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THE TEACHING OF PROBLEM SOLVING USING CREATIVE APPROACH

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ABSTRACT

This research study aimed to find out the effectiveness of creative approach in the teaching of problem solving. It also aimed to identify the frequent miscalculations committed by the pupils in solving word problems. The study utilized the quasi-experimental design with a control and experimental group. Each group was given pre and post-tests. Answers were analyzed to identify the common errors committed by the students. It was found out that the pre-test performance in both control and experimental group was below average. Their performances differed in the post-test where the control group had an average performance while the experimental group had above average performance. The pupils in both control and experimental had significantly improved their performance. It was also found out that they significantly differed in solving word problems involving multiplication and in performing word-problems involving two operations. The totality of the results showed a significant difference between the control and experimental group in solving word problems. The common errors found involved errors in combinations and the concept of distracters. Some pupils derived the unknown combinations from the known ones. Creative approach in teaching problem solving was then effective. Students found it easier to solve the problems because the teacher provided them with real life situations and that pupils were trained to formulate and create their own problems and then solve the problems they created. Component skill errors are the most common errors committed by the pupils in solving word problems in both groups. Teachers should therefore provide sufficient time in teaching problem solving and that problem solving must always be made as a preparatory activity to present a new lesson. Teachers must include activities that involve creative approach which eventually guide and expose the students to create then solve their own word problems.

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INTRODUCTION

The task of preparing the pupils for their roles in society before was much simpler than in the schools today. Today's students must understand a wide range of concepts and skills and must learn problem solving strategies that would have broad applications. One often hears writing across the curriculum and writing process as well as reading concept area and the language modalities to understanding. However, we seldom hear of Arithmetic transverse other discipline, math pedagogies, mathematics in another content spaces, or the entire math modalities other than its relationship to scientific knowledge; Mathematics is an overlooked component in integrative teaching and learning (Kleiman, 1991). Math, like any skill subjects, can develop on what young children already learn and perform. In text, the foundation is the child's overall involvement and aptitude to express in speech or in sign

language. While in Math, the origin is the child's own proficiency with engagements such as relating, partaking and associating the child's emerging thoughts of period and the youth's normal recognition of graphic, melodic, and program outlines. The role of math in the present scientific age is significant to education. Through it, educators have found effective means to help the youth participate actively in the present economic and social life. People from all walks of life always encounter problems in his daily living. When a child is asked to buy something from the store, a problem arises as to the change and the estimate of the total amount to pay in order to bring the right amount of money. It has been observed by many, particularly by this researcher that many elementary pupils reach intermediate grades without mastering the basic skills on problem solving. Can it be that some teachers don't enhance problem solving? Or is it also possible that they cannot motivate their students for they themselves are not

motivated. Stimulated by these observations and readings made on the subject, this study was conducted to propose and provide the teachers' suggested strategy in the teaching of problem solving to make the lesson more meaningful and interesting to the pupils.

Theoretical/Conceptual Framework: Math delivers the idea for computing, quantifying, associating, recognizing patterns of rationalization and collaborating accurately. The concepts and skills can offer a tool for deep thinking, probing and expressing within the discipline encompassing within student's lives. It is a language students can carry into the domain they develop. Hence, mathematics must be given importance in teaching, especially problem solving for it is here where children are given time to think, analyze, communicate ideas and that problem solving provides the opportunity to meet a challenge. In the provision of Article XIV, Section 2, paragraph 1 of the 1987 Philippine Constitution mandates that the government shall create, uphold and maintain a broad, sufficient and cohesive structure of education pertinent to the essentials of the public and state. These changes on education are highly substantial and truly innovative.

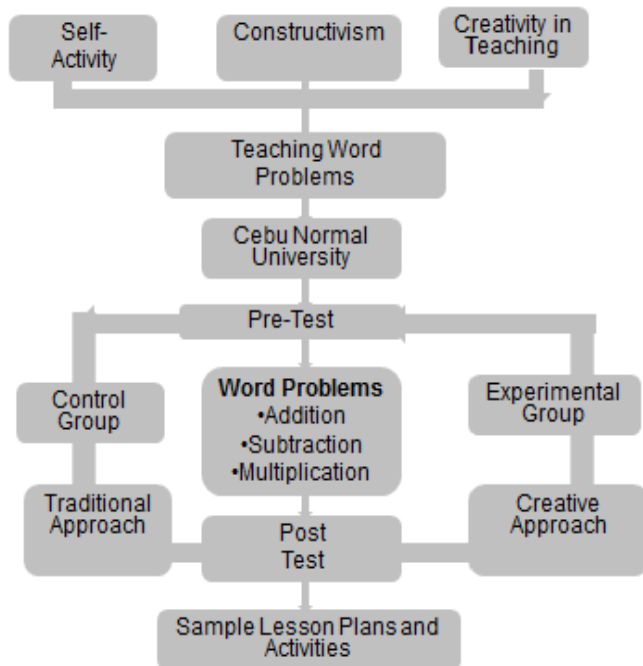


Figure 1. Theoretical/Conceptual Framework of the Study

This research innovation is an attempt to implement the mandate of the constitution to make problem solving adequate to the needs of the pupils. Skill in problem solving is important to everyone in his dealings with situations in his everyday life. Creative approach is designed to satisfy this need of society as stipulated in the constitution. Adequate experience of the students in the basic facts especially addition and subtraction is a must in solving word problems. The students have to gain interest if they are to master the basic facts and solve problems with ease and efficiency. William McDougall (1979) strongly advocated the theory that one's thoughts and behavior could be the results of inherited instincts which would be compelling sources of conducts but modifiable by learning and experience. Problem solving skill contributes to the development of personality. The child develops independence and initiative. Since the problem is usually adopted to his level, he looks for his own solutions. He is encouraged to think for himself and

thereby develops self-reliance. Success in solving problems gives a student confidence. The student is encouraged to work on his own ability and teacher ceases to be a taskmaster. Activities should be planned so as to give the students opportunities for doing, reacting and undergoing (Lardizabal, et al, 1984). The theory of constructivism (Vygostsky, 2004) strongly affirms the researcher's innovation. The theory states that students construct their own understanding and knowledge of world through experiencing things and reflecting on those experiences. Learning is an active social process gained through activities in the life-like social institution. This can be done through self-activity. Skills and concepts are learned more effectively if they are met in natural situations. The innovation provides every student the opportunity to actively create his/her own knowledge. This study dealt with creative approach of making the lessons in problem solving more interesting and easier to tackle. It tried out this particular approach to determine its effectiveness. This approach was proposed following the suggestion of Borlaza (1971) who said that teachers should develop the creative imagination of the pupils so they could see beautiful and useful things to make out things that one usually threw away. Creative teaching could be self-rewarding. Creativity fed on itself. The best judge for a creative product would be the individual himself. Teachers should provide opportunities for children to pursue individual projects which they had selected from those suggested by the teacher or which they had designed. In this study, the teaching of problem solving used creative approach where the students formulated their word problems utilizing the activities prepared by the teacher.

Problem solving or reflective thinking is regarded by many as the type of mental activity towards which all simpler types of learning lead. It requires ability to reason which is a distinguishing characteristic of intelligent activity. Teaching children to think is one of the most difficult and important tasks of the teachers. The fact that more children do not learn to think effectively can be attributed to the large emphasis often given to the rate of learning and the development of routine habits and to the failure of the curriculum to provide opportunities for problem solving through reflective thinking (Yoakman and Simpson, 1979). Teachers may positively embrace the significant contributions on the knowledge of the different strategies could bring to the teaching profession and that teachers could possess varied repertoire of skills and strategies in the teaching and learning process through professional growth and development (Obaob & Damiao; 2015). It was because of the felt need to help pupils develop problem-solving skills that this study was undertaken.

Statement of the Problem

The study aimed at finding out the effects of creative approach in teaching problem-solving to grade four pupils of Cebu Normal University, Cebu City.

Particularly, it also sought to attain the following objectives:

1. Find out the entry and exit profile of the performance of the grade four pupils in Mathematics between the:
 - 1.1. Conventional;
 - 1.2. Creative approach?
2. Identify the significant mean gain of the pupil's performance in Mathematics from the pre-test to the post-test between the:

- 2.1. Conventional;
- 2.2. Creative approach?
3. Determine the significant difference between the achievement of grade four pupils of the control and the experimental group?
4. Discover the common errors committed by the pupils of the control and experimental groups?

Significance of the Study: Results of the research would be very beneficial to the people who would be concerned with pupils' performance and who had direct influence on teachers and pupils. The school administrators through the findings of this study will gain insight regarding better teaching strategies in teaching problem solving. The teachers will always find ways and means to improve and increase achievement of their pupils. Results can be considered as a reference factor to improve problem-solving strategies that will bring about better achievement. Every effort exerted by both teachers and administrators the focus is always the students. Findings of this study would make them aware of the importance of independence. Finally, the parents who play a very significant role in the development of the pupils would realize the importance of problem-solving to the lives of their children.

Design: The design used in this study was quasi-experimental with a control and an experimental group. It tried to measure the effectiveness of the creative approach in the teaching of problem solving among the grade four pupils. Each group was given an entry-test and exit-test. Only the students in one group was treated with the creative approach while the other group was treated with the conventional approach. Both groups had the same skills taught. They only differed in the teaching approach.

The Teaching Problem Solving Using Creative Approach: Creative approach in the teaching of problem solving is a combination of the different approaches like the discovery approach (Villamin,1976), heuristic approach (Salandanan,1985), language experience approach (Kennedy, 1984), inquiry approach (Salandanan,1985), acting-out or dramatization (Kennedy, 1984) and math story problems (Silbert,1990). This approach is applied when the pupils are very prepared with the relevant pre-skills. The relevant pre-skills in the teaching of problem-solving involving addition, subtraction and multiplication are the mastery of the basic facts and the exposure of the pupils to the action key words usually used in problem solving. These also provided the pupils with a general understanding of how language and math skills would be integrated to solve problems. It also dealt with procedures for teaching pupils to solve addition, subtraction and multiplication problems and was divided into two parts. The first part was the introduction of the concept of story problems to the pupils. The procedure discussed taught the pupils how to solve action story problems by drawing pictures, then translating phrases into symbols. This was done by the teacher through guided questions. In this phase, the teacher played a great role, that of serving as a model in translating pictures to problems. The teacher would present a pre-skill format designed to teach pupils how to translate four key word/phrases such as get more, get rid of, end with and how many – to symbols. The phrase, get more, was translated to a plus sign; get rid of to a minus sign; end with to an equal sign and “how many” to an empty box. After the pupils knew these

four terms, the teacher would present another set of another pre-skill exercises. The teacher illustrated another set of exercises where he said a common verb and asked if the verb could be translated to a plus sign or a minus sign or a multiplication sign. These common verbs were buys, sells, losses, eats, finds, gives away, each of, breaks of the objects and makes. For example: “When you buy something do you get more or get rid of something? So, when you buy something, do you use plus or minus sign?”

Part B was the structured worksheet/exercise. The teacher gave a worksheet with a set of problems. If the pupils could decode the words of the story, then he could read the problems. If the pupils did not have adequate decoding skills, the teacher should read the problems to them. After reading each phrase, they were directed to draw the appropriate picture. Then the pupils rephrased the problems by using the keywords and then solved the problem by following the correct equation. This was utilizing the language-experience approach. Another activity was the acting-out strategy or dramatization. The children dramatized or replicated a real world situation without solving a problem. Then the teacher prepared a min-store stocked with empty foods and household-product containers in the classroom to give the children experiences of buying and selling their store products. This activity was applied when the pupils had mastered the skills.

Data Gathering Procedure: The investigator secured approval at the Vice President of Academic Affairs' office through the College Dean and the Principal of the Elementary Department. After which, he then grouped the 140 grade four students to two sections with 70 pupils each. One was the experimental and the other was the control group. He conducted a try-out of the researcher-made test to the grade five pupils of Cebu Normal University at the start of the school year. Reliability and validity tests were established. The entry test and exit test were administered to the respondents of both experimental and control groups. The results were interpreted and analyzed.

The Researcher's Tool: The researcher utilized the teacher-made test with items on problem solving involving addition, subtraction and multiplication. The test was composed of five sets of 10 items per set. Set 1 was composed of problems involving addition; Set 2 was composed of problems involving subtraction. Set 3 was composed of problems involving addition and subtraction; Set 4 was composed of problems involving multiplication and Set 5 was composed of problems involving addition, subtraction and multiplication. Each set was administered for 60 minutes.

RESULTS AND DISCUSSION

In solving word problems involving addition, pupils in both groups showed mastery as a result in the pre-test. Solving word problems involving addition for control and experimental was easy for the grade four pupils. Mastery of skills in grade three was evident. In contrary, the grade four pupils in both groups during the pre-test had below average performance in the rest of the skills tested. They had not fully grasped the skills in solving problems involving one-step subtraction, word problems involving addition and subtraction, word problems with one step involving multiplication and with two steps of word problems involving addition, subtraction as well in multiplication. Grade four pupils could not perceive what

operation to use and that they were not exposed to the types of problems they were solving. They did not as well master the basic operations on subtraction and multiplication. Some pupils followed only one step and few of them used the wrong operation in solving the problems. They also could not comprehend the word problem hence, they could not decode them. In totality, both groups had below performance during the pre-test. Non-mastery of the basic skills and faulty steps in solving these word problems were evident in the solutions of the grade four pupils on word problems involving addition, subtraction and multiplication. During the exit test, the grade four pupils in the control group had above average performance in solving word problems involving addition. They had average performance in solving one-step word problems involving subtraction and multiplication. It implied that the pupils had mastery in solving one-step word problems involving addition, subtraction and multiplication. They found it easy to decode word problems involving one step operation. The pupils in the control group also had significant learning in these skills using the conventional modality of teaching. While in word problems involving two-step operations, the grade four pupils in the control group had below average performance. They did not follow the right steps and they also lacked the decoding skills. Generally, the grade four pupils in the control group had shown mastery in solving word problems involving addition, subtraction and multiplication. On the other hand, the grade four pupils exposed the creative approach showed an above average performance in one-step word problems involving addition, subtraction and multiplication.

They even had an above average execution in solving problems with two steps involving addition and deduction. It only proved that creative approach was found to be very effective in teaching word problems involving addition, subtraction and multiplication having one step and two steps. This showed that the difference in the mean during the pre-test and post-test in the class exposed to the creative approach is very significant. The pupils could easily follow the right steps in solving the word problems and that decoding of the problem was easier to do. They found easier to solve the given problems because they had felt the need and that they were exposed to these problems as they formulated same word problems in the process. In comparison between the control and experimental groups relative to their mean difference, it was found out that it was only in solving word problems with one step involving multiplication and in word problems with two steps involving addition, subtraction and multiplication showed significant difference. In these skills, the pupils exposed to the creative approach performed better than the traditional approach. It was gleaned from this findings that the grade four pupils could easily solve two-step word problems by employing the creative approach. The pupils exposed to the innovation were provided with a variety of experiences or learning situations that dealt with manipulation-construction approach (Esteban;1985). The use of creative approach equipped the pupils in decoding the problem well and they efficiently followed the right operations needed in solving the problems. There are five common errors identified in this study. They are component skill errors, strategy errors, fact errors, decoding the problem and carelessness or inaccuracy.

The first three common errors committed by the pupils in the control group during the pre-test and post-test were component skill error, fact error and decoding. This revealed that the pupils used a different operation instead of the correct operation to use, most of them included the distractor of the word problem and that majority of them committed an error in performing the combination. While in solving word problems involving two steps, the students in the control group committed an error in decoding which meant that the students in the control group followed only one step instead of two steps, they performed wrong pair of numbers and that they only used one operation error was still the number one type. By solving word problems with two steps, the students exposed in the creative approach committed the error in decoding which meant that most of those who got wrong used other operation instead of the correct one. The errors committed by the students in the experimental group were mostly on fact errors which showed that some of them had errors in combination and error in adding the partial products. While in solving word problems with two steps involving addition, subtraction as well as in multiplication, its analysis revealed that majority of the errors were on decoding and in component skills errors that showed wrong operation used and the error in combination.

Conclusions

The pupils exposed to the creative approach in solving word problems had a better performance indicating far above required standards. They had coped with the performance level expected of them. The use of dramatization and simulations in teaching grade school children greatly motivated them to solve word problems and that creative approach was proven more effective in teaching word problems. More activities that may enhance their skills in identifying the correct operation to use should be given emphasis to entail mastery and correct decoding. The use of creative approach in the teaching of word problems is therefore imperative.

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