

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

This chapter presents the results of the analyses of data. These results were obtained from the analyses of the following data including, first, student composition scores in the pretest and the posttest; second, the error rates of students' pretest and posttest writing; third, the participants' responses to the attitude questionnaire. The results of the analyses will be reported first and then discussed.

#### **Results**

In the following section, the results of the comparisons of students' pre- and post-test writing scores are first presented, followed by the comparisons of the analyses of students' error rates in the pre-and post-test writing. Then the results of comparing students' responses to the attitude questionnaire are reported.

#### **Writing Scores**

The students' overall writing scores in the pretest and posttest were subjected to SPSS for statistical analyses. These scores were the averages of the scores given by two independent graders using the JCEE rubric.

#### **Effects of Direct Error Correction and Code Error Correction on Writing**

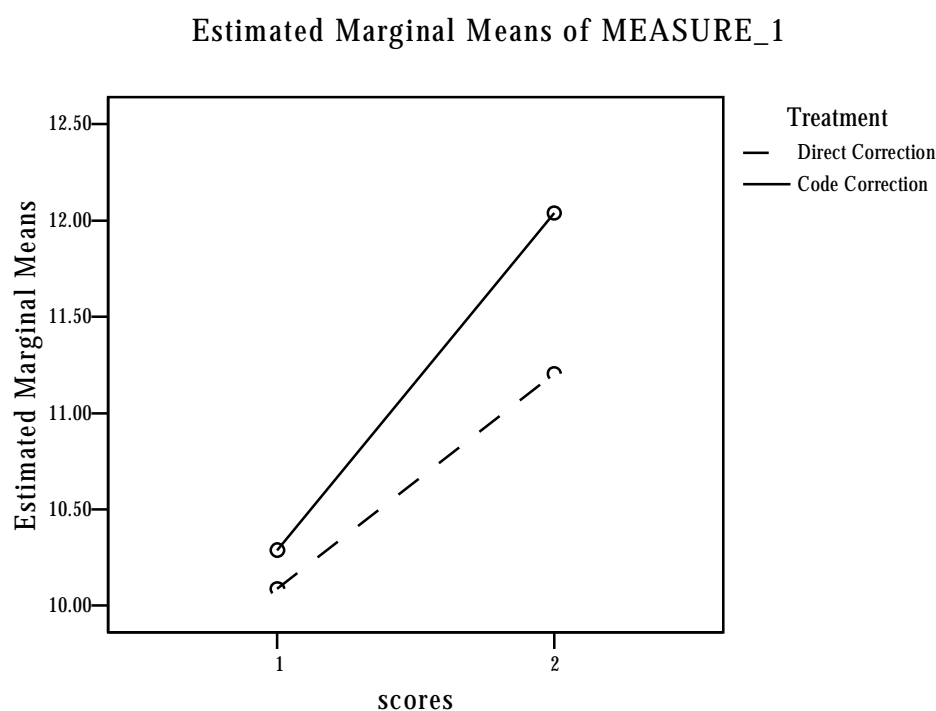
##### **Quality**

To answer the first research question—"Is code error correction more effective than direct error correction in improving student writing quality?"—descriptive statistics of the writing scores including means and standard deviations are first displayed in Table 4 for comparison. The pre- and post-test mean scores of the two treatment types were plotted in a multiple line graph as shown in Figure 2.

**Table 4**  
**Means and Standard Deviations of Pre- and Post-test Writing Score**

	<u>Pretest Score</u>			<u>Posttest Score</u>		
	Mean	S.D.	N	Mean	S.D.	N
Direct Correction Group	10.09	2.87	45	11.20	2.07	45
Code Correction Group	10.29	2.94	45	12.04	2.24	45

**Figure 2**  
**Pre- and Post-test Writing Scores of Two Treatment Groups**



Note: In the X axial, the value “1” represents the pretest scores while the value “2” refers to the posttest scores.

According to Table 4, for either the pre- or post-test scores, the mean value of the code correction group was greater than that of the direct correction group ( $10.29 > 10.09$ ;  $12.04 > 11.20$ ). As can be clearly observed in Figure 2, the discrepancy between the two groups in the posttest was greater than that in the pretest. This suggested that students in the code group made more improvement in writing quality than students in the direct group. To test

for the significant difference between the effects of two error correction methods, a MANOVA was performed and the comparisons of the pre- and post- test scores for both groups are displayed in Table 5.

**Table 5**  
**Comparisons between Pre- and Post- test Score in Direct Correction Group and in Code Correction Group**

Source of Variation	SS	F	Sig of F
Comparison between the Scores of the Direct Correction Group	28.03	15.26	.000**
Comparison between the Scores of the Code Correction Group	68.87	37.49	.000**

\*\*p < .001.

As shown in Table 5, the F value of 15.26 for the direct correction group and that of 37.49 for the code correction group suggested that there was significant difference in their pre- and post-test scores ( $p < .001$ ) for both groups. These results indicated that students in both groups made significant improvement in their posttest writing. In other words, both error treatments were effective in improving students' writing quality.

Then, the comparison was further made between the posttest scores of the two groups and the results were shown in Table 6.

**Table 6**  
**Comparison Between Posttest Scores of Direct Correction Group and Code Correction Group**

Source of Variation	SS	F	Sig of F
Comparison between the Posttest Scores of the Two Treatment Groups	15.65	3.37	.070

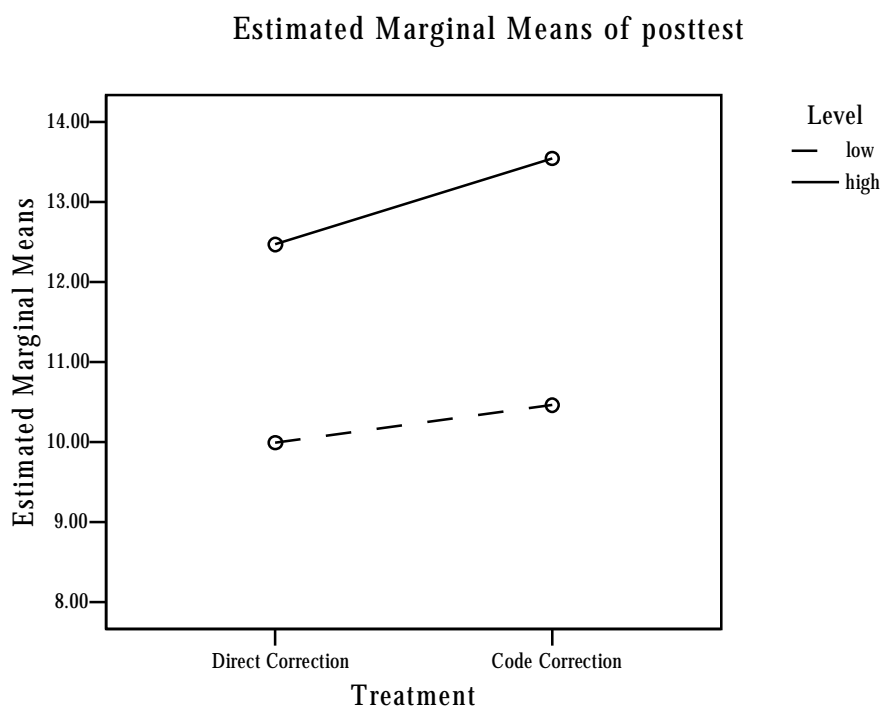
According to Table 6, no significance was found between the mean scores of two groups, 11.20 and 12.04 ( $F=3.37, p = .07 > .05$ ). This finding suggested that although the mean score of the code correction group was higher than that of the direct correction group (as  $12.04 > 11.20$ , See Table 4 in page 38), the code correction group did not significantly outperformed the direct correction group at the end of the treatment. The two treatment types were thus considered equally effective in improving student’s writing quality.

### **Interaction between Treatment Types and Writing Proficiency Levels**

To address the third research question “How do the effects of the two methods differ on the writing quality of students at different writing proficiency?” the interaction between treatment types and writing proficiency levels were examined by a two-way ANOVA procedure. The results as shown in Figure 3, indicated that there was no significant interaction between the two factors at the .05 level ( $F = .766, p > 0.05$ ).

**Figure 3**

### **Posttest Writing Mean Scores of Two Treatment Groups at Two Writing Proficiency Levels**



As can be seen in Figure 3, the two lines representing the lower and higher proficiency students were not completely parallel. This indicated that there was still an interaction effect to certain degree because the discrepancy in the mean scores of the two treatment groups was greater in the higher proficiency group than that in the lower proficiency group. Therefore, to examine the effects of the two correction methods on the writing quality of students at two different levels of writing proficiency, MANOVAs were further conducted.

Before the results of MANOVA test is shown, the results of the descriptive statistics of the more proficient students will be first presented.

**Effects of Direct Error Correction and Code Error Correction on Writing Quality at Higher Proficiency Level**

The descriptive statistics of the higher-proficiency students' pre-and post-test writing scores were first displayed in Table 7.

**Table 7**  
**Means and Standard Deviations of Pre- and Post-test Writing Scores for Students of Higher Proficiency**

	<u>Pretest Score</u>			<u>Posttest Score</u>		
	Mean	S.D.	N	Mean	S.D.	N
Direct Correction Group	12.45	1.88	22	12.47	1.57	22
Code Correction Group	12.41	2.15	23	13.54	1.53	23

As shown in Table 7, the mean scores of the two treatment groups, 12.45 of the direct correction group and 12.41 of the code correction group, were almost identical in their pretest writing, while at the post-treatment stage the mean value obtained by the higher proficiency students in the code group was much greater than that of the

direct correction group (13.54 > 12.47). To test if the difference was significant, a MANOVA was conducted and the comparisons of the pretest and posttest scores for both groups at higher proficiency level are displayed in Table 8.

**Table 8**  
**Comparisons of Pre- and Post- test Scores in Direct Correction Group and in Code Correction Group at Higher Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Scores of the Direct Correction Group	.00	.00	.963
Comparison between the Scores of the Code Correction Group	14.75	7.62	.000**

\*\*p < .001.

As can be seen in Table 8, the mean scores on the pretest and posttest for the direct correction group were almost identical ( $F = .00$ ,  $p = .963 > .05$ ). The result indicated that the more proficient students in the direct correction group made little or no progress after the treatment. However, more proficient students in the code correction group made significant improvement ( $F = 7.62$ ,  $**p < .001$ ). These findings thus suggested that code error correction benefited students of higher proficiency but the direct correction failed to be effective for these more proficient students.

The comparisons between the direct group and the code group in their pretest and posttest scores were further made and the results were displayed in Table 9.

**Table 9**

**Comparison Between Direct Correction Group and Code Correction Group in Their Pre- and Post-test Writing Scores at Higher Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Pre-and Post-test Score of the Direct Correction Group	.02	.00	.951
Comparison between the Pre-and Post-test Score of the Code Correction Group	13.01	5.39	.025*

\*  $p < .05$

Table 9 indicates that there was no significant difference between the two treatment groups of more proficient students in their pretest writing scores ( $F = .00$ ,  $p = .951 > .05$ ). However, there was significant difference between the posttest scores of the two treatment groups ( $F = 5.39$ ,  $p = .025 < .05$ ). These findings suggested that the more proficient students in the code correction group significantly outperformed their counterparts in the direct correction group in their posttest writing (13.54 > 12.47). In other words, the code correction treatment was more effective for students of higher writing proficiency.

**Effects of Direct Error Correction and Code Error Correction On Writing Quality at Lower Proficiency Level**

The descriptive statistics of the less proficient students' pre-and post-test writing scores were displayed in Table 10.

**Table 10****Means and Standard Deviations of Pre- and Post-test Writing Scores for Students of Lower Proficiency**

	<u>Pretest Score</u>			<u>Posttest Score</u>		
	Mean	S.D.	N	Mean	S.D.	N
Direct Correction Group	7.83	1.50	23	9.99	1.75	23
Code Correction Group	8.07	1.77	22	10.46	1.71	22

As shown in Table 10, the average gain score of the code correction group was greater than that of the direct correction group by only .23 (2.39 - 2.16 = .23). The result implied that the two treatments produced the same effects on students of lower proficiency. To test if significant difference existed between two treatment groups, a MANOVA was conducted and the comparisons of the pre- and post- test scores for both groups at lower proficiency level are presented in Table 11.

**Table 11****Comparisons of Pre- and Post- test Scores in Direct Correction Group and in Code Correction Group at Lower Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Scores of the Direct Correction Group	53.91	53.23	.000**
Comparison between the Scores of the Code Correction Group	63.07	62.28	.000**

\*\*p < .001.

The results in Table 11 showed that the less proficient students in either treatment group made significant improvement from the pretest to the posttest writing (F = 53.23, p < .001; F = 62.28, p < .001). This indicated that the two correction



methods were both effective in improving the writing quality of lower-proficiency students.

Then, the comparisons were made between the direct c group and the code group in their pretest and posttest scores and the results were displayed in Table 12.

**Table 12**  
**Comparison Between Direct Correction Group and Code Correction Group in Their Pre- and Post-test Writing Scores at Lower Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Pretest Scores of the Two Treatment Groups	.64	.24	.626
Comparison between the Posttest Scores of the Two Treatment Groups	2.47	.83	.368

Table 12 revealed that there was no significant difference in the pre-and post-test scores of the two treatment types ( $F = .24, p = .626 > .05$ ;  $F = .83, p = .368 > .05$ ). These findings suggested that both treatments were equally effective for students of lower proficiency.

### **Error Rate**

The error rate was the ratio of errors in a single draft to the total number of words written in that particular draft. To examine the effects of code error correction and direct error correction on the writing accuracy of students, the error rates of students' pretest and posttest writing were subjected to SPSS for analysis. The procedures used included descriptive statistics, MANOVAs and a two-way ANOVA.

### **Effects of Direct Error Correction and Code Error Correction on Writing**

#### **Accuracy**

To answer the second research question "Is code error correction more effective than direct error correction in improving student writing accuracy?" descriptive

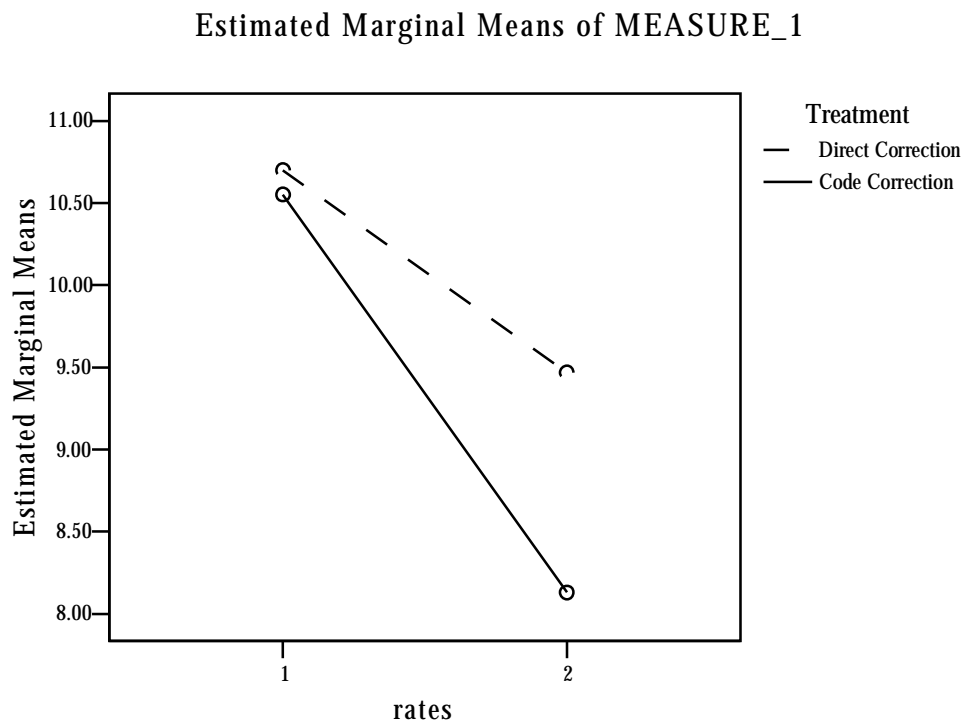
statistics of the error rates including means and standard deviations of the two treatment groups are first displayed in Table 13 for comparison. Also, the mean error rates of the pretest and posttest writing of both groups were plotted and shown in Figure 4.

**Table 13**  
**Means and Standard Deviations of Error Rates in the Pre- and Post-test Writing**

	<u>Pretest Error Rate (%)</u>			<u>Posttest Error Rate (%)</u>		
	Mean	S.D.	N	Mean	S.D.	N
Direct Correction Group	10.70	4.15	45	9.47	3.2	45
Code Correction Group	10.55	5.04	45	8.13	3.38	45

Note: The number 10.70 means that in average there were 10.70 errors in every 100 words written.

**Figure 4**  
**Pre-and Post-test Error Rates of Two Treatment Groups**



Note: In the X axial, value “1” represents pretest error rate and value “2” is posttest error rate.

According to Table 13, there was little difference between the mean error rates of the two groups in the pretest writing (10.70 % for the direct correction group and 10.55 % for the code correction group), but the difference increased greatly in the posttest writing (9.47 % for the direct correction group and 8.13 % for the code correction group). The increased discrepancy can also be observed from the two descending lines in Figure 4. These results indicated that the error rates of the students in the code correction group decreased more than those of the students in the direct correction group, suggesting the more positive effect of code correction method on students' written accuracy.

To test for the significant difference between the two treatment groups in term of their writing accuracy, a MANOVA was performed and the comparisons of the pre- and post- test mean error rates for both groups are displayed in Table 14.

**Table 14**  
**Comparisons between the Pre- and Post- test Error Rates in Direct Correction Group and in Code Correction Group**

Source of Variation	SS	F	Sig of F
Comparison between the Pre- and Post-test Error Rates of the Direct Correction Group	34.10	8.3	.005**
Comparison between the Pre- and Post-test Error Rates of the Code Correction Group	131.77	32.07	.000**

\*\*p < .001, \*p < .05

Based on Table 14, significant difference between the mean error rates of the pretest and posttest writing was found in both treatment groups (F = 8.3, p = .005 < .05; F = 32.07, p = .000 < .001). As also shown in Figure 4, the error rates dropped from pretest to posttest writing; therefore, these findings demonstrated that students in both groups made significant improvement in their written accuracy.

The comparisons were then further made between the direct group and the code group in their pretest and posttest error rates. The results are displayed in Table 15.

**Table 15**  
**Comparison between Direct Correction Group and Code Correction Group in Their Pre- and Post-test Error Rates**

Source of Variation	SS	F	Sig of F
Comparison between the Pretest Error Rates of the Two Treatment Groups	.50	.02	.879
Comparison between the Posttest Error Rates of the Two Treatment Groups	40.27	3.72	.057

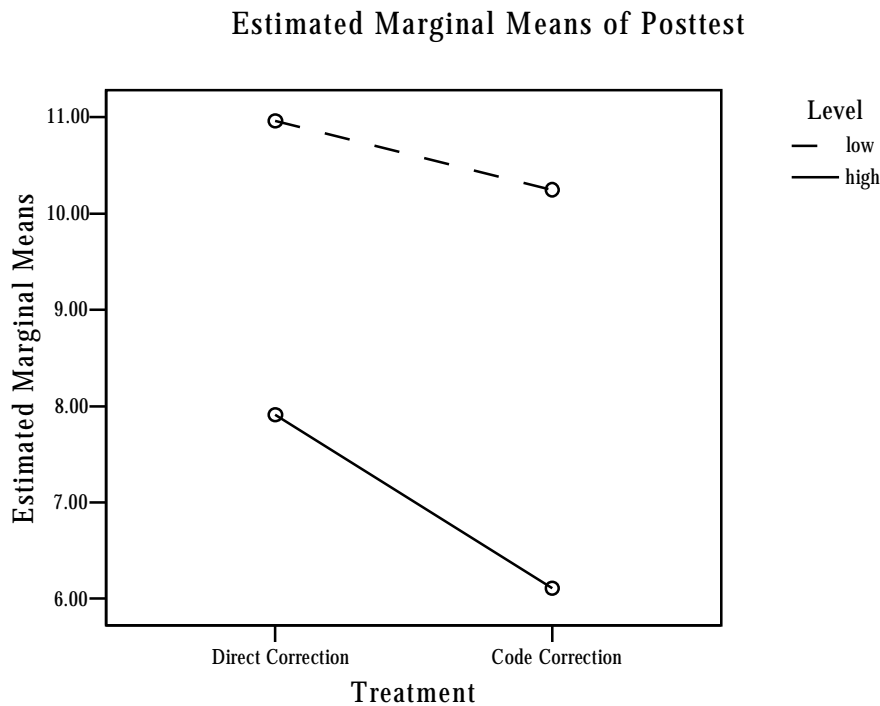
Table 15 shows that, in both the pretest and posttest writing, no significant difference was found between the mean error rates of the two treatment groups ( $F = .02, p = .879 > .05$ ;  $F = 3.72, p = .057 > .05$ ). These results indicated that students in the code error correction did not made significantly more improvement than their counterparts in the direct correction group in terms of their written accuracy. Therefore, the conclusion was made that the two correction methods were equally effective in improving students' written accuracy.

**Interaction between Treatment Type and Proficiency Level**

To address the fourth research question “How do the effects of the two correction methods differ on the writing accuracy of students at different writing proficiency?” the interaction between the treatment types and writing proficiency levels was examined by a two-way ANOVA procedure. The results, as shown in Figure 5, indicated that there was no significant interaction between the two factors at the level of .05 ( $F = .87; p = .354 > .05$ ).

**Figure 5**

**Posttest Mean Error Rates of Two Treatment Groups  
at Two Proficiency Levels**



As shown in Figure 5, the two lines representing the lower and higher proficiency students were not parallel, indicating that there was an interaction to certain degree. To examine the effects of the two correction methods on the writing accuracy of students at two levels of writing proficiency, MANOVAs were further employed.

Before the results of MANOVA tests are shown, the descriptive statistics of the means and standard deviations for the error rates will be first presented.

**Effects of Direct Error Correction and Code Error Correction on Writing**

**Accuracy at Higher Proficiency Level**

The descriptive statistics of the higher-proficiency students' pre-and post-test error rates were first displayed in Table 16.

**Table 16****Means and Standard Deviations of Error Rates in the Pre- and Post-test Writing of Higher-proficiency Students**

	<u>Pretest error rates (%)</u>			<u>Posttest error rates (%)</u>		
	Mean	S.D.	N	Mean	S.D.	N
Direct Correction Group	7.52	2.76	22	7.91	2.89	22
Code Correction Group	7.41	2.31	23	6.09	1.91	23

According to Table 16, for more proficient students, there was little difference between the mean error rates of the two treatment groups in the pretest writing (7.52 % and 7.41 %). However, in the posttest, the difference obviously increased (7.91 % and 6.09%). The direct correction group increased its mean error rate by .39 % while the code correction group reduced its error rate by 1.32 %. This implied that the written accuracy of students in the direct group deteriorated whereas that of students in the code group improved at the end of the treatment. To test for significant difference between the two groups, a MANOVA test was conducted and the comparisons of the pretest and posttest error rates for both groups at higher proficiency level are displayed in Table 17.

**Table 17****Comparisons between Pre- and Post- test Error Rates in Direct Correction Group and in Code Correction Group at Higher Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Pre- and Post-test Error Rates of the Direct Correction Group	1.68	.86	.360
Comparison between the Pre- and Post-test Error Rates of the Code Correction Group	20.09	10.22	.003**

\*\*p < .01

As Table 17 shows, the deterioration in written accuracy of the direct correction group in their posttest writing was not significant ( $F = .02, p = .360 > .05$ ). On the other hand, the improvement in written accuracy of the code correction group was significant ( $F = 6.26, *p = .003 < .01$ ). This result indicated that the direct correction method had very little or no effects on the writing accuracy of higher-proficient students while the code correction treatment had a positive effect on their writing accuracy.

The comparisons between the direct group and the code group in their pretest and posttest error rates were further made and the results were displayed in Table 18.

**Table 18**  
**Comparison Between Direct Correction Group and Code Correction Group in Their Pre- and Post-test Error Rates at Higher Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Pretest Error Rates of the Two Treatment Groups	.13	.02	.886
Comparison between the Posttest Error Rates of the Two Treatment Groups	37.33	6.26	*.016

\*\* $p < .01$

Based on Table 18, there was no significant difference between the two treatment groups of more proficient students in their pretest error rates ( $F = .02, p = .886 > .05$ ). However, significant difference existed between the mean error rates of the two treatment groups at the posttest stage ( $F = 6.26, p = .016 < .05$ ). These results suggested that there was significant difference between the effects of the two treatments on students of higher proficiency. The code correction method was more effective in improving the written accuracy of higher-proficiency students.

## Effects of Direct Error Correction and Code Error Correction on Writing

### Quality at Lower Proficiency Level

The descriptive statistics of the lower-proficiency students' pre-and post-test error rates were displayed in Table 19.

**Table 19**

### Means and Standard Deviations of Error Rates in the Pre- and Post-test Writing of Lower-proficiency Students

	<u>Pretest error rates (%)</u>			<u>Posttest error rates (%)</u>			<u>Reduction of error rate (%)</u>
	Mean	S.D.	N	Mean	S.D.	N	
Direct Correction Group	13.74	2.71	23	10.96	2.77	23	-2.78
Code Correction Group	13.84	5.05	22	10.25	3.31	22	-3.95

Table 19 indicated that the average reduction of error rate in the code correction group was greater than that of the direct correction group by 1.17 % (3.95 % - 2.78 %). To test if the difference was significant, a MANOVA test was conducted and the comparisons of the pretest and posttest error rates for both groups at lower proficiency level are displayed in Table 20.

**Table 20**

### Comparisons of Pre- and Post- test Error Rates in Direct Correction Group and in Code Correction Group at Lower Proficiency Level

Source of Variation	SS	F	Sig of F
Comparison between the Pre- and Post-test Error Rates of the Direct Correction Group	89.04	19.93	.000**
Comparison between the Pre- and Post-test Error Rates of the Code Correction Group	141.84	31.75	.000**

\*\*p < .001, \*p < .05



According to Table 20, the decrease of error rates in both treatment groups was highly significant ( $F = 19.93, p < .001$ ). This result indicated that for both correction methods were effective in improving the writing accuracy of the lower proficient students.

Then, the comparisons were made between the direct correction group and the code correction group in their pretest and posttest error rates and the results were displayed in Table 21.

**Table 21**  
**Comparison Between Direct Correction Group and Code Correction Group in Their Pre- and Post-test Error Rates at Lower Proficiency Level**

Source of Variation	SS	F	Sig of F
Comparison between the Pretest Error Rates of the Two Treatment Groups	.10	.01	.939
Comparison between the Posttest Error Rates of the Two Treatment Groups	5.76	.62	.435

Table 21 indicated that no significant difference was found between the written accuracy of two treatment groups either at the pretreatment or the post-treatment stage ( $F = .01, p = .939 > .05$ ;  $F = .62, p = .435 > .05$ ). The two treatments were equally successful in helping less proficient students reduce their errors. This finding demonstrated that direct error correction and code error correction were equally effective in improving the written accuracy of lower-proficiency students.

#### **Participants' Responses to the Attitude Questionnaire**

The Attitude Questionnaire administered at the end of the experiment contains three Liker-scale items, two multiple-choice items and one open-ended question. To answer the fifth research question “How do code error correction group and direct error correction groups differ in their attitude toward the implemented correction

systems at the end of the experiment?" the students' responses to Item 1 to item 5 in the questionnaire were subjected to SPSS for analysis. As for the last open-ended question, students' responses were analyzed qualitatively for comparison and discussion.

### **Students' Perceptions of Their Improvement in Writing Ability, Editing Ability and Writing Autonomy**

The first three Liker-scale Items in the attitude questionnaire probed into students' self-perceptions of their improvement in writing ability, writing accuracy and writing autonomy. Cross-tabulation and chi-square tests were used for statistical analysis of students' responses to these items. For each item, the comparison was first made between two treatment groups regardless of different proficiency levels to see the influence of treatment type on students' response. After that, tests were further conducted for the comparison between two proficiency groups within each of the two treatment types. Tests were also conducted for the comparison between two treatment groups within each of the two proficiency levels. These comparisons were made to see if the influence of treatment types differed on students of different proficiency levels. The results of each item were reported in Table 22, Table 23 and Table 24.

As shown in Table 22, no significant difference was found between the responses of students from two treatment groups for the first two items ( $p = .525 > .05$ ;  $p = .362 > .05$ ). This result suggested that the two treatment groups held similar attitudes toward their improvement in writing ability and editing ability. However, for the third item, significant difference was found between the two treatment groups ( $*p = .025 < .05$ ). The result suggested that students from the code correction group perceived significantly more improvement in writing autonomy than students from the direct correction group did (as 77.8 % > 55.6%).

**Table 22**

**Comparison of Students’ Responses to the Attitude Questionnaire Items 1,2 & 3 between Two Treatment Groups (Tested within All Students)**

Item	Treatment Groups		Direct (%)		Code (%)	
	P	N	P	N	P	N
1. I feel that I have improved a lot in my English writing ability after the writing practice of this semester.	57.8	42.2	51.1	48.9	$\chi^2 = .403, p = .525$	
2. I feel that I have improved a lot in my ability to self-edit my compositions after the writing practice of this semester.	73.3	26.7	64.4	35.6	$\chi^2 = .83, p = .362$	
3. After the writing practice of this semester, I feel that I have improved a lot as an active and autonomous writer.	55.6	44.4	77.8	22.2	$\chi^2 = .50, *p = .025$	

Note. P = positive (“strongly agree” and “agree”; N = negative (“disagree” and “strongly agree”))

When the comparison was further made between two treatment groups at two different levels of writing proficiency, different results arose and they were displayed in Table 23.

**Table 23**

**Comparison of Students’ Responses to the Attitude Questionnaire Items 1, 2 & 3 between Two Treatment Groups (Tested between Two Proficiency Levels)**

Item		Item 1			Item 2			Item 3		
		Writing ability			Editing ability			Writing autonomy		
Tested within lower proficiency level	Direct (%)	P	65.2	$\chi^2 = 10.0$	P	69.6	$\chi^2 = 3.343$	P	65.2	$\chi^2 = .458$
		N	21.7		N	26.1		N	30.4	
	Code (%)	P	22.7	$*p = .002$	P	40.9	$p = .067$	P	77.3	$p = .498$
		N	68.2		N	50.0		N	22.7	
Tested within higher proficiency level	Direct (%)	P	50.0	$\chi^2 = 3.154$	P	68.2	$\chi^2 = .273$	P	45.5	$\chi^2 = 4.454$
		N	50.0		N	27.3		N	50.0	
	Code (%)	P	69.6	$p = .076$	P	78.3	$p = .601$	P	78.3	$*p = .035$
		N	21.7		N	21.7		N	21.7	

Note. P = positive (“strongly agree” and “agree”; N = negative (“disagree” and “strongly disagree”))

As shown in Table 23, for these three items, three comparisons were made between two treatment groups at lower proficiency level while three other comparisons were made between two treatment groups at higher proficiency level. Among these six comparisons, two of them produced significant difference.

The first significant difference was found in the comparison between two treatment groups of lower proficiency students for the first item (\* $p = .002 < .05$ ). This result demonstrated that at lower-proficiency level, students from the direct group perceived more improvement in their writing ability than students from the code group (as 65.2% >22.7%). The second significant difference existed in the comparison between two treatment groups of higher proficiency for the third item (\* $p = .035 < .05$ ). This finding indicated that for students of higher proficiency, students from the code group perceived more improvement in their writing autonomy than students from the direct group (as 78.3% > 45.5%).

From these findings, it was noted that although two treatment groups of students at different proficiency levels did not differ in their attitudes toward their improvement in editing ability, they differed in their perceptions of their improvement in writing ability and writing autonomy. In terms of writing ability, the two treatment groups of higher proficiency students did not differ in their perception of improvement, while the lower-proficiency students from the direct group felt they improved more than those from the code group. This observation also revealed the lower-proficiency students' belief that direct correction method helped them improve their writing ability more effectively than code correction method did.

However, in terms of their improvement in writing autonomy, the difference in attitude indicated in Table 19 mainly occurred between the two treatment groups of higher-proficiency students. This finding indicated that at lower-proficiency level,

students thought both treatments helped them improve in their writing autonomy; whereas it also revealed that, at the higher-proficiency level, students believed that code correction method helped them improve their writing autonomy more than direct correction method.

To further test the effects of two treatment types on the attitudes of students at different proficiency levels, another six comparisons were made between students of two proficiency levels; three of them were conducted within the direct group while the other three in the code group. The results were displayed in Table 24.

**Table 24**  
**Comparison of Students' Responses to Item 1,2 & 3 of the Attitude Questionnaire between Two Proficiency Groups (Tested between Two Treatment Groups)**

Item		Item 1			Item 2			Item 3		
		Writing ability			Editing ability			Writing autonomy		
Tested within direct correction group	Lower (%)	P	65.2	$\chi^2 = 2.776$	P	69.6	$\chi^2 = .009$	P	65.2	$\chi^2 = 1.867$
		N	21.7		N	26.1		N	30.4	
	Higher (%)	P	50.0	p = .096	P	68.2	p = .924	P	45.5	p = .172
		N	50.0		N	27.3		N	50.5	
Tested within code correction group	Lower (%)	P	22.7	$\chi^2 = 10.744$	P	40.9	$\chi^2 = 5.065$	P	77.3	$\chi^2 = .006$
		N	68.2		N	50.0		N	22.7	
	Higher (%)	P	69.6	**p = .001	P	78.3	*p = .024	P	78.3	p = .936
		N	21.7		N	21.7		N	21.7	

Note. P = positive (“strongly agree” and “agree”; N = negative (“disagree” and “strongly disagree”)

\*p < .05; \*\*p < .001

Among the six comparisons, two of them produced significant difference. The first significant difference was found in the comparison between two proficiency levels in the code correction group for the first item (\*p = .001 < .01). This result demonstrated that among students who received code correction, students of higher proficiency perceived more improvement in their writing ability than students of

lower-proficiency did (as 69.6% >22.7%). The second significant difference existed in the comparison between two proficiency levels in the code correction group for the second item (\*p = .024 < .05). This finding indicated that among students who received code correction, students of higher proficiency perceived more improvement.

These findings indicated that students of higher proficiency level considered code correction helped them improve their writing and editing ability more than students of lower proficiency did (69.6 % > 22.7 %). Therefore, an observation was made that, in improving students’ writing ability and editing ability, code error correction better served students of higher proficiency than students of lower proficiency.

**Students’ Perceptions of Correction Responsibility**

The fourth item (a multiple-choice item) in the attitude questionnaire asked the students about their views concerning the responsibility of error correction. Students’ responses to Item 4 were subjected to a cross-tabulation and a chi-square test for statistical analyses and the results were listed in Table 25.

**Table 25**  
**Comparison of Students’ Responses to the Attitude Questionnaire Item 4**  
**(Tested between Two Treatment Groups within All Students)**

Item 4. Who is responsible for error correction?								
Option Group	Teacher		Students		Both of them		$\chi^2$	p
	f	%	f	%	f	%		
Direct group	3	6.7	16	35.6	26	57.8	.997	.318
Code group	4	2.4	21	46.7	22	48.9		

Note: f = frequency

From Table 25, although no significant difference was found in the responses of the students from two treatment groups (p = .318 > .05), the percentage of each option still

shed some light on the students' opinions about the responsibility of error correction. First, for either group, a larger percentage of students (57.8% and 48.9 % respectively) regarded that the responsibility of error correction should be taken both by the teacher and the students. This interesting finding revealed that more than half of the students from the direct correction group, who received correct answers from their teacher, considered that the teacher and the students should share the responsibility of correcting errors. The other finding was that in either the direct or code correction groups, very few of the students thought that the teacher should be solely responsible for the correction job (6.7% and 2.4 % respectively). These two findings reflected most students' beliefs that students should participate in the activity of correcting their errors in their own writing.

### **Students' Preference for Error Correction**

The fifth item investigated students' attitude toward the treatment they received by asking their preferred error correction method. Two alternatives were offered for them to choose from: the code error correction and the direct error correction. Students' responses to Item 5 were subjected to a cross-tabulation procedure and the results were displayed in Table 26, Table 27 and Table 28.

**Table 26**

### **Students' Attitude toward Error Correction**

Item 5: After the writing practice conducted in this semester, how do you like your teacher to correct your compositions for the next semester?

	Direct Correction Group N = 45		Code Correction Group N = 45	
<b>Positive</b> Attitude toward the Implemented Treatment	<u>Selection of Direct Correction</u>		<u>Selection of Code Correction</u>	
	frequency	%	frequency	%
	26	57.8	26	57.8
<b>Negative</b> Attitude toward the Implemented Treatment	<u>Selection of Code Correction</u>		<u>Selection of Direct Correction</u>	
	frequency	%	frequency	%
	19	42.2	19	42.2

As indicated in Table 26, closer to 60 % (57.8 %) of students in either treatment group expressed their positive attitude toward the treatment they received, while about two-fifths (42.2 %) of the students disliked the way in which the teacher treated their errors. This finding suggested that both treatments were considered equally successful since more than half of the students in both groups liked the way in which the teacher corrected their errors and expected the same practice to be continued.

However, the comparison made between students of two different proficiency levels in either the direct group or the code group resulted in difference in students' attitudes toward the treatment they received. The results were displayed in Table 27 and Table 28 respectively.

**Table 27**  
**Students' Attitude toward Error Correction (In the Direct Correction Group)**

	Lower-proficiency		Higher-proficiency	
	frequency	%	frequency	%
<b>Positive</b> Attitude toward the Implemented Treatment (Selection of direct correction)	15	65.2	11	50.0
<b>Negative</b> Attitude toward the Implemented Treatment (Selection of code correction)	8	34.8	11	50.0

Table 27 displayed the results of the comparisons between students of different levels in the direct correction group. It first revealed that 65.2 % of lower-proficiency students in the direct group preferred their teacher to continue practicing direct correction method they received for this semester, while the rest 34.5 % disapproved the implemented correction and preferred their teacher to give them code correction instead. As for students of higher proficiency, half of them (50 %) indicated their



approval for teacher’s practice of direct error correction while the other half (50 %) disliked direct correction and expected their teacher’s indication of error types rather than their provision of correct answers.

To sum up, the lower-proficiency students held more positive attitudes toward their implemented treatment—direct error correction—than the higher-proficiency students. In other words, less proficient students liked direct error correction better than more proficient students did.

**Table 28**  
**Students’ Attitude toward Error Correction (In the Code Correction Group)**

	Lower-proficiency		Higher-proficiency	
	frequency	%	frequency	%
<b>Positive</b> Attitude toward the Implemented Treatment (Selection of code correction)	9	40.9	17	73.9
<b>Negative</b> Attitude toward the Implemented Treatment (Selection of direct correction)	13	59.1	6	26.1

Table 28 also revealed the difference in students’ attitudes toward the code correction they received when the comparisons was made between students of different levels in the code correction group. The results indicated that less than half (40.9 % ) of lower-proficiency students in the code group preferred their teacher to continue practicing code error correction they received for this semester, while closer to 60 % disliked code correction they received and expected the teacher to provide them with correct answers for their errors. The attitudes of higher-proficiency students were very different from those of the lower-proficiency students in the code group. More than 70 % (73.9 %) of higher-proficiency students liked the way in which their teacher responded to their errors and expected no change of it. Only a small

percentage of them (26.1 %) expressed their disapproval for the teacher's practice of code error correction and expected teacher's provision of correct answers.

From this finding, it is clear that the students of higher proficiency held very positive attitude toward their implemented treatment—code error correction, while the students of lower proficiency held negative attitudes toward code error correction. Therefore, code error correction could be considered as the correction method which better tailored to the needs of higher-proficiency students than the needs of lower-proficiency students.

### **Open-ended Question**

The open-ended question, Item 7, was mainly designed to explore students' opinions of the advantages and disadvantages of the treatment they received. Their answers were summarized by the researcher and were discussed as follows.

#### **Code Error Correction**

In the code correction group, many higher-proficiency students regarded code error correction as an effective approach, stating that the code system helped them raise their awareness of grammar. After the treatment, they paid more attention to the correctness of the sentences they wrote to ensure that their writing was comprehensible. Besides, they indicated that the process of finding the correct answers by consulting the teacher, their classmates or the reference books helped them clarify some confusing grammatical concepts and facilitated their memorization of the correct forms of the misspelled words. However, some higher-proficiency students also expressed their difficulties in finding the correct answers sometimes. They suggested that more reference books such as dictionaries be provided in the writing class for students to consult when they felt confused.

Contrary to the advantages of the treatment mentioned by many students of higher proficiency, students of lower proficiency expressed more of their disapproval of the

treatment. Many of them indicated that the provision of error types did not help them much in finding the correct forms or expressions of the erroneous usages or structures. Although they learned which type of grammatical errors they made, their limited grammar knowledge did not enable them to locate the correct answers for their errors. Hence, they felt quite disappointed and frustrated when they received their revision in which the same errors were indicated by the teachers again. One of them wrote,

“I spent a lot of time correcting my errors, but I felt discouraged when the revision was given back to me. I found that my errors were in vain because my corrections were not even correct”

They also suggested that model answers be provided for the errors they made so that they wouldn't have to go through the painstaking and time-consuming process of finding the correct answers.

### **Direct Error Correction**

For the direct correction approach, the most frequently indicated problem was the teacher's misinterpretation of what students wrote. One of the higher-proficiency students wrote,

“Sometimes the teacher misunderstood what I want to say. It was probably because what I wrote is not comprehensible. The teacher sometimes looked at my sentences, interpreted them in a different way and then reformed my ideas. I felt confused and discouraged because that was not what I had intended to say.”

The problem of putting the words into the student's mouth was also indicated in the answer of another student, in which she wrote,

“The teacher often misinterpreted my ideas, and when the draft was given back to me, I could only copy down her opinions to say something I did not really want to say.”

Another disadvantage of the direct correction approach indicated by students of higher proficiency was that this method deprived students of the opportunities of finding the correct answers themselves. The direct provision of correct answers by the

teacher, despite its convenience, did not help them memorize the correct usages or the grammatical concepts of the erroneous sentences or structures. They merely copied down the teachers' answers but forgot the usages next time they wrote. They also pointed out that it was difficult for them to categorize their errors even though the correct forms of errors were offered. Furthermore, some suggestions were made by them to better this direct correction method. For example, one of them suggested that the teacher label the type of errors and leave the correction job to the students. In this way, she believed students were able to keep what they learned in mind and really improved their writing ability.

Although some disadvantages were mentioned by students of higher proficiency, advantages were also mentioned by students of two proficiency levels. Most students considered that this approach saved them a lot of time spent searching for the correct answers. Students of lower proficiency especially liked this correction method and many of them stated they learned a lot from the teacher's model answers for their errors. Although a few of them indicated the occasional occurrences of their frustration resulted from their teacher's red marks, they still expressed their approval of this approach method and hoped the teacher would not change her way of responding to their errors.

## **Discussion**

In this section, the results of the analyses of writing scores and error rates are discussed. The results of students' responses to the attitude questionnaire are then discussed.

### **Students' Improvement in Writing Quality**

The findings drawn from the statistical analyses of students' writing scores are consistent with those from the analyses of the error rates. First, students in both treatment groups made significant improvement in their written accuracy and overall

writing quality. Second, students from the code group did not significantly outperformed students from the direct group in terms of their improvement in their writing quality and written accuracy. Third, when comparisons were further made between two treatment groups at two levels of writing proficiency, more proficient students in the code group outperformed their counterparts in the direct group in terms of their improvement in both writing quality and written accuracy. However, for students of lower proficiency, there was no significant difference between two treatment groups in both their improvement in writing quality and written accuracy.

The consistent findings of writing scores and error rates revealed that the reduction in error rate did translate into the improvement in their writing quality. The evidence of the improvement both in writing quality and written accuracy proved that students' focus on form did not result in the deterioration in the quality of their writing. On the contrary, students overall writing quality improved as their written accuracy increased.

The improvement in both written accuracy and overall writing quality can be interpreted as an increase in communicative effectiveness. As Ashwell (2000) stated in his study, grammar correction is a way to improve the formal accuracy of the written product and it in turn raises the effective of communication. That is, when students pay more attention to the correctness of the sentences, they convey their ideas more clearly. For the beginner writers in this study, their ability to effectively communicated their thoughts determined not only their scores in grammar but also their overall writing scores. Students who failed to write comprehensible sentences are not likely to score high in their overall writing quality because the graders could barely understand what they intended to say.

### **Students' Improvement in Writing Accuracy**

As mentioned in the previous section, both direct correction and code correction helped students improve their writing accuracy, but neither of the two treatment types could be considered superior. The finding of lack of difference was in accordance with the results in Semke (1984) and Robb et al. (1986). Although this finding cast doubt on the superiority of code error correction to direct error correction, it proved that code error correction was as effective as direct error correction in helping students improve their writing accuracy.

Despite the lack of significant difference between two treatment groups, the comparison of the two groups at two different levels of writing proficiency yielded significant results. Higher- proficiency students from the code correction group outperformed their counterparts from the direct group in their writing accuracy, indicating that code error correction was a more effective method than direct error correction in helping more proficient improve their writing accuracy. This finding supports the conclusion made in Kubota's (2001) study that learners' ability to make the grammatical judgments improved with the increase of learners' proficiency, and a less explicit method is not only sufficient but also motivating for the more proficient students. In this study, for the higher-proficiency students in the code group, the correction method of providing cues of the types of errors, rather than the direct answers, demanded more cognitive efforts from them, which in turn resulted in effective learning of the grammar. Hence, those more proficient students in the code group made more improvement in their writing accuracy in the long run.

As for the students of lower proficiency, code correction is not better than direct correction in improving their writing accuracy though both treatments helped them reduce their error rates significantly. Since both error correction methods were equally successful in helping students improve their written accuracy, teachers' decision on

the correction method should take students' attitudes into consideration. In the following section, the students' attitudes toward error correction are discussed.

### **Students' Attitudes toward Error Correction**

The results of students' responses to the attitude questionnaire yielded several findings. First, in terms of writing autonomy, students from the code group perceived more improvement than those from the direct group. This result can be attributed to more cognitive efforts they exerted in their correcting process, hence raising more students' writing autonomy.

Second, in terms of writing ability and editing ability, even though there was no significant difference found between two treatment groups, significant difference in attitude existed between two groups at higher proficiency level. Higher proficiency students believed that code error correction successfully helped them improved their writing and editing ability. This finding is in keeping with the results in Chandler (2003) and Lee (2004). In their studies, students perceived code error correction to be the best way for them to learn not to make errors in the future because it identified the types of errors, helped them diagnose their weakness in grammar, and in turn raised their grammar awareness. In the current study, the correct grammar forms of errors were internalized by students who received code correction method, which could eliminate their grammatical errors gradually, enable them to communicate their ideas more effectively and become an autonomous and independent writer in the long run.

However, it should be noted that the positive effects of code correction on students' attitudes toward their improvement in writing ability did not occur on students of lower proficiency. Less proficient students from the direct group perceived more improvement in their writing ability than those from the code group. That is, lower-proficiency students held more positive attitudes toward the effects of direct correction on the improvement of their writing ability. This finding is consistent with

the results in Lee (1997), that suggested that code error correction should be carefully implemented to students of lower proficiency because they benefited more from the direct error correction. Although code correction and direct correction are equally effective methods for improving students' writing quality and accuracy, the direct correction method is more suitable for the lower proficiency students in consideration of their positive attitudes toward it.

The third finding was related to students' perception of correction responsibility. Very few students responded that teachers should be solely responsible for the errors whereas more than half of the students preferred code correction. This finding is in accordance with the results in Radcki and Swales (1998), in which most students expressed their approval of code correction and only a very small number of them felt that the correction job should be done solely by the teacher. Students' attitudes toward correction responsibility suggested that very few students were against error correction in which students needed to correct answers themselves. This finding was considered positive evidence for code error correction.

The last finding concerning students' preferences for error correction was drawn from students' responses to the multiple-choice Item 5 and the open-ended question. The results displayed the difference in the attitudes of students at different writing proficiency levels. Students at lower proficiency level held more positive attitudes toward direct correction than code correction. The reasons for this preference were revealed in depth in their responses to the open-ended question. Their preference for direct error correction to code error correction mainly resulted from their frustration arising from their failure to find the correct answers in their correcting process. Due to their deficit in grammar knowledge, they liked the model answers provided by their teacher which gave them direct and explicit guidance for revising the compositions. These reasons correspond to those in Chandler's (2003) survey. Chandler found that



his participants preferred direct correction because it was the easiest and fastest way to make correction.

As to the more proficient students, a higher percentage of them expressed their preference for code correction. They expressed code error correction facilitated their memorization of the correct forms. They also pointed out frustration they experienced in direct correction method in which they sometimes had to copy down the teacher's words which was not what they intended to say. More advanced students' preference for code error correction was also found in the studies of Leki (1991) and Lee (2004). Both of their studies concluded that most students preferred error correction with codes labeled on their errors.

To sum up, the current study echoed back to the previous surveys in that lower-proficiency students preferred direct error correction to code error correction because of less frustration in the rewriting process. On the other hand, higher-proficiency students liked code correction better because of its effectiveness in raising their grammatical awareness and facilitation of their acquisition of the grammatical concepts.

### **Summary of the Results and Discussion**

This chapter presented the results and discussion of the analyses of the participants' writing scores and error rates in their pre- and post-test writing, followed by the analyses of the students' responses to the attitude questionnaire. The findings, consistent with the results of several other studies, first revealed that code error correction was a more effective correction method for students of higher proficiency. It was also found that higher-proficiency students held more positive attitude toward code error correction while less proficient students held the opposite attitude, preferring direct error correction to code error correction.