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# EFFECTIVENESS OF WORKTEXT IN TEACHING GRADE 7 MATHEMATICS

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**Abstract :** This study aimed to determine the effectiveness of worktext in teaching Grade 7 Mathematics to the academic achievement of Grade 7 learners in Doyong-Malabago National High School, Calasiao II District, Schools Division Office I Pangasinan during the school year 2023-2024. This study used the pre-test and post-test non-comparative quasi-experimental design to determine the implications of the strategies in teaching Mathematics to grade 7 learners' academic performance in their Mathematics subject. There was a significant difference in the achievement of learners in Mathematics 7 when taught using worktext and without using work text as teaching approaches. There was a significant difference in the achievement of learners in Grade 7 Mathematics when taught using the two teaching approaches and when grouped according to their Mathematical level. There was a significant interaction effect in the achievement of the learners when they are exposed using two teaching approaches and when grouped according to their Mathematical level. Worktext method is an effective teaching approach and enhances learners' capabilities in the understanding lesson in Grade 7 Mathematics. Lecture method and the use of worktext as a teaching approach are effective for the different mathematical level of ability.

***Keywords: worktext efficacy, teaching approach, unlocking difficulty***

## I.INTRODUCTION

Learning basic concept in mathematics is very important. The study of Alfeld (2009) Opined that a person understood Mathematics when they could explain basic mathematical properties in other simpler form of concept; could connect logically among facts, and could recognize the relation between a new concept with previous concepts. In other words, the purpose of teaching and learning is to promote understanding (Sabri, 2008). The use of different strategies in teaching mathematics is one of the promising innovations to improve teaching and to create a meaningful learning experience for students.

Teachers believe that utilization of instructional worktext could be one effective means of addressing the difficulty since it enhances knowledge, thinking skills, problem-solving abilities of all students, as well as incorporate recent advances in disciplinary content (Nicoll, 2008). Another study conducted by May-as (2007) emphasized that the developed instructional materials for interactive learning are useful and beneficial for the improvement of the students' critical thinking skills. Bruce (2007) concluded that the use of workbooks/worktexts is beneficial, resulting in not only higher scores but also an increase in power of self-direction which helps in retention, skill in fundamental processes, reasoning ability and solving problems. As to the performance rating, a teacher should endeavor to lift up his performance as well as the students' mathematical achievement. As cited by Patan (2010), teaching activities that include the different use strategies and active learning materials are associated with mathematical achievement.

However, the issue of lower than expected mathematics achievement is a persistent worry to education leaders and policy makers. In Daniek Maramba National High School between 2013 and 2016, there has been no significant change in NAT result. To this result, the researcher found out that the students are experiencing difficulty in mathematics subjects, particularly in Mathematics seven as usually reflected in their scores. With this problem, the researcher sought to find out if the use of worktext in teaching mathematics enhances the academic performance of the students in grade seven mathematics. The objective of democratic education is the optimum development of the individual. To meet this end, it is imperative that greater attention should be given to the needs of individual learners – thus the demand for individual instruction. Individual instruction is backed by the philosophy that every child is unique. People develop at different rates. Development is relatively orderly, and development takes place gradually. (Woolfolk, 2013) One technique to individualize instruction is to use modularized instruction, where individual differences of students in their

capacities to learn are taken into account. Individualized instruction develops critical thinking. Students are encouraged to question, criticize and argue their point of view. It also develops one's self-concept by recognizing the desirability of individual differences. The basis for this approach is the fact that every student is unique with his potentials, abilities, interests, and needs. Thus, no two students can learn the same concepts at the same rate in the same manner.

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## II. STATEMENT OF THE PROBLEM

This study aimed to determine the effectiveness in using a Worktext to the academic achievement of Grade 7 Mathematics in Doyong-Malabago National High School, Calasiao II District, Schools Division Office I Pangasinan during the school year 2023-2024.

Specifically, it sought to answer the following sub-problems:

1. What is the pre-test and post-test mean score of the Grade 7 learners?
2. Is there a significant difference on the learners' achievement in Mathematics 7 when taught using worktext and without using worktext as teaching approaches?
3. Is there a significant difference on the learners' achievement in Mathematics 7 when taught using the two teaching approaches and when grouped according to their Mathematical level?
4. Is there a significant interaction effect on the learners' achievement when they were exposed using the two teaching approaches and when grouped according to their Mathematical level?

## III. METHODOLOGY

### 3.1 Research Design

This study used the pre-test and post-test non-comparative quasi-experimental design to determine the implications of the strategies in teaching Mathematics to students' academic performance in their Mathematics subject. This design is the same as the Classic Controlled Experimental Design except that the respondents cannot be randomly assigned to either experimental or control group, or the researcher cannot control which group will get the treatment. In other words, participants do not all have the same chance of being in the control or the experimental group, or of receiving or not receiving the treatment.

### 3.2 Data and Sources of Data

This study was conducted at Doyong-Malabago National High School, Calasiao II District, Schools Division Office I Pangasinan during the school year 2023-2024.

The researcher conducted the study with the learners from sections that he handles as the respondents of the study because these two sections were assigned to the researcher, hence, giving her the authority to conduct experiment applying the identified two teaching strategies in the teaching of mathematics seven.

A fishbowl technique was used to determine which sections are to be assigned for lecture and using worktext.

For mathematical ability, the researcher used the mathematics final grades of the learners in their second quarter grades from their report card that is reflected on their school report card. To determine the mental ability of the learners, the researcher categorized it as follows (pattern from the study of Patan, 2010)

### 3.3 Instrumentation and Data Collection

The validated worktext of Gumanoy (2016) was used in this study. The worktext contained the objectives, input: discussion on the different topics covered from the period of the current study, examples, and exercises with the solution. A letter was sent to Mr. Gumanoy to secure his approval for the use of his instrument.

A letter requesting permission was presented to the School Head of Doyong-Malabago National High School allowing the researcher to use the Grade 7 learners as the research respondents. Upon grant of approval, the letter was forwarded to the Mathematics coordinator of the said school. Arrangements were then made by the researcher as to when the pre-test, post-test would be conducted.

The Grade 7 Section A learners were assigned to using the worktext and while Grade 7 Section B learners were subjected to lecture method.

The researcher provided each of the subjects a copy of the worktext to the group who utilized the worktext. The subjects of this group were given a pre-test for 40 minutes, a work text was studied for the whole grading period after the topics discussed post-test were given.

Whereas for the group that was assigned to a lecture method, the same pre-test was given for 40 minutes. After the pre-test, discussion of the lesson followed. Seatwork and exercises were given after the discussion. These processes were done for the whole grading period. Then a post-test was administered after the lesson was tackled.

### 3.4 Tools for Data Analysis

After the data gathered, these were analyzed and interpreted accordingly.

To answer problem no. 1, the mean, standard deviation and one-way analysis of covariance (ANCOVA) was used on the achievement of learners when taught using worktext and without using work text as teaching approach

To answer problem no. 2, the mean, standard deviation and one-way analysis of covariance (ANCOVA) was used on the achievement of learners when taught using the two Teaching approaches and when grouped according to their Mathematical level.

And to answer problem no. 3, a two-way analysis of covariance was used by the researcher for the interaction effect in the achievement of the students when they are exposed using two teaching approaches and when grouped according to their mathematical level.

IV. RESULTS AND DISCUSSION

This chapter deals with the presentation, analysis and interpretation of the data gathered relative to sub-problems in the study.

Significant Difference in the Learners' Achievement in Grade 7 Mathematics when taught using Worktext and without using Worktext as Teaching Approaches

**Table 2**
Mean Scores and Standard Deviation Values of the Pre-test and Post-test

| Type of Group | N | Pretest Mean | SD | N | Post-test Mean | SD |
|---|---|---|---|---|---|---|
| Experimental Group | 30 | 23.467 | 2.913 | 30 | 28.730 | 3.213 |
| Control Group | 30 | 24.190 | 2.739 | 30 | 24.970 | 4.839 |
| Overall | 60 | 24.1075 | 2.826 | 60 | 30.966 | 4.026 |

The table shows that the control group obtained slightly higher mean than that of the experiment group in the pretest. This result indicates that both groups have acquired the knowledge in pre-requisite skills of the lesson before the conduct of the study.

Furthermore, Table 2 showed that the experimental group gained high scores in the post-test with a mean value of 28.73 compared to the control group having a mean value of only 24.97.

During the conduct of the study, it was observed that learners who were taught using the worktext showed inclination upon receiving the worktext since they were used the instructional material such as worktext as their primary tool in the learning process. Moreover, the students in experimental group could study the lessons in the worktext repeatedly and made them obtain a significant increase in their mean score.

On the other hand, the students in the control group had a direct input from the teacher in the on of the lesson in Grade 7 Mathematics. The in-depth discussion given by the researcher led the group to obtain a significant increase of their mean score. Thus, students understand the lessons given by the researcher.

The higher value of the standard deviation of the control group shows that the scores of these students were scattered and not close to the mean compared with the scores of those learners in the experimental group. This implies that students who were taught using a worktext really understand the concepts well. This resulted in their higher mean score in the post-test.

The control group has a high standard deviation. It explains that the test scores of the learners in this group are not closed compared to the experimental group. It further deduced that most of the learners did not understand the selected lesson in Grade 7 Mathematics which was discussed by the teacher-researcher thoroughly.

To test if there is a significant difference in teaching approach used by the teacher between the experimental and the control group, the One-Way Analysis of Covariance (ANCOVA) was employed. Table 2 presents the summary of the results.

Table 3
Summary of One –Way ANCOVA on the Achievement of Learners in Grade Seven Mathematics when taught using Worktext and Taught Using without Worktext

| Source of Variation | Type III Sum of Squares | Df | Mean Square | F-Value | p-value |
|---|---|---|---|---|---|
| Covariate | 21.13 | 1 | 21.13 | 3.310 | 0.037 |
| Main Effect | 93.17 | 1 | 93.17 | 14.598 | 0.000 |
| Explained | 49.31 | 2 | 24.655 | 3.863 | 0.000 |
| Residual | 344.67 | 54 | 6.382 | | |

It can be gleaned on from table 2 that the computed *F*-value is 14.598 at $p = 0.000$, which is less than the set level of significance at $\alpha = 0.05$. Thus, the null hypothesis is rejected. This implies that there is a significant difference in the achievement of learners in Grade 7 Mathematics when taught using the two teaching strategies. It further derived that the worktext helps the respondents in solving problems using the principle of the mathematical concept.

The finding of this study is related to the study of Luarez (2017) that there was a significant difference in the pre-post-test between the experimental and the control group. The said study concluded that the worktext helped the students in learning Pre-Calculus.

This result was supported by *Aureada* (2017) that a developed work text is a valid instructional material providing student performance improvement in Logic. However, this study negates the study of Salavaria (2014) that the respondents were very satisfied with Statistics Work text. The students are more satisfied with the Statistics Work text than the teachers and teachers were most satisfied with the usability of the work text.

**Significant Difference in the Learners' Achievement in Grade 7 Mathematics when Taught using the two Teaching Approaches and when Grouped according to their Mathematical Levels**

Table 4 presents the comparison of the achievement of learners with different Mathematical ability levels. It is shown that the above average, average and below average achieving learners in the experimental group has a higher score in the post-test than the above average, average and below average achieving learners in the control group. This result can be attributed to the other factors that disturb the focus of the learners like the time they spent in studying the lessons since they also have other subjects to study.

Furthermore, average achieving learners in the experimental group have little increase in their test scores in the post-test which can be accounted for other factors that affect while learning the lesson. The low achieving learners both on the experimental

and control group showed a little increase in their scores than the rest of the groups. This indicates that low achieving learners have difficulty in grasping the lesson in both teaching strategies.

**Table 4**

Mean and Standard Deviation of Learners' Achievement in Grade 7 Mathematics when Grouped According to their Mathematical Ability

| Group | N | Pret-test | | Post-test | |
|---|---|---|---|---|---|
| | | Mean | s.d. | Mean | s.d. |
| Experimental | | | | | |
| Above Average | 8 | 31.15 | 3.24 | 35.11 | 3.93 |
| Average | 10 | 24.34 | 1.88 | 27.86 | 3.93 |
| Low | 12 | 14.91 | 2.68 | 23.22 | 2.77 |
| Control | | | | | |
| Above Average | 8 | 30.11 | 1.92 | 30.72 | 1.82 |
| Average | 10 | 26.39 | 2.55 | 27.33 | 3.56 |
| Low | 12 | 16.07 | 3.24 | 16..86 | 1.92 |

It can be gleaned from the table that the computed *F-value* was 6.122 and a *p*-value of 0.028 which is significant at p-value of 0.05. Thus, the null hypothesis is rejected. This implies that the learners in the experimental group with different ability levels and those learners in the control group have the significant difference in their achievement when taught using the two teaching approaches.

**Table 5**

Summary Table of Two-Way ANCOVA on the Achievement of Learners in Grade 7 Mathematics when Taught Using Work Text and Taught Without Worktext

| Source of Variation | Type III Sum of Squares | df | Mean Square | F-Value | p-value |
|---|---|---|---|---|---|
| Covariate | 19.216 | 1 | 19.216 | 1.129 | 0.012 |
| Factor A (Mathematical Ability) | 104.120 | 1 | 104.120 | 6.122 | 0.028 |
| AxB | 3.117 | 1 | 3.117 | 0.183 | 0.000 |
| Explained | 139.112 | 4 | 34.778 | 2.045 | 0.000 |
| Residual | 780.002 | 52 | 17.006 | | |

**Significant Interaction Effect on the Learners' Achievement when they are Exposed using two Teaching Approaches and when Grouped according to their Mathematical level**

As shown in Table 5, the F-value of 0.183 with $p = 0.000$ is lesser than the significant level at 0.05. Thus, the null hypothesis is accepted, which states that there is a significant interaction effect in the achievement of the learners when they are exposed using two teaching approaches and when grouped according to their mathematical level. This implies that Mathematical Ability and the teaching approaches interact if taken at the same time.

This finding further implies that the teaching approaches and mathematical ability have a significant interaction effect on the achievement test scores of the learners. The result further implies that the teaching approaches have interaction on the ability level of the result. Hence, whatever teaching approach is applied by the subject teacher the average learners could still get a better result on the achievement test than the low average learner. The parallel result in the control group shows that average learners performed better than the low average learner.

This result is negated with the findings of Lumaya (2004),Javar (2004) and Francisco (2009) which indicated no significant interaction exist in the learners' achievement when they are grouped according to their mathematical ability and the teaching strategies used.

**Recommendations**

In the light of the findings and conclusions, this study recommended the following:

1. Using of work text in Grade 7 Mathematics subject is encouraged.
2. Studies on the use of a worktext may be conducted as an approach in teaching other subjects' areas to see if the students perform similarly.
3. More sections are encouraged to be included in the choice of respondents for the future researcher to have another experimental study on using a work text.

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