Research Question 3:

Is there a relationship between the nature of the strategy of rhetorical invention used by a student spontaneously in Sample 1 and the nature of the strategy of rhetorical invention used by a student in Sample 2?

In this study evidence of rhetorical invention submitted along with the final drafts of written argumentation in Sample 1 and Sample 2 was classified into three groups: structured (lists, outlines, etc), non-structured (freewriting, looping, etc.), and mixed. The latter category emerged upon completion of the preliminary analysis of the data.

These artifacts did not have a clear structure or organization, thus approximating the nature of non-structured strategies of rhetorical invention. However, they contained some evidence of a direction of the writer's inquiry and demonstrated some elements of structure (e.g., numbering and/or ordering of ideas). Due to the fact that such case was not a single occurrence, such drafts which contained both elements of structured and non-structured strategies were grouped in a separate category ($E_{1\ mixed}=8$, $N_{1present}=39$, $N=48$) Nine of the drafts submitted in Sample 1 did not have any evidence of rhetorical invention. The distribution of the data is represented in the pie-chart (Figure 3.2) The following groups thus were obtained: $E_{1non\text{-}structured}$, $E_{1structured}$, E_{1mixed}, $E_{2Larson's}$, and $E2_{freewriting}$.

In Sample 1 only nine counts of structured strategies of rhetorical invention were detected ($N_{1structured}=9$, $N_{1present}=39$, $N=48$). The majority of the drafts, which contained evidence of rhetorical invention, demonstrated the students' use of non-structured strategies ($N_{1non\text{-}strutcured}=22$, $N_{1present}$, $N=48$), while eight drafts contained evidence of a mixture of the two major types ($N_{1mixed}=8$, $N_{1present}=39$, $N=48$). As revealed by the frequency analysis, a non-structured type of rhetorical invention had the highest count in Sample 1.

Graphic representation of the data on the type of rhetorical invention used by the students in Sample 1 and in Sample 2 is provided in Figures 4.1 and 4.2. As illustrated by the pie-charts, in Sample 1 students were more likely to use non-structured strategies (38.3%) than structured (3.3 %) or mixed (13.3) strategies of rhetorical invention.

It was hypothesized that students who use a particular strategy of rhetorical invention spontaneously while composing their essays in Sample 1 will be more likely to use the same or similar strategies of rhetorical invention after the instruction, in Sample 2. The variable of the type of rhetorical invention used in Sample 2 was correlated with the variable on the type of rhetorical invention in Sample 1.

Some students changed the type of strategy of rhetorical invention they used when writing an argumentative essay in Sample 2. 6 of the subjects who used freewriting as the strategy of rhetorical invention in Sample 2 had used the same strategy spontaneously in Sample 1. 4 student writers who used Larson's Heuristic in Sample 2 had based their argumentative essays in Sample 1 on some type of a structured strategy of rhetorical invention (listing, clustering, etc.). 3 of the student writers used a mixed strategy of rhetorical invention both in Sample 1 and Sample 2.
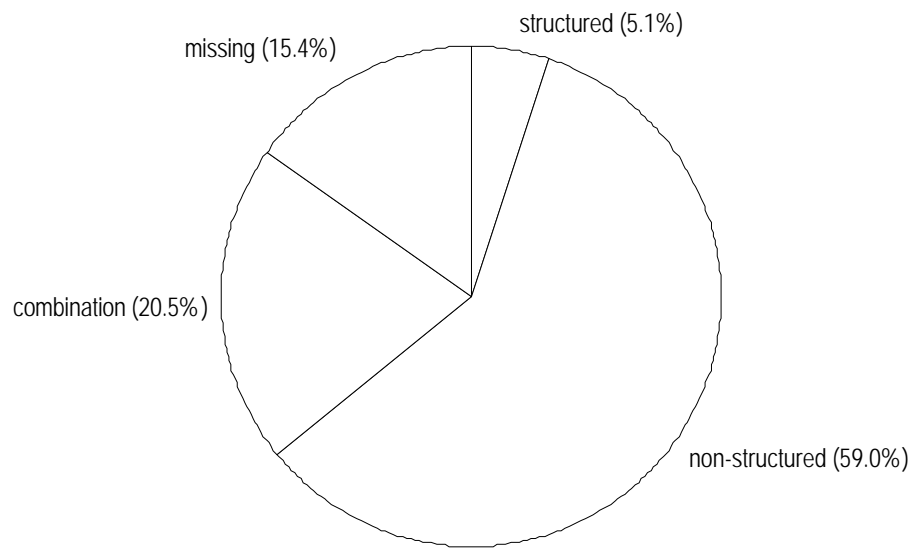
Rhetorical Invention 1: Type

structured (5.1%)

missing (15.4%)

combination (20.5%)

non-structured (59.0%)

Figure 4.1

Rhetorical invention 2: Type

Combination (25.0%)
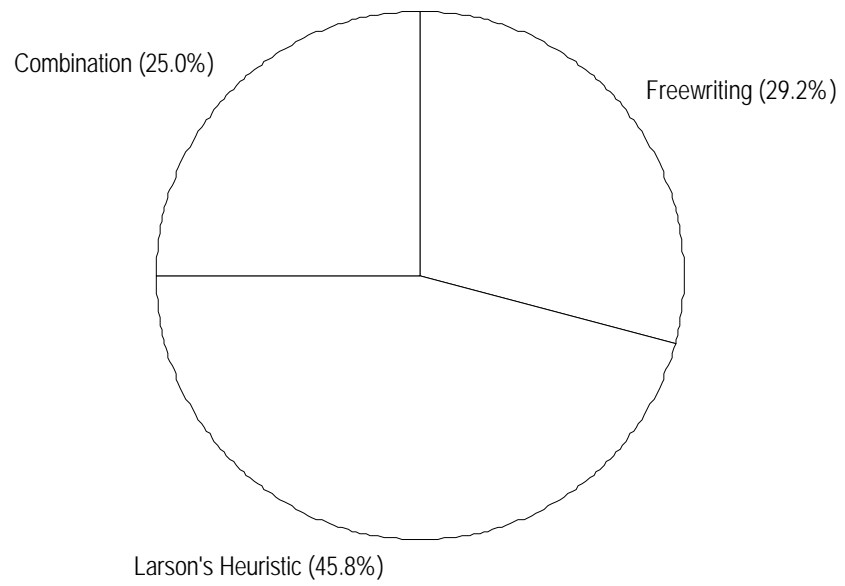
Freewriting (29.2%)

Larson's Heuristic (45.8%)

Figure 4.2

Due to the fact that more than two groups were detected in each of the data sets on the strategies of rhetorical invention, a correlational analysis was performed. It was tested whether students' use of a particular strategy of rhetorical invention was related to the type of rhetorical invention used by a student spontaneously in Sample 1.

For a two-tailed test of significance the alpha level was established at .05. The probability of student use of the same or comparable strategy of rhetorical invention in pre-test and post-test was 52%. As a result of the test, it was determined that only 4% of the students' choice of a strategy of rhetorical invention in Sample 2 could be accounted for by students' preferences for a particular type of rhetorical invention in Sample 1 (Table 4.4). Relevant descriptive statistics are presented in Table 4.5. The student choice of a strategy of rhetorical invention in post-test could not be accounted for by the nature of invention strategy used in the pre-test.

Table 4.3

Chi-square Test

	Value	df	Asymp. Sig
Pearson Chi-square	4.46	6	.61
Likelihood ratio	4.89	6	.56
Linear-by-linear association	2.29	1	.13
N of valid cases	48		

Table 4.4

Directional Measures

	Value	Sig.
Lambda Symmetric	.019	.761
Invention 2 type dependent	.038	.781

Table 4.5

Crosstabs

			Invention 1 type				Total
			Structured	Non-structured	Mixed	Missing	
Inention2type **freewriting**							
	Count		4	6	3	1	14
	Expected Count		2.6	6.4	2.3	2.6	14.0
	% of Total		8.3%	12.5%	6.3%	2.1%	29.2%
	Residual		1.4	-.4	.7	-1.6	
	Std. Residual		.8	-.2	.4	-1.0	
	Adjusted Residual		1.1	-.3	.6	-1.3	

Table 4.5 (continued)

Crosstabs

			Invention 1 type				Total
			Structured	**Non-structured**	**Mixed**	**Missing**	
Inention2type	**Larson's**						
		Count	4	11	2	5	22
		Expected Count	4.1	10.1	3.7	4.1	22.0
		% of Total	8.3%	22.9%	4.2%	10.4%	45.8%
		Residual	-.1	.9	-1.7	.9	
		Std. Residual	-.1	.3	-.9	.4	
		Adjusted Residual	-.1	.5	-1.3	.6	

Table 4.5 (continued)

Crosstabs

			Invention 1 type				Total
			Structured	Non-structured	Mixed	Missing	
Inention2type	Mixed						
		Count	1	5	3	3	12
		Expected Count	2.3	5.5	2.0	2.3	12.0
		% of Total	2.1%	10.4%	6.3%	6.3%	25.0%
		Residual	-1.3	-.5	1.0	.8	
		Std. Residual	-.8	-.2	.7	.5	
		Adjusted Residual	-1.1	-.3	.9	.6	

Table 4.5 (continued)

Crosstabs

		Invention 1 type				Total
		Structured	**Non-structured**	**Mixed**	**Missing**	
Total						
	Count	9	22	8	9	48
	Expected Count	9.0	22.0	8.0	9.0	48.0
	% of Total	18.8%	45.8%	16.7%	18.8%	100.0%

Research Question 4

Is there a relationship between the nature of the rhetorical invention strategy and a student's grade on the argumentative essay as reflected by the scores in Sample 1 and in Sample 2?

In both samples collected in this study the mean scores on the essays that contained evidence of structured, non-structured, mixed, or no evidence of rhetorical invention differed among themselves. The following descriptive statistics are relevant to the discussion of the research question.

In Sample 1 the highest mean score was obtained on those essays that contained evidence of mixed strategies of rhetorical invention (M_{1mixed}= 3.25, N_{1mixed} = 8, N = 48). 98% of the mean scores on the essays based on mixed strategies of rhetorical invention were distributed between 1.82 and 2.84 on a 4.0 scale. Standard deviation on data within this group was fairly large (.66). Relevant descriptive statistics are summarized in Table (5.1).

Table 5.1

Mean Scores

	Sample 1		Sample 2	
	Statistic	**Std. Error**	**Statistic**	**Std. Error**
Structured				
Mean	4.67	.44	5.95	.28
95% Confidence **Lower**	3.65		5.37	
Interval for the mean **Upper**	5.68		6.54	
5% trimmed Mean	4.57		5.95	
Median	4.0		6.0	
Variance	1.75		1.76	

Table 5.1 (continued)

Mean Scores

	Sample 1		Sample 2	
	Statistic	**Std. Error**	**Statistic**	**Std. Error**
Structured				
Std. Deviation	1.13		1.3266	
Minimum	4.00		4.00	
Maximum	7.00		8.00	
Range	3.00		4.00	
Interquartile Range	1.0		2.000	
Skewness	1.83	.72	.091	.49
Kurtosis	2.11	1.4	-1.24	.95

Table 5.1 (continued)

Mean Scores

	Sample 1		Sample 2	
	Statistic	**Std. Error**	**Statistic**	**Std. Error**
Non-structured				
Mean	5.81	.28	6.14	.39
95% Confidence **Lower**	5.23		5.3	
Interval for the mean **Upper**	6.41		6.98	
5% trimmed Mean	5.8		6.21	
Median	5.5		6.5	
Variance	1.77		2.13	

Table 5.1 (continued)

Mean Scores

	Sample 1		Sample 2	
	Statistic	**Std. Error**	**Statistic**	**Std. Error**
Non-structured				
Std. Deviation	1.33		1.46	
Minimum	4.00		3.0	
Maximum	8.00		8.0	
Range	4.00		5.0	
Interquartile Range	2.0		2.0	
Skewness	.1	.49	-.81	.6
Kurtosis	-1.35	.95	.16	1.15

Table 5.1 (continued)

Mean Scores

		Sample 1		Sample 2	
		Statistic	**Std. Error**	**Statistic**	**Std. Error**
Mixed					
	Mean	6.5	.5	5.67	.35
	95% Confidence **Lower**	5.32		4.88	
	Interval for the mean **Upper**	7.68		6.45	
	5% trimmed Mean	6.56		5.63	
	Median	7.0		5.5	
	Variance	2.0		1.52	

Table 5.1 (Continued)

Mean Scores

	Sample 1		Sample 2	
	Statistic	**Std. Error**	**Statistic**	**Std. Error**
Mixed				
Std. Deviation	1.41		1.23	
Minimum	4.0		4.0	
Maximum	8.0		8.0	
Range	4.0		4.0	
Interquartile Range	2.5		1.75	
Skewness	-.81	.75	.42	.64
Kurtosis	-.23	1.48	-.45	1.23

Table 5.1 (Continued)

Mean Scores

		Sample 1	
		Statistic	Std. Error
Missing			
Mean		5.56	.56
95% Confidence	**Lower**	4.27	
Interval for the mean	**Upper**	6.84	
5% trimmed Mean		5.56	
Median		5.0	
Variance		2.78	

Table 5.1 (Continued)

Mean Scores

	Sample 1	
	Statistic	**Std. Error**
Missing		
Std. Deviation	1.67	
Minimum	3.0	
Maximum	8.0	
Range	5.0	
Interquartile Range	2.5	
Skewness	.29	.72
Kurtosis	-.4	1.4

The mean scores on the essays that contained evidence of non-structured strategies of rhetorical invention was lower than M_{1mixed} but higher than the mean score on the essays that contained evidence of structured strategies of rhetorical invention or no evidence at all ($M_{1non\text{-}structured}$ = 2.91, $N_{1non\text{-}structured}$ = 22, N = 48). The value of standard deviation of mean score distribution in this group was .67. Ninety-five per cent of the mean scores were distributed between 2.61 and 3.2. Thus, the spread of the distribution of $M_{1non\text{-}structured}$ was greater than the spread of the distribution of M_{1mixed}. Thus, the variance of the mean scores in a group of essays based on non-structured strategies of rhetorical invention, though the range statistic is the same for both mean scores on the essays based on mixed and non-structured strategies of rhetorical invention.

The mean scores on the essays based on structured strategies of rhetorical invention was 2.33 ($N_{1structured}$=9, N_1=48). This mean score was the lowest among the four groups singled out for the analysis. Standard deviation of .66 was detected in this group of data. The 95% confidence interval for the mean was between 1.82 and 2.84 on a 4.0 scale. Mean scores on the essays based on structured strategies of rhetorical invention ranged from 2.0 to 3.5 on a 4.0 scale, which places them in the lower portion of the mean score distribution. The spread of the data distribution on the essays in this group is greater the spread of the data distribution on the essays in the non-structured group but lower than that of the mixed strategies group.

The mean score on the essays that contained no evidence of rhetorical invention was lower than the mean score on non-structured group or mixed strategies group. However, it was higher than the mean score on the essays in a structured strategies group ($M_{1missing}$ = 2.83, $N_{1structured}$ = 9, N = 48). Ninety-five per cent of the mean scores in the group of essays with no evidence of rhetorical invention were located between 2.17 and 3.5 points on the 4.0 scale. Thus, the mean scores on essays in this group were the most widely dispersed data if compared to the nature of mean score distribution in the three other groups. The lowest observed mean score in the group of essays with no evidence of rhetorical invention in Sample 1 was 1.5, while the highest mean was 4.0 on a 4.0 scale.

The differences among the mean scores in Sample 1 could not be considered conclusive in answering the research question about the relative effectiveness of structured and non-structured strategies of rhetorical invention. Due to the fact that the

groups were not of equal sizes, the statistical procedure of analysis of variance (ANOVA) was used to determine whether the differences among the mean scores on argumentative essays based on structured, non-structured, mixed, and missing evidence of rhetorical invention were statistically significant. The goal was to determine whether different strategies of rhetorical invention could account for the variation among the mean scores obtained on the essays in Sample 1. For a two-tailed test, the level of significance was established at .05, df=3, 44.

With Levine's statistic of .47, the assumption of homogeneity of variance was met (Table 5.2). The between groups estimate (15.04, df =3) reflects the magnitude of the relationship among the groups selected for the analysis ($E_{1structured}$, $E_{1non-structured}$, E_{1mixed}, and $E_{1missing}$). The groups varied substantially though not strongly enough to display a statistical difference. The within-groups variance estimate (89.27) reflects the dispersion of the scores in each of the groups. A large within-groups estimate is considered an indication that the mean scores within groups varied strongly (Table 5.3).

The within-groups variance was unquestionably greater than the between-groups estimate, which suggests that the dispersion of the scores in the groups was greater than the difference among individual groups. A preliminary inference based on the observed between-group and within-group variance was that a type of strategy of rhetorical invention was not the most accurate grouping factor for the essays in Sample 1.

Table 5.2

Type of Rhetorical Invention and Quality of Final Draft

Test of Homogeneity of Variance

	Levene's Statistic	df1	df2	Sig.
Mean Score 1	.47	3	44	.7

Table 5.3

Type of Rhetorical Invention and Quality of Final Draft

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Sample1	**Between Groups**	15.04	3	5.01	2.47	.07
	Within Groups	89.27	44	2.03		
	Total	104.31	47			

For the four groups entered in the analysis, $F_{3,44}=2.47$, df=3, 44. With $F_{critical}$ $_{df=3,44}= 2.88$, $F_{observed} < F_{critical}$, the researcher was not able to reject the null hypothesis at $p = .05$. However, due to the fact that no hypothesis was established a priori and no previously conducted studies could suggest the direction of the hypothesis, post hoc tests were performed to determine whether individual groups differed. Further, due to the magnitude of within-group and between-group variance, *post hoc* tests of statistical significance of the detected differences in the mean scores were performed.

Individual groups were entered in the analysis to determine whether any differences among the observed mean scores were statistically significant. Using the harmonic mean of the group sizes, the LSD test of significance revealed that the variation in the mean scores among three groups was statistically significant. The mean score on the essays within the group based on non-structured strategies of rhetorical invention was significantly higher than the mean score on the essays based on structured strategies of rhetorical invention. The test also revealed that the mean scores on the essays based on the combination of structured and non-structured strategies of rhetorical invention was significantly higher than on the essays based on the structured strategies (Table 5.4)

Table 5.4

Multiple Comparisons

			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
						Lower Bound	Upper Bound
LSD	Structured	Non-structured	-1.26[*]	.56	.04	-2.29	.16
		Combination	-1.94[*]	.69	.01	-3.23	-.04
		Missing	-1.0	.67	.14	-2.35	.35

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

Thus, the differences between two individual groups could be accounted for by the different strategies of rhetorical invention used by the students during their writing processes. The type of rhetorical invention used by the students in Sample 1 appeared to have a significant impact on the quality of the drafts produced as reflected in the mean scores for two groups. However, the significance of the obtained test results is minimal. Though the result of the test revealed that the observed differences were statistically significance, this finding cannot be considered meaningful in terms of its implications for a student's grade on an essay. The result of the test of statistical significance could also be attributed to low sensitivity of the instrument of assessment. Another variable that could have affected the finding was the nature of the mean score distribution and variance in Sample 1.

In Sample 2, the highest mean score was obtained on the essays based on non-structured strategies of rhetorical invention ($M_{2\,non-structured} = 3.1$, $N_{2\,non-structured} = 14$, $N = 48$). With standard deviation of .74 and standard error of the mean .2, ninety five per cent of the mean scores were distributed between 2.7 and 3.5 points on the 4.0 scale. The distribution was widely spread between the lowest observed mean score ($M_{min2\,non-structured} = 1.5$, $N = 48$) and the highest mean score of 4.0 ($M_{max2\,non-structured} = 1.5$, $N = 48$).

The mean score obtained on the essays based on Larson's Heuristic was lower than the mean score of the essays based on freewriting ($M_{2Larson's} = 5.9545$, $N_{2Larson's} = 22$, $N = 48$). With standard deviation of .66 and standard error of the mean .14, the ninety-five per cent confidence interval for the mean the mean was 2.68 to 3.27. Analysis of the nature of distribution revealed that the mean scores within this group were more clustered and less widely dispersed along the axis. The minimum range statistic was 2.0, and the maximum range statistic was 4.

The mean score on the essays based on mixed strategies of rhetorical invention was the lowest among all three groups ($M_{2mixed} = 2.83$, $N_{2mixed} = 12$, $N = 48$). With standard deviation of .62 and standard error of the mean .18, ninety five per cent of the mean scores of the essays within this group were distributed between 2.44 and 3.22 on a 4.0 scale. It appeared that the tightness of the distribution of the mean scores was the greatest among all three groups analyzed. Though the range of the mean score for both the group of essays based on mixed strategies of rhetorical invention and the range of the

mean score on the essays based on Larson's Heuristic was the same (2.0 to 4.0 on a 4.0 scale), the analysis of the histograms revealed that upper point of the range was more typical among the mean scores of the essays based on Larson's heuristic than on mixed strategies of rhetorical invention.

As described, the nature of data distribution and the mean scores in the three groups singled out in Sample 2 differed among themselves. Due to unequal group sizes ($N_{2freewriting}=14$, $N_{2Larson's}=22$, $N_{2combination}=12$, $N=48$), the analysis of variance (ANOVA) was performed to determine whether the detected differences among the groups were statistically significant. For a two-tailed test, the level of significance was established at .05, df= 2, 45.

With Levine's statistic of .25, the assumption of homogeneity of variance was met (Table 5.5). The between-groups estimate (1.94, df = 2) reflects the magnitude of the relationship among the groups entered in the analysis and suggests that the groups did not differ greatly among themselves (Table 5.6). This preliminary inference based on the examination of descriptive statistics was bound to have an effect on the nature of the test of statistical significance. The researcher established provisionally that if there were differences among the individual groups, they were minimal.

The within-groups estimate (81.98, df=45) reflects the magnitude of dispersion of the mean scores within each group. The observed dispersion of the mean scores within each of the groups entered in the analysis suggests that argumentative essays within each group differed more from other essays within the same group than from a representative essays from other groups.

For the three groups entered in the analysis, $F_{df=2,45} = .53$. Thus, the researcher failed to reject the null hypothesis at p = .05. The result is not statistically significant to conclude that the observed differences in the mean scores within the three groups could be attributed to the type of rhetorical invention used by the student writers. These differences, detected among the mean scores on the essays within different groups entered in the analysis, were not statistically significant and could not be accounted for by the variation in the usage of strategies of rhetorical invention.

Table 5.5

Test of homogeneity of Variance

	Levene's Statistic	df1	df2	Sig.
Mean Score 2	.24	2	45	.78

Table 5.6

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Sample2	**Between Groups**	1.94	2	.97	.53	.59
	Within Groups	89.27	45	1.82		
	Total	104.31	47			

As revealed by the preliminary analysis, the observed within-groups variance in Sample 2 did not differ greatly from the observed within-group difference in Sample 1, therefore suggesting that the nature of score distribution within each of the groups in each of the samples did not undergo a substantial difference that could be attributed to the instruction in the strategies of rhetorical invention. However, the comparison of between-groups estimate for Sample 1 and Sample 2 suggests that the individual groups entered in the analysis in Sample 2 differed among themselves to a smaller degree than the groups in Sample 1.

Due to the nature of the mean score distribution and great within-groups variance post hoc tests were performed to determine whether any of the observed differences were statistically significant. The tests revealed that no differences existed between individual groups in Sample 2 either (Table 5.7).

The researcher was not able to reject the null hypothesis at p=.05. In Sample 2, the variance of the mean scores obtained on written argumentation was not related to the variance in the type of rhetorical invention used by the student writers. It appeared that the statistical significance of a relationship between the type of rhetorical invention and the mean scores in the groups in Sample 1 was neutralized by some other factor in Sample 2. It was beyond the scope of this research to determine and examine this factor.

Table 5.7

Multiple Comparisons

			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
						Lower Bound	Upper Bound
LSD	Structured	Freewriting	-.18	.46	.58	-1.19	.67
		Combination	.29	.48	.56	-.69	1.26

Unhypothesized Findings

Mean Scores and Length of Rhetorical Invention

An interesting result was obtained from the comparison of corresponding groups of essays based on similar strategies of rhetorical invention in Sample 1 and Sample 2. Three groups were singled out within each of the samples: drafts that contained evidence of structured strategies of rhetorical invention in Sample 1 and Sample 2 ($E_{1\ structured}$, $E_{2\ Larson's}$), drafts that contained evidence of non-structured strategies of rhetorical invention ($E_{1non-structured}$, $E_{2freewriting}$), and drafts that contained evidence of a combination of the structured and non-structured strategies of rhetorical invention (E_{1mixed}, E_{2mixed}).

The comparison among the corresponding pairs of scores yielded the following results. For the groups of essays based on structured and non-structured strategies of rhetorical invention, there has been an increase in an estimate. The mean scores on the essays based on freewriting in Sample 2 was much higher than the mean score on the essays based on non-structured strategies of rhetorical invention in Sample 1 ($M_{1freewriting}=2.09$, $N_{1freewriting}=9$, $N=48$; $M_{2freewriting}=3.10$, $N_{2freewriting}=14$, $N=48$). The mean score of only one group of essays (E_{mixed}) was lower in Sample 2 than in Sample 1 ($M_{1mixed}=3.25$, $N_{1mixed}=8$, $N=48$; $M_{2mixed}=2.83$, $N_{2mixed}=12$, $N=48$). Relevant descriptive statistics on the variables of interest for Sample 1 and Sample 2 are presented in Table 6.1.

Table 6.1

Length of Rhetorical Invention

Descriptive Statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
Long	26	54.2	54.2	54.2
Short	13	27.1	27.1	81.3
Missing	9	18.8	18.8	100.0
Total	48	100.0		

It may be inferred that effectiveness of a strategy of rhetorical invention is not an absolute estimate. Rather, it should be contextualized. Specifically, within this study the nature of rhetorical situation was kept constant and thus controlled for by research design. However, the observed fluctuation of the effectiveness of a particular type of rhetorical invention should be examined for its possible correlation with other factors, e.g., students' knowledge of the scripts. Though there may be a logical explanation for the improved quality of the drafts based on freewriting and Larson's Heuristic, the direction of change in quality of the drafts based on mixed strategies of rhetorical invention remains unclear.

It has been determined that the type of rhetorical invention in Sample 1 was related to the grade obtained on the essay. In order to determine whether other characteristics may account for the scores, the analysis of variance (ANOVA) was performed. The researcher explored whether the length of the evidence of rhetorical invention could explain variance in the scores on the drafts.

In addition to categorization of the drafts in Sample 1 by the type of rhetorical invention ($E_{1non-structured}$, $E_{1structured}$, E_{1mixed}, $E_{1missing}$), the categorization by the length of the evidence of rhetorical invention was made. Three groups were formed among the available artifacts: drafts with a long evidence of rhetorical invention (E_{1long}), drafts with short evidence of rhetorical invention (E_{1short}), and drafts with evidence of rhetorical invention missing ($E_{1missing}$).

The data collected were distributed as follows. Twenty-six drafts contained long evidence of rhetorical invention ($N_{1long} = 26$, $N = 48$). Short evidence of rhetorical invention was observed in 13 counts ($N_{1short} = 13$, $N = 48$). Nine of the submitted drafts of written argumentation in Sample 1 contained no written evidence of rhetorical invention ($N_{1 missing} = 9$, $N = 48$). The distribution of the data is presented in Figure 6.2.

Rhetorical Invention 1: Length
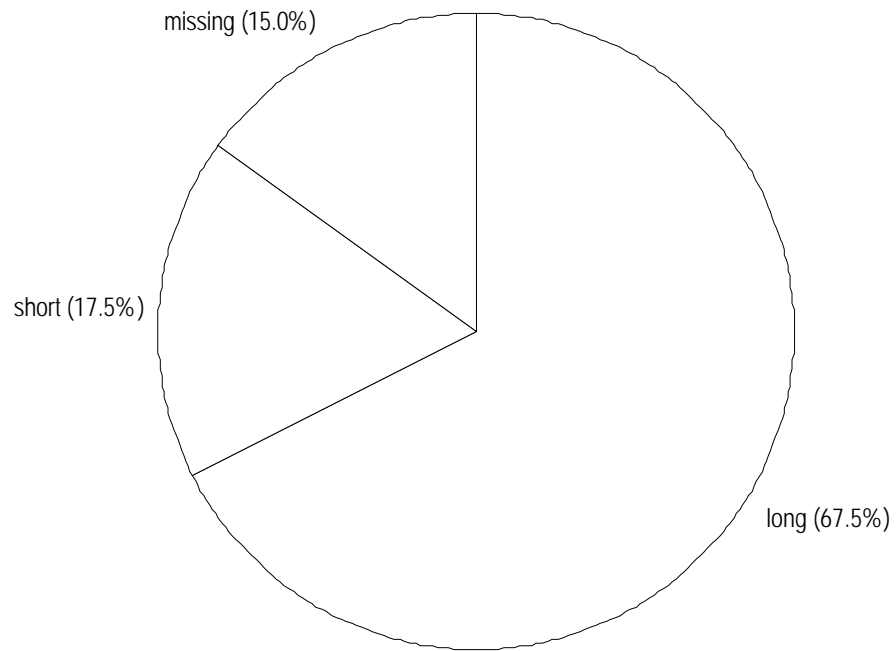
missing (15.0%)

short (17.5%)

long (67.5%)

Figure 6.2

The mean score on the essays that contained long evidence of rhetorical invention in Sample 1was the highest among the examined three groups (M_{1long}=3.1, N_{1long}=26, N=48). Standard deviation of 1.36 and standard error of the mean .26 were observed for the data within this group. The 95% confidence interval of the mean was located between 2.8 and 3.4 points on the 4.0 scale. The lowest observed mean score on an essay with long evidence of rhetorical invention in Sample 1 was 2.0 and the highest observed mean score was 4.0 on a 4.0 scale.

The mean score on the essays with no evidence of rhetorical invention was lower than the mean score on the essays that contained long evidence of rhetorical invention but higher than the mean score on the essays with short evidence ($M_{1missing}$ = 2.14, $N_{1missing}$=9, N=48). The data distribution in this group was characterized by standard deviation of 1.66 and the standard error of the mean of .56. The lower bound of the ninety-five percent confidence interval for the mean was 2.14, while the upper bound was 3.42. thus, in 95% of the observations the mean score on an essay with no submitted evidence of rhetorical invention are located in the above interval on a 4.0 scale.

The lowest observed mean estimate within a group of essays with no evidence of rhetorical invention was 1.5, while the highest observed mean score was 4.0. The dispersion of the mean scores along the axis, therefore, was substantial from the lower bound of the scale to its highest bound. The mean score on the essays submitted with short evidence was the lowest among the three groups (M_{1short} = 2.31, N_{1short}=13, N=48). The data distribution in this group was characterized by standard deviation of .96 and standard error of the mean of .56. Thus, though the mean score on the essays with short evidence of rhetorical invention was the lowest among the three groups, the central tendency of the data distribution within this group was higher than in the other two groups entered in the analysis.

The lowest observed mean score on the essays with short evidence of rhetorical invention was 2.00, while the highest observed mean was 3.5. Thus, the dispersion of the data was smaller than for the two other groups. The lower bound of the ninety-five interval for the mean was 2.02, while the upper bound of the interval was 2.6. Therefore, ninety-five per cent of the observed mean scores on the essays submitted with short evidence of rhetorical invention were located in the lower portion of a 4.0 scale. Relevant

descriptive statistics on the data in the group of essays submitted with short evidence of rhetorical invention are summarized in Table 6.3.

Though observed differences were detected among the mean scores on the essays submitted with long evidence of rhetorical invention, short evidence of rhetorical invention, and no evidence of rhetorical invention, this observation was not conclusive due to unequal group sizes within the sample ($N_{1long}=26$, $N_{1short}=13$, $N_{1missing}=9$, $N=48$). The test of variance (ANOVA) was performed to determine whether the differences in the scores on students' essays in Sample 1 could be attributed to the differences in the length of evidence of rhetorical invention. For a two-tailed test of statistical significance, the alpha level was established at .05 for degrees of freedom of 2 and 45.

With Levine's statistic of 2.12, the assumption of homogeneity of variance was not met (Table 6.4). However, the ANOVA test is typically considered robust to the violation of this assumption.

Table 6.3

Descriptive Statistics

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Invention1length								
Long	26	6.19	1.36	.27	5.64	6.74	4.0	8.0
Short	13	4.69	1.11	.31	4.02	5.36	4.0	7.0
Missing	9	5.67	1.73	.58	4.33	7.0	3.0	8.0
Total	48	5.69	1.49	.21	5.25	6.12	3.0	8.0

Table 6.4

Test of Homogeneity of Variance

	Levine's Statistic	df1	df2	Sig.
Sample 1	1.837	2	45	.171

The between-groups estimate (21.642, df=2) reflects the magnitude of the relationship among the groups selected for the analysis (E_{1long}, E_{1short}, $E_{1missing}$). The three groups subjected to analysis varied substantially as reflected by the large between-groups estimate of 21.64. The within-groups estimate of 79.34 reflects the dispersion of the mean scores within each of the groups entered in the analysis. A large within-groups estimate revealed that the mean score in each of the groups were spread widely on the scale from 1.0 to 4.0. Relevant descriptive statistics are presented in Table 6.5.

Similarly to the nature of distribution of the mean scores with the grouping variable of the type of rhetorical invention, in the present analysis the following was observed: the within-group variance was much greater than the between-group estimate. A preliminary inference was made that essays with long evidence of rhetorical invention varied among themselves to a greater extent than they differed from the essays in other two groups.

As a result of the tests of statistical significance, the researcher rejected the null hypothesis at p=.05. The difference among the mean scores detected at the level of the preliminary analysis was statistically significant ($F_{observed}$ = 6.14, $F_{critical}$ = 2.79, df = 2, 45). Therefore, it can be concluded that the variance detected in the mean scores of at least two groups entered in the analysis could be accounted for by the length of evidence of rhetorical invention that had been submitted with the drafts.

Post hoc tests were performed to determine the specific groups in which the difference was statistically significant. In order to minimize the likelihood of the Type I error, LSD test of statistical significance was used. As a result, it was determined that statistically significant difference existed between the mean score in the group of essays with long evidence of rhetorical invention and in the mean score on the essays within a group with short evidence of rhetorical invention. The difference was statistically significant at p=.001. No statistically significant difference was found in comparison of the group of essays with no evidence of rhetorical invention and the other two groups. The results of an overall F test and multiple comparisons are presented in Table 6.6 and 6.7 respectively.

Table 6.5

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Sample1	**Between Groups**	19.5	2	9.75	5.17	.009
	Within Groups	84.8	45	1.88		
	Total	104.31				

Table 6.6

Multiple Comparisons

			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence	
						Lower Bound	Upper Bound
LSD	long	short	1.5[*]	.47	.002[*]	.56	2.44
		missing	.52	.53	.327	-.54	1.59

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

Analysis of the Focus Group Data

General Perceptions of Writing-as-process

Students participating in the focus group had various background in regard to the writing courses in high school and college. Some shared that their teachers were extremely concerned with the correctness of their essays, specifically with sentence structures and punctuation:

> It's like whatever I say is kind of not important, if it's [syntax] isn't right. I felt so frustrated when I couldn't get the point across, or she didn't try to understand what I was trying to say. I would spent hours on a paper and get a low grade anyway.

Students expressed negative attitude toward the so-called "in-class writing." With this type of writing, they were expected to pre-write, draft, revise, and edit during one class period. Unfortunately, this type of assignment is still part of the requirements in the English 111 course, which all students enrolled in the English 112 course took prior to the semester in which the research study was conducted. With in-class writing, students had little time fully to develop their essays. Since sometimes the topic for their writing was assigned by the instructor, often they were forced to write about something that was of little or no interest to them. As a result, the writing itself was meaningless.

> Sometimes I would sit there and not know what to do with the topic. I know about freewriting and prewriting and stuff... But it's like... well, it's like that's all there is. The topic is just sitting there, and I have no idea what to do with it.

The students expressed their satisfaction with writing-as-process. As they indicated, it appeared reasonable that they were taught how to generate ideas, develop, and organize them. The most important advantage of the writing-as-process was, as they indicated, that the drafts were not expected to be perfect immediately after they finished writing. They found it extremely helpful that many instructors taught them how to revise and edit their essays. It was a discovery for many students that within revision and editing, a writer focuses on one issue at a time, not the entire essay at once.

I can never figure out what's wrong with my paper. It sounds right to me, and when I read it to somebody else, they say that it's ok. But the teacher still finds things that are wrong. And even when we discuss papers in groups, it's not the same as discussing them with the teacher.

Overall, students found instruction in writing-as-process more effective than instruction in writing-as-product. The primary reason was that many of them became aware that it is not their being poor or inexperienced writers that could have effect on the quality of their essays. The final drafts were also contingent on the successful completion of such subprocesses as prewriting, drafting, revision, and editing.

The most challenging part of the writing process, as students conceived of it, was that it was subjected to grading. Their dissatisfaction often originated in lack of knowledge of the teachers' expectations. Ideally, students would have extensive discussion of the "occasion for writing," or rhetorical situation. Such discussion would include the purpose of writing, the nature of the audience, the length of the piece of discourse to be produced, the specific plan of attack.

Student writers considered argumentation as the most difficult writing task that they completed during the semester. Part of the reason was attributed to the fact that they did not know how argumentative discourse was different from any other type of writing they have done before. Another important factor was that they did not have any explicit instruction in argumentative writing. Recognizing argumentation among other types of discourse was another problem that students had. It was only during the argumentation-oriented unit of the semester that they began to pay attention to the numerous example of argumentative discourse.

I didn't know about persuasion before. I like to read but I never think about what it does to me, I just read. And it's the same with TV, you know, like we talked about the commercials and how they are argumentative. I never thought about it that way. I guess now I can figure out what other people are trying to do when they are selling me things, but I never paid attention before. Another thing is that I think I argue a lot but don't know it, I just do...

In many cases, students felt that they had enough ideas to argue for or against an issue, but could not organize these ideas to produce the necessary effect. Since argumentation appeared to be so different from other types of writing, students were reluctant to use their prior knowledge of the writing process while composing their argumentative essays, especially at the beginning of the unit on written argumentation.

The Role of Rhetorical Invention

Most students knew the stage of rhetorical invention under the name of "prewriting." This misconception is representative of the general confusion in the field of rhetoric and composition. Students felt that the process of genesis of the ideas for their writing begins at the time when the rhetorical situation is specified and ends when they begin composing their first draft, i.e., when they actually begin completing their sentences, putting them in order, etc. They also appeared to have no clear understanding of their goal at the stage of rhetorical invention: one of the students shared this:

> I don't like prewriting, because it's a waste of time. I end up with something that doesn't make sense, it doesn't flow, and I feel like I wasted my time. And I need to go back and do the whole thing all over again. The paper never flows, and I hate cutting things back just because they don't fit.

Students ranked rhetorical invention and generating ideas for their writing the second most difficult part of their writing processes. The most important stage, though, was selecting the topic for their writing. In response to the question about the criteria that students typically use when selecting an appropriate topic, they listed such factors as the amount of knowledge they have about a particular topic, the degree of interest the topic has to them, and whether they read something about this topic in the past. It was obvious that students conceptualized having read something about a topic differently from having knowledge about the topic.

> I like to write about things I know something about... I feel better about my writing when I can choose a topic, not just write about something I don't know anything about. It's like I have something to say about it, and it makes me write

faster and more. If a teacher gives me a topic that I don't like I never have enough to say about it, whatever I do.

In an attempt to explore the nature of the difference, the students were asked to tell the researcher about the two concepts and explain how the two differed. This distinction was apparently intuitive rather than conscious, for it took the students 46 seconds to shape their answers. In response to the question, students indicated that "after reading how someone organized ideas about the subject, especially if they had prior knowledge of the subject, illustrated a way of organizing their own ideas about this subject". It was easier to write about something after having read about it than after recognizing that the subject was familiar to them.

Background in Rhetorical Invention

Most students knew several strategies of rhetorical invention: freewriting, brainstorming, clustering. They indicated that they used these strategies with varying degrees of frequency. Among the structured strategies of rhetorical invention, students mentioned only listing. Neither Burke's Pentad nor Pike's Tagmemic nor Larson's Heuristic were among the strategies with which students were familiar prior to the beginning of the instruction.

Students considered that using rhetorical invention was helpful but not critically important for the outcome of their writing. The biggest frustration related to the strategies of rhetorical invention originated in the great amount of time required for completion of them with little tangible outcome. Many students felt that they were just wasting their time, for as a result of an exercise in freewriting or clustering, they had the same ideas they started off with.

It's not like I can really discover something when I do the prewriting. I can remember something and put it down, some idea or an event, but I'd remember it anyway. I don't know, it's just frustrating to have a page filled with stuff and then... well, you know, not know what to do with it.

Having no direction for their writing was a concern for most students. Students felt that they were forced to keep too many things under control at one time. For example, the ideas which they put down during the freewriting stage had to be shaped to meet the audience profile, which most often remained vague. Upon completion of freewriting, students shared, they felt that they had to begin everything from the beginning.

> I like to go straight into the first draft and just keep going. It's more like what I can show to the teacher and talk about. With prewriting I have just stuff and it doesn't make a whole lot of sense... I don't even want anybody to read it.

They found it extremely difficult to organize their ideas and select the relevant ones. Most disturbing was the fact that some students became so inhibited with trying to make their freewriting an efficient investment of their time, that they actually began monitoring their ideas as they free wrote. As a result, though, they found that they had too few ideas to go on with.

Structured vs Non-structured Strategies of Rhetorical Invention

Instruction in other strategies of rhetorical invention was helpful in that it opened other possibilities. Students felt that neither freewriting, which was typically associated with all non-structured strategies of rhetorical invention, nor Larson's Heuristic, which came to be associated with all structured strategies of rhetorical invention, was effective in helping them to write good argumentative essays. Too much emphasis was placed on independent thinking with freewriting. This resulted in lack of focus, drifting away from the topic, developing ideas which were unrelated to the prompt.

> When I am freewriting I just find something, you know, a topic or an idea or a point or something and just keep going... rambling on...until I had nothing more to say... I never spent time looking for other positions and points to talk about. I always feel like I'm going in circles, saying the same thing over and over again, just in different words.

On the other hand, Larson's heuristic forced students to examine specific relationships and specific characteristics. Though they found that the suggestions were sometimes helpful, they were frustrated by the authoritarian nature of the sections of the heuristic.

> It made me think about the topic and look at it from different angles. But some of the questions are so difficult to understand that I'd spend more time figuring out what the question means than answering it. But when I did know what it was asking, I had a lot to say, so it was more fun to use than freewriting.

Some students found that the nature of the strategy did not have a strong impact on the quality of the essays they produced.

> As for time and effort, and the quality, Larson's is as good as any other way. It was just so new to me that I didn't feel comfortable with it, especially at the beginning. I like listing questions, but it's different.

Many students in Sample 2 and several students in the focus group found a solution in combining the known strategies.

> When we practiced Larson's, I often had two sheets of paper, and I'd use one to answer a question, and another to say what I really think about it, you know, in my own words. I tried just answering the questions but it didn't work. Just when I have something to say about the topic, the next question is asking about something else, and I forget what I wanted to say after I come back to that previous question. I couldn't remember where I wanted to go, because the questions were not in the order that I had in mind.

The solution students found was to combine the advantages provided by Larson's Heuristic and freewriting: they would follow the questions prompted by Larson's Heuristic until they come to the point which is of interest to them. If the next question of

the heuristic was not related to what students believed was relevant for the argumentation, they free wrote on the question that interested them most. Upon completion, sometimes they resumed their exploration of the topic as suggested by Larson's heuristic. Sometimes they felt that they had enough ideas to support their position and refute the opposition. Whatever the solution was, students who discovered the mixed type of rhetorical invention felt that they really authored their writing. One member of the focus group suggested that having specific questions to follow was helpful in that they validate the writer's choices and direction of the inquiry.

Summary of Findings

	Research Question	Findings
1	Is there an overall improvement of the quality of written argumentation produced by community college student writers after instruction in structured and non-structured strategies of rhetorical invention?	As demonstrated by the higher mean score on the students' argumentative essays in Sample 2, instruction in the strategies of rhetorical invention was beneficial and had a positive effect on the quality of the final drafts.
2	Are college student writers more likely to use structured or non-structured strategies of rhetorical invention for their written argumentation after being taught both?	In the pretest students were more likely to use non-structured than structured, mixed or no strategies of rhetorical invention. No statistically significant differences were detected in the posttest.
3	Is there a relationship between the nature of rhetorical invention used the student writers spontaneously and the nature of rhetorical invention after instruction?	A moderate correlation was detected between the type of strategy of rhetorical invention used by a student writer in Sample 1 and Sample 2.
4	Is there a relationship between the type of rhetorical invention and the quality of the final drafts of written argumentation produced by community college students?	The type of rhetorical invention had a stronger impact on the quality of students' written argumentation in the pre-test than in the post-test. The length of the evidence of rhetorical invention collected in Sample 1 was strongly correlated with the quality of final drafts of written argumentation.

CHAPTER V

DISCUSSION, CONCLUSIONS,

AND RECOMMENDATIONS

Introduction

This research study was designed to determine whether formal instruction in structured and non-structured strategies of rhetorical invention contributed to the overall improvement of college students' written argumentation. In addition, the goal of this study was to examine the relative effectiveness of structured (Larson's heuristic) and non-structured (freewriting) strategies of rhetorical invention for written argumentative discourse produced by the students in the study. The pretest-posttest design revealed that formal instruction in the above strategies contributes to the overall improvement of students' written argumentation as reflected by the scores on the Focused Holistic Scale for Argumentative Discourse.

The study examined (1) whether there was an overall improvement of the students' written argumentation after instruction in strategies of rhetorical invention; (2) whether college student writers are more likely to use structured or non-structured strategy of rhetorical invention while writing argumentative essays upon completion of instruction in both strategies; (3) whether there exists a relationship between the nature of invention strategy used by the student spontaneously while composing an argumentative essay during the pretest stage and the type of invention strategy used for the posttest; and (4) whether there was a relationship between the type of rhetorical invention and quality of the final draft of argumentative writing.

The results, reported in Chapter IV, are discussed in this chapter. First, the effects of formal instruction in structured and non-structured strategies of rhetorical invention are interpreted. Next, the analysis of the frequency with which students employed structured and non-structured strategies of rhetorical invention in Sample 1 and Sample 2 are provided. The relationship between the type of rhetorical invention and the quality of the final draft of written argumentation is discussed. Further, unhypothesized findings of this study are interpreted. Conclusions and recommendations for further research on

rhetorical invention are included in each of these sections. General conclusions and recommendations for instructional practices in the college composition classroom constitute the final section of this chapter.

Instruction in Strategies of Rhetorical Invention
And Quality of Written Argumentation

As a result of this study, it was determined that formal instruction in strategies of rhetorical invention has an impact on the quality of written argumentation produced by community college students. This research provided evidence that there is a tendency toward improvement of quality of students' written argumentation after student writers had been taught structured (Larson's Heuristic) and non-structured (freewriting) strategies of rhetorical invention. The results of the study are consistent with the findings of other studies designed to determine whether prior planning results in better written discourse produced by student writers (Flower & Hayes, 1992; Piolat & Rousseau, 1996).

The mean score on the essays solicited after completion of instruction was 2.98 on a 4.0 focused Holistic Grading Scale for Argumentative Writing. This mean score was higher than the mean score on the essays solicited prior to the beginning of instruction (2.84). It was determined that the observed overall increase of the students' grades on the essays written in the post-test phase of the study was not statistically significant.

In an attempt to interpret the above result, the following should be taken into consideration. The nature of the writing prompts in the pretest and posttest is not believed to be a critical factor that confounded the result of this study. Though all students within Sample 1 wrote their argumentative essays on the same topic, and all of them wrote on another writing prompt in the posttest, this characteristic of the design is unlikely to affect the outcome. This inference is based on the findings of the study conducted by Brossel (1983) that suggest that there exist "no significant differences among the levels of information load, or rhetorical context" (in Hillocks, 1986, p. 171). Further, as noted by Metviner (1981), "the rhetorically deficient" topics proved to be more effective (in Hillocks, 1986, p. 171). The effectiveness of the topics was assumed to be reflected in the quantity and quality of the produced discourse. In most studies conducted to test the

statistical significance of the topic variations, the results revealed that the variation in the quality of students' written discourse could not be accounted for by the variations in the writing prompts (Hillocks, 1986).

Lack of statistical significance of the difference between the students' scores on the argumentative essays in the pretest and posttest could be attributed to the following factors. First, writing is commonly recognized as complex and difficult intellectual endeavor. Though it is "both generative and open to reconfiguration" (Flower & Hayes, 1992, p. 205), the true change occurs slowly and should not be expected within a short period of time. Radical improvement within a short period of time occurs very seldom. This study was designed to take place during the three weeks of a regular sixteen-week long semester, and the value of its results lies in the fact that they provide ground to confirm the tendency toward improvement of students' written argumentation after instruction in and practice of application of strategies of rhetorical invention.

Further, this study was designed to examine whether there was an overall change in the quality of the produced written argumentation. The difference between the mean scores within pre-test and post-test, though not statistically significant, was detected. The most important inference that can be based on this finding is that there was an observed tendency toward improved written argumentation after students were taught how to use Larson's Heuristic and freewriting. Therefore, though the mean score difference was not statistically significant, the results of the study are encouraging.

Another factor that could account for the results of this study is that the change of the quality of a writer's discourse is not constant across the proficiency levels. For example, written discourse produced by experienced writers is subject to a more rapid change than the written discourse of those writers who have limited experience in written composing. Since the results of this study are aimed to provide empirical evidence in favor of classroom instruction in strategies of rhetorical invention, and since every college classroom is a heterogeneous environment, the proficiency level of the student writers was not statistically controlled. Specifically, no discrimination was made between advanced and problem writers despite the differences in the planning processes (Flower & Hayes, 1992). Further research is needed to examine the degree of effectiveness of

instruction in strategies of rhetorical invention for students whose levels of writing proficiency vary.

The direction of the change detected in the quality of students' written argumentation in the pretest and posttest suggests that future research is needed to determine the long-term implications of instruction in strategies of rhetorical invention on the quality of produced argumentation. Contrary to what Britton (1982) refers to as "spontaneous inventiveness," the findings of this study revealed that explicit instruction in the strategies of rhetorical invention does indeed contribute to an improvement of students' written argumentation. There is a need for further investigation to determine whether such instruction has a comparable effect of other modes of discourse. Specifically, the effects of instruction in the strategies of rhetorical invention for expository writing or personal narratives.

It should be noted, however, that on average, the improvement of the quality of written argumentation did not have an impact on the students' grades. The change of .27 was not a sufficient increase to move a score of an argumentative essay in either direction on a 4.0 scale adopted for assessment. There is a need for a more sensitive instrument of the assessment of students' written argumentation. Such an instrument would increase the accuracy of the measurement of the change would increase as a function of an increased sensitivity of an instrument. With the Focus Holistic Scale for Argumentative Discourse, the type I error was not guaranteed. It is possible that the instrument employed to measure the quality of students' written argumentation was not sensitive enough to record the change that occurred within a three-week period of time.

The results of the study were aimed to provide practical guidelines for the teachers of written composing. These results suggest that explicit instruction in the strategies of rhetorical invention should be included in the instructional procedures in a college composition classroom. Such instruction has proved to contribute to the improvement of students' written argumentation within a three-week period of time. This finding is consistent with the results of the study conducted by Scardamalia (1984).

Overall Quality of Students' Argumentative Discourse
After Instruction

Another important finding of this study was difficult to quantify, though not less interesting from a theoretical perspective. The overall nature of students' argumentative essays underwent a change during the time between the pretest and posttest. Specifically, 1.5 was the lowest observed score in both pre-test and post-test. The highest observed score in both samples was 4.0 on a 4.0 scale. However, the number of the essays that scored in the lower portion of the scale decreased dramatically in the post-test sample. For example, a mean score of 2.0 was observed in 13 cases in the pre-test, while the same score was observed in only 6 cases within the post-test. Since the sample sizes were equal, the above result reveals that more argumentative essays obtained higher grades in the post-test of the study. The lowest observed score in the pre-test was on an essay that contained no evidence of rhetorical invention. The score on the essay produced by the same student writer in the post-test was 3.0. Evidence of freewriting was submitted with the final draft of this essay within the post-test.

Further, as indicated in Chapter IV, the nature of distribution of the scores in the pre-test differed from that in the post-test. It was of a particular interest to the researcher whether the shape of the distribution underwent any transformations. The analysis revealed that the score distribution in the post-test approximated the normal distribution to a greater extent than that within the pre-test. This finding suggests that as a result of instruction in the strategies of rhetorical invention, students' performance at the posttest was more consistent with the expected. This inference is based on the greater degree of normality in the posttest. The scores on the essays in Sample 2 were more evenly distributed than the mean scores in Sample 1. This inference suggests a possibility for further research on the effects of instruction in the strategies of rhetorical invention. It appears relevant to examine whether the initial differences among the proficiency levels observed among the student writers are changed or perhaps even neutralized as a result of instruction in the strategies of rhetorical invention. This conclusion is consistent with the findings of other studies on the effects of planning on the quality of students' written discourse (Hillocks, 1986).

The study was designed to investigate whether explicit instruction in the strategies of rhetorical invention contributes to the improvement of students' written argumentation. Furthermore, it was aimed to determine the relative effectiveness of structured and non-structured strategies for this mode of discourse. The findings of this study reveal that students do not become more self-conscious about their writing after being taught invention strategies. Specifically, during the focus group discussion, students shared that they had become more confident in their writing. This positive change in attitude, it was indicated, occurred due to the knowledge of the planning stage of the writing process. This finding is consistent with the result of other studies on students' knowledge of strategies of rhetorical invention (Kellogg, 1987; LaRoche, 1993; Ross, 1996). Instruction in the strategies of rhetorical invention served as an external validation of the students' intuitive knowledge. The students shared that their anxiety often resulted from self-perception as the "worst writer in class," because they had no knowledge about "whether it was right" what they were doing.

It was a limitation of this study that students' knowledge of the scripts appropriate for written argumentation was not statistically controlled for in the pretest of the research. It was determined during the focus group discussion that students had little or no experience in composing written argumentative discourse prior to the beginning of the study. This factor could have confounded the quality of the essays solicited prior to the instruction in rhetorical invention. Specifically, it cannot be determined with certainty whether students whose essays were scored in the upper portion of the scale demonstrated high quality due to the application of the strategies of rhetorical invention or students' knowledge of the scripts appropriate for this mode of discourse.

However, the effect of students' varying background and experience in written argumentation were minimized in the posttest of the study. Instructional procedures were designed so that both strategies of interest, Larson's Heuristic and freewriting, were taught in context of existing argumentative discourse. Students read and analyzed essays, practiced application of structured and non-structured strategies of rhetorical invention, and discussed their results during the peer group and student-teacher conferences. Thus, the relative effectiveness of a particular type of the strategies of rhetorical invention is best reflected by the students' performance during the post-test phase of the study.

Granted the design of this study, an inference can be made that students' knowledge of strategies of rhetorical invention along with their knowledge of the scripts for the mode of discourse to be produced are critical to the quality of the final drafts. This conclusion is consistent with the findings of other studies on the variables of writing performance (Carey, 1989; Schnelle & Riley, 1991), who determined that there exists a positive relationship between the importance of rhetorical plans as well as students' ability to plan their written discourse.

Further, students' writing processes are difficult to standardize. Rough adjustments were made to categorize the evidence of rhetorical invention in the pre-test of the study. As a result, a group with evidence of an unhypothesized strategy was detected and labeled as "mixed" strategy of rhetorical invention. An interesting finding of this study was that the essays based on this strategy obtained the highest mean score within the pretest but appeared to score lower in the posttest. In fact, the essays based on mixed strategies of rhetorical invention in the posttest obtained the scores lower than the essays based on the same strategy of rhetorical invention in the pretest.

The lack of statistical significance of the observed difference between the mean scores within the pretest and posttest of this study could be attributed, at least in part, to the fact that a fairly large group of essays was submitted with evidence of mixed strategies of rhetorical invention. Instruction in application of these strategies was not provided, therefore, it may be assumed that the application of these strategies in the posttest was still based on intuitive assumptions. Further, the observed deterioration of the quality of the final drafts written on the basis of mixed strategies of rhetorical invention could have neutralized the observed difference between the other two groups entered in the analysis. The decision was made not to exclude the detected group of mixed strategies of rhetorical invention, since the results of this study are primarily to be used to guide a classroom instructional practice.

Student Use of Structured and Non-structured Strategies

Of Rhetorical Invention

This study was designed to explore whether students' choice of a strategy of rhetorical invention underwent a change during the three-week period of time. It was compared how students use strategies of rhetorical invention spontaneously, i.e., in the pretest, and after being taught freewriting and Larson's heuristic. As reported in Chapter IV, the frequency of students' use of structured strategies of rhetorical invention increased in the posttest. The mode of written discourse to be produced was controlled for, and both samples represented written argumentation.

Nine essays in the pre-test contained evidence of structured strategies of rhetorical invention, while twenty-two essays in the posttest were submitted with evidence of Larson's heuristic. The dramatic increase was observed in the students' use of structured strategies of rhetorical invention. The other two types of rhetorical invention that were detected and entered in the analysis at the pretest stage of the study, displayed a change as well. Students appeared to use freewriting almost as often in the posttest as they did in the pretest ($N_{1freewriting} = 9$, $N_{1present} = 39$, $N=48$; $N_{2freewriting} = 14$, $N=48$). Similar effect was observed for the combination of structured and non-structured strategies of rhetorical invention: eight students used it in the pretest and nine students applied it in the posttest ($N_{1mixed}=8$, $N_{1present}=39$, $N=48$; $N_{2mixed}=12$, $N=48$).

Evidence of structured strategies of rhetorical invention was represented by the fewest number of cases in the pre-test of this study. This result was somewhat puzzling since it would be logical to assume that the data would be distributed more evenly when students used strategies of rhetorical invention spontaneously and that every strategy of rhetorical invention would be observed with similar frequency. However, the majority of argumentative essays submitted in the pretest contained evidence of non-structured strategies of rhetorical invention. Further, as revealed by the analysis, there was no statistically significant difference between the mean score on the essays that contained evidence of rhetorical invention and those that contained no such evidence. It is possible then to assume that those students who used a structured strategy of rhetorical invention in the pretest chose not to submit its evidence with their drafts. This inference is also

supported by the fact that the increase in the students' use of Larson's heuristic in the posttest was not statistically significant.

The analysis of the students' preferences in the application of a particular strategy of rhetorical invention revealed that the nature of a strategy needs to be subjected to a thorough analysis. It appears reasonable to assume that students are more comfortable when submitting evidence of non-structured strategy of rhetorical invention than they are when including evidence of structured strategy. When given a choice, as in the pretest of this study, the students who applied a non-structured strategy of rhetorical invention constituted the overwhelming majority of the collected evidence. This observation was consistent with the results of the study conducted by Pope & Prater (1990). As revealed by the findings of both studies, students demonstrate a tendency toward using non-structured strategies of rhetorical invention.

The increased frequency of students' use of structured strategies of rhetorical invention and the consequent overall improvement of students' written argumentation are consistent with the findings of Ross (1996), who concluded that students' writing performance improves as they are taught how to use structured strategies of rhetorical invention These observations revealed that students with limited knowledge of the scripts for a written discourse to be produced lean toward that strategy of rhetorical invention that eliminates or reduces to reasonable minimum the need to filter information through the requirements of the genre. As suggested by Flower & Hayes (1992), resorting to a heuristic device may serve as a compensatory strategy the goal of which is to follow a pre-established line of inquiry. Further research is needed to determine whether structured strategies of rhetorical invention are equally instrumental and appealing to the students engaged in the production of other modes of discourse, e.g., personal narrative or expository writing.

As a result of this study, another possible suggestion for further research on the nature of students' invention can be made. It appears important to investigate whether those students who submitted no evidence of rhetorical invention in the pretest indeed applied a structured strategy of rhetorical invention and just chose not to submit it. Another possible line of inquiry for future research may be to determine whether students are more likely to expose evidence of non-structured strategies of rhetorical invention

than they are to provide evidence of non-structured strategies in a writing situation that approximates normal conditions. When students are not specifically taught the structured strategies of rhetorical invention, it may be hypothesized, they feel more reluctant to provide evidence of its application.

Argumentative discourse is generally considered a very structured mode of writing, for it possesses a clear statement of the author's position and demonstrates the knowledge of both sides of a conflict. Most important, it is the mode of discourse that is focused on the reader to a greater extent than any other of the existing modes of written discourse (Secor, 1983). It was hypothesized that though student writers may use non-structured strategies of rhetorical invention in the pre-test, they will favor the structured strategies after being taught them. This hypothesis was justified by the nature of discourse to be produced.

It cannot be determined with certainty whether students used more strategies of rhetorical invention in the posttest than in the pretest. It may be inferred, however, that the difference in the occurrence of various types in the pretest was statistically significant. No such conclusion can be made for the sample collected in the posttest. After being taught both structured and non-structured strategies of rhetorical invention, the distribution of the data approximated theoretically expected to a greater degree than in the pretest of the study. This inference was supported by the results of the statistical procedure.

As reported in Chapter IV, the observed differences among students' use of structured and non-structured strategies of rhetorical invention did not deviate from the expected frequencies. Though the number of occurrences of each strategy of rhetorical invention was not equal among the three groups, this difference was very small. It is concluded that after being taught both structured and non-structured strategies of rhetorical invention, students use both with comparable frequency.

As noted earlier, written argumentation is traditionally considered more structured than other modes of written discourse and generally involves more complex planning (Matsuhashi, 1981). Application of a structured strategy of rhetorical invention would then be more consistent with the writers' needs. Specifically, it would allow them to organize ideas as they go through the initial stage of their writing processes. Results of

this study did not provide evidence to support this assumption. Provided the nature of structured and non-structured strategies of rhetorical invention and frequencies of students' use of both strategies, it may be inferred that organizing ideas during the initial stage of the writing process did not have an appeal to the overwhelming majority of the student writers.

This result is consistent with the findings of other studies on rhetorical invention (Flower & Hayes, 1992). Though students organize their ideas as they are engaged in the rhetorical invention, this process is less intense than during the drafting and revising. It appears that students internalize the suggestion of many composition textbooks and attempt to generate more ideas for their written discourse rather than try and organize these ideas. The results of this study revealed that planning does not always involve structuring and patterning of discourse.

Non-structured strategies of rhetorical invention allow writers more flexibility and more freedom in determining the provisional direction of their inquiries. Since the purpose of the stage of rhetorical invention is to assist the writer in generating as many ideas as possible, non-structured strategies appear to accomplish this goal to a greater extent. Structured strategies in general and Larson's Heuristic in particular impose too many constraints that impede writer's free expression. This finding is consistent with the results of the study of cognitive analysis of planning in adult writers carried out by Flower & Hayes (1992). The researchers note that "the process of building [global and local plans] does not have to proceed in an orderly top-down or bottom-up fashion—even if the final network behind a coherent paper is hierarchical" (p. 204)

It may be inferred, however, that the third group of strategies of rhetorical invention detected within both pre-test and post-test of this study may provide an invaluable source of information about the nature of students' planning. Specifically, following the protocol analysis conducted by Flower and Hayes (1992) and using the results of this study, the following inferences cam be made. First, evidence of mixed strategies of rhetorical invention clearly demonstrated two levels of planning detected by Flower and Hayes (1992). These two levels determined the global and local goals established by the writers during the planning stage of their writing processes. Guided by a particular global question of Larson's Heuristic, students reshaped their focus and often

began to freewrite on an insight that did not appear to be directly stimulated by a question of the heuristic.

As noted earlier, students had very limited knowledge of and experience in written argumentation as a particular discourse mode prior to the beginning of instruction. This could justify their preference for non-structured strategies of rhetorical invention in the pre-test: due to the lack of the criteria for determining how to filter their discourse, students intuitively applied a non-structured strategy of rhetorical invention. It is assumed that after instruction in the strategies of rhetorical invention and exposure to written argumentation, students began to establish the schemas for developing their essays in the posttest of this study.

Further, it is unlikely that students' scripts for written argumentation were fully developed and mature after the three weeks of instruction, though it is undeniable that students were more confident in their knowledge of appropriate patterns for constructing this mode of discourse. Indirectly, the increase in the observed frequency of students' use of Larson's Heuristic in the posttest of the study may be attributed to this fact. Specifically, consistent with the findings of Flower and Hayes (1992), opportunistic planning, i.e., planning as a response to a pre-established though provisional goal, increased. Students responded to a line of inquiry suggested by Larson's Heuristic but as they generated ideas stimulated by it, they managed the generated information through resorting to something that was less rigid and more informal, i.e., freewriting. This process could be responsible, at least to a degree, for the large group of evidence of rhetorical invention that could not be classified as either structured or non-structured.

Pre-test to Post-test Use
Of Strategies of Rhetorical Invention

As a result of this study, it was determined that students' use of the rhetorical invention strategies in the pretest and posttest were moderately correlated. It was found that there was a strong probability that students who used a non-structured strategy to generate ideas for the argumentative essay within the pretest used freewriting as a strategy of rhetorical invention for their essays in the posttest. Similarly, the students who

used some structured strategy of rhetorical invention in the pre-test often used Larson's Heuristic to generate ideas for their written argumentation in the posttest. In 52 % of the cases the strategy used within the pretest was correlated with the strategy used in the posttest.

It was one of the goals of this study to collect data of the nature of students' rhetorical invention under normal conditions that approximated a self-sponsored rhetorical situation and to compare this data with the data solicited after instruction in strategies of rhetorical invention. Due to the fact that students were advised but not required to submit evidence of rhetorical invention in the pre-test, it cannot be determined with certainty that these students did not complete the planning phase of their writing processes.

Students' use of strategies of rhetorical invention in the pretest was spontaneous and intuitive. The evidence collected represented disorganized artifacts of word associations, looping, etc. within the non-structured group and artifacts with outlines, lists, etc. in the structured strategies group of the data. It was noted that students remained fairly consistent in their use of a type of strategy of rhetorical invention. This inference suggests that perhaps students' preference of a particular type of strategy varies not as a function of discourse mode to be produced but rather of students' cognitive modes. Further research is needed to determine whether explicit instruction in strategies of rhetorical invention or student characteristics are a better predictor of the quality of written discourse. No known study has been designed to explore the above research problem.

An interesting finding of the study was that though students favored similar strategies of rhetorical invention in both pretest and posttest, the quality of the final drafts underwent a slight change as reflected in the mean scores on the Focused Holistic Scale for Argumentative Discourse. Specifically, the mean score of the essays based on the non-structured strategies of rhetorical invention in the pre-test was higher than the mean score of the essays based on freewriting in the posttest. Similarly, the mean score on the essays based on structured strategies of rhetorical invention in the pretest was higher than the mean score on the essays based on Larson's Heuristic in the posttest.

This finding suggests that explicit instruction in the above strategies of rhetorical invention, combined with students' exposure to written argumentation and practice in application of these strategies, contributed to the improved quality of their argumentative essays. The group of essays based on a combination of both structured and non-structured strategies of rhetorical invention in the pretest sample of the study obtained the highest mean score among the three groups entered in the analysis. However, the group of essays based on the mixed strategies of rhetorical invention in the posttest had a less impressive mean score than in the pre-test. This fact may be attributed to the nature of instruction in the strategies of rhetorical invention: students were taught how to use structured (Larson's Heuristic) and non-structured (freewriting) strategies but not a combination of the two. Thus, in the absence of explicit instruction, a combination of the two types of strategies appears to be less effective than the strategies taught and practiced.

Consequently, while students' use of both structured and non-structured strategies of rhetorical invention became more refined and sophisticated, the success of their application of a combination of the two types of strategies seemed to deteriorate, which was reflected in the lower mean score of the essays in this group in the posttest. Two groups of essays, those based on non-structured and structured strategies of rhetorical invention, revealed an overall improvement, while the group of essays based on a combination of the strategies obtained a lower score in the posttest. Future research may attempt to determine whether mixed strategies of rhetorical invention are effective if they are taught and practiced.

As reported in Chapter IV, student participants of the focus group discussion articulated the limitations of both Larson's Heuristic and freewriting. The results are consistent with theoretical discussion of "adult planning" provided by Flower, Schriver, Carey, Haas, Hayes (1992). The researchers suggest that the one of the most typical characteristics of rhetorical invention among adults is an attempt "to plan a complex response to a complex rhetorical situation" (p. 205). Within such planning writing is governed by global goals and working goals. The former originate in the writers' understanding of the rhetorical situation, while the latter are dynamic structures that originate in the writers' knowledge of the content and schemata appropriate for the mode of discourse to be produced.

As discussed in Chapter IV, students found that Larson's Heuristic was often reductionist in that it failed to allow the student writers enough space to elaborate on a question. A combination of the features of structured and non-structured strategies of rhetorical invention among student writers in this study, therefore, was a way of conflict resolution. Flower, et. al (1992) discuss a similar observation:

> Facing conflicts was a surprisingly common experience for these writers. In these encounters, goals come into contention with each other, or the text is in violation of certain constraints, or intentions run into the barrier of the writer's own inadequate topic knowledge. Such conflicts can fuel frustration and writer's block, yet a sensitivity to conflicts may open the door to an integrated plan (p. 225)

It may be concluded, then, that the top-level global goal of producing a piece of argumentative written discourse was in conflict with the working goals as suggested by the questions of Larson's Heuristic. The findings of this study suggest that students' reliance on the questions of Larson's Heuristic is less effective than their sophisticated application of freewriting. Though the latter is more conducive to the shift in emphasis, its overall effectiveness for written argumentation is undeniable. Larson's heuristic appeared to contribute to content generating among the writers, while freewriting necessitated active goal formation and thereby called for higher level cognitive processes.

Type of Rhetorical Invention
and Quality of the Final Drafts

The results reported in Chapter IV enable the researcher to make the following inferences. First, no statistically significant difference was detected between the group of essays submitted with evidence of rhetorical invention regardless of the type of strategy used and the group of essays submitted without any evidence. This finding suggests that students could have planned their argumentative essays without articulating their preliminary results in the written form. This inference is consistent with the assumptions

of Flower, Schriver, Carey, Haas, and Hayes (1992) about the possibility of non-textual rhetorical invention. This phenomenon is perhaps the least studied type of planning and should be addressed in future studies on rhetorical invention. Few studies have been designed to investigate whether students who create "mental drafts" obtain lower grades if compared to the students who articulate their rhetorical invention prior to the drafting of their essays (Kellogg, 1988).

Second, among the evidence of rhetorical invention that was submitted along with the final drafts of written argumentation, it was determined that regardless of the strategy of rhetorical invention in the pretest, students whose evidence of rhetorical invention was long typically produced argumentative essays of significantly higher quality than those who submitted short evidence of rhetorical invention. This result is consistent with the findings of think-aloud protocol analysis carried out by Flower & Hayes (1992) and a study conducted by Piolat & Rousseau (1996) and provides quantitative data on the variables of interest. The result of this study is also consistent with the findings reported by Piolat and Rousseau (1996). In their study "a long draft enabled the students in both class years to obtain a better grade on the essay than did a short draft" (p 121).

This study confirms that more extensive planning, as reflected in longer evidence of rhetorical invention, contributes to a better written argumentative discourse, a finding similar to those of other studies designed to investigate the extent of students' planning while composing for expository writing. It may be concluded that the extent to which students are engaged in planning is of paramount importance for the outcome of the writing endeavor. Noteworthy, though the mean score on the essays with evidence of rhetorical invention, long or short, was higher than the mean score on the essays with no such evidence, the observed difference was not statistically significant.

Thirdly, the essays based on non-structured strategies of rhetorical invention within the pre-test obtained significantly higher scores than the essays based on structured strategies, mixed strategies as well as those essays that were submitted with no evidence of rhetorical invention. The observed difference was statistically significant. The inference based on this result is that when students use strategies of rhetorical invention spontaneously, non-structured strategies such word associations, looping, etc. typically contribute to a higher quality of the final drafts of written argumentation than

structured strategies of rhetorical invention. This inference may be interpreted to suggest that when engaged in non-structured strategies of rhetorical invention, students enjoy more flexibility and generate more ideas than when they apply structured strategies. Used spontaneously, i.e., prior to the instruction, non-structured strategies of rhetorical invention appear to be superior to structured strategies in that they contribute to higher quality of final drafts of written argumentation.

However, the results obtained from the analysis of the data within the posttest of the study revealed that though there was an observed difference among the mean scores on the essays based on structured, non-structured, and mixed strategies of rhetorical invention, this difference was not statistically significant. In an attempt to interpret this finding, it may be suggested that students' knowledge of the scripts for written argumentation improved. This growing knowledge of the schemas appropriate for the mode of discourse to be produced could have neutralized the effects of application of any particular strategy of rhetorical invention. Further research is needed to examine whether knowledge of the strategies of rhetorical invention is indeed a predictor of the quality of the produced final drafts, provided students' knowledge of the scripts for written argumentation is statistically controlled.

Though it was demonstrated that the strategies examined in this study possess the most characteristic features of the entire cluster to which they belong, an additional investigation should be carried out in order to determine whether other strategies of rhetorical invention, not included for direct analyses in this study, can be assigned comparable qualities. For example, though Burke's Pentad bears a striking resemblance to classical invention and to Aristotle's topoi in particular, further research needs to be carried out to examine whether the results of this study can be applied to predict the degree of its effectiveness for written argumentation.

Suggested Questions for Future Research

1. Does effectiveness of instruction in the strategies of rhetorical invention vary as a function of a discourse mode to be produced?
2. Is there a relationship between the writers' proficiency levels and the effectiveness of the strategies of rhetorical invention?
3. Is the extent of rhetorical invention as measured by length of its articulated evidence a reliable predictor of the quality of written argumentation?
4. Does the effectiveness of structured and non-structured strategies of rhetorical invention vary across the modes of discourse?
5. Does instruction in constructive planning, i.e., a combination of structured and non-structured strategies of rhetorical invention, contribute to a higher quality of the final drafts?
6. What are the strategies of rhetorical invention used but not articulated by the student writers?

Implications for Teaching

As a result of this research study, the following suggestions are offered to the teachers of written composing. First, community college students benefit from explicit instruction in the strategies of rhetorical invention. Both structured and non-structured strategies appeal to students and guide their spontaneous inventiveness. Because many of the students have a limited knowledge of scripts appropriate for written argumentation, structured strategies of rhetorical invention such as Larson's Heuristic serve as a compensatory device and allow student writers to explore the issue more thoroughly.

Next, students benefit from having a variety of strategies for developing of their written argumentation. As revealed by the results of this study, students tend to apply both structured and non-structured strategies with comparable frequency after being taught both. Furthermore, students' choice of invention strategy is contingent upon their spontaneous pre-disposition only partially. Deductive and inductive instruction is a critical factor of students' successful writing.

The type of rhetorical invention is strongly correlated with the quality of the final drafts of written argumentation when students' knowledge of appropriate scripts is not sufficient to serve as a guiding force behind their writing process. More mature knowledge of the scripts, complemented by students' knowledge of the strategies of rhetorical invention, results in higher quality of written argumentation.

Finally, the extent of rhetorical invention as measured by the length of the artifacts is strongly correlated with the quality of produced argumentative discourse. Due to the fact that written argumentation is one of the most structured modes of discourse, arranging their thoughts in a linear fashion enables students to be better prepared for the drafting stage of their writing processes.