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Research Article

Assignment Patterns and their Relationship to Students' Academic Achievement

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ABSTRACT

The study attempted to determine the relationship of the assignment patterns in the assignment scores and academic achievement of fourth year students of Cristo Rey High School in Capas, Tarlac during the Academic Year 2014-2015. Specifically, the study sought to describe the assignment scores and achievement test scores of the students in the three assignment patterns. To test their significant difference and to find out whether there is a significant relationship between assignment patterns and students' academic achievement. The quantitative research, specifically correlational method was employed. The major instruments used were the three assignment patterns and the researcher-made achievement test. Results of the three patterns assignment scores and achievement test scores were tabulated for interpretation. Findings showed that the lateral assignment pattern appeared to be the best pattern based on the result of their assignment scores and achievement test scores. A significant difference was marked among the assignment scores and achievement test scores of the students. The two criterion variables were significantly and highly positively correlated. Thus, giving assignments to students means improving their academic achievement in Mathematics and vice versa.

Keywords: relationship; lateral assignment pattern; spiral assignment pattern; vertical assignment patterns; students' academic achievement.

INTRODUCTION

Assigning homework serves various educational needs. It serves as an intellectual discipline, establishes study habits, eases time constraints on the amount of curricular material that can be covered in class, and supplements and reinforces work done in school. In addition, it fosters student initiative, independence, and responsibility.

Assignment is one important element in classroom management. The progress of the student in a course bears direct relation to the degree of challenge in the work required of them. It is a widespread belief that among school administrators, teachers and parents that assignment is a valuable tool to raise student effort. As a vital part of the teaching-learning process, assignment serves as the main intersection between home and school. Tasks

assigned out-of-class to students are an extension or elaboration of classroom work. Gregorio [11] defined assignment as simply the laying out of a task and procedure for mental work. It is a specific piece of work to be done by the students, under certain conditions and in a certain way. It is the initial point in directing the studying and learning of the students. Proper utilization of assignment leads to self-mobilized oriented and self-directed students.

Assignment as a tool allows individualization, since a student is independent to tackle his assignment in his/ her own perspective and point of view [4]. However, some teachers are not aware of the problems they create in giving homework. Parents, as well as those who accept tutorials, complain about the way the teachers give homework. Canonizado stated that to avoid the conflicts teachers need to be specific in giving homework. Second,

teachers must give an instruction that can be easily understood by the students, and lastly, teachers must avoid giving homework that is beyond the knowledge of everyone.

To cope with the challenges of the 21st century, there is a need to improve quality of instruction in Mathematics. According to Añez [1], the citizens of the modern world cannot afford to be ignorant in Mathematics. Thus, Mathematics teachers need to search for more effective strategies and methods to provide a springboard to enhance knowledge, skills and attitudes of students towards computations, analyses and application of math problems in daily lives. Giving the right assignment pattern to students may improve the mathematics performance of the students. Anything learned or formed needs to be strengthened or reinforced. Disuse of what has been learned leads to forgetting. Assignment is one of the reinforcement activities given by the teachers to improve the achievement and retention of students' learning. It can be the assignment that deals with the present lesson or the assignment with the inclusion of the previous or present lesson, or the assignment with the combination of the past, the present and future lesson.

The researcher renamed in this study, the types of assignment as assignment patterns namely the lateral, the spiral and the vertical patterns. With these three patterns of giving assignment, the researcher would like to find out which of them is the most effective and if these assignment patterns have a significant relationship to the improvement of students' assignment scores and academic achievement in general.

2. Objectives:

This study is guided by the following objectives:

1. To determine the assignment scores and academic achievement of the students in terms of lateral assignment pattern, spiral assignment pattern and vertical assignment pattern.
2. To determine the significant difference among the assignment scores and academic achievement of the groups in the three assignment patterns.
3. To determine significant relationship between the assignment scores and the academic achievement in the lateral assignment pattern group, spiral assignment pattern group and vertical assignment pattern group.

3. Hypotheses:

1. There is no significant difference among the assignment scores of the students using the lateral, spiral and vertical assignment patterns.
2. There is no significant difference in the academic achievement of the students in the lateral, spiral and vertical assignment patterns.
3. There is no significant relationship between the assignment scores and academic achievement of the students in the lateral assignment pattern group, spiral assignment pattern group and vertical assignment pattern group.

MATERIALS AND METHODS

4.1 Respondents:

The respondents of the study were the three sections taken from 15 heterogeneous classes in the fourth year level enrolled in the Academic Year 2014-2015 of Cristo Rey High School, Cristo Rey, Capas, Tarlac, Philippines. The cream section or the homogenous class was not included in the selection. Using the draw lots technique, of the 15 heterogeneous sections, the three sections came from sections IV- Purity, IV- Loyalty and IV- Piety with a total of 120 students.

4.2 Instruments:

To collect the necessary data for the study, the three assignment patterns and the teacher-made achievement test were used.

In this study, the three assignment patterns used were the lateral, spiral and vertical patterns. In the lateral assignment pattern group of giving assignment after the teacher/researcher discussed a certain lesson under quadratic function the students were given assignment related to the present lesson. In the spiral pattern group of giving assignment, after the teacher/researcher discussed the same lesson under quadratic function the students were given assignment related to the past, the present and the future lessons. On the other hand, in the vertical pattern group of giving assignment, after the teacher/researcher discussed the same lesson under quadratic function the students were given assignment related to the present lesson and the past lesson.

The researcher constructed a teacher-made test in Mathematics IV. It covers second quarter lessons in Quadratic Functions whose subtopics are: Quadratic Function Defined, Deriving $f(x)=a(x-h)^2+k$ from the Quadratic Function $f(x)=ax^2+bx+c$, the Vertex and Axis of Symmetry of the Graph of a Quadratic Function and the y-Intercept, Graphing a Quadratic Function, Forms of a Quadratic Function, Zeros of a Quadratic Function, the Quadratic Function Derived from Zeros of the Function and Word Problems Involving Quadratic Functions. A 40-item multiple choice test was constructed for these lessons.

Pilot testing was done to establish the validity of the teacher-made achievement test. Reliability coefficient was determined using the Kuder-Richardson Formula 20 to ascertain the reliability of the test. The test items were analyzed to determine which items were good, fair, and poor items. Good and fair items were retained and poor items were improved or modified. The results provided the item analysis, the difficulty and the discrimination indices, and the reliability of the test.

4.3 Data Analysis:

A rubric scale was used in scoring the solutions per item of each student assignment.

Description	Assignment Mean Score
Excellent	129.00-160.00
Above Average	97.00-128.99
Average	65.00-96.99
Below Average	33.00-64.99
Poor	0.00-32.99

Scores for each assignment patterns were interpreted using the following scale:

Description	Achievement Mean Score
Excellent	33.00-40.00
Above Average	25.00-32.00
Average	17.00-24.00
Below Average	9.00-16.00
Poor	0.00-8.00

Scores from the achievement test were interpreted using the following scale:

The Pearson Product Moment Correlation Coefficient (sometimes referred to as the PPMCC, and typically denoted by *r*) was used in establishing correlation between assignment scores and academic achievement of students in Mathematics IV.

Raw scores obtained from the achievement test were presented in tabular form for the purpose of interpretation. For the manipulation of data, the frequency, percentage, means, and differences of means were computed for each group. The difference in performance was computed by the Analysis of Variance (ANOVA) and tested by the F-ratio at 0.05 level of significance. Means of the three groups were compared to measure the relationships of the assignment patterns to the performance of the group by ANOVA and F-test.

5. Results:

5.1 Findings

Table 1 presents the summary of the assignment scores of the students on lateral, spiral, and vertical assignment patterns. It shows that the mean score of the students in lateral assignment pattern is the highest of the three groups which is 103.63 with a

description of *above average* followed by the mean score of the spiral assignment pattern which is 89.83 with also a description of *above average* and the mean score of the vertical assignment pattern is the lowest which is 78.95 with a description of *average*. This means that students exposed to lateral assignment pattern performed better in their assignments compared to the other two groups. These results contradict the findings of Castro that students exposed to distributive organizational assignment pattern (past and present lesson) achieved significantly better than students who were exposed to the vertical organizational assignment pattern (present lesson) and the oblique organizational assignment pattern (past, present and future lesson).

When a student is assigned a thoughtful homework assignment, he/ she is more apt to complete the assignment with diligence and is engaged in his/her learning experience. In these situations, homework is used to reinforce what was done in the classroom, but also to spark the student's interest for the next class and well beyond.

Table 1: Assignment Scores of the students.

Assignment Mean Scores	Lateral Ass.Pattern		Spiral Ass. Pattern		Vertical Ass.Pattern		Description
	f	%	f	%	f	%	
129.00-160.00	12	30	1	2.5	0	0	Excellent
97.00-128.99	13	32.5	14	35	4	10	Above Average
65.00-96.99	10	25	21	52.5	28	70	Average
33.00-64.99	2	5	4	10	8	20	Below Average
0.00-32.99	3	7.5	0	0	0	0	Poor
Total	40	100	40	100	40	100	
Mean Score	103.63		89.83		78.95		
sd	36.77		33.31		33.33		

Table 2 shows the academic achievement of the students in the lateral, spiral and vertical assignment patterns. It reveals that students' academic achievement of the lateral assignment pattern got the highest computed mean score of 26.40, followed by the mean score of the vertical assignment pattern that is 22.83, and the spiral assignment pattern that is 20.53. Most of the scores of the students in the lateral assignment pattern obtained a descriptive rating of *above average*, while the score of the students in the spiral assignment pattern and vertical

assignment pattern falls on the same descriptive rating of *average*. It simply means that the students exposed to the lateral assignment pattern performed better in their achievement test as compared to the two other patterns. These findings substantiated the study of Falch & Ronning that assigning homework to students have statistically significant effect on their achievement.

Cooper, *et al.* [8] maintains that with only rare exceptions, the relationship between the amount of

homework students completed and their achievement outcomes was positive and statistically significant.

Students should be encouraged more serious and determined in their learning pursuit and should

imbibe healthy study and work attitudes and habits in order to achieve higher scores/grades.

Table 2 Achievement test scores of the students

Achievement Test	Lateral Ass. Pattern		Spiral Ass. Pattern		Vertical Ass. Pattern		Description
	f	%	f	%	f	%	
33.00-40.00	4	10	2	5	0	0	Excellent
25.00-32.00	23	57.5	7	17.5	18	45	Above Average
17.00-24.00	12	30	20	50	15	37.5	Average
9.00-16.00	1	2.5	11	27.5	7	17.5	Below Average
0.00-8.00	0	0	0	0	0	0	Poor
Total	40	100	40	100	40	100	
Mean Score	26.40		20.53		22.83		
sd	5.128		5.848		5.237		

Table 3 shows that there is a *significant difference* among the assignment scores of the students in the three assignment patterns because of

the F-value 5.136, which is significant at 0.05. level of significance.

Table 3: Comparison of the three assignment patterns in their assignment scores.

	Sum of Squares	df	Mean Square	F Sig	
Between Groups	12234.15	2	6117.08	5.136	0.007
Within Groups	139341.1	117	1190.95		
Total	151575.2	119			

In relation to Table 3, as could be gleaned from Table 4, the multiple comparisons of the three patterns in the dependent variable, assignment scores are presented. The mean of each group was compared to the other two to measure their achievement by the standard error of difference between means of correlated data. Result reveals that the lateral group still holds the highest mean difference as compared to the spiral group and vertical group. The mean difference of the lateral group over spiral group was 13.800, while the mean difference of the lateral group over vertical group was 24.675. The comparison of assignment scores of lateral group over vertical group and vertical group over lateral group are both significant at 0.05 level.

It implies that students exposed to the lateral and vertical assignment patterns got the higher scores in their assignments as compared to that in the spiral assignment pattern. In contrast with these findings, Reed found out that the distribution content

of math homework assignments that includes material meant to practice past lessons or prepare for future lessons, or both, are more effective than assignments that include only same-day content.

Similar with the researchers' and her colleagues' observations and personal experiences, the students' practice in doing their assignments is that some students nowadays submit their output task for compliance only. Only few students take their assignment seriously. They fail to realize that homework is an effective tool when used as a form of practice designed for application of knowledge.

It is important that the students are aware of the skills that they need to be able to possess before they go home and do it with homework. Many parents might not be available, or might not know how to actually help them with the concept, or may do it differently. Therefore, it is important that teachers know that the students understand the concept before they send them home with the practice.

Table 4: Multiple comparisons of assignment scores.

Assignment Patterns		Mean Difference	Sig.	Interpretation
Lateral	Spiral	13.8	0.076	Not Significant
	Vertical	24.675*	*0.002	Significant
Spiral	Lateral	-13.8	0.076	Not Significant
	Vertical	10.88	0.161	Not Significant
Vertical	Lateral	-24.675	*0.002	Significant
	Spiral	-10.9	0.161	Not Significant

*The mean difference is significant at 0.05 level.

The F-value of 11.961 at .05 level of significance in Table 5 shows that very significant difference was marked among the achievement test scores of the three groups of students with different assignment patterns.

Table 6 illustrates the multiple comparisons of the three assignment patterns in the dependent variable, academic achievement. Result reveals that the lateral assignment pattern still holds the highest significant mean difference as compared to the other two patterns. The mean difference of the lateral

assignment pattern over spiral assignment pattern was 5.875, while the mean difference of the lateral

assignment pattern over vertical assignment pattern was 3.575.

Table 5: Comparison of the three assignment pattern groups in their achievement test scores.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	701.15	2	350.575	11.961	0.000
Within Groups	3429.35	117	29.311		
Total	4130.5	119			

It simply means that students in the lateral assignment pattern group got higher scores in their achievement test as compared to the other two groups.

On the multiple comparisons of the three patterns on the academic achievement of students, only the vertical over spiral pattern or spiral over vertical pattern was not significant in result. The rest were significant at 0.05 level.

It was slightly similar with the analyzed studies of Cooper [8] that compared students who completed

homework with those who completed no homework. Across five studies, the average homework completer had higher scores on unit tests compared to the students who completed no homework.

Homework was positively linked to student achievement. It is an inexpensive method of improving students' academic preparation without increasing staff or modifying curriculum. "So, as the pressure to improve test scores continues to increase, so does the emphasis on homework".

Table 6: Multiple comparisons on the academic achievement of the three assignment patterns.

Assignment Patterns	Mean Difference	Sig.	Interpretation
Lateral	Spiral	5.875*	Significant
	Vertical	3.575*	Significant
Spiral	Lateral	-5.875*	Significant
	Vertical	-2.3	Not Significant
Vertical	Lateral	-3.575*	Significant
	Spiral	2.3	Not Significant

* The mean difference is significant at 0.05 level

** Correlation is significant at 0.01 level.

Pearson Product-Moment Correlation Coefficient was used in the computation of results as displayed in Table 7 to show the relationships

between assignment scores and academic achievement of the students exposed to three assignment pattern.

Table 7: Correlation between the assignment score and academic achievement of the three assignment patterns.

Assignment Pattern	Variables	r comp.	Degree of Correlation	Sig. (2-tailed)	Interpretation
Lateral Group	Assignment Score	.985**	High Positive Correlation	0.000	highly significant
Spiral Group	VS	.889**	High Positive Correlation	0.000	highly significant
	Academic Achievement	.988**		0.000	
Vertical Group	Academic Achievement	.988**	High Positive Correlation	0.000	highly significant

** Correlation is significant at the 0.01 level.

Students exposed to the lateral assignment pattern, the computed $r=.985$, while in the spiral assignment pattern the calculated $r=.889$ and in the vertical assignment pattern $r=.988$. The significant level obtained by the three assignment patterns is less than the *set alpha* level of 0.01. The two variables are highly positively correlated to each other. By positive correlation is meant that as the value of one variable increases, the value of the other variable also increases; and as one decreases, the other also decreases.

The findings were parallel in the work of Blanco [4]. She revealed that there is a significant relationship between students' academic performance in mathematics and the most effective assignment pattern. It shows in her study that the

assignment patterns have associated the performance of students in mathematics based on the increase of their posttest result as compared with their pretest. Through practice and participation in learning tasks, homework can improve students' achievement. Thus, it would be expected that if homework were completed accurately, not only would the student's general knowledge and grades improve but the student would also increase mastery of basic academic skills, such as reading, writing, spelling and mathematics.

5.2 Discussion and Conclusion

Based on the assignment scores of the students in the three assignment patterns, findings show that the computed mean score of the lateral assignment

pattern was the highest of the three groups which is 103.63 with a rating of *above average* followed by the mean score of the spiral assignment pattern which was 89.83 with the same rating of *above average* and the mean score of the vertical assignment pattern is the lowest which was 78.95 with a rating of *average*.

In terms of students' academic achievement in the three assignment patterns, the lateral group got the highest computed mean score of 26.40 with a rating of *above average* while the mean scores of the spiral group 20.53 and vertical assignment group 22.83 had a rating of *average*.

With the F-value of 5.136 at 0.05 level, ANOVA reveals that significant difference was marked among the students of the three assignment patterns. In the multiple comparisons of the three patterns in the dependent variable, assignment scores, result shows that the lateral assignment pattern still holds the highest mean difference as compared with the other two patterns. The mean difference of the lateral assignment pattern over spiral assignment pattern was 13.800, while the mean difference of the lateral assignment pattern over vertical assignment pattern was 24.675.

With the F-value 11.961 at 0.05 level of significance, ANOVA shows that very significant difference was marked among the three groups of students exposed to the lateral assignment pattern, spiral assignment pattern and vertical assignment pattern in their academic achievement.

From the multiple comparisons of the three patterns in the dependent variable, academic achievement, result shows that students exposed to lateral assignment pattern still holds the highest significant mean difference of 5.87500 against spiral assignment pattern and 3.57500 against vertical assignment pattern.

Using the Pearson Product-Moment Correlation Coefficient between assignment scores and students' academic achievement of the three assignment patterns, result shows that each pattern is highly positively correlated to the two set criterion variables. The computed $r=.985$ for lateral assignment pattern, while the computed $r=.889$ for spiral assignment pattern, and the computed $r=.988$ for vertical assignment pattern.

Since the significant level of the two correlations for each group is less than the *set alpha* level of .01, the null hypothesis was rejected.

Based on the results and findings of the present study, the following conclusions are derived:

Students exposed to the lateral assignment pattern appeared to be the best among the three as described in the result of their assignment scores.

In terms of students' academic achievement, the students exposed to the lateral assignment pattern performed better compared to the other two assignment pattern groups.

A significant difference was marked among the assignment scores of the students in the three assignment patterns. From the multiple comparisons of assignment scores, students exposed to the lateral

assignment pattern and vertical assignment pattern got the higher scores in their assignments as compared to the spiral assignment pattern.

A significant difference was also marked among the achievement test scores of the students in the three assignment patterns. In the multiple comparisons of their achievement test scores, students from the lateral pattern group got the higher scores in their achievement test as compared to the two other patterns.

The assignment score and academic achievement of the three groups of students were *significantly and highly positively correlated*.

5.3 Recommendations:

After careful review of the findings and analyses of the study, the following recommendations are proposed:

The principal and other school administrators should have a collaborative effort in coming up with various projects, activities such as workshops, seminars and programs for teachers regarding the use of the most effective assignment pattern, in this case, the lateral assignment pattern, so that they will be able to increase students' assignment scores and to address the needs of the learners.

The teacher must be adequately equipped with the knowledge and skills on the importance of giving assignments to students for the improvement of their academic achievements, specifically, the giving of assignment after the day's lesson.

Whatever assignment patterns is used, students' assigned task should be checked regularly to motivate the making of assignments and to ensure maximum outcome.

Since the lateral pattern of giving assignment evidently showed significant outcome in terms of achievement test scores, the mathematics teacher should further explore its effectiveness.

Teachers should emphasize and instill in the minds of the students the importance of assignment in whatever pattern it comes as a reinforcement activity for their academic achievement. Researchers may replicate this study using other groups of students.

Authors' Contribution:

Dr. Minnie M. Calaguas, thesis adviser, guided Ms. Lorna C. Rodriguez, the main author, in the conceptualization and editing of the current study.

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