that the between subjects effect for the post-test scores in the spelling test is significant (F=102.796; p= .000). The post-hoc comparison between the three groups presented in table no. 6.3, show the pair wise comparison between the three groups on the post-test scores in spelling test.

Table No. 6.3: Post-hoc comparison of the post-test scores in spelling test.

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	-.450	.198	.068	-.93	.03
	C	2.200*	.198	.000	1.72	2.68
B	A	.450	.198	.068	-.03	.93
	C	2.650*	.198	.000	2.17	3.13
C	A	-2.200*	.198	.000	-2.68	-1.72
	B	-2.650*	.198	.000	-3.13	-2.17

* The mean difference is significant at .05 level.

The mean differences between the group A and group C and group B and group C in the post-test scores in the spelling test are significant with a 95% confidence interval. From the table no. 6.3 it is seen that the post-test scores of group A and group B are not significantly different (Mean difference=-0.450). Hence, for the spelling test, the null hypothesis is partially rejected for group A and group C and also for group B and group C for the post test scores in the spelling test.

Results for the composition test: The result of the one-way ANOVA computed on the post-test scores in composition test for the three groups is presented in Table no. 6.4.

Table No. 6.4: ANOVA Summary table of the post-test scores in composition test.

Source	*df*	SS	MS	F
Between Subjects	2	187.600	93.800	251.605
Within Subjects	57	21.250	.373	
Error	59	208.850		

Table no. 6.4 shows that the between subjects effect for the post-test scores in the composition test is significant (F=251.605; p= .000). Moreover, the post-hoc comparison between the three groups presented in table no. 6.5, show the pair wise comparison between the three groups on the post-test scores in composition test.

Table No. 6.5: Post-hoc comparison of the post-test scores in composition test.

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	-1.700*	.193	.00	-2.16	-1.24
	C	2.600*	.193	.000	2.14	3.06
B	A	1.700*	.193	.000	1.24	2.16
	C	4.300*	.193	.000	3.84	4.76
C	A	-2.600*	.193	.000	-3.06	-2.14
	B	-4.300*	.193	.000	-4.76	-3.84

* The mean difference is significant at .05 level.

The mean differences between the three groups in the post-test scores in the composition test are significant with a 95% confidence interval. From the table no. 6.1 it is clear that the post-test scores of group A and group B; group B and group C and group A and group C are significantly different. Hence, for the composition test, the null hypothesis is partially rejected.

The null hypothesis is rejected for two out of three measures in writing problems. Therefore, there is a statistically significant difference between the post-test scores between i) group A and group C; and ii) group B and group C. However, the results fail to reject the null hypothesis completely as the difference in the post-test scores in the spelling test is not significant for group A and group B. From the above discussed results it may be said that the null hypothesis is partially rejected.

$H_0$6: There will be no statistically significant difference in the follow-up test scores for writing problems between i) Group A and group B; ii) Group B and Group C and iii) Group A and Group C.

To test this hypothesis, one way ANOVA was used to compare the means of the follow-up test scores for writing between the three groups. Three one-way ANOVA were used for the three separate measures (copy, spelling, composition) of writing problems. The results are discussed below.

Results for copy test: The result of the one-way ANOVA computed on the follow-up test scores in copy test for the three groups is presented in Table no. 6.6.

Table No. 6.6: ANOVA Summary table of the follow-up test scores in the copy test.

Source	Df	SS	MS	F
Between Subjects	2	8509.733	4254.867	302.932
Within Subjects	57	800.600	14.046	
Error	59	9310.333		

Table no. 6.6 shows that the between subjects effect for the follow-up test scores in the copy test is significant (F= 302.932; p= .000). Moreover, the post-hoc comparison between the three groups presented in table no. 6.7, show the pair wise comparison between the three groups on the follow-up test scores in copy test.

Table No. 6.7: Post-hoc comparison of the follow-up test scores in copy test.

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	4.200*	1.185	.002	1.35	7.05
	C	-22.900*	1.185	.000	-25.75	-20.05
B	A	-4.200*	1.185	.002	-7.05	-1.35
	C	-27.100*	1.185	.000	-29.95	-24.25
C	A	22.900*	1.185	.000	20.05	25.05
	B	27.100*	1.185	.000	24.25	29.95

* The mean difference is significant at 0.05 level.

The mean differences between the three groups in the follow-up test scores in the copy test are significant with a 95% confidence interval. From the table no. 6.6 and 6.7 it is clear that the follow-up test scores of group A and group B; group B and group C and group A and group C are significantly different.

Results for the spelling test: The result of the one-way ANOVA computed on the follow-up test scores in spelling test for the three groups is presented in Table no. 6.8.

Table No. 6.8: ANOVA Summary table of the follow-up test scores in spelling test.

Source	df	SS	MS	F
Between Subjects	2	68.033	34.017	92.551*
Within Subjects	57	20.950	.368	
Error	59	88.983		

Table no. 6.8 shows that the between subjects effect for the follow-up test scores in the spelling test is significant (F= 92.551; p= .000). Moreover, the post-hoc comparison between the three groups presented in table no. 6.9, show the pair wise comparison between the three groups on the follow-up test scores in spelling test.

Table No. 6.9: Post-hoc comparison of the follow-up test scores in spelling test.

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	-.450	.192	.57	-.91	.01
	C	2.000*	.192	.000	1.54	2.46
B	A	.450	.192	.57	-.91	.01
	C	2.450*	.192	.000	1.99	2.91
C	A	-2.000*	.192	.000	-2.46	-1.54
	B	-2.450*	.192	.000	-2.91	-1.99

* The mean difference is significant at 0.05 level.

The mean differences between the i) group A and group C and ii) group B, and group C in the follow-up test scores in the spelling test are significant with a 95% confidence interval. From the table no. 6.9 it is clear that the follow-up test scores of group A and group B are not significantly different.

Results for the composition test: The result of the one-way ANOVA computed on the follow-up test scores in composition test for the three groups is presented in

Table no. 7.0. The data shows that the between subjects effect for the follow-up test scores in the composition test is significant (F= 347.513; *p*= .000). Moreover, the post-hoc comparison between the three groups presented in table no. 7.1, show the pair wise comparison between the three groups on the follow-up test scores in composition test.

Table No. 7.1: ANOVA Summary table of the follow-up test scores in composition test.

Source	*df*	SS	MS	F
Between Subjects	2	216.433	108.217	347.513*
Within Subjects	57	17.750	.311	
Error	59	234.183		

The mean differences between the three groups in the follow-up test scores in the composition test are significant with a 95% confidence interval. From the table no. 7.1 it is clear that the follow-up test scores of group A and group B; group B and group C and group A and group C are significantly different.

Table No. 7.2: Post-hoc comparison of the follow-up test scores in composition test.

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	-2.200*	.176	.00	-2.62	-1.78
	C	2.450*	.176	.000	2.03	2.87
B	A	2.200*	.176	.000	1.78	2.62
	C	4.650*	.176	.000	4.23	5.07
C	A	-2.450*	.176	.000	-2.87	-2.03
	B	-4.650*	.176	.000	-5.07	-4.23

* The mean difference is significant at 0.05 level.

Hence, the null hypothesis $H_0 6$ is partially rejected for the follow-up test scores of group A and group B, group B and group C and group A and group C for copy and composition test. Moreover, the null hypothesis is also rejected for the follow-up test for group A and group C and group B and group C in the spelling test. The results fail to reject the hypothesis for the follow-up test in spelling test. Consequently, the alternate hypothesis may be accepted that there is a statistically significant difference in the follow-up test scores for writing problems between i) Group A and group B; ii) Group B and Group C and iii) Group A and Group C

Hypotheses for the second dependent variable of behavior problems:

The behavior of the participants was assessed with the help of the Child behavior checklist (CBL) that was given to the teachers. The teachers rated the behavior of the participants during pre-test, post-test and follow-up test. The number of behavior problems checked in the checklist was considered as the score. The table no. 7.2 shows the Mean and SD of the scores on the CBL.

Table No. 7.2: Mean and SD for the behavior problems.

	Group	Mean	Std. Deviation	N
Pre-test	1	14.4000	1.14248	20
	2	15.1500	.87509	20
	3	14.1000	.85224	20
	Total	14.5500	1.04840	60
Post-test	1	13.7500	1.01955	20
	2	5.6500	.67082	20
	3	14.2000	.69585	20
	Total	11.2000	4.04131	60
Follow-up	1	13.7000	1.08094	20
	2	5.9500	.51042	20
	3	14.6000	.88258	20
	Total	11.4167	4.00547	60

$H_0$7: There will be no statistically significant difference between the pre-test, post-test and follow up-test scores for "behavior problems" of Group A, Group B and Group C when the three groups are compared with each other.

To test this hypothesis, a 3X3 two-way mixed ANOVA was computed with the scores for behavior problems. Table no. 6.9 shows the summary of the results.

Table No. 7.3: ANOVA Summary table of the behavior problems.

Source	df	SS	MS	F	Partial Eta Squared (η^2)	Observed power
Between Subjects	59					
Group	2	1229.078	614.539	497.214*	.946	1.000
Error	57	70.450	1.236			
Within Subjects						
Time of testing	2	370.744	185.372	445.832*	.887	1.000
Group X time of testing	4	831.189	207.797	499.765*	.946	1.000
Error	114	47.400	.416			

As shown in Table no. 7.3, the between-subjects main effect of group was found to be significant ($F_{(2,57)}$=497.214; p=0.000). The effect size of the main effect is .997 which shows a large effect. The within-subjects main effect of time of testing was also found to be significant ($F_{(2,114)}$ =445.832; p=0.000). The group by time of testing interaction was significant ($F_{(4,114)}$=499.765; p=0.000). The effect size of the within-subjects main effect and interaction were also found to be large (.887 and .946).

Moreover, the post-hoc comparisons computed for groups in behavior problems yielded significant findings (Table No. 7.4). The mean difference of the scores in behavior problems compared between group A and Group B was significant.

The scores of the participants in group C and Group B were significantly different (MD=5.4667; p=.000). Similarly, the mean difference of group C and group A was also found to be non-significant (MD= .15000 ; p=.741)

Table No 7.4: Post-hoc comparisons by groups for behavior problems

Group	Group	Mean Difference	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper bound
A	B	5.6167*	.20297	.000	5.1282	6.1051
	C	.15000	.20297	.741	-.3384	.6384
B	A	-5.6167*		.000	-6.1051	-5.1282
	C	-5.4667*		.000	-5.9551	-4.9782
C	A	-.15000		.741	-.6384	.3384
	B	5.4667*		.000	4.9782	5.9551

* The mean difference is significant at the .05 level.

The results of the ANOVA presented in Table no. 7.3 and the post-hoc analysis show that there is a statistically significant difference between the pre-test, post-test and follow up-test scores for behavior problems for Group A, Group B and Group C when the three groups are compared with each other for behavior problems. However the post-hoc comparisons show that there is no statistically significant difference between the behavior problems in group A and group C. Group A did show reduction in mean scores however significant difference could not be established statistically.

Hence, the null hypothesis is partially rejected. Alternatively it may be accepted that there is a statistically significant difference. The results fail to reject the null hypothesis completely as the groups A and C have not been found to be significantly different.

$H_0$8: There will be no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "behavior problems" of the intervention group A.

The scores of group A collected at pre-test, post-test and follow-up test were compared using t-test. The results of the paired comparisons are presented in table no. 7.5.

Table No. 7.5: t-test on the scores of behavior problems for group A

	Paired Differences					t	df	Sig.
	Mean	SD	SE	95% Confidence Interval				
				Lower	Upper			
Pre-post	.15000	.67082	.15000	-.16395	.46395	1.000	19	.330
Post-followup	-.45000	.82558	.18460	-.83638	-.06362	-2.438	19	.025
Pre-follow up	-.30000	.92338	.20647	-.73216	.13216	-1.453	19	.163

As shown in table no. 7.5 the pre-test and post-test scores are not significant (t=1.000; p=.330). Similarly, the pre-test and follow-up test scores are also significant (t=-1.453; p=.163). Post-test and follow-up is significant (t=-2.438; p= .025).

Hence, the null hypothesis is accepted that there is no statistically significant difference between the i) pre-test and post-test ii) pre-test and follow-up test scores of group A. However, the null hypothesis is rejected for post-test and follow-up test scores where statistically significant difference was found.

$H_0$9: There will be no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "behavior problems" of the intervention group B.

The scores of group B collected at pre-test, post-test and follow-up test were compared using t-test. The results of the paired comparisons are presented in Table no. 7.6.

Table No.7.6: t-tests on the scores in behavior problems in group B.

	Paired Differences					T	df	Sig.
	Mean	SD	SE	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-post	9.50000	1.14708	.25649	8.96315	10.03685	37.038	19	.000
Post-follow up	-.05000	.99868	.22331	-.51740	.41740	-.224	19	.825
Pre-follow up	9.45000	.94451	.21120	9.00795	9.89205	44.744	19	.000

As shown in the table, the pre-test and post-test comparison for behavior for group B is significant (t=37.03; p=.000). Difference between post-test and follow-up test scores in behavior problems is not significant. Pre-test and follow-up test scores are significantly different (t=44.74; p=.000).

Hence, for group B the null hypothesis is partially rejected as there is a statistically significant difference between the i) pre-test and post-test; iii) pre-test and follow-up test intervention scores on "behavior problems" of the intervention group

B. However, the null hypothesis is accepted partially as the difference between the post-test and follow-up test scores on behavior problems have been found to be non-significant.

$H_0$10: There will be no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "behavior problems" of the control group C.

The scores of group A collected at pre-test, post-test and follow-up test were compared using t-test. The results of the paired comparisons are presented in table no. 7.7.

Table No. 7.7: t-test of scores in behavior problems of group C

	Paired Differences					t	df	Sig.
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-post	.42857	2.50143	.54586	-.71007	1.56721	.785	20	.442
Post-follow-up	-.42857	.97834	.21349	-.87390	.01676	-2.007	20	.058
Pre-follow-up	.00000	2.46982	.53896	-1.12425	1.12425	.000	20	1.000

The results of the t-test show non significant differences for group C at the pre-test, post-test and follow-up test scores for group C as the scores are not significantly different from each other. Hence, the null hypothesis is accepted that there is no statistically significant difference between i) pre-test and post-test; ii) post-test and follow-up; iii) pre-test and follow-up test intervention scores on "behavior problems" of the control group C.

$H_0 11$: There will be no statistically significant difference in the post test scores for "behavior problems" between i) group A and group B; ii) Group B and Group C and iii) Group A and Group C.

One-way was used to find out the differences in the post-test scores between the three groups which is presented in Table 7.8.

Table No. 7.8: ANOVA Summary table of the post- test scores in behavior problems..

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	980.433	2	490.217	787.108*	.000
Within Groups	35.500	57	.623		
Total	1015.933	59			

The between groups effect is significant (F=787.108; p=.000) showing significant difference between the three groups. The post hoc analysis shows the pair-wise comparisons of the three groups (Table 7.9)

Table No. 7.9: Post-hoc comparison of the post- test scores in behavior problems.

Group		Mean Difference	Std. Error	Sig.	95% Confidence Interval	
1	2	8.60000(*)	.24956	.000	7.9995	
	3	.05000	.24956	.978	-.5505	.6505
2	1	-8.60000(*)	.24956	.000	-9.2005	-7.9995
	3	-8.55000(*)	.24956	.000	-9.1505	-7.9495
3	1	-.05000	.24956	.978	-.6505	.5505
	2	8.55000(*)	.24956	.000	7.9495	9.1505

* The mean difference is significant at the .05 level.

The post-hoc analysis show significant difference between group A and group B at 95% confidence interval (MD=8.6000; p=.000). Group B and and group C were also significantly different at 95% confidence interval (MD=8.5500; p=.000). However, there was no significant difference between group A and group C (MD=.05000; p=.978).

Thus, the null hypothesis is partially rejected for group B and group C, and group A and group B as there is a statistically significant difference between i) group A and group B; ii) group B and group C. The results fail to reject the null hypothesis for the difference between group A and group C at the post test.

$H_{o}12$: There will be no statistically significant difference in the follow-up test scores for behavior problems between i) group A and group B; ii) Group B and Group C and iii) Group A and Group C.

The follow-up scores of the three groups were compared using one way ANOVA. The results are presented in Table no. 8.0

Table No. 8.0: ANOVA Summary table of the follow-up test scores in behavior problems..

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1068.133	2	534.067	1042.527*	.000
Within Groups	29.200	57	.512		
Total	1097.333	59			

The between groups effect is significant (F=1042.527; p=.000) showing significant difference between the three groups. The post hoc analysis shows the pair-wise comparisons of the three groups (Table 8.1)

Table No. 8.1: Post-hoc comparison of the follow-up test scores in behavior problems.

Group		Mean Difference	Std. Error	Sig.	95% Confidence Interval	
1	2	9.00000(*)	.22634	.000	8.4553	9.5447
	3	.10000	.22634	.898	-.4447	.6447
2	1	-9.00000(*)	.22634	.000	-9.5447	-8.4553
	3	-8.90000(*)	.22634	.000	-9.4447	-8.3553
3	1	-.10000	.22634	.898	-.6447	.4447
	2	8.90000(*)	.22634	.000	8.3553	9.4447

* The mean difference is significant at the .05 level.

The ANOVA results for the follow-up scores yield significant difference between the three groups. The post-hoc analysis shows a significant difference (95% CI)between group A and group B (MD=9.000; p=.000) and between group B and group C (MD=8.9000; p=.000). However, there is no significant difference between group A and group C (MD=-.1000; p=.898).

Hence, the null hypothesis is partially rejected for the difference between i) group A and group B; ii) Group B and Group C. However, the null hypothesis is partially accepted that there is no significant difference between the follow-up test scores of group A and group C.

Summary:

This chapter presents the findings of the study. Moreover, it also presents the results of the hypothesis testing conducted for the variables of the study. The next chapter presents the discussion of the results. Moreover, it also presents the conclusion, implications, limitations and recommendation for future research.