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Effectiveness of Problem-Based Learning Strategy to The Test Performance of The Grade 5 Pupils in Mathematics

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Abstract — This study evaluated the effectiveness of Problem-based Learning Strategy to the performance of the Grade 5 pupils in Mathematics of Wague Elementary School in Leyte II District. The findings of the study were bases for a proposed intervention strategic plan. This study used the quasi-experimental method of research to evaluate the effectiveness of the Problem-solving based learning strategy to the performance of the Grade 5 pupils in Mathematics. The results of the study were basis for an Strategic intervention plan. The researcher utilized Universal Sampling in identifying the respondents of the study. The test of difference between the pretest and posttest scores performances of the grade 5 pupils in Mathematics subject before and after the integration of the problem-based learning strategy in the delivery of the most essential learning competencies or the different lessons in Mathematics in the 4th grading period that lasted for 1 month or 4 weeks in the implementation. Based on the results given in Table 3, which discusses the pretest and posttest performances that the learners should gained before and after the implementation of the identified learning intervention that could enhance the mathematical problem skills or improving the performance of the Grade 5 pupils in Mathematics. It can be gleaned from the results in the table which entails the test of difference between the scores from the pretest and posttest performance of the Grade 5 pupils. it shows further that the Grade 5 pupils performances in Mathematics in the pretest which is very evident that it is below compared to the posttest performance result which resulted to the computed t value and it has identified that this results are quit high compared to the critical t value at 0.05 level of significances. The following results are the bases whether the hypothesis will be rejected or accepted on the certain level of significance.

Based from the results in table 3, the teacher researcher decided that the hypothesis which states that there is no significant difference between the pretest and posttest score performances of the grade 5 pupils in Mathematics before and after the integration of the Problem-based learning strategy is rejected. In other words, the utilization of the new intervention that was identified by the researcher to be shared to the Grade 5 learners are quit effective considering that the performance in the pretest assessment prior to the utilization of the identified intervention which

is the problem-based learning strategy in the delivery of the lessons in the fourth grading period which focus on the MELCS for 1 month or weeks. The results in table 3 regarding the test of difference of the pretest and posttest score performances in Mathematics of the Grade 5 pupils after the integration of the Demo-Video Lessons implied that since the grade 5 pupils performances are increasing or improving based on the results given, it is very evident that the integration of the Problem-based learning strategy is very significant in improving the mathematical skills of the learners or improve the numeracy performance of the learners as a whole and the good thing of having this experience is that they will already be active in interacting in the teaching and learning process and during in the delivery of the different topics in Mathematics which means that it is significantly effective and it really helped in improving the performance or skills specially in Mathematics Subject.

Keywords — Effectiveness, Problem-based Learning Strategy, Grade 5 Pupils

I. Introduction

One aspect of the mathematics curriculum that involves high levels of reasoning is solving word problems. Word problems, sometimes referred to as story problems, and are used to give learners a glimpse of how mathematics is used in the real world (Bogomolny, 2009). Word problems consist of a linguistic presentation of hypothetical situation in which problems are posed that can be solved through the use of mathematical equations.

Some mathematicians conceptualize word problems as part of a larger problem-solving component of the mathematics curriculum in which students must overcome barriers in order to obtain and explain a solution to a mathematical problem that is not directly apparent (Heddens & Speer, 2001).

Teaching the new generation of learners is a big challenge. One must defy the odds and understand students' needs and necessities in order that they can gain the most possible learning. It is a high time that the learning providers or the teachers must be fully aware and abreast of the current situation and attitudes of learners, be innovative and resourceful enough to deal with them so that the quality of education that the government is imposing would be more achievable.

Children today, are digital natives who are perfectly at home with technology and use it to mediate their experience and social relationships. They value experiential and exploratory learning, quickly becoming bored with passive lectures.

What essential for today is to provide them with everyday quality learning style using the problem-solving strategy approach in order for them to develop their critical thinking, and opportunities to discover notions by themselves that be use in the day-to-day interactive course.

What is needed is not a teacher by profession but it must be a teacher by heart because learners nowadays are becoming abrupt, hasty and impulsive. If a teacher does not have the required attitude towards the job of teaching, he never wins. But if a teacher possesses the "must have" personality and characteristics of quality learning facilitators with innovative teaching strategies, there would be an assurance of a very high learning outcome in the totality of the child's new adventures in life, rendentions of intellectual developments and virtues if life that would bring them to their highest goals when they become mature and thus, can reach their full potential and be what they want to be in the future.

As a learning facilitator of Mathematics for how many years, I can say that problem-solving strategies is effective in the performance among learners. Why? It'd because, it would foster higher order thinking skills of my grade 5 learners. The competencies suggested in MELC, K to 12 Curriculum in grade 5 also emphasizes the comprehension of concepts through development of skills and competent performance of basic operations and problem-solving skills.

In everything we do, not all the time it runs smooth. Sometimes it would fail and sometimes meet problem and circumstances. About these Problem-solving strategies Research, I found out some problems of my learners a few of them, the reason why their performance not effective.

- Unmastered of the four fundamental operation.
- Not able to comprehend the word problem
- Careless in doing the process of solving problem
- Literacy problem.

According to Vygotsky, zone of proximal development implies that learners can move from their present stage to a higher lever through scaffolding or guidance provided by teachers. By carefully designing activities, teachers can stimulate children's' higher level thinking skills that aid them in understanding concepts.

This study will help find solution to particular problem arising in school. There were be possible of high score in numeracy rate if this study found out effective in using this strategy in teaching.

As a Researcher, he is very optimistic to find good output on her study that will be helpful in attaining the acceptable mean percentage score of 75 percent specifically in Mathematics. Graphical Organizers in teaching of reading and its effects on Pupils comprehension.

This study evaluated the effectiveness of Problem-Based Learning Strategy to the test performance of Grade 5 pupils in Mathematics in Wague Elementary School in Leyte II district in the division of Leyte. The findings were the bases for the proposed Problem Solving Based Strategies Plan.

Specifically the study sought to answer the following questions:

1. What is the performance of the Grade 5 pupils in Mathematics before the integration of Problem-Based Learning Strategy?
2. What is the performance of the Grade 5 pupils in Mathematics after the integration of Problem-Based Learning Strategy?
3. Is there a significant difference in the performances of the Grade 5 pupils in Mathematics before and after the integration of Problem-Based Learning Strategy?
4. What Improvement plan can be proposed based on the findings?

HYPOTHESIS:

There is no significant difference in the performances of the Grade 5 pupils in Mathematics before and after the integration of Problem-Based Learning Strategy.

II. Methodology

Design. This study utilized the Quasi-Experimental research design to determine the Effectiveness of the Graphic organizers to the reading Performance of the Grade 5 pupils in Wague Elementary School based from the different most essential learning competencies in 4th grading period delivered in Mathematics subject. The main local of the study is the Wague Elementary School which is located in Leyte II District in the Schools Division of Leyte. Based from the aforementioned locale, the main respondents that were chosen by the teacher-researcher was the Grade 5 learners prior to the inclusion of the Graphic organizer in the delivery of the most essential learning competencies and after the aforesaid intervention were done. The assessment given to the respondents was carefully validated by the teacher-researcher herself which are the pretest reading and posttest Mathematical skills and performances of the Grade 5 pupils, the different steps to conduct the reading approaches were undertaken in order to validate their performances before and after the implementation of the Intervention in reading performances of the respondents. This study is mainly focus on the results of the different reading validation to gather data: The pretest reading performance of the Grade 6 pupils before the implementation of the graphic organizers, , The Posttest numeracy performance of the Grade 5 pupils after the implementation of the Graphic Organizers, as well as the significant difference of the pretest and posttest reading performances before and after the implementation of the Graphic Organizers in the delivery of the most essential learning competencies in teaching numeracy for the 4th Grading Period. In the Quasi-experimental research design, the researcher prepared the different mathematical operations using problem-based learning strategy materials. The focus of this study was the learners who are experiencing difficulties in learning mathematics as well as those learners who were independent

learners as well as facilitating in the giving in the average level of performance. ; The proposed strategic plan was taken based on the findings of the study.

Sampling. There are 31 who are included in the study. 15 respondents of the study were Males and 16 were Females and the primary means of reach is face to face implementation of the study as well as during the gathering of data in the school where the study was conducted.. Another way of contacting them are through cell phones of their respective parents.

Research Procedure. The researcher prepared the research design which is the quasi-experimental research design and tools which are the different reading materials based from the validated materials such as the consolidated test items from the self-learning materials to utilize in the study. The different tools prepared by the Teacher-researcher were the ff: validated Summative Test Questionnaire in English subject from the Self Learning Modules that were focused on the different competencies in the 4th grading period. The 40 items test questions were used before the integration of the problem-based learning strategy who were given to the pupils. After one month of the intervention, posttest post validation to validate the performances was given to the grade 5 pupils with the same test questionnaire that were given in the pre-test reading assessment. . Prior to the preparation of all validation tools which will be used by the teacher-researcher in determining their performances before and after the integration of the intervention together with the reading materials which were utilized in teaching reading, The Approval and recommendation from the Office of the Schools Division Superintendent, as well as to the Assistant Schools Division Superintendent being the Chairman of the Schools Division Research Committee through the Senior Education Program Specialist in Planning and Research. After the Approval of the Schools Division Research Committee, the Approved or endorsement letter from the body together with the approved letter of intent were forwarded to the Office of the Public School District Supervisor as well as to the office of the School principal in order to get full support on the conduct of the study as well as to get also approval from their end. The proposed title and design was submitted to the School Division Office for approval. Upon approval, the Division released endorsement to the District Office where the school is located. When the research was approved by the Schools Division Office and District Office, the researcher began the process of data gathering. Validation of the instruments through Experts such as the Master Teacher and in coordination with the school head and lastly to the Education Program Supervisor in Learning Resource was sought. Orientation of the participants was done. Answering and retrieval of the research tool followed. Tallying of results and treatment of data. Analysis and Interpretation of Data. Making of Proposed problem-based strategic intervention Plan.

Ethical Issues. The right to conduct the study was strictly adhered through the approval of the principal, approval of the Superintendent of the Division. Orientation of the respondents both the learners and the teachers including the School Principal was done.

Treatment of Data. The following statistical formulas were used in this study:

The quantitative responses were tallied and tabulated. The data was treated statistically using the following statistical tool. Weighted Mean. This was utilized to assess the performance of the Grade 5 learners in Reading. T-Test For Mean Difference- This tool were used to calculate the performance of the Grade 5 learners in Reading.

III. Results and Discussion

TABLE 1
PRE-TEST PERFORMANCE OF GRADE 5 PUPILS IN MATHEMATICS

Score Range	Description	Experimental Group	
		Frequency	%
33-40	Excellent	0	0
25-32	Very Good	0	0
17-24	Good	8	26
9-16	Fair	14	45
1-8	Poor	9	29
Total		31	100
Weighted Mean		**12.28**	**Fair**

Table 1 shows the pre-test performance of the Identified respondents which are the Grade 5 pupils in Mathematics before the integration of the different learning materials that focus on the problem-based learning strategy that the teachers should share to the learners in the delivery of the most essential learning competencies particularly on the 4th grading period in the different lessons in Mathematics.

In this study, the teacher researcher is focusing on the idea of touching and teaching the learners through the use of different learning materials gleaned on the problem-based learning strategy . The teacher researcher in this time, shall be creating avenue for all the types of learners which deal with high order thinking skills.

Based on the results in table 1 which was divided into 5 level of performances which could be used later during the pre-evaluation as well as to the post evaluation to be given by the learners through the integration of the problem-based learning strategy in the delivery of the most essential learning competencies in mathematics. Based from the results given, it can be gleaned that from the Excellent performance level having a score ranging from 33-40, there were none from the respondents or zero (0) percent from the 31 total number of respondents who were not able to excellently done their tasks even if the approach or strategy identified by the researcher is not yet

introduced by the researcher to the Grade pupils as respondents to this study before they will be receiving the interventions . In the Very Good Level of Performance of the Grade 5 having a score ranging from 25-32, there were none from the respondents gained in this pre-evaluation as they still learned the different learning lessons through the strategies utilized by the leaners or simply zero (0) percent. On the other hand, in the good of performance level which considered to be the average learning performance having a class interval of 17-24 and found out that there are 8 respondents gained on this level with an equivalent percentage of 26 percent. Moreover, in the fair level of performance having the scores ranging from 9-16, it was found out that majority of the learners are belong to this level of performance which means that they are in the fair level having the 14 respondents or 45 percent among all the 31 respondents being validated. Lastly, in the poor level of performance, with the scores ranging from 1-8, there were 9 respondents or 29 percent.

The results in table 1 which focused on the pretest performance of the Grade 5 pupils in Mathematics before the integration of the Problem-based learning strategy in the delivery of the most essential learning competencies particularly on the most essential learning competencies in the 4th Grading period or in the last period of school year. The pretest performance level of the grade 5 pupils result implied that the grade 5 learners are having difficult time in learning the subject or they don't have confidence or others are lack of confidence in learning the subject because they just gained fair level of performance. In other words the learners should exposed new learning strategies in order for them to learn new things in the different lessons in Mathematics in order to increase their performances considering that the performance that they have gained only fair level of performance which has an equivalent rating 12.28. In other words, even in the time when they already exposed to the different learning strategies in learning the topics, they don't really get the idea of improving their performance, thus they should learn new things in learning mathematics.

TABLE 2
POST-TEST PERFORMANCE OF GRADE PUPILS IN MATHEMATIVS

Score Range	**Description**	**Experimental Group**	
		Frequency	**%**
33-40	Excellent	12	39
25-32	Very Good	10	32
17-24	Good	9	29
9-16	Fair	0	0
1-8	Poor	0	0
Total		31	100
Weighted Mean		**29.10**	**Very Good**

Table 2 shows the posttest performance in Mathematics of the Grade 5 pupils after they already exposed to the new intervention which is the problem-based learning strategy in the delivery of the most essential learning competencies that was delivered for one month implementation or integrating the different learning materials that were involved in the giving of caste studies, and other materials that could justify the intervention being utilized which is the problem-based learning strategy to the topics specified in the time frame prepared by the teacher-researcher in the delivery of the most essential learning competencies particularly on the 4th grading period.

Based on the results in table 2, it can be gleaned that from the Excellent performance level having a score ranging from 33-40, there was really an increase in terms of performance of Grade 6 learners which was the respondents of the study there were 12 respondents or grade 6 learners or 39 percent from the 31 total number of respondents who were done their tasks excellently after they are exposing to the problem-based learning strategy. This is the way of giving the best in order to let the learners learned the easy way to make the mathematics fun and memorable. In the Very Good Level of Performance having a score ranging from 25-32, there were 10 respondents or 32 percent among all the 31 respondents being tested while in the good level of performance having a scores ranging or class interval of 17-24, there were 9 respondents or simply 29 percent while in the poor level of performance, there were none or 0 percent from the grade 5 pupils out from the 31 total number of respondents being tested.

The results in table 1 which focused on the posttest performance of the Grade 5 pupils in Mathematics after the integration of the Problem-based learning strategy in the delivery of the most essential learning competencies particularly on the Most essential competencies in the 4th Grading period implied that the grade 5 learners are really learning the different topics being introduced by the teacher to gain quality of learning and teaching for both the teacher and learners specially in learning mathematics as a subject. It can be shown based from the results that the learners really improved their learning skills in solving the different mathematical problem thus they already mastered the lessons even if the topics presented by the teacher-researcher were already in the difficult level. It can be justified because the overall weighted mean is 29.10 or having the very good rating of performance in terms of leveling their skills based from the performance=s they have gained.

Moreover, it is really important for the teachers to really teach the lessons based on the learning capacity of the learners in consonance with their motivation in learning the topics because it will really helped them or it adds from their learnings from the different learnings from the past lessons they have experience. Furthermore, It is evident that the Grade 5 learners really love the new innovation being introduced by their teachers and also they really love to learn from even if the environment is not really friendly due to covid restriction.

TABLE 3
TEST OF DIFFERENCE BETWEEN THE SCORES IN THE PRE-TEST AND POST-TEST OF GRADE 5 PUPILS IN MATHEMATICS

Groups	Test Scores		Computed T	Critical T	Decision	Interpretation
Grade 5 Learners	Pretest Posttest	12.28 29.10	1.742	0.933	Reject Ho	**Grade 5 Learners**

Table 3 shows the test of difference between the pretest and posttest scores performances of the grade 5 pupils in Mathematics subject before and after the integration of the problem-based learning strategy in the delivery of the most essential learning competencies or the different lessons in Mathematics in the 4th grading period that lasted for 1 month or 4 weeks in the implementation. Based on the results given in Table 3, which discusses the pretest and posttest performances that the learners should gained before and after the implementation of the identified learning intervention that could enhance the mathematical problem skills or improving the performance of the Grade 5 pupils in Mathematics. It can be gleaned from the results in the table which entails the test of difference between the scores from the pretest and posttest performance of the Grade 5 pupils. it shows further that the Grade 5 pupils performances in Mathematics in the pretest is equal to 12.28 which is very evident that it is below compared to the posttest performance result which is equal to 29.10. which resulted to the computed t value of equal to 1.742 and it has identified that this results are quit high compared to the critical t value of 0.993 at 0.05 level of significances. The following results are the bases whether the hypothesis will be rejected or accepted on the certain level of significance.

Based from the results in table 3, the teacher researcher decided that the hypothesis which states that there is no significant difference between the pretest and posttest score performances of the grade 5 pupils in Mathematics before and after the integration of the Problem-based learning strategy is rejected. In other words, the utilization of the new intervention that was identified by the researcher to be shared to the Grade 5 learners are quit effective considering that the performance in the pretest assessment prior to the utilization of the identified intervention which is the problem-based learning strategy in the delivery of the lessons in the fourth grading period which focus on the MELCS for 1 month or weeks. The results in table 3 regarding the test of difference of the pretest and posttest score performances in Mathematics of the Grade 5 pupils after the integration of the Demo-Video Lessons implied that since the grade 5 pupils performances are increasing or improving based on the results given, it is very evident that the integration of the Problem-based learning strategy is very significant in improving the

mathematical skills of the learners or improve the numeracy performance of the learners as a whole and the good thing of having this experience is that they will already be active in interacting in the teaching and learning process and during in the delivery of the different topics in Mathematics which means that it is significantly effective and it really helped in improving the performance or skills specially in Mathematics Subject.

IV. Conclusion

Based from the findings of the study, it can be concluded that there is a significant difference between the pre and post-test scores of grade 5 pupils in Mathematics. Thus, the integration of the Problem-based learning strategy is significantly effective in improving the different most essential learning competencies in Mathematics thus, utilization of the intervention even to the other grading level as well as to the other learning competencies is highly recommended to cater the different needs of the learners.

V. Recommendations

1. The proposed intervention plan should be used in the delivery of the lessons in Mathematics.
2. Administrators or school head should initiate trainings and workshops specially this summer time which could happens during the July and August should be conducted particularly on the development of the different learning materials focusing on the problem-based learning strategy that follows norms or standards of crafting those learning materials in Mathematics.
3. School Heads should encourage teachers in all subject areas to develop demo-video lessons in their subjects and let them undergo the process of doing the quality assurance in order to let this materials be downloaded to the DepEd Portal to be used for other teacher who are really needing the materials and have no capacity to craft due to lack of trainings and or resources.
4. Based from the results of the study having the excellent and good performances level, teachers should continue to adopt and integrate the teaches and expose the grade 5 learners to maintain or improve the performance for those learners who are really need help in improving their mathematical skills.
5. In relation to the abovementioned, the researcher is giving the authority to the future researcher to conduct the same study to validate the significant findings of the study.

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AUTHOR'S PROFILE

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The author is born on June 09, 1985 at Villaba, Leyte Philippines. He finished her Bachelor's degree in Hotel Restaurant, Tourism and Management at Biliran Province State University (BiPSU) formerly known as Naval State University (NSU) – Main Campus. He took his supplemental course in Teaching Education at Palompon Institute of Technology-Tabango Campus. He is currently finishing his Master's degree of Arts in Education major in School Supervision and Administration at Western Leyte College of Ormoc City. He is currently a Teacher I in the Department of Education and a Grade V Teacher at Wague Elementary School at Barangay Wague, Leyte, Leyte, Philippines. He is assigned in several coordinators in school such as Mathematics coordinator, LIS/EBIS, EMIS, SMEA and ICT coordinator. He is 7 years in the service. He believes that teaching the young minds of today's generation provides them the possibility of a better future.