Effectiveness of Mathematics Proficiency Sessions *(MPS)* for Primary Pupils

**Aldrin John J. Estonanto[1], Karen Mae H. Palabrica[2],
Jaydee F. Grefaldeo[3]**
Sorsogon State College, Sorsogon City, Philippines
[1]aldrinestonanto@ymail.com, [2]karenmaepalabrica14@gmail.com,
[3]grefaldeojaydee28@gmail.com

Abstract - *Educational institutions seek for innovative strategies to counter the long- fought problem of low students' performance in mathematics. Several studies conducted had revealed that a good foundation on basic mathematical concepts increases the numeracy rate of countries. Hence, it is essential to develop programs that will address the mathematical needs of students. This descriptive- evaluative study assesses the effectiveness of the extension program Math Proficiency Sessions (MPS) for Primary Pupils of Sorsogon State College- Senior High School Program. The DepEd validated competency-based pre- tests and post- tests for Grades 1 to 3 were utilized as the main instrument of this research. Statistical tools used were mean, standard deviation, percentage and t- test. Findings showed that primary pupils' proficiency was at the beginning level prior to the implementation of the program. Approaching proficiency level was attained after the conduct of the math proficiency sessions. The study revealed further that there was a significant difference between the results of the Pre- test and the Post-test. Thus, the research concludes that the conduct of the extension program Math Proficiency Sessions (MPS) for Primary Pupils was an effective approach in improving the mathematics performance of pupils. Therefore, the adoption of the program in other communities is highly recommended.*

Keywords: descriptive –evaluative, mathematics, math proficiency sessions, proficiency, primary pupils,

INTRODUCTION

Mathematics has a vital stronghold and impact on the development of a nation. It is not an accident that those races that edged in this discipline also excel in their economic aspects. Studies showed that countries with superior math literacy rate, namely Singapore, Japan, China and United States are more economically blessed compared to their third world country counterparts. [1] Nevertheless, this scientific truth sometimes are forgotten and oftentimes ignored not just by ordinary *Juan de la Cruz*, but even by educators and curriculum planners.

In the Philippines, we cannot deny the fact that yearly our educational institutions across the archipelago are producing mathematically unequipped graduates. The 1999 results of the Trends in International Mathematics and Science Studies or TIMSS [2] showed how far behind the Philippines had been with its other neighboring countries in Asia. While Singapore excelled with its average score of 604 in Mathematics, the Philippines only got 345 performance levels which placed us in the 3rd place from the bottom surpassing only Morocco (337) and South Africa (275). In the 2003 TIMSS, Philippines once again ranked 3rd place from the bottom with a mean score of 358, falling short 138 points from the International Average of 495 surpassing again only two countries, Morocco (347) and Tunisia (339), since South Africa, World's Poorest Performer in Math, did not participate that year [3].

While the government is struggling to redeem its honor in the international community, the Bicol Region is also in the midst of battle to gain its academic reputation in the national arena. The result of the 2003 TIMSS revealed that Region V only got an average performance of 340.09 which is far lower than the National Average Rate obtained. Among the 15 participating regions throughout the country, Region V secured its position in the 9th rank only [3]. Furthermore, the results of the National Achievement Test (NAT) in the last 5 years showed low performance of the Bicolano students in Mathematics as compared to their other subjects such as English and Filipino [4]. In the province of Sorsogon, the same dilemma of poor NAT results in Mathematic is being faced by the two divisions of the Department of Education, though it can be noted that the trend of the slope of the said achievement test for the past three

consecutive years is consistently not descending. This means, Filipino educators need to double the efforts in improving the quality of math education they cater to students. One of it is the implementation of remedial evaluation. Essentially, there are notions and concepts that supported this call for remediation.

The implemented remedial program proved to be effective with recovering ninety four percentages of students in Tamil Language and ninety three percentages of students in Mathematics. [5] Remedial as one of the factor tool to recuperate Philippines' predicament will offer at-risk students to become more adept learners and achieve success. Moreover, theories like behaviorism and constructivism inform instructional methods such as direct instruction and personalized instruction which is vital to this research. This theory examines the effect of pedagogical style for college-level remedial mathematics students and the effect of the chosen assessment method in determining students' success [6].

The Sorsogon State College, with the mandate to conduct extension services, conceptualized a community outreach program that will help improve the academic performance of elementary pupils in mathematics. With the theory that numeracy rate of the country will advance if good foundations in mathematics will be laid down during early stages of development, primary pupils from Grades 1- 3 were chosen as beneficiaries of the program. To realize the cited purpose, the SSC Senior High School- STEM Program has teamed up with Barangay Boton, Boton Elemetary School and Aremar Construction, Inc. By virtue of a memorandum of agreement (MOA), the program "Mathematics Proficiency Sessions for Primary Pupils" was implemented at Boton Elementary School on September 12- October 12, 2016 [7].

As the leading Teacher- Education College in the province, this endeavor of extending the institution's expertise in the field of Mathematics to elementary pupils is very helpful not only to the pupils but also to the community.

Along with the experiential learning the faculty and senior high school students will gain, the Sorsogon State College as a premier institution of higher learning that is committed to the progress of the province of Sorsogon, has the opportunity in this project to realize its mission to become service- oriented by being the community's steward in uplifting the quality of education Sorsogueños receive, particularly in Mathematics subjects. This study is concerned with the assessment of the effectiveness of this extension program.

OBJECTIVES

The main purpose of this study is to evaluate the effectiveness of the research cum extension program Mathematics Proficiency Sessions (MPS) for Primary Pupils that was held at Boton Elementary School, Casiguran, Sorsogon in September- October 2016. Specifically, the study is aimed to : (1) Determine the academic performance of the beneficiary pupils of the program in mathematics prior to its implementation; (2) Identify the proficiency level of the primary pupils along the different components of the proficiency course; (3) Determine the significance difference between the academic performance of pupils prior to the implementation of the program and after its implementation and; (4)Assess the effectiveness of the program Mathematics Proficiency Sessions (MPS) for Primary Pupils among the beneficiary pupils of Boton Elementary School.

METHODS

The research utilized the descriptive- evaluative method of study. It is descriptive- evaluative research since it is concerned with the assessment of the learning of the pupils and the evaluation of the effectiveness of the program. A DepEd- validated and published 1st Quarter Test for Grades 1 to 3 was used as the primary instrument of the study. The said examination was used for the utilization during the Pre- test prior to the implementation of the program and in the Post- test after its implementation to measure the progress of the beneficiaries along the various competencies included in the math proficiency course. The components of the test were Number Sets, Place Value, Operations on Numbers, Other Number Systems, Money and Problem. The following scale that was adapted from the policy guidelines for the implementation of the K to 12 Curriculum was applied in determining the proficiency level of pupils in mathematics [8]:

Table 1. Scale used in Measuring Mathematics Proficiency of Pupils

Score	Descriptive Equivalent
90- above	Advanced
85- 89	Proficient
80- 84	Approaching Proficiency
75- 79	Developing
74- bellow	Beginning

Statistical tools employed were frequency count, mean, standard deviation and t- test. For the interpretation of the average score and standard deviation of the test results, the following scale that was adopted and modified with permission from the study of Estonanto and Fungo [9] was used:

Table 2. Scale used in the Interpretation of Mean and Standard Deviation

SD / Mean	0—18	19- 25	26- 30
0- 2	Homogenously Low	Homogenously Average	Homogenously High
3- above	Heterogeneously Low	Heterogeneously Average	Heterogeneously High

It can be noted that Salkind [10] stressed that in comparing the pre- test and post- test after a treatment is done, the t- test is the most appropriate statistical tool. The null hypothesis was tested using the two- tailed test at 0.05 level of significance.

RESULTS AND DISCUSSION

Table 3. Mean Score and Standard Deviation of Pupils in the Pre- test

Grade Level	Mean Score	SD	Interpretation
Grade 1	12. 75	0. 94	Homogenously Low
Grade 2	14. 10	0. 71	Homogenously Low
Grade 3	21. 25	2. 83	Heterogeneously Average
Overall	**16. 03**	**1. 49**	**Homogenously Low**

Total Number of Items = 30

Results of the Pre- test. Table 3 presents the average score and standard deviation of the primary pupils of Boton Elementary School in Pre- test that was conducted prior to the implementation of the program. The results show that out of 30 items, only 12. 75, 14.10 and 21.25 were the mean scores of Grade 1, 2 and 3 pupils respectively. The overall mean of the group was 16. 03 with the standard deviation of 1. 49. The figures reveal that the pupils have low mastery of the competencies described in the curriculum guide in mathematics of the K to 12 curriculum of the Department of Education [11].

Similarly, the study of Doroja [12] revealed the same findings with the Grades 1 to 6 pupils of Bentuco Elementary School. The researcher mentioned that the poor performance level of the respondents may be associated with poor foundations in the fundamental operations, and the basic skills in rounding off numbers and place value.

Table 4 discusses further the proficiency level of the pupils along the different components included in the pre- test. It was found out that only in the component Number Sets the pupils registered Developing mastery level and that in other components the pupils were in the Beginning proficiency level in mathematics. These results reflect the need of the pupils for an enhancement in the competencies in mathematics that registered low proficiency. Thus, it can be deduced that a proficiency course in mathematics covering the identified components must be conducted to the respondents of this study.

Implementation of the Mathematics Proficiency Sessions (MPS) for Primary Pupils. After the conduct of the TNA and the Pre- test, the program was implemented by virtue of a memorandum of agreement (MOA) signed on September 13, 2016. The MOA defined that the SSC shall take charge of the instructional services of the program, DepEd- Boton Elementary School shall provide the venue, identify the beneficiaries and assist the implementation of the program, Boton local officials shall be in charge of the security concerns, and the Aremar Construction, Inc. shall provide the food of the beneficiaries of the program.

Table 4. Proficiency of Pupils along Different Components of the Pre- test

Components	Proficiency Level (%)				Interpretation
	Grade 1	Grade 2	Grade 3	Overall	
Number Sets	74. 09	75. 01	79. 11	76.07	Developing
Place Value	58. 11	75. 15	78. 43	70. 56	Beginning
Operations on Numbers	50. 24	57. 33	40. 98	49. 52	Beginning
Other Number System	40. 23	34. 14	52. 59	42. 32	Beginning
Money	70. 06	68. 08	55. 89	64. 68	Beginning
Problem Solving	30. 18	42. 25	31. 75	34. 73	Beginning
Overall	**53. 82**	**58. 66**	**56. 46**	**56. 31**	**Beginning**

On the operational stage of the program, the components of the Pre- test that registered beginning mastery level among the pupils were identified as the focus of the enrichment and remedial instruction of the program. Consultation of parents and teachers was also conducted to know the study habits, strengths and weaknesses of the pupils in mathematics. This was intended to ensure optimum support and cooperation of the stakeholders during the implementation of the program. [13]   It was agreed that the extenionists from Sorsogon State College shall render the instruction, teachers from Boton Elementary School shall be in charge of the classroom reinforcement and the parents shall follow up the take home learning tasks assigned.

Based on the suggestions and I nformation provided by these partners, the proficiency course in mathematics formally started on September 13, 2016. Since the respondents were composed of three distinct grade levels, the task force MPS were divided into three teams- Team Grade 1, Team Grade 2 and Team Grade 3. Technology was utilized as instructional material throughout the whole sessions. It can be highlighted as well that the facilitators of the program also used singing and dancing in teaching mathematical concepts to the primary pupils. Estonanto [9] mentioned in his study that the integration of singing and dancing is an effective approach to improve the academic performance of pupils in mathematics and to lessen math anxiety among pupils. Every after session, a post- conference with parents and teachers was held so that the progress of the pupils would be monitored. In these conferences, modules that include the powerpoint presentation of the topics and enrichment activities were provided to the teachers and interested parents of the pupils. It can be noted as well that the modules were also utilized by the teachers in their classroom discussions as a form of reinforcement to the enrichment program. After an almost a month of monitoring, a Post- test was conducted to assess the improvement of the performance in mathematics of the beneficiary pupils of the Math Proficiency Sessions (MPS) for Primary Pupils of Boton Elementary School. The results revealed that the pupils did not register in the proficiency mastery level. Nevertheless, it was found out that a significant difference in their performance was obtained. Thus, the parents and teachers of Boton Elementary School were thankful of the program and promised to continue to follow up the pupils by using the instructional materials given to them as reinforcement to the pupils.

Results of the Post- Test. A parallel test (to the Pre- test) was conducted to the beneficiary pupils of the Math Proficiency Sessions (MPS) for Primary Pupils of Boton Elementary School after the program (September 12 – October 12, 2016). Table 5 explains the performance of the pupils in mathematics after the implementation of the proficiency course. The findings reveal that from the mean score of 12. 75, 14.10 and 21. 75 for Grades 1, 2 and 3 in the Pre- test respectively, the mean score was raised to 23. 98, 25.13 and 24.54 respectively. The table also shows that the improvement in the academic performance of pupils in mathematics was inclusive since the overall standard deviation was 1. 20 which means the class was homogenous.

Table 5. Mean Score and Standard Deviation of the Pupils in the Post- test

Grade Level	Mean Score	SD	Interpretation
Grade 1	23. 98	1. 06	Homogenously Average
Grade 2	25. 13	0. 86	Homogenously High
Grade 3	24. 54	1. 68	Homogenously Average
OVERALL	**24. 55**	**1. 20**	**Homogenously Average**

Total Number of Items = 30

Moreover, table 6 reflects that the proficiency level of the pupils along the components of the short course had also improved. Although the goal to achieve proficient mastery level was not able to attain, however there were notable improvements in the proficiency level of pupils. The overall proficiency level of Grades 1, 2 and 3 in the components Operations on Numbers, Other Number System, and Money were 83.82 %, 84.72 % and 83.60 % correspondingly which all have a descriptive equivalent of Approaching Proficiency Level. Additionally, the proficiency level in the components Place Value and Problem Solving was Developing which have numerical equivalent of 77.82 % and 75.79 % respectively. Only in the area Number Sets did the pupils register Proficient mastery level with a proficiency score of 85.20 %. Finally, the overall proficiency level of pupils as reflected in the results of the Post- test was 81.83 % with a descriptive equivalent of Approaching Proficiency. Thus, it can

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be deduced that there is a substantial evidence of improvement both in the performance and proficiency level of pupils since from Homogenously Low and Beginning Proficiency Level categories during the Pre- test, the performance of pupils was raised to Homogenously Average and Approaching Proficiency categories.

Table 6. Proficiency of Pupils along Different Components of the Post- test

| Components | Proficiency Level (%) | | | | I |
	Grade 1	Grade 2	Grade 3	Overall	
Number Sets	85. 06	84. 78	85. 75	85. 20	P
Place Value	78. 09	79. 25	76. 11	77. 82	D
Operations on Numbers	85. 11	86. 08	80. 28	83. 82	AP
Other Number System	79. 85	86. 12	88. 19	84. 72	AP
Money	78. 88	87. 78	84. 15	83. 60	AP
Problem Solving	72. 65	78. 46	76. 25	75. 79	D
OVERALL	**79. 94**	**83. 75**	**81. 79**	**81. 83**	**AP**

P-Proficient; D-Developing; AP-Approaching Proficiency

Results of the T- test. The mean scores and standard deviations of the results of the Pre- test and Post- test were compared using two- tailed T- test at 0. 05 level of significance. Broto [14] stressed that in testing the null hypothesis using a t- test, a maximum of 30 samples must be observed. Considering this, 30 samples out of 101 respondents were taken using simple random sampling. This is 30 % of the population which exceeds the minimum requirement set by Zulueta and Perez [15] which is 20 % only for small socio- educational researches. Table 7 presents the results of the t- test. It reflects that the computed t- test value was 5. 933 which was beyond the critical value 1.645.

Table 7. Computed T- test Value of Means Scores in Pre- test & Post- test

Variables	t-value	tabular value	Decision
Mean Scores of Pupils in the Pretest and Post-test	5. 933	1.645	Reject the H_0

Since the result belonged to the area of rejection in the normal curve, thus the null hypothesis is rejected. Therefore, it can be said that there is a significant difference between the mean scores of the pupils in the Pre- test and the Post- test. Consequently,

it can be deduced also that the short course Mathematics Proficiency Sessions (MPS) for Primary Pupils held at Boton Elementary School, Casiguran, Sorsogon on September 12- October 12, 2016 was an effective approach and program in improving the performance and proficiency level of primary pupils in mathematics.

CONCLUSION

This research determined that the conduct of the extension program Math Proficiency Sessions (MPS) for Primary Pupils was an effective approach in improving the mathematics performance of pupils. This study has also shown the resulting pedagogical success of remediation as to behaviorism and constructivism approach.

Based on the foregoing results and findings of this research cum extension program, the following conclusions are drawn: (1) There was low academic performance in mathematics among the Grades 1, 2 and 3 pupils of Boton Elementary School prior to the implementation of the program Mathematics Proficiency Sessions (MPS) for Primary Pupils; (2) The proficiency level of the primary pupils was at the Beginning mastery level prior to the program; (3) The academic performance of the pupils after the program was at Homogenously Average category; (4) The proficiency level of the primary pupils after the program was Approaching Proficiency level; (5) There is a significant difference between the mean scores of the pupils in the Pre- test and in the Post- test and; (6) The program Mathematics Proficiency Sessions (MPS) for Primary Pupils was an effective approach in improving the academic performance and proficiency level of primary pupils in mathematics; (7) This extension program will improve the performance level of primary learners. Also, the teachers of Boton Elementary School will benefit from this endeavour since the extensionists were involved in the teaching process which mainly focuses on building strong foundation in mathematics. With this extension program, the barangay Boton of Casiguran Sorsogon will be having graduates equipped with knowledge and skills that will contribute to the vision of its community.

RECOMMENDATION

Based on the findings and conclusions of this research cum extension program, the following recommendations are proposed: A similar community-based math proficiency program be adopted by other

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communities in the province of Sorsogon; More partner agencies, faculty and student extensionists, and other stakeholders of the school- community be involved in the conceptualization and implementation of the program and; The implementation time frame of the program must cover longer time duration to include at least one complete grading period or one semester; Other core subjects may be included as part of the extension program so that there will be a strong foundation in all core subjects and not only in the subject mathematics; and Increase the number of beneficiaries by considering other grade levels.

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