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Teacher-Written Comments and Differing Frequency of Homework: Their Effect on Pupils' Mathematics Achievement

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ABSTRACT

This study reports the effect of teacher written comments on pupils' Mathematics and differing frequency of homework on pupils' Mathematics achievement. It utilized a pretest-posttest quasi experimental control group design to gather the data. This study was administered at Claveria Central School in Claveria, Misamis Oriental among grade five pupils. The analysis of covariance was used to analyze the data collected because the participants were intact classes devoid of randomization. Results disclosed that the frequency of homework, whether given daily or twice a week does not affect the mathematics achievement of the pupils. Pupils with daily homework are as good as those with twice a week homework. The feedback system, as given on the quizzes of the pupils affect the achievement of scores of the pupils. The pupils with comments on their quizzes performed better than those without comments. The achievement score of pupils as influenced by feedback on quizzes does not interact with the achievement scores as influenced by the frequency of homework. The researcher suggests that teachers should indicate correct answers, solutions, and favorable remarks in addition to giving grades when checking quizzes since it enhances the achievement of the pupils. Quizzes should be returned with correct answers, solutions and favorable remarks and grade by a mathematics teacher.

Keywords: Written comments, homework, feedback

INTRODUCTION

Every student is worthy of an excellent program of instruction in mathematics that challenges each student to achieve at a high level the requirement for productive citizenship and employment. Teachers guide the learning process in their classroom environment through a variety of instructional approaches directly tied to the mathematics content and student needs.

Today's children cannot be prepared for tomorrow's increasingly technological world with yesterday's content. The widespread impact of technology on almost every aspect of our lives requires changes in the content and nature of school mathematics program. Such changes involve the different areas of the mathematics program inorder to address the preparation of the students of today. These areas includes teaching strategies, methods, instructional tools, assessment, homework, and other teaching-learning related areas. There is a need to study with these areas inorder to meet our future educational demands. The value of homework has been the subject of debate over the years. In regards to research, the jury is still out as to whether homework positively impacts a student's academic achievement (Lohmann, 2016). There have been studies that show that doing homework in moderation improves test performance. So we cannot rule out the value of homework if it is conducive to learning. However, studies have also shown that the benefits of homework peak at about one hour to ninety minutes and then after that test scores begin to decline.

There is a need to help those who disagree with the changing direction and let them see that it is time to refocus efforts to enable all students to learn Mathematics they will need for their future.

Peterson and Kennedy (2006) concluded that teachers tended to indicate and make a greater number of corrections and provide more criticisms and lessons, explanations, and suggestions when the work was attributed to a male writer. Female teachers generally wrote a greater number of comments and tended to indicate and make more corrections. Generally, teachers were reluctant to engage with the ideologies in students' writing. There was a correlation between convention errors and the number and types of comments.

Improving the teaching of mathematics depends on what the teacher knows and does. The evaluation process can reveal areas of instruction that are not consistent with the desired vision of teaching mathematics, which only the teacher can make to realize the vision.

It is now seen in our society that pupils in mathematics need the intense

ways of understanding the mathematical concept. Being responsive to the present needs of mathematics pupils, the researcher conducted this study on the effect of teacher-written comments and differing frequency of homework on pupils' achievement in Mathematics. The study is concerned with how homework and test as reinforcement may lead to better achievement. For this reason, this research will focus on finding out if pupils perform differently related to the different frequency of homework and different types of test feedback.

FRAMEWORK

Generally, assignment and test are not intensely scrutinized by ordinary teachers for their effectiveness in improving students' understanding. Homework is generally recognized as an effective way to reinforce what students learn in class, but claims that it may cause more than good, especially for younger students, are common (Terada, 2015).

Although some teachers are not aware of the importance of homework and quiz, most mathematics teachers believe that homework is a form of reinforcement and a quiz is a means of feedback system to determine whether the pupils truly understand the lesson or not. Students' response to the feedback they receive on written comments on assignments is an important but relatively under-researched aspect of teaching and learning (Walker, 2009).

In general, homework has substantial benefits at the high school level, with decreased benefits for middle school students and little benefit for elementary students (Cooper et al., 2006). While assigning homework may have academic benefits, it can also cut into important personal and family time.Assigning too much homework can result in poor performance (Fernandez-Alonzo et al., 2015).

A student's ability to complete homework may depend on factors that are outside their control (Cooper et al., 2006; OECD, 2014; Eren & Henderson, 2011). The goal should not be to eliminate homework but to make it authentic, meaningful and engaging (Darling-Hammond & Ifill-Lynch, 2006).

Still, changing the culture of homework would not be easy. Teachers-to-be get little instruction on homework during their training. Pope (2015) stated that despite some vocal parents arguing that kids bring home too much homework, many others get nervous if they think their child does not have enough.

Galloway et al. (2013) argue that teachers and school administrators need to set clear goals when it comes to homework-and parents and students should be in on the backpacks full of take-home assignments will probably keep stirring up

more feelings than facts.

This study was done using the theory of Skinner (1938), the Instrumental Conditioning Reinforcement Theory. This theory states that there are no eliciting stimuli and that the behavior is controlled by its effects or its influences on the environment: though there may be stimuli identified in whose presence the behaviors are more likely to occur, these stimuli gain their control over that behavior because they previously have been present when that behavior was reinforced.

In this study, therefore, homework and test are used as reinforcement. On the other hand, comments as feedback are also considered as reinforcement. Reinforcement can be negative as well as positive. A positive reinforcer according to Skinner, is a stimulus that strengthens the probability when removed from a situation whether positive or negative. It has the effect of increasing the probability of a response. Punishment weakens behavior.

OBJECTIVES OF THE STUDY

This study aimed to: (1) determine the pupils' pretest and posttest scores in the achievement test; (2) compare pupils' Mathematics achievement in effect by a teacher-written comments and differing frequency of homework; and (3) determine the interaction of feedback on quizzes with the frequency of homework.

METHODS

This study investigated the effect of teacher-written comments and differing frequency on homework on pupils' nachievement. The independent variables of the study were the teacher-written comments and the differing frequency of homework while the dependent variable was the achievement in mathematics. Mathematics achievement was measured scores in a teacher-made test in elementary Mathematics V.

This study used teacher made instruments to gather the data. This is a 30 item multiple choice type of test based on the content of selected topics in Elementary Mathematics. This was conducted by the researcher and validated to a group of pupils who were not included in the study. The result obtained a reliability coefficient of 0.81 using the KR-20.

The quasi-experimental design was used in this study. The design of the study is illustrated as follows:

Treatment 2	Treatment 1	
	Experimental Group B1 Quizzes With Comments	Experimental Group B2 Quizzes Without Comments
Group A1 Daily Homework	Section 3	Section 5
Group A2 Twice a Week Homework	Section 2	Section 4

This research followed the pretest-posttest design. It involved two treatment variables. T1 which is the treatment with comments and without comments, and T2 which is the treatment of frequency of homework (daily and twice a week). Two groups had received the T1 with comments and two groups received without comments. Two groups received the T2 with daily homework, and two groups received T2 with twice a week homework. The four groups were given the pretest and the posttest at the beginning and the end of the experimental period respectively.

The researcher handled the four classes to minimize, if not eliminate, the possible effect of the teacher factor that may affect the outcome of the study. The students were not informed that they were the subjects of the study.

The four groups were randomly assigned to particular treatment groups. They were given the same lesson each day. Quizzes were given after each lesson was taught. The papers of the Experimental Group 1 were with written – comments. The students of this group were told to write the comments and correct solutions to incorrect answers on their notebooks. These served as a reinforcrment to students' learning.

Some of the comments which were written on the test paper aside from the corrections were: "good work", "excellent", "very good", "keep it up", "job well done", "better luck next time", "you've nearly got the correct answer", and "be careful in writing numbers".

Check marks, as well as favorable remarks, where indicated on the papers of those correct answers. On the other hand, "X" marks, correct solutions and answers were indicated on the papers of those who got incorrect answers.

The next day the teacher discussed to all the four groups those items which were commonly not answered correctly.

With regards to homework given, a different set of homework was given to the groups. In other words, the homework given daily was different from the homework given twice a week, but the degree of measuring the pupil knowledge was similar to both groups. After the teacher had collected all the papers, she

asked the students randomly to verify whether they did their homework.

After all the topics had been discussed, the posttest was given to the four groups. The data were collected, computed and analyzed.

The data gathered in the pretest-posttest achievement test were analyzed using ANCOVA.

RESULTS AND DISCUSSION

Table 1

Mean and Standard Deviation of the Pretest and Posttest Scores of the Achievement Test in Mathematics V

	Experimental Group B 1				Experimental Group B 2				
	With Comments				Without Comments				
	X	SD	Y	SD	X	SD	Y	SD	Y (Mean)
Daily	10. 92	3.50	21.84	3.30	10.79	3.30	15.68	3.16	18.76
Twice a Week	10.02	2.48	21.02	2.61	12.51	3.61	16.00	3.16	18.51
Y (Mean)			21.43				15.18		

X- Pretest Mean Y- Posttest Mean

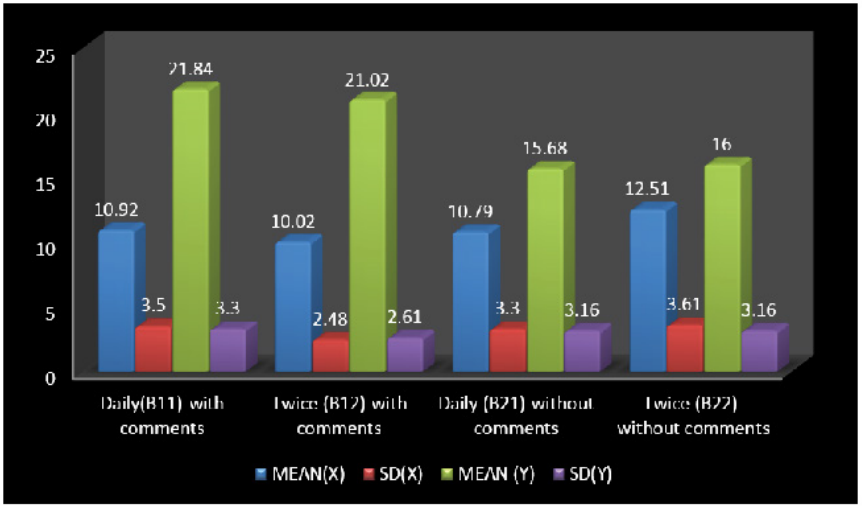

Figure 1. Graph Showing the Mean Score and Standard Deviation of the Experimental Groups, where X Means Pretest and Y Means Posttest

Table 1 and Figure 1 show the mean and the standard deviation of pretest (X) and posttest (Y) scores on the Mathematics Achievement Test. Based on Table 1, the experimental group B11, which was the group given with daily homework and whose test papers had written comments obtained a mean of 10.92 in the pretest, while the experimental group B21, which was the group given with daily homework and whose test papers had no comments obtained a mean of 10.79 in the pretest. The mean obtained is relatively low considering that there were thirty numbers in the test. This indicates that both groups have a poor background of the concepts and contents of Mathematics V. On the same table, the posttest of experimental group B11 with daily homework and with comments on quizzes had a mean of 21.84 and the experimental group B21 with daily homework and without comments on quizzes had a mean of 15.68. This indicates that the pupils in experimental group B11 with daily homework and with comments on quizzes have increased their achievement scores after the treatment by 100% while the experimental group B21 with daily homework and without comments on quizzes have increased by 50% only.

As to variability of the scores in the pretest, experimental group B11, with daily homework and with comments had a standard deviation of 3.50 while the experimental group B21 with daily homework and without comments had a standard deviation of 3.30. Experimental group B11 and B21 have more or less the same spread of their scores hence the students in both groups before the treatment have similar variability. However, in the posttest, experimental group B11 with daily homework had a standard deviation of 3.30 while experimental group B21 had a standard deviation of 3.16. This means that B11 became more spread in their scores while experimental group B21 was less spread in their scores.

In the same table, comparing the experimental group B12 with the treatment twice a week homework and with comments in quizzes, the pretest mean is 10.02 while experimental group 22, those having twice a week homework and quizzes without comments, has a pretest mean of 12.51. This is still low, taking into consideration the number of items 30. In the posttest, the table shows that experimental group B12 had a mean of 21.02 while the group B22 has a mean of 16. This means that the group with teacher comments has the edge over the group without comments.

With regards to the variability of the scores of experimental group B12 with twice a week homework and quizzes with comments and experimental group B22 with twice a week homework and quizzes without comments, the table shows that the experimental group B12 has a standard deviation of 3.61. This means

that experimental group B22 with twice a week homework and quizzes without comments had a more widespread scores compared to experimental group B12 with twice a week homework and quizzes with comments. In the posttest, however, the experimental group 12 had a standard deviation of 2.61 while experimental group B22 had a standard deviation of 3.16. The posttest standard deviation shows that experimental group B22 with twice a week homework and quizzes without comments had lessened their variability compared to experimental group B2 with twice a week homework and quizzes with comments.

Table 2

Summary Table of Two –Way ANCOVA

Sources of Variations	Adjusted Sum of Squares	df Squares	Mean	F Computed
Factor A	.14	1	.14	.02
Factor B	33.28	1	33.28	5.56
Interaction AB	.15	1	.15	.02
Error Within	863.82	144	5.99	

Table 2 shows the result of the two analysis of covariance: Factor A (frequency of homework) Factor B (feedback system in quizzes). For Factor A, the ancova yielded an F-ratio .02 which is less than the critical value at 0.05 level. This means that the frequency of homework, whether daily or twice a week, did not significantly affect the achievement of the pupils. This implies that regardless of the frequency of the homework, the achievement of the pupils has improved considerably. Homework can be a great way to enhance learning and play an important role in achieving a better academic result as proven by Sinha (2018). This gives the idea that the amount and the frequency of homework do not affect the level of achievement. Homework itself greatly affects the achievement of the students whether given with different amount and frequency.

On the same table, the ANCOVA yielded an F-ratio of 5.56 which is significant at .05 level. This means that the feedback system brought a significant change in the achievement scores of the pupils. The group with comments performed better than those groups without comments on the quizzes. This implies that teacher feedback on tests and written comments on the notebook of every pupil strengthened the pupils' concept–building and application. The group whose quizzes had no comments, improved but their scores were not as

high as the group with comments. As stated on the study of Harks et al. (2014) that process-oriented feedback was perceived as more useful than grade-oriented feedback and that feedback's perceived usefulness had a positive effect on changes in achievement and interest. Consistent with this, process-oriented feedback had a greater positive indirect effect than grade-oriented feedback on changes in mathematics achievement and interest via its perceived usefulness. There were no such effects on changes in self-evaluation. Feedback or written comments positively affect students' mathematics achievement.

With regards to the interaction of the two feedback on quizzes and frequency of homework, no significant interaction was found. As shown on the table, The F-ratio is .02. This means that the null hypothesis that there is no significant interaction between the type of feedback on quizzes and frequency of homework is accepted. This implies that the feedback system on quizzes did not affect the students' achievement as influenced by the frequency of homework. This is similar also to the result of the study of Cooper (2012) that there is a weak relationship between the amount of homework and student achievement. However the present study focuses on the relationship of comments and quizzes to student achievement. This also confirms that comments have a great effect on achievement whether it is with daily homework or twice a week of homework. In a general view also, homework whether with comments on a quiz or with out comments on the quiz, does not interact. This means that the effect of homework to students' achievement will not be affected by the comments on the quiz.

CONCLUSIONS

In light of the aforementioned findings of the study, it can be concluded that the frequency of homework, whether given daily or twice a week does not affect the mathematics achievement of the pupils. Pupils with daily homework are as good as those with twice a week homework. The feedback system, as given on the quizzes of the pupils affect the achievement of scores of the pupils. The pupils with comments on their quizzes performed better than those without comments. The achievement score of pupils as influenced by feedback on quizzes does not interact with the achievement scores as influenced by the frequency of homework. Teachers should indicate correct answers, solutions, and favorable remarks in addition to giving grades when checking quizzes since it enhances the achievement of the pupils. Quizzes should be returned with correct answers, solutions and favorable remarks and grade by a mathematics teacher.

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