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Effectiveness of Printed Modules in the Performance of Grade VI Learners in Science of Baquioen Elementary School

A.Abarra

Baquioen Elementary School, SDO I Pangasinan, Department of Education, Philippines

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CORRESPONDING AUTHOR

*E-mail: alexander.abarra@deped.gov.ph

ABSTRACT

The primary goal of this action research was to assess the effectiveness of printed modules on the performance of Grade VI pupils in Science during the school year 2021-2022 at Baquioen Elementary School, Sual District, SDO I Pangasinan. Specifically, this study aimed to determine the performance of the Grade VI pupils in science during the pre-test and post-test. It also sought to find answers if there is a significant difference in the performance of the respondents after utilizing printed modules in 8 weeks. This action research project utilized the quasi-experimental method, more especially the single group pre-test and post-test design. An independent variable is changed in a quasi-experiment without participants being randomly assigned to one condition or another. The primary tools used to acquire the required data were the pre-and post-test questionnaires. The researcher developed these questionnaires, and the master teacher in charge of testing then validated them. The school principal gave his approval before things were put into practice. The statistical methods employed to address the specific questions were the main and t-test. Based on the results found there was a significant improvement in the performance of the respondents after they were exposed to printed modules in 8 weeks with a mean difference of 10.48. Therefore, it was proven that there is a significant difference between the scores of pre-test and post-test. Thus, the hypothesis was rejected.

1. INTRODUCTION

1.1 Research Background

The pandemic had a significant impact on the education sector, and regular sessions were immediately cancelled for everyone's protection. The academic school year was done at home by the new learning modalities. During this period, there are no scheduled meetings for teachers and students in the classroom. Everything was done remotely to make it easier for the teachers to distribute and submit requirements and evaluations, and this was made possible using a variety of contact means, including phone calls, text messages, social media posts, the internet, and other online communication platforms. Therefore, this study was initiated to evaluate the effectiveness of printed Science modules.

The DepEd, whose main goal is to provide accessible and high-quality education to Filipino students, reaffirmed emphatically through Secretary Leonor Briones that education must continue despite the pandemic. As a result, distance learning is now being implemented with the use of printed materials.

Learning is regarded as one of the most important aspects and characteristics that contribute to a country's progress, affecting future generations positively and extensively while relying on current and advanced scientific foundations. This advancement is measured by educators' understanding of teaching methods, means, and theories, as well as their understanding of modern teaching orientations.

The Department of Education (DepEd) responded by implementing the Basic Education Learning Continuity Plan (BE-LCP), which ensures that basic education would continue despite the COVID-19 virus's threat to all school workers and students. This ensures that teachers may securely conduct education and that students can continue to learn in a safe environment. Education will be given via distance or remote learning platforms, according to the BE-LCP. The Department also takes into accounts the circumstances and situations of

learners across the country, as well as elements that may impede their distance learning development. [1]

In response, the Department of Education (DepEd) condensed the curriculum and developed the Most Learning Competencies (MELC) to allow students and parents to focus on what matters now. Internet technology is used in distance or remote learning platforms to provide interactive, real-time, or synchronous learning activities. It is also less expensive than using telephone technology. Online systems also allow teachers to deliver materials, assess students, and give instructional support without requiring physical presence, ensuring that no one's safety is jeopardized.

Distance learning is not a new kind of education delivery; it has long been utilized as an alternative for students whose circumstances make regular attendance at school impossible. For students who are unable to attend conventional school classes, the module-based alternative delivery modality (ADM) is the most widely employed. The Alternative Learning System (ALS), which serves out-of-school children and youth who want to continue their education despite their circumstances, uses this model. Distance learning is defined by DepEd's BE-LCP as "a learning delivery modality in which learning takes place between the teacher and learners who are geographically distant from each other during instruction and is comprised of different modes, including modular distance learning, online distance learning, and television/radio-based instruction."

The DepEd BE-LCP establishes remote learning modalities by taking into account school and community technology infrastructures, as well as learners', parents', and teachers' capacity to undertake distance learning. For both teachers and students, technology infrastructure such as desktop computers, laptops, tablets, cellphones, and internet access are critical in the implementation of distance or remote learning. While the school may function as a learning center to assist learning delivery, the school's technology infrastructure is critical to its success in implementing remote learning. Because internet connectivity is so important in allowing distance or remote learning, both the learner and the teacher must have access to it. However, several considerations such as the school, instructor, and learner's location, where signals can impact connection quality and the additional expense to parents and teachers, make internet connection difficult. Because parents' ability to provide instructional assistance varies, the teacher must be knowledgeable and skilled to minimize the impact on the teaching and learning process. [2]

According to DepEd's National Learner Enrolment and Survey Forms (LESFs), 8.8 million (39.6%) of the 22.2 million enrollees prefer modular remote learning for the coming school year. Meanwhile, 3.9 million students (17.6%) preferred blended learning (which combines various modalities), 3.8 million (17.1%) preferred online learning, and 1.4 million and 900,000 students selected TV-based and radio-based learning, respectively. Many Filipino learners choose Modular Distance Learning due to worries about access to the internet, devices or gadgets, other technology-related challenges, cost, and infrastructure availability to support them.

The Most Essential Learning Competencies (MELC), a condensed form of the traditional basic education curriculum, were used to align the modules. Because there would be no face-to-face education, MELC's goal is to compress the curriculum to lessen the workload of learners. Modules are created for self-paced and autonomous learning, ensuring that a student at a specific level can study and complete the activities in the module within a certain amount of time.

Modules were utilized before the COVID-19 pandemic for students who had trouble attending classrooms on a regular basis. Teachers created these modules based on the lessons that the learner had missed. The technique is not extensively used among students and is not used on a regular basis; therefore, it is merely a preventative step to guarantee that students can cope with the current lesson when they are allowed to attend classes. Self-Learning Modules (SLM) were employed as the primary teaching and learning tool during the epidemic, rather than face-to-face interaction, which was not the case before COVID-19.

Teachers, parents, or anybody else can give instructional support to the student under MDL. The teacher can provide educational support to the student via a variety of communication media. Teacher interventions such as conducting online classes or online kumustahan were largely used to provide instructional support rather than to deliver teachings in the same way that an online class would. On this modality, face-to-face interaction is limited to house visits only if possible and if community and organizational constraints allow. Learner evaluations are written and usually asynchronous, therefore they are not completed in real-time, making it impossible to reflect the learner's progress.

Because the SLM is intended for individual learning, its content quality and usability are critical. These are the features of the module that will determine its utility as a teaching and learning tool. The self-learning module is used to deliver education and facilitate teaching and learning in modular remote learning. Its usefulness as a teaching and learning tool may be determined by the content quality and usability. Teachers consider challenges such as access to the internet and technology, as well as instructional assistance from parents and guardians when giving interventions to ensure the effectiveness of MDL implementation.

This study focuses on the effectiveness of the SLM in Science in the implementation of modular distance learning at the elementary level taking into account the SLMs' quality of content, usability, teachers' implemented interventions, and effectiveness of SLM as a teaching and learning tool.

1.2 Literature Review

A study Ref. [3] entitled "Distance Learning Challenges on the Use of Self-Learning Module" determined distance learning challenges in the use of self-learning modules. the participants of the study were 3 grade V teachers, 30 parents and 30 pupils of Bulan North Central School-A Descriptive qualitative method was utilized as the research design of the study. Under this method, responses were gathered from the in-depth interviews dealing with the challenges in the new normal. This method was chosen to gather the challenges and coping mechanisms of teachers, in terms of preparation of modules, monitoring and assessment and for both parents and pupils in terms of time management, comprehension, motivation and independent learning.

A study Ref. [4] entitled "Parents' Perception on Printed Modular Distance Learning in Canarem Elementary School: Basis for Proposed Action Plan" determined and analyzed the perceptions of parents on printed modular distance learning in an elementary school. There were 50 parent respondents selected via convenience sampling. Parents' perceptions were along the

manner of distributing modules, retrieval of modules, time allotment for learning activities, the learning activities in the module, assessment and observance of safety and health protocols in the distribution and retrieval of modules. Questionnaires were distributed to the parents through the Purok Leaders who were responsible for the distribution and retrieval of the learning modules. Weighted mean was used to analyze the responses of the parents in the questionnaires. Findings revealed that parents mostly agreed to the strategies in the distributing modules, retrieval of modules, time allotment for learning activities, the learning activities in the module, and assessment and highly agreed to the observance of safety and health protocols in the distribution and retrieval of modules. However, parents claimed that time allotment in the completion of learning activities was insufficient since the activities were so many. In addition, some parents claimed that they could not understand some topics in the module so they could not help their children in answering the learning activities. The research then recommended a review of the learning activities and conduct a seminar for parents to guide them in assisting their children during their "classes "at home. An action plan was developed to improve the implementation of modular learning in the new normal.

The paper of Ref. [5] ascertained the effectiveness of the Modular Teaching Approach in teaching Grade 10 Science at Maximino Noel Memorial National High School. Quasi-experimental and Purposive sampling were utilized. Data were collected through pre-tests and post-tests using the learning module in Science10 prescribed by the Department of Education. Data was obtained using frequency count, percentage, mean and standard deviation and t-test for the significant difference. Results revealed that the performance of the Grade 10 students during the pre-test in the following competencies: describing the distribution of active volcanoes, earthquake epicentres, and major mountain belts; distinguishing the different types of plate boundaries; and explaining the different processes that occur along the plate boundaries, was described as Beginning. However, after using the Modular Teaching Approach, the post-test performance of the students on the aforementioned competencies increased significantly and was described as Proficient. This indicated that the approach showed positive results and displayed a vital connection in increasing students' academic achievement. Thus, an enhanced learning module was proposed as an instructional intervention to improve students' performance in Science 10.

The study of [6] aimed to determine the performance of the Grade 4 pupils in Science during the pre-test and post-test. It also sought to find the answer if there is a significant difference in the performance of the respondents after utilizing the modular learning approach in 8 weeks. The project utilized the quasi-experimental design specifically the single group pre-test and post-test design. This is a design where one group of participants will undergo a pre-test and then be post-tested after the treatment condition has been administered. Thirty (30) Grade 4 pupils were subjected as respondents in the conduct of this action research. A comparison group pre-test and post-test design was used for this study. Teacher-made pre-test and post-test Science examinations were the instruments used to gather the needed data. Based on the results found there was a significant improvement in the performance of the respondents after they were exposed to the modular learning approach in 8 weeks. Also, with a mean difference of 9.73, therefore it was proven that there is a significant difference between the scores of pre-test and post-test.

In the study [7] entitled "Effectiveness of Printed Modules in the Performance of Grade III-Bonifacio Learners in Science of Piaz Elementary School" aimed to determine the performance of the Grade III-Bonifacio learners in science during the pre-test and post-test. It also sought to find answers if there is a significant difference in the performance of the respondents after utilizing printed modules in 8 weeks. Thirty-three (33) Grade III learners were subjected as respondents in the conduct of this action research. A comparison group pre-test and post-test design was used for this study. Teacher-made pre-test and post-test science examinations were the instruments used to gather the needed data. Based on the results found there was a significant improvement in the performance of the respondents after they were exposed to printed modules in 8 weeks. Also with a mean difference of 5.39%, therefore it was proven that there is a significant difference between the scores of pre-test and post-test. Thus, the hypothesis was rejected.

The study of Ref. [8] titled "Effectiveness of Printed Modules in the Performance of Grade III Pupils in Science of Sta. Cruz Elementary School" aimed to determine the performance of the Grade III pupils in Science during the pre-test and post-test. It also sought to find answers if there is a significant difference in the performance of the respondents after utilizing printed modules in 8 weeks. The project utilized the quasi-experimental design specifically the single group pre-test and post-test design. This is a design where one group of participants will undergo a pre-test and then be post-tested after the treatment condition has been administered. Thirty-six (36) Grade III learners were subjected as respondents in the conduct of this action research. A comparison group pre-test and post-test design was used for this study. Teacher-made pre-test and post-test science examinations were the instruments used to gather the needed data. Based on the results found there was a significant improvement in the performance of the respondents after they were exposed to printed modules in 8 weeks. Also with a mean difference of 4.5, therefore it was proven that there is a significant difference between the scores of pre-test and post-test.

The researcher of this study acknowledges the literature reviews used in the context of this study by the innumerable authors whose works contributed to the success of this endeavour. Their diligent work and creative ideas had accomplished more than they had intended.

1.3 Research Objective

This study aims to evaluate the Effectiveness of Printed Modules in the Performance of Grade VI pupils in Science of Baquioen Elementary School during the school year 2021– 2022. Specifically, this study aimed to find out the answer to the following problems: (1). What is the performance of the Grade VI pupils in Science during the Pre-test and post-test? (2) Is there a significant difference in the performance of the Grade VI pupils in Science before and after using the printed modules?

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2 MATERIALS AND METHODS

2.1 Research Design

The quasi-experimental design, specifically the single group pre-test and post-test design, was used in this action research project. This is a design in which one group of participants will be pre-tested and then post-tested following the administration of the treatment condition. A quasi-experiment involves the manipulation of an independent variable without the random assignment of participants to conditions or orders of conditions. Among the important types are non-equivalent group designs, pre-test-post and interrupted time series designs [9].

2.2 Source of Data

The participants in this action research project were Grade VI pupils from Baquioen Elementary School in Sual District, SDO I Pangasinan during the school year 2021-2022. There was only one (1) section in the grade level composed of forty (40) pupils who participated in the study under the advisory of the researcher. It was a heterogeneous group of pupils.

2.3 Instrumentation and Data Collection

The main instruments utilized in gathering the needed data of this study were the prepared questionnaires of the researcher in pre-test and post-test. The pre-test and post-test questionnaires contained forty (40) multiple-choice items each. The master teacher checked and validated the test questions before they were approved by the head of the school. The competencies learned for eight (8) weeks served as the foundation for these questionnaires.

The Pretest questionnaires were given to parents and administered in the morning on April 18, 2022, and were collected in the afternoon on the same day.

The post-test was held on June 13, 2022, in the morning, and the questionnaires were distributed directly to the respondents' parents and collected the same day in the afternoon.

Pre-tests can be used diagnostically to determine if there are any gaps in understanding from previous units taught. Most pretests use elements of review and new material to get a comprehensive picture of student knowledge within a given area. They can be used in this way to assess whether students have retained knowledge from prior lessons [10].In addition, pretesting is the stage in survey research when survey questions and questionnaires are tested on members of the target population/study population, to evaluate the reliability and validity of the survey instruments before their final distribution. Pretesting is widely regarded as indispensable in survey questionnaire development and is also crucial to improving data collection for quality-of-life research. It incorporates a variety of methods or combinations of methods [11]. The posttest provides summative data to teachers and students and ensures students start on the next unit together. Through the post-test, students and teachers can reflect on each student's mastery of the unit, informing future learning activities to ensure student mastery [12]. Furthermore, post-tests are designed to measure immediate change, but should (through feedback) also serve to drive a learner to reflect on the content they have consumed and to revisit areas of the content where they still have deficiencies. Results from a Post-test are typically compared to results from the same questions administered immediately before an educational intervention. This allows for a more meaningful paired analysis [13]. The pre-test and post-test were checked and recorded to determine the scores or performance of the learners.

The above-mentioned tools used in this research gave an overview of the performance of the respondents in the administered tests. Hence, they were utilized in the study.

2.4 Tools for Data Analysis

The data gathered was statistically treated using mean whereas a t-test at 0.05 level of significance was employed to test the difference of the two (2) tests. Data were gathered and analyzed before and after the implementation of the printed modules in the science subject of the samples for eight (8) weeks. Examination scores were used to measure learners' learning outcomes. Through which results of the pre-test and post-test were compared to note the difference between the scores.

The mean of a set of data points is defined as their sum divided by the total number of data points. The mean is a measure of central tendency that is most appropriately used for continuous data, i.e., variables that are measured on a continuous, uninterrupted scale and can take any value on that scale[14]. The mean is a stable measure of central tendency. Unlike other measures, all the data are taken into consideration for finding the perfect representative figure for the data set. Every data set can have only a mean which makes it unique from other measures. It is the only common measure in which all the values play an equal role. Therefore, it can be greatly affected by any value which has a great difference from other values [15]. The mean was used to measure if there was an improvement in the learners' performance from the pre-test to the post-test.

A t-test is a type of inferential statistics used to determine if there is a significant difference between the means of two groups, which may be related to certain features. A t-test is a statistical test that is used to compare the means of two groups [16]. According to Ref. [17], the t-test tells you how significant the differences between groups are; In other words, it lets you know if those differences (measured in means) could have happened by chance. The t-test was used because there were two (2) test results being compared in the study. These are the results of the pretest and posttest being administered by the researcher.

3 RESULTS AND DISCUSSION

3.1 Performance among Grade VI Pupils in Science during Pre-Test and Post-Test

Table 1 shows the performance in Science among Grade VI Pupils in Science during Pre-Test and Post-Test. The pre-test mean result was 27.45, while the post-test mean result was 37.93, as shown in Table 1. The test results showed that learners' performance improved after using printed modules for 8 weeks (Table 1).

The study found that the used modules produced a positive result, with all learners scoring higher on the post-test than on the pre-test. The study also found that using printed modules resulted in a better understanding of Science concepts. Thus, 100% of the learners passed the passing mark or mastery level of 75%.

The present study findings supported the findings of [6] with aimed to determine the performance of the Grade 4 pupils in Science during the pre-test and post-test. Thirty (30) Grade 4 pupils were subjected as respondents in the conduct of this action research. Based on the results there was an improvement in the

performance of the respondents from pre-test to post-test after using printed modules in 8 weeks with a mean difference of 9.73.

The study of Ref. [7] also backs up the findings of the current study to determine the performance of the Grade III-Bonifacio learners in science during the pre-test and post-test. Teacher-made pre-test and post-test science examinations were the instruments used to gather the needed data. Based on the results found there was an improvement in the scores of the respondents after using printed modules in 8 weeks with a mean difference of 5.38. Therefore, it was proven that the use of printed modules improved the scores of the learners from the pre-test to the post-test.

Table 1. Performance among Grade VI Pupils in Science during Pre-test and Post-test

Pupils	Pre-Test	Post-Test
1	32	40
2	28	38
3	30	40
4	26	38
5	24	36
6	30	40
7	32	40
8	26	38
9	27	38
10	26	36
11	24	38
12	34	40
13	22	36
14	20	35
15	28	38
16	28	38
17	29	37
18	22	36
19	26	38
20	32	40
21	25	34
22	20	35
23	22	36
24	27	38
25	28	37
26	29	38
27	30	40
28	28	38
29	30	40
30	29	38
31	23	37
32	27	38
33	25	36
34	26	38
35	29	38
36	32	40
37	33	40
38	28	38
39	27	38
40	34	40
Mean	**27.45**	**37.93**

Additionally, the findings of Valencia [5] revealed that using learning modules as an alternative instructional method in teaching Science 10 significantly enhances the performance of the students. This shows that the approach used appeared to be effective and exhibited a vital connection in improving students' academic achievement in Science 10 having a pre-test and post-test mean difference of 7.675.

3.2 Test for Significant Difference in the Performance of the Grade VI Learners in Science after Using Printed Modules

Table 2 shows the test for Significant Difference in the Performance of the Grade VI in the Science after using Printed Modules.

Table 2. Test for Significant Difference in the Performance of the Grade VI Learners in Science after Using Printed Modules

	Pre-Test	*Post-Test*
Mean	27.45	37.925
Variance	12.92051	2.686538
Observations	40	40
Df	39	
t Stat	-28.4167	
t Critical two-tail	2.022691	

Table 2 reveals the result of the T-test in the analysis of data to either the use of printed modules is effective in the performance of the Grade VI pupils. The means of Pre-Test and Post-Test are significantly different at $p<0.05$.

The absolute value of the calculated t exceeds the critical value ($-28.42>2.02$), so the means are significantly different. Therefore, the hypothesis that there is no significant difference between the results of the pre-test and post-test in which the used of printed modules is highly rejected. This implies also that the use of printed modules in the teaching-learning process showed a significant difference in the improvement of learners' performance in Science.

The present study findings back up the findings of [8] to determine the performance of the Grade III pupils in Science. The project utilized the quasi-experimental design specifically the single group pre-test and post-test design. This is a design where one group of participants will undergo a pre-test and then be post-tested after the treatment condition has been administered. Thirty-six (36) Grade III learners were subjected as respondents in the conduct of this action research. Based on the results found there was a significant improvement in the performance of the respondents after they were exposed to printed modules in 8 weeks.

Ref. [3] which determined distance learning challenges on the use of self-learning modules also supported the findings of the current study. The participants of the study were 3 grade V teachers, 30 parents and 30 pupils of Bulan North Central School-A Descriptive qualitative method was utilized as the research design of the study. Under this method, responses were gathered from the in-depth interviews dealing with the challenges in the new normal. This method was chosen to gather the challenges and coping mechanisms of teachers, in terms of preparation of modules, monitoring and assessment for both parents and pupils in terms of time management, comprehension, motivation and independent learning. As a result, the performance of the learners significantly improved.

A study of [4] which determined and analyzed the perceptions of parents on printed modular distance learning in an elementary school also corroborates the findings of the present study. Questionnaires were distributed to the parents through the Purok Leaders who were responsible for the distribution and retrieval of the learning modules. Weighted mean was used to analyze the

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responses of the parents in the questionnaires. Findings revealed that parents mostly agreed to the strategies in the distributing modules, retrieval of modules, time allotment for learning activities, the learning activities in the module, and assessment and highly agreed to the observance of safety and health protocols in the distribution and retrieval of modules. An action plan was developed to improve the implementation of modular learning in the new normal. As a result, the performance of the learners in this study significantly improved.

4 CONCLUSION

The differences between the pre-test and post-test data are considered significant, as indicated in the data presentation and analysis. This study suggested that the use of printed modules was proven to be effective in enhancing the performance of the Grade VI learners in Science with a mean difference of 10.48. Therefore, the use of printed modules contributed to enhancing the performance of the respondents in Science.

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