



October 2013

The Reading Comprehension and Mathematical Problem Solving Skills among Grade Four Pupils

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**THE READING COMPREHENSION AND MATHEMATICAL PROBLEM
SOLVING SKILLS AMONG GRADE FOUR PUPILS**

A Special Project

presented to

The Faculty of the College of Graduate Studies
and Teacher Education Research
Philippine Normal University
Manila

In Partial Fulfillment of the Requirements for the Degree
Master of Arts in Teaching – Mathematics

by

Ederlyn D. Esteban

October 2013

APPROVAL SHEET

This seminar paper entitled “**THE READING COMPREHENSION AND MATHEMATICAL PROBLEM SOLVING SKILLS AMONG GRADE FOUR PUPILS**” prepared and submitted by **EDERLYN D. ESTEBAN**, in partial fulfillment of the requirements for the degree of **Master of Arts in Teaching Mathematics**, has been examined and recommended for acceptance.

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ACKNOWLEDGMENT

The researcher wishes to extend her sincere gratitude and appreciation to the following persons instrumental to this study:

My adviser -- **Professor Allan S. Reyes**, for his guidance and understanding.

Claret School of Quezon City family especially the **Grade Four teachers (2012 – 2013) and the Grade Five teachers (2013 – 2014)** for the unwavering encouragement and support in the duration of the completion of this work.

Mr. John Paul L. Botin, for all the ideas he had shared in this study.

Mr. Bernardino Li and Mrs. Razerly Ibañez, for all the suggestions given in making of the research instruments used in this study.

My husband, **Dean Carlo P. Esteban**, for the unceasing love, continuous prompting and tireless understanding which translated to the realization and fruition of this endeavor.

My son, **Dean Edward**, for being an inspiration even in the most trying times in making the same task.

And above all, to **Almighty God**, for all the strength and blessings, thus, making all things possible.

ABSTRACT

Title	The Reading Comprehension and Mathematical Problem Solving Skills Among Grade Four Pupils
Researcher	Ederlyn D. Esteban
Degree	Master of Arts in Teaching
Specialization	Mathematics
Key Concepts	Reading Comprehension, Mathematical Problem Solving, Comprehension, Problem Solving
Adviser	Allan S. Reyes

This study sought to determine the extent of relationship between reading comprehension and mathematical problem solving skills of Grade Four (4) pupils of Claret School of Quezon City for the School Year 2012 – 2013. Specifically, this also aimed to determine the level of reading comprehension and the mathematical problem solving skills of the Grade Four pupils. This study made use of the correlation method of research. One hundred fifty-three (153) grade four pupils from Claret School of Quezon City in the school year 2012 – 2013 were the respondents. The researcher-made tests were used as the instruments in this study. The mean was used to identify the level of reading comprehension and the mathematical problem solving skills of the Grade Four pupils. Also, to establish the relationship of reading comprehension and mathematical problem solving skills, the Pearson Product-

Moment Correlation Coefficient (r) was employed. The results revealed that the level of reading comprehension of Grade Four (4) pupils of CSQC was high average while the level of mathematical problem solving skills was low average. This result in mathematical problem solving skills was due to the error brought about by their comprehension of the problem. Aside from it, computational skills were evidently not mastered. Furthermore, the computed value of (r) showed that there was moderate relationship between reading comprehension and mathematical problem solving skills of Grade Four (4) pupils of CSQC. The reason for such moderate relationship was occasioned by the extent of understanding of the textual or word problems. Also, since mathematical word problems required correct interpretation of given clues, any misinterpretation eventually led to incorrect answers.

TABLE OF CONTENTS

	Pages
Title Page	i
Approval Sheet	ii
Acknowledgment	iii
Abstract	iv
List of Tables	viii
List of Appendices	ix
Chapter I The Problem and Its Background	
Introduction	1
Background of the Study	4
Conceptual Framework	6
Statement of the Problem	8
Hypothesis of the Study	9
Significance of the Study	9
Scope and Delimitation	10
Definition of Terms	11
Chapter II Review of Related Literature	
Mathematics Word Problem	12
Reading Comprehension	16

Reading in Mathematical Content	19
Problem Sentences	25
Chapter III Methodology	
Research Design	29
Respondents of the Study	30
Locale of the Study	30
Research Instrument	31
Data Gathering Procedure	32
Statistical Procedure	33
Chapter IV Presentation, Analysis, and Interpretation of Data	34
Chapter V Summary, Conclusions, and Recommendations	
Summary	39
Conclusions	41
Recommendations	42
Bibliography	44
Appendices	47
Curriculum Vitae	84

List of Tables

Table		Page
Table 1	Number of Respondents	34
Table 2	Frequency and Percentage of Error in Reading Comprehension	35
Table 3	Interpretation of Mean Score	36
Table 4	Frequency and Percentage of Error in Word Problem	37

List of Appendices

Appendix		Page
A	Letter to the Principal	47
B	Letter to the Head of Student Development Center	48
C	Mathematics Word Problem Test	49
D	Reading Comprehension Test	50
E	Scoring Rubrics of Problem Solving Test	57
F	Evaluation of Checklist for the Assessment of Test Questions and Scoring Rubrics	58
G	Summary of Experts' Validation of Word Problem Test and Scoring Rubric	63
H	Summary of Experts' Validation of Reading Comprehension Test	66
I	Computation of Pearson Product-Moment Correlation Coefficient of Word Problem and Reading Tests	67
J	Computation of Pearson Product-Moment Correlation Coefficient of Achievement Test	73
K	Certificate of Authenticity	79
L	Certificate of Editing	82

CHAPTER I

The Problem and Its Background

Introduction

Problem solving is one of the most important lessons that many students need to learn in relation to the subject mathematics. This cannot be avoided at all levels of formal education as the subject mathematics, in fact, relates to something that has to be solved all the time whether expressed in numerical equation or sentences that have to be read well.

However, common problems encountered in mathematics by most students are failing marks especially in problem solving that involves questions in the form of sentences that have to be translated into equations to be solved. Most of the time, students find it difficult to come up with the answer due to the fact that their equations have gone wrong.

Understanding equations is vital for students to solve mathematical equations. However, their reading comprehension is primarily one of the initial skills that need to be acquired. According to Kaplan et. al. (2002) as cited by McDonald (2010), the abilities of reading have influence or effect on the growth of children on mathematics and not the other way around where mathematics abilities influence children's growth in reading.

In simple terms, the ability of children or students to comprehend well the questions as they read them influence the way they approach mathematics and not the other way around. This is essentially true as there have been studies such as the ones conducted by Hite (2009), Seifi (2012), Osterholm (undated), and Vilenius-Tuohimaa et.al, (2008) amongst others that show that problems in reading comprehension, or the ability to comprehend, likewise leads to problems affecting children's capability to solve mathematical problems.

Studies that focus on countries where English is not the primary medium also showed concern on the students' ability to comprehend mathematical problems.

The article by Espiritu (undated) particularly focused on the Philippines to determine this phenomenon of students having difficulty in comprehending the mathematical problem statements. Based on the article: The Philippine Bilingual Education Policy, first implemented in 1974 was issued by the Department of Education, Culture and Sports through a Dept. Order No. 25 s. 1974 titled, "Implementing Guidelines for the Policy on Bilingual Education."

The policy is said to target the "achievement of competence in both Filipino and English at national level, through the teaching of both languages and their use as media of instruction at all levels." Therefore the said language is mandated to be used as the medium of instruction in Mathematics.

Mathematics textbooks and materials are written in English for all grade levels. According to Gonzales (1989) and Young (2002) however, “Filipino children are expected to solve mathematical word problems in English even from their first year of schooling” (Gonzales, 1989; Young, 2002 as cited by Bautista et.al, 2009).

Word problems are defined as “verbal descriptions of problem situation wherein one or more questions are raised, the answer to which can be obtained by the application of mathematical operations to numerical data available in problem statement (Verschaffel et.al, 2000).”

These mathematical word problems are concerned with relating real world situations to mathematical concepts which students need to imagine and solve.

In teaching both the skills in problem solving and reading comprehension, it really takes a dedicated, skillful, diligent teacher and a very good program in order to produce students with strong foundation in these areas. With this in mind, the researcher challenged herself to conduct the study on determining the extent of relationship of reading comprehension and mathematical problem solving skills of Grade Four (4) pupils with high hopes that the findings will be beneficial to the institution, its clientele, and to the field of education as well.

Background of the Study

Claret School of Quezon City (CSQC) Grade School Department has been granted a Level III accreditation status after 45 years since it commenced rendering education to students. This said accreditation is the “highest level given by the Federation of Accrediting Agencies of the Philippines (FAAP) and Philippine Accrediting Association of Schools, Colleges and Universities (PAASCU).”

Claret Grade School Department was recognized by the Level III accreditation through its standard of instruction and a well-developed mechanism for improving and upgrading its own curriculum. Specifically, the new accreditation looks at the credible teaching performance of teachers that engenders effectiveness of teaching and learning paving way to foster a strong faculty and staff development.

Furthermore, this Level III accreditation likewise recognizes the high level of achievement and performance of students in both academic and co-curricular activities in which the community extension services and outreach program of the school are depicted strongly due to the overall performance of the school’s studentry.

However, parents and teachers noticed that there is still quite a number of Claretians who are suffering from fear of academic subjects particularly Mathematics. Problem solving poses as a real challenge especially

Mathematics. The students dread problem solving activities due mainly to the lack of interest in attempting or tackling the same.

Apparently, both parents and teachers observed that word problems are really posed as a struggle for students. They had trouble understanding and solving mathematical problems stated in a story or narrative form. In considering National Council of Teachers of Mathematics principles and standards (NCTM 2000), one of the notions was the Learning Principle. It claims that students must learn Mathematics with understanding. But it is feared that their lack of reading comprehension was hindering their ability to reach the solution to problems.

Thinking about the issue of reading comprehension difficulties in relation to problem solving or just plain word problems and the pursuit of academic excellence of CSQC, the researcher deemed it necessary to conduct a study to find if there is any significant relationship between the reading comprehension and problem solving skills of Grade Four (4) pupils of Claret School of Quezon City (CSQC). The researcher sought to find out if a pupil who comprehends well does just the same in mathematical problem solving and vice versa. The findings in this research will also serve as a basis for the enhancement of the Mathematics and Reading programs of the same school in consideration.

Conceptual Framework

There are many approaches to problem solving. However, among the best known general approach to problem solving is that of Polya (1957). Polya outlined four steps in the problem-solving process, namely: 1) understand the problem, 2) devise a plan, 3) carry out the plan, and 4) look back.

The first step is common among children that fear mathematics as they are not able to comprehend the problem. The second step would need the students to develop a plan that will help them solve the problem they understood. Meanwhile, the third step requires children to apply one or more problem solving skills. The fourth step suggests that the process should be re-read in order to verify what is being asked.

A problem that needs to be solved can arrive in different ways. Though there may be specific theories about problem solving process, sometimes, what is needed is just plain common sense or use of simple logic.

Hence, a mental representation of the text is created, and therefore, a mental representation of the problem is devised as well.

The representations that the students will make upon reading the problem and stating what they have understood is in fact the start of the problem solving process as this means that they can actually translate the problem into something else such as a mathematical expression or representation that they will work on to arrive to a specific answer.

According to Heddens and Speer (2007), to solve word problems, students are required to have three sets of skills: empirical skills, like computation and measuring; application skills, for handling common situations; and thinking skills, for working through situations that are unfamiliar.

But most students struggle with word problems because of some reasons given by Sherman, et.al (2009). According to them, students have little understanding of Mathematics vocabularies. Also, students have limited ability to read problems, which is related to students' reading level. If the vocabulary is beyond the students' comprehension, the mathematics of the problem is compromised. Moreover, students also struggle word problems because they have limited verbal ability to explain thinking. Students who lack verbal skills have trouble expressing or explaining their thinking both aloud or on paper.

It is these reasons particularly that reading comprehension is very important in order for the students to be able to come up with a good plan in solving the problem. This is also proven by Demingoy (2012) in his study, which revealed that there is a significant, substantial, and positive relationship between word problem solving skills and reading comprehension.

The illustration below demonstrates the relationship of mathematics skills and reading skills in which comprehension is interdependent for the students to be able to have good mathematical skills or abilities and as well as reading skills and abilities.

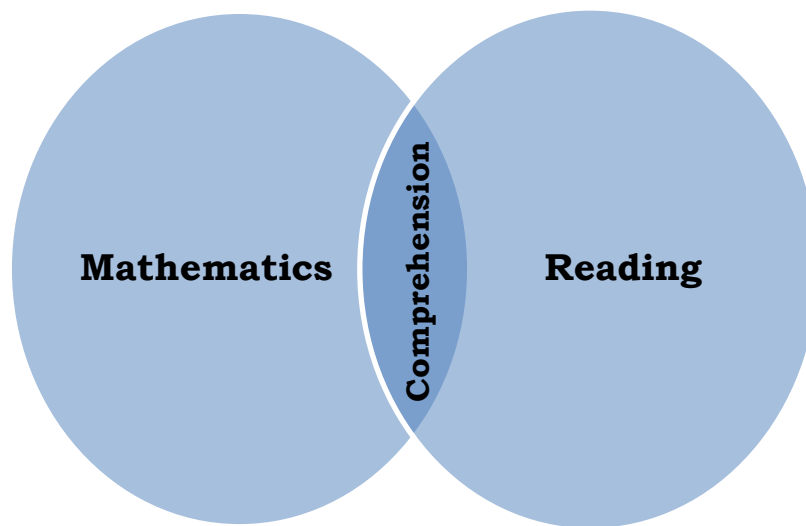


Figure1. Conceptual Paradigm

Statement of the Problem

This study sought to determine the extent of relationship between reading comprehension and mathematical problem solving skills of Grade Four (4) pupils of Claret School of Quezon City for the School Year 2012 – 2013.

More specifically, this is aimed at answering the following questions:

1. What is the level of reading comprehension of Grade Four (4) pupils of CSQC?

2. What is the level of mathematical problem solving skills of Grade Four (4) pupils of CSQC?
3. Is there a significant relationship between the reading comprehension skills and the mathematical problem solving skills of Grade Four (4) pupils of CSQC?

Hypothesis of the Study

This study tested the null hypothesis:

There is no relationship between the reading comprehension skills and the mathematical problem solving skills of Grade Four (4) pupils of CSQC.

Significance of the Study

This study aims to determine if there is any significant relationship existing between the reading comprehension skills and the mathematical problem solving skills of Grade Four (4) pupils of Claret School of Quezon City. The researcher concentrated in this study for it is within her field of interest and it is related to her job being a mathematics teacher.

Findings of this research would be of great importance particularly to the following:

Educators. The result of this study can answer the questions as to why pupils fail Mathematics especially when it comes to solving word problems.

English and Mathematics Area Coordinators. The results of the study will help them in developing programs that will address the needs of the students.

Parents. The results of this study can serve as their guide in helping their kids with their studies especially when it comes to Reading and Mathematics.

School Administrators. The results may be utilized for the enhancement of the Reading and Mathematics program of the Grade School Department.

Students. The results will help them identify their level of reading comprehension and mathematical solving skills and eventually do some remediation or enhancement to perform better in class.

Textbook Authors. The result of this study could be used for developing workbook to enhance both the skills in reading comprehension and mathematical problem solving.

Scope and Delimitation

This study concerns itself with the correlation between reading comprehension and mathematical problem solving skills of the Grade Four (4) pupils of Claret School of Quezon City for the School Year 2012 – 2013. It is limited to the four (4) sections of grade four pupils of CSQC specifically Prudence, Responsibility, Solidarity, and Tactfulness.

Definition of Terms

For clarity and better understanding, certain terms utilized in this study are defined operationally, to wit:

correlation –the extent of relationship between two variables

mathematical problem solving – the process of arriving at an answer to mathematical problems with the application of different skills, steps and techniques. As defined operationally, it is by showing the equation, solution and final answer to the given word problem.

reading comprehension – the extent of understanding any written texts.

As defined operationally, it involves major skills such as noting details, using context clues, getting the main idea, making inference, and drawing conclusion.

CHAPTER II

Review of Related Literature

This Chapter provides the review of related literature and studies on reading comprehension abilities of students towards problem solving in mathematics, the recommended action that mathematics teachers should do, and the like.

Mathematics Word Problem

Looking at most curricula in mathematics, it can be noticed that the focus is primarily on the computational skills of arithmetic as this aspect is believed to compose the complete set of competencies that students must have in mathematics.

However, it was also said that mathematics involves far more than computation. According to Reys, et.al (1995) mathematics “is a study of patterns and relationships. Children need to become aware of recurring ideas and of relationships between and among mathematical ideas.”

Also, “mathematics is a way of thinking.” It provides us with strategies for organizing, analyzing, and synthesizing data largely not exclusively numerical as in fact mathematics is applied in our daily lives, hence

individuals who are comfortable with mathematics actually apply it as they encounter daily problems.

“Aside from a way of reasoning, mathematics is an art, too, which is characterized by order and internal consistency.” Further, aside from being an art, mathematics may be considered as language since it utilizes a set of terms and symbols that carry meanings. These terms and symbols enhance our ability to communicate about science, about real-life situations, and about mathematics itself.

“Lastly, mathematics is a tool.” It is what mathematicians use, hence through this subject, children can learn to understand and appreciate the facts, skills, and concepts that the school program involves.

Over the last two decades, studies claim that mathematics educators have stressed the importance of the role of problems in the mathematics curriculum and in the development of students’ processes and skills in solving problems. Johnson and Rising (as cited in Orton and Frobisher, 1996) claim that learning to solve problems is the most significant learning in every mathematics class. They give the following reasons:

1. It is a process whereby we learn new concepts.
2. Problems may be a meaningful way to practice computational skills.
3. By solving problems we learn to transfer concepts and skills to new situations.

4. Problem solving is a means of stimulating intellectual curiosity.

5. New knowledge is discovered through problem solving.

According to Riedesel and Schwartz (1999), problem solving is now seen as the heart of the mathematics curriculum. As the NCTM Standards describe mathematics curriculum in which children “use problem-solving approaches to investigate and understand mathematical content”, this implies that problem solving is the engine that drives the mathematical investigations in school.

As cited by Orton and Frobisher (1996), there are three major categories of problem in which teachers and students operate. These are the routine problems, environmental problems, and process problems.

Routine problems employ knowledge and techniques already acquired by a student in a narrow and synthetic context. Routine problem like “How many more than 286 is 637?” seek to translate a symbolic mathematical into one which uses words as well as symbols. Another type of routine problem is often called a story problem in words. Before students commence the process of solving problems of this kind, they need understanding of the contexts in which the problem is set.

Environmental problems, often called ‘real life’ or ‘real-world’ problems, are set in context which represent the real or practical world, or as close as match to the real world as possible. Environmental problems require students to apply informal as well as formal knowledge to their solution to the problem.

Informal knowledge is developed from direct experience, seldom from the formally constructed knowledge of the mathematics classroom.

Process problems are set in a mathematics context in contrast to real problems. This type of problem focuses on the mathematics itself and on the mathematical thinking processes for arriving at the solution.

In a nutshell, mathematics as a problem-solving activity is something that involves the obvious or something that can be solved by common sense.

Problem solving is at the very heart of “doing mathematics”. Many kinds of mathematics problems exist, thus, the type of problem solving strategy used depends on the skills of the person solving the problem. In this case, when a problem is identified, there will be a natural urgency to answer the problem and solve it.

While it is true that a difficult and tedious problem for one person may be a routine and quick computation for another, the process of problem solving always involves using prior knowledge in new or different ways, formulating a plan or strategy to reach the desired goal, and possibly acquiring new knowledge about the given situation. This process is said to be complex as it needs abilities to produce creative connections. As much, students need many opportunities to experience the process and to develop various problem solving strategies. The NCTM standards therefore, determine four goals related to developing problem solving abilities. These are 1) build new mathematical

knowledge through problem solving, 2) solve problem that arise in mathematics and in other context, 3) apply and adapt a variety of appropriate strategies to solve problem, and 4) monitor and reflect on the process of mathematical problem solving (Dossey, McCrone, Giordano, & Weir, 2002)

As cited by Riedesel and Schwartz (1999), there are two aspects to problem solving: the solution to the problem and how the solution was obtained. The solution is sometimes referred to as the product while the method of obtaining the solution is sometimes referred to as the process. At school, the answer of the problem is always the focus of determining whether one's answer is actually right or wrong. However, this should not be the case as more than the answer itself. The process or the way the solution was arrived in order to get the answer is very much important. Hence it is a responsibility of the teachers and the parents to teach the children or the students and make them understand that what is more important is the solution that they have applied in deriving the answers.

Reading Comprehension

As cited by Villamin (1999), "Reading is not a subject but rather an information gathering and utilization process. In other words reading skills are process skills and reach into all content areas".

According to Romero and Romero (1998), when one reads, there must be comprehension otherwise no reading takes place.

Comprehension is the understanding what the author has written and being able to explain it by the person's own words. The following are generally considered manifestations of comprehension; noting details, getting the main idea, inferring, predicting outcomes, and drawing conclusions.

Noting details are a factual type of reading comprehension in which the reader is directly concerned with memorizing the items within the passage.

Getting the main idea is similar to finding the most important thing an author is trying to say. Recognition of the main idea of a paragraph is important because it not only helps you understand the paragraph but also helps you remember the content.

Meanwhile, inferring occurs when a person mentally explore and take a position in relation to the facts and related details.

Reading to generalize is a type of comprehension in which the important elements within the passage are related to one another so that they can be combined into a principle, generalization, or conclusion.

Reading to predict outcome is a kind of reading where the reader is made to identify an expected outcome or probable consequence based on certain tendencies or trends observed.

According to Villamin et.al, (2000), comprehension, from the Latin *prehendere*, meaning “to seize”, is the art or capacity of understanding. In general sense, comprehension encompasses all the reading skills which can be given in the three levels, that is; reading the lines, reading between the lines, and reading beyond the lines.

Level I comprehension is reading the lines or literal comprehension (Roe D. et.al, 2005). The reader derives meaning from sequential words and their grammatical relations to each other in sentences, paragraphs, and chapters. Thus, Level 1 comprehension is achieved when the reader can:

- recognize the main thought of a paragraph and identify its supporting details
- follow the author’s arguments
- detect the theme, climax and resolution of a story
- pick out the author’s generalizations and conclusions
- visualize the characters, the setting and the events on a fiction work

Level II comprehension is reading between the lines or interpretive reading (Roe D. et.al, 2005). This level is achieved when the reader can:

- deduce the author’s purpose, interpret his thoughts, and pass judgment on his statements
- distinguish between fact and opinion
- interpret clues to character and plot

- compare the author's idea with his own
- check the author's sources, taking into account his competence in the subject areas
- recognize and interpret figures of speech such as metaphors and irony.

Level III comprehension is reading beyond the lines or high-order comprehension (Roe D. et.al, 2005). This is considered the most difficult task in comprehension because it involves critical and creative reading techniques.

On this level, the reader is expected to:

- recognize implications
- anticipate consequences
- draw conclusions not stated by the author
- arrange the author's ideas into new patterns, enlarging their scope or combining them with his (the reader's) own ideas
- analyze and synthesize the author's thoughts in such a way as to give him (the reader) an original insight into the human condition, the nature of the universe, the meaning of life, etc.

Reading in Mathematical Content

Problem solving is a complex mental process involving visualization, imagination, manipulation, abstraction, and the association of ideas. Problem solving requires unique and original responses. It also requires skills in

reading and computing. Students who have difficulty in either or both of these areas will be severely handicapped in solving problems.

Learning to solve problems is the most significant learning that occurs in any mathematics class – and the most difficult. (Lola June May, 1974)

Effective reading in mathematics would need a rather different approach than what is usually done when reading other materials say in literature and the like. In mathematics, facts are presented in condensed form and problems are briefly and concisely worded. Therefore, the details are often of critical importance and must not be missed.

A level concentration and a slow reading rate are suggested in order to develop a critical attitude towards looking at the problem. The readers must be able to extract essential information and should exhibit a specific effort directed towards recognizing the specific questions to be answered. The purpose of understanding the significance of each symbol, word, and phrase is essential as there will be a number of technical meanings in each word in the problem, hence, it must be thoroughly read. The reader must then be concerned with creating generalizations and principles as illustrated by the sample problem found in the text and must be able to read with the intention of employing the principles in daily instances.

Several studies have shown the relationship of mathematical problem solving skills to different factors that may affect them. One of the factors

affecting the problem solving skills, as given by the studies of Pagapong (2009), Atas (2009), Larido (1986), Dulfo (2006) and Vilenius-Tuohimaa, et.al (2008) is reading comprehension.

According to Pagapong the level of comprehension skills in English could be an indicator to measure the pupils' mastery of comprehension skills in Mathematics.

Furthermore, in the study conducted by Atas, it was also shown that the correlation between the students' reading comprehension and grade point average is 0.332 found to be significant at 0.01 level. This implies that reading comprehension is a factor in the overall performance of the respondents.

Similarly, Larido pointed out that "failure on the part of the pupils to comprehend the problem in whole or in part was an irritant that troubled many pupils in the correct solution of the problems." This lack of comprehension may be said to be a reason why the pupil were unable to visualize the situation of the problem in his own mind.

Further, the students might have comprehended the greater part of the problem but still failed to solve it correctly because there was no understanding in the vocabulary of some of the terms or words used in the problem proper. Another frequent cause of this difficulty could be carelessness in reading in which a student may be able to read and solve a problem and but due to careless reading failure, solves the problem incorrectly.

In addition to this, PM Tuohimaa et.al also proved that performance in mathematical word problems continue to be related to reading comprehension, suggesting that both of these skills involve an overall reasoning component. However, the results revealed that technical reading skill level was related to both mathematics word problem-solving and reading comprehension. “Fluent technical reading skills may work as a “capacity enhancer”, helping the reader to maximize her/his prior knowledge on the subject at hand” (Van Keer & Verhaeghe, 2005); a reader with poorer decoding skills struggles more with the text itself, resulting in poorer performance in tasks requiring logical reasoning strategies.

Relative to word problem solving, Bautista, Mulligan, and Mitchelmore (2009) found out that the language of the problem led to differences in children’s solutions. There was a higher occurrence of non-attempts and errors when problems were given in English. Some problems not solved in English were solved in Filipino. Children’s limited English vocabulary may explain why there are several non-attempts for English problems. Another possible explanation is that children fail to relate particular words to the problem situation. The limited exposure of Filipino children to the English language becomes a main cause to their capability to excel in word problem solution.

Aside from comprehension itself and language barrier, another factor is proven by Miranda (1996), Larido (1986), and Dulfo (2006) in their studies that

showed that the mathematical skills affect the problem solving ability of the students. Confusion of processes caused many pupils to arrive at incorrect results. That is, while a pupil might have known the different fundamental processes, he might have known just what process to use for a given problem, whether to add, or subtract, multiply or divide. Apparently, these students have not had the chance to unlearn their fear of solving math problems. They have difficulty in learning to adapt themselves to a given problem or situation or to select the proper process for solution. Carelessness in copying and supplying the needed data when solving word problems also contribute in poor performance in problem solving.

The last factor considered was that of Soto (1985), which revealed that socio-economic status and attitude toward Mathematics were shown to be significantly related to the performance in Mathematics problem solving. Aside from this finding, Soto also found out that attitude and reading comprehension were associated with the choice of problem solving strategies.

In the study of Seifi et.al (2012), the researchers investigated the students' difficulties towards mathematics problem solving especially on word problems based on the teachers' perspective. The population of the study was 52 mathematical teachers of Arak middle school from which the respondents were randomly selected. Findings of the study revealed that difficulties on representation, understanding word problems, constructing a plan, and

defining the related vocabularies presented in the word problems are the major concerns of students. Based on the study, text difficulties, unfamiliarity with contexts in problems, and the use of inappropriate strategies are the main difficulties of the students. Further, according to the teachers who are respondents of the study, they tried to help these students by teaching them how to look for a pattern, drawing pictures, and rewording the problems (Seifi et.al, 2012).

Borovik and Gardiner (2006) mentioned in their research paper the characteristics of students who are mathematics-able:

- a) the ability to make and use generalizations often quickly such as giving generalizations towards a pattern seen and the like.

- b) rapid and sound memorization of mathematical material in which the child doesn't feel tired even when solving too many problems.

- c) ability to offer and use multiple representations of the same mathematical object or the capability of students to analyze and interpret using different presentations through tables, graphs, analytical expressions and the like.

- d) an instinctive tendency to approach a problem in different ways such that a child continuous to solve problems and find different approaches towards answering a problem.

- e) ability to use analogies and make connections

f) ability to recognize what it means to “know for certain”.

g) ability to detect unstated assumptions in a problem, and either to explicate and utilize them, or to reject the problem as ill-defined.

h) lack of fear of “being lost” and having to struggle to find one’s way through the problem

i) tendency to rapid abbreviation, compression or a curtailment of reasoning in problem solving

These characteristics or combination of these are usually reflected by students that are able in mathematics.

Meanwhile, it is true that there are instances that the problem does not lie on the child or the students but in fact, with the problem sentences.

Problem Sentences

According to Borovik and Gardiner (2006), the word problems have also characteristics that need to be sufficient in order to help students comprehend the problems: First, A good problem has to be accessible and firmly rooted in the mathematical material familiar to children.

Second, a good problem is developmental, it activates and trains new modes of thinking and stretches existing skills. Third, a good problem is revealing: it opens up new mathematical vistas or sheds new light on existing objects, structures and processes of mathematics. Fourth, it helps if a problem

is extendable and can be set at increasing levels of complexity, perhaps even leading to the development of a miniature “theory” and lastly good problems frequently incorporate purely aesthetic criteria: simplicity, rhythm, naturalness, elegance and surprise—qualities which are often present in problems that help to develop an appetite for problem solving (Borovik and Gardiner, 2006).

Meanwhile, the study of Vilenius-Tuohimaa et. al (2008) aimed at determining the interplay between mathematical word problem skills and reading comprehension among 225 children in Grade 4. In their study, they tested the students’ text comprehension and mathematical word problem-solving performance.

Findings revealed that the performance on mathematics word problems was “strongly related to performance in reading comprehension. Fluent technical reading abilities increased the aforementioned skills.” There were no gender differences in mathematics word problem-solving performance, but the girls were better in technical reading and in reading comprehension according to the results of the study. Further, according to their investigation, the parental levels of education have positively predicted children’s mathematics word problem-solving performance and reading comprehension skills (Vilenius-Tuohimaa et.al., 2008).

Aside from the reading comprehension, there are suggestions also that the problem questions found in textbooks have likewise contributed to the possible difficulty of the students to comprehend the questions. According to Foxman, 1999 (as cited by Osterholm, undated), textbooks seem to play an important role in mathematics education at all levels and hence the reading activity and reading comprehension of students likewise play an important role.

Osterholm's study aimed at discussing the two-directional relationship between reading comprehension and problem solving. Specifically, his study looks into how reading comprehension affects problem solving and how this reading comprehension may be added as an important part of problem solving. Further, his study analyzes how reading comprehension may be affected by the mathematical text content.

Studies on reading suggest that building blocks of reading include cognitive overload that include too much time trying to decode that leads to having not enough time or cognitive energy to comprehend as cited by McDonald (2010).

In this regard, not only the reading comprehension of students must be examined, nor the way the questions in word problems are worded, but also how mathematics teachers teach mathematics in a way that the students do not just focus on passing the exam but rather by developing a skill of finding

flaws in other people and relating to others their own mathematical thinking (Borovik & Gardiner, 2006). Based on the study by Borovik and Gardiner (2006), an effective mathematician teacher is one that is both a diagnostician and a communicator as well. They argued that mathematics teacher should be able to see the problems being encountered by students, determine the level of difficulty, and understand the underlying causes in order to bring the subject closer to the students.

CHAPTER III

Methodology

This chapter includes information on the research methodology employed as well as the statistical techniques that the researcher utilized in the process of analyzing and interpreting the data. Comprehensive description of the research design, subjects and locale of the study, and the procedure done in the gathering of data are also found in this chapter.

Research Design

This study is a descriptive survey analysis of the relationship of reading comprehension and mathematical problem solving skills of Grade Four (4) pupils of Claret School of Quezon City. In order to attain this goal, correlation method was used. Correlation is a process to ascertain the degree of relation between two or more variables. If corresponding observation scores made of two sets tend to have similar position in their series, the correlation is positive. It is negative, on the other hand, if the corresponding values tend to have divergent in position in the respective series.

Respondents of the Study

The subjects and respondents of this study were the four (4) sections of Grade Four (4) pupils of Claret School of Quezon City for the School Year 2012 – 2013 which amounted to approximately Fifty Percent (50%) of the total number of sections of Grade Four (4) grouped heterogeneously. Each section was composed of about Forty (40) pupils, chosen primarily for the reason that each one was handled by the same Mathematics and Reading teacher. During the actual administration of the test, there were absentees, thus, lowering the total number of respondents from its target of one hundred fifty-nine (159) to one hundred fifty-three (153).

Locale of the Study

Claret School of Quezon City (CSQC) is a Catholic school for boys run by the Claretian Missionaries. Established in June 1967, it is located at Mahinhin Street, U.P. Village, Diliman, Quezon City, Philippines. It was named after its patron -- St. Anthony Mary Claret, who founded the Congregation of Missionary Sons of the Immaculate Heart of Mary.

Research Instrument

a. Mathematical Problem Solving Test

The researcher prepared ten (10) mathematical word problems, a rubric on how each word problem would be given points, and an evaluation checklist for the assessment of the test and the rubric.

The problem solving test and the rubric were then given to three mathematics experts for evaluation. The test was validated (*see appendix G*) and was limited to five (5) items instead of ten (10) as suggested to consider the time limit to be allotted for the test.

The 5-item problem solving test included whole numbers, fractions and decimals. The pupils were asked to show an equation, develop a solution, and label the final answer for each word problem. Each item was worth four (4) points making the test equivalent to twenty (20) points. The points given to each problem were based on a rubric made by the researcher and were likewise validated by the experts.

b. Reading Comprehension Test

The researcher prepared a twenty-item reading comprehension test which included the basic comprehension skills such as noting details, using context clues, getting the main idea, making inferences, and drawing conclusions. The first draft of the multiple-choice test had three (3) options. It

was then given to three (3) reading experts for validation (*see appendix H*). Corrections and suggestions were implemented, the major of which was making four (4) choices instead of three (3). Each item was given one (1) point.

Data Gathering Procedure

The researcher sought the permission of the Reading and Mathematics coordinators and the Principal of Claret School of Quezon City to gather data needed for her study. Upon approval, the reading comprehension test and the mathematics problem solving test were given a test trial to determine the amount of time the test would be given to the respondents. Given Forty (40) minutes each, the tests were administered to the respondents on February 13, 2013.

The answers in each test item were checked carefully by the researcher and the scores were recorded. The data collected were then tabulated and duly analyzed.

The results of the Achievement Tests in Reading and Mathematics of the same respondents were also gathered from the office of the Student Development Center. The results were used to be a point of comparison with the researcher-made test.

Statistical Procedure

This study made used of the following statistical tests:

To answer questions 1 and 2 presented in the statement of the problem, the mean (), which is the arithmetic average of a set of observation, was computed. The mean was interpreted as follows: score 0 – 9 means poor; 10 – 11 means low average; 12 means average; 13 – 14 means high average; 15 – 16 as above average; 17 – 18 as excellent; and 19 – 20 as superior.

To answer question 3 presented in the statement of the problem, the Pearson Product-Moment Correlation Coefficient (r) was computed. The value of (r) was interpreted as follows: 0 - ± 0.20 as negligible relationship; ± 0.21 - ± 0.40 as slight relationship; ± 0.41 - ± 0.70 as moderate relationship; ± 0.71 - ± 0.90 as marked or high relationship; and ± 0.91 - ± 1.00 as very high or perfect relationship.

CHAPTER IV

Presentation, Analysis, and Interpretation of Data

This chapter deals with the presentation, analysis, and interpretation of the data gathered.

The study attempted to determine or establish any significant correlation between the reading comprehension and the mathematical word problem solving skills of Grade Four (4) pupils of Claret School of Quezon City for the School Year 2012 – 2013.

Table 1
Number of Respondents

#	Section	Number of Pupils	Absentees	Respondents
1	Prudence	40	2	38
2	Responsibility	40	3	37
3	Solidarity	40	0	40
4	Tactfulness	39	1	38
TOTAL		159	6	153

Table 1 shows the total number of pupils as respondents in this study. The difference between the number of pupils and the actual respondents was occasioned by the absences of pupils from three (3) sections namely Prudence, Responsibility, and Tactfulness.

Table 2
Frequency and Percentage of Error in Reading Comprehension

Skill	Item	Frequency	%	Average Percentage
Noting Details	1	34	22.22	21.41%
	2	28	18.30	
	3	34	22.22	
	4	35	22.88	
Using Context Clues	5	108	70.59	39.38%
	6	27	17.65	
	7	41	26.80	
	8	65	42.48	
Getting the Main Idea	9	26	16.99	25.00%
	10	27	17.65	
	11	26	16.99	
	12	74	48.37	
Making Inference	13	12	7.84	42.65%
	14	67	43.79	
	15	64	41.83	
	16	118	77.12	
Drawing Conclusion	17	21	13.73	22.06%
	18	26	16.99	
	19	13	8.50	
	20	75	49.02	

Table 2 shows the frequency and percentage of error committed in reading comprehension test. It shows that about 42.65% of the pupils had difficulty in making inferences while only 21.41% of the pupils got mistakes in noting details.

Table 3
Interpretation of Mean Score

Raw Score	Transmuted Grade	Interpretation
0 – 9	60.00 - 71.25	Poor
10 - 11	72.50 - 73.75	Low Average
12	75.00	Average
13 – 14	78.13 - 81.25	High Average
15 – 16	84.38 - 87.50	Above Average
17 – 18	90.63 - 93.75	Excellent
19 – 20	96.88 – 100.00	Superior

The table above shows the scores, its corresponding grades and the interpretation of a twenty-item test used by CSQC in consideration. In answering the first question stated in Chapter 1, the mean score of the respondents in reading comprehension test yielded 13.98 with a transmuted grade of 81.19. This means that the level of reading comprehension of the Grade Four (4) pupils is within the range of high average.

On the other hand, the mean score of the respondents in mathematical word problem test was computed at 11.55 with a transmuted grade of 74.44. As shown in Table 3, this indicates that the level of mathematical problem solving skill of Grade Four (4) is low average.

Table 4
Frequency and Percentage of Errors in Word Problem

Problem Number	Thinking Error		Technical Error		No Error	
	Frequency	%	Frequency	%	Frequency	%
1	17	11.11%	70	45.75%	66	43.14%
2	59	38.56%	59	38.56%	35	22.88%
3	45	29.41%	65	42.48%	43	28.10%
4	56	36.60%	39	25.49%	58	37.91%
5	122	79.74%	14	9.15%	17	11.11%
AVERAGE		39.08%		32.29%		28.63%

Table 4 shows the frequency and percentage of error in the mathematics problem solving test. An item categorized as a thinking error is that in which the pupil scored either zero (0) or one (1). Technical error is when pupils score either two (2) or three (3) and a score of four (4) is given if the pupil answered the problem correctly and satisfied all the conditions required. The same table suggests (as shown by the average) that the most number of errors are from those who failed to answer the items or never attempted answering at all.

Appendix I (pages 67 - 72) shows the scores of the respondents in Mathematics Word Problems and Reading Comprehension Tests. The computed value of Pearson Product-Moment Correlation Coefficient (r) of 0.52 suggests that there is a moderate relationship between the mathematical word problem solving and reading comprehension.

Appendix J (pages 73 - 78) shows the scores of Mathematics and Reading Achievement Tests. In support of the claim relative to the extent of relationship of reading comprehension and mathematical problem solving skills, the Pearson Product-Moment Correlation Coefficient (r) of the achievement test in Reading and Mathematics was also computed. The computed value of r that is 0.60 suggests that there is moderate relationship between the mathematical word problem solving and reading comprehension which is almost similar to the first in terms of its numerical value of r . However, the corresponding interpretation is just the same.

CHAPTER V

Summary, Conclusion and Recommendations

This chapter summarizes the findings of the study in consideration. Similarly, conclusions are drawn and recommendations are given to the end of shedding further light to the questions and assumptions raised at the onset of this endeavor.

Summary

This study was conducted to determine the extent of relationship between reading comprehension and mathematical problem solving skills of Grade Four (4) pupils of Claret School of Quezon City for the School Year 2012 – 2013.

In order to achieve this goal, correlation method was used. This study was conducted in Claret School of Quezon City during the school year 2012 – 2013 among the 153 pupils coming from the approximately fifty percent (50%) of the total population of Grade Four (4).

The instruments used (reading comprehension test and mathematical word problem test) were prepared by the researcher and were likewise validated by experts. The reading comprehension test comprised of twenty (20) items designed to measure specific skills such as noting details, using context clues,

getting the main idea, making inferences, and drawing conclusions. The mathematical word problem test was composed of five (5) word problems involving whole number, fraction, and decimals. Each item was given four (4) points making the whole test equivalent to twenty (20) points.

The respondents were given a time trial to determine the amount of time the test would be given to the respondents. From the same instance, it was found out that the said set of test could be finished, at most, in forty (40) minutes.

The results were gathered, tabulated, and analyzed. In order to determine the level of reading comprehension and level of mathematical problem solving skills of the pupils of Grade Four (4), the mean score of each test was computed. To determine the correlation of reading comprehension and mathematical problem solving skills, the Pearson Product-Moment Correlation Coefficient (r) was used.

The findings in this study were summarized in line with the questions the researcher sought to answer, to wit:

1. What is the level of reading comprehension of Grade Four (4) pupils of CSQC?

The results revealed that the mean score of 13.98 is indicative of a High Average level of reading comprehension of Grade Four (4) pupils of CSQC. Furthermore, it showed that the pupils found it difficult to make inferences

and to use context clues. However, they found noting details and drawing conclusions fairly easy.

2. What is the level of mathematical problem solving skills of Grade Four (4) pupils of CSQC?

The findings revealed that the mean score of 11.55 implies that the level of mathematical problem solving skill of Grade Four (4) pupils of CSQC is low average. Also, the findings revealed that most of the pupils were not able to answer word problems due to thinking error.

3. Is there a significant relationship between the reading comprehension and the mathematical problem solving skills of Grade Four (4) pupils of CSQC?

Given the computed value of Pearson r at 0.52, it indicates that the reading comprehension and mathematical problem solving skills are moderately related.

Conclusions

Based from tabulated results of this study, the following conclusions were drawn:

1. The level of reading comprehension of Grade Four (4) pupils of CSQC was high average. The pupils' weaknesses in reading comprehension were mostly on making inferences and using context clues. On the other

hand, noting details and drawing conclusions were remarkably high as manifested by the results.

2. The level of mathematical problem solving skills of Grade Four (4) pupils of CSQC was low average. This result was due to the error brought about by their comprehension of the problem. Aside from it, computational skills are evidently not mastered.
3. The reason for such a moderate relationship between the reading comprehension and mathematical problem solving skills of Grade Four (4) pupils of CSQC was occasioned by the extent of understanding of the textual or word problems. Furthermore, since mathematical word problems usually require correct interpretation of given clues, any misinterpretation eventually leads to incorrect answers.

Recommendations

In light of the findings of this study, the researcher proposes the following recommendations:

1. For the administrators, conduct a vertical and horizontal articulation on a regular basis (quarterly or semi- annually) such that specific concerns in the areas of Mathematics and Reading requiring immediate remediation can be addressed.

2. For Reading and Mathematics coordinators, closely monitor the progress of the respondents in the succeeding year since their improvement, or the complete lack of it, is a representative of the extent of knowledge of the entire level in the abovementioned areas.
3. For Reading and Mathematics teachers, continuously revise and design programs to address the growing needs of the pupils, thus, obviating or reducing the need for remedial classes or other forms of intervention either within the school year or during summer.
4. For students, devote more time in reading books and other informative text to improve their level of comprehension and help them solve word problems on their own.
5. For future researchers, conduct further studies on the factors that may improve the reading comprehension and mathematical problem solving skills of the students.

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APPENDIX A
Letter to the Principal



CLARET SCHOOL OF QUEZON CITY
UP Village, Diliman, Quezon City
Tel. No. 921- 65- 87 FAX #9218136
GRADE SCHOOL DEPARTMENT

Mrs. Carmelita C. Condecido
Principal
Grade School Department

Madam,

Greetings of peace!

I am now writing my seminar paper entitled **“Correlation Between Reading Comprehension and Mathematical Word Problems Among Grade Four Pupils of Claret School of Quezon City”**.

In connection with this, may I ask your permission to use the forty-minute period of the selected sections of Grade Four (4) for the administration of the tests needed in my study.

Hoping for your favorable response. Thank you.

Sincerely,

Ederlyn D. Esteban

Noted:

Ms. Sandie A. Gonzales
Mathematics Coordinator

Mrs. Razerly D. Ibañez
Reading Coordinator

cc: APAA, GLL, HAs

APPENDIX B
Letter to the Head of Student Development Center



CLARET SCHOOL OF QUEZON CITY

UP Village, Diliman, Quezon City
Tel. No. 921- 65- 87 FAX #9218136

GRADE SCHOOL DEPARTMENT

February 26, 2013

Mrs. Helen C. Bonanza, RGC
Student Development Center
Head

Madam,

Greetings of peace!

I am now writing my seminar paper entitled **“Correlation Between Reading Comprehension and Mathematical Word Problems Among Grade Four Pupils of Claret School of Quezon City”**.

In connection with this, may I ask your permission to have an access to the Reading and Mathematics SDC test results taken July 2012 of the Grade four pupils section Prudence, Responsibility, Solidarity, and Tactfulness. The results will be used as one of the data for the study.

Rest assured that all results will remain confidential.

Hoping for your favorable response. Thank you.

Sincerely,

Ederlyn D. Esteban

Noted:

Mrs. Carmelita C. Condecido
Principal

APPENDIX C
Mathematics Word Problem Test



CLARET SCHOOL OF QUEZON CITY
UP Village, Diliman, Quezon City
Tel. No. 921- 65- 87 FAX #9218136
GRADE SCHOOL DEPARTMENT

Examinee Number _____

Solve the following word problems using ESA (Equation, Solution, and Answer). Label the final answer.

- 1) There were 687 boys and 547 girls who participated in the parade. Of these, 879 wore costumes. How many children did not wear costumes?
E:
S:
A:
- 2) Ella bought a dozen pocketbooks which cost Php275 each. If she gave Php4000 to the cashier, how much change would she receive?
E:
S:
A:
- 3) Mark bought 17 notebooks at Php19.50 each and a box of crayons at Php23.00. How much did he spend in all?
E:
S:
A:
- 4) Angela bought 7 meters of cotton cloth for Php652.75. How much did the cloth cost per meter?
E:
S:
A:
- 5) The Grade 4 pupils of Claret School of Quezon City gathered - kilograms of old newspaper. The Grade 3 pupils gathered - kilograms less than the Grade 4 pupils. How many kilograms of old newspapers did the two grade levels gather together?
E:
S:
A:

APPENDIX D
Reading Comprehension Test



CLARET SCHOOL OF QUEZON CITY
UP Village, Diliman, Quezon City
Tel. No. 921- 65- 87 FAX #9218136
GRADE SCHOOL DEPARTMENT

Examinee Number: _____

Read the selection below.

Animal Migration

by Kimberly M. Hutmacher

Have you ever noticed that we only see certain animals in certain seasons? Many animals move from one area to another at different times during the year. This movement is called migration.

Animals migrate for different reasons. Some, like the manatee and the ruby-throated hummingbird, migrate to stay warm in the winter.

Some animals migrate for food, water, and protection. Caribou move south each winter to evergreen forests. The forests protect them from the cold winds and provide a better food supply.

Other animals, like the emperor penguin, migrate for their children. These penguins choose the coldest time of the year and the coldest place on the planet – Antarctica – to raise their young. They migrate inland, away from the sea, so they are far away from predators when their eggs hatch.

These journeys are often thousands of miles. It's amazing that so many animals are able to find their way back to the very same places in the world year after year.

Loggerhead turtles travel thousands of miles to lay their eggs on the very same beach where they were hatched themselves.

Monarch butterflies often end up migrating thousands of miles to the very same tree that their ancestors roosted in generations before.

California gray whales have the longest migration journey of any mammal. They travel 10 000 – 14 000 miles round trip each year.

We know the many reasons why animals migrate, but one no really knows how they find their way. Maybe you will become the famous scientist that solves the mystery of animal migration.

A. Noting Details

Write the letter of the correct answer on the space before the number.

- ____ 1. What is migration?
- A. animals looking for food
 - B. animals traveling long distances
 - C. animals preparing to hatch eggs
 - D. animals sleeping through the winter
- ____ 2. What animal holds the record for the longest migration?
- A. California gray whales
 - B. Caribou
 - C. Loggerhead turtles
 - D. Monarch butterflies
- ____ 3. Why do ruby-throated hummingbirds migrate?
- A. to look for food
 - B. to stay warm in the winter
 - C. to keep away from predators
 - D. to move to a safer place to hatch eggs
- ____ 4. What information about animal migration is not known?
- A. why animals migrate
 - B. when animals migrate
 - C. where the animals migrate to
 - D. how animals find their way when they migrate

B. Using Context Clues

Read the sentence and choose the meaning of the underlined word.

- ____ 5. The museum presented an exhibit showing ancestors of the royal clan. The family of the clan encompass seven generations.
- A. to accomplish a task
 - B. to pay no attention to
 - C. to describe something
 - D. to include a wide range
- ____ 6. The book has enchanted children for almost a century. Children just love reading it.
- A. has been forgotten
 - B. has abhorred somebody
 - C. has delighted somebody
 - D. has frightened somebody
- ____ 7. She received a parcel from her Auntie Susan. It contains her favorite books and toys.
- A. bag
 - B. baggage
 - C. magazine
 - D. package
- ____ 8. A patent is a special paper that proves that the invention is the inventor's and no one else.
- A. idea for an invention
 - B. ownership of an invention
 - C. general name for an invention
 - D. permission to copy an invention

C. Getting the Main Idea

Read each paragraph and choose the main idea by writing its letter on the space before each number.

- ____ 9. Edison loves to play games. His favorite game is chess because it requires a great deal of thought. Edison also likes to play less demanding board games that are based mostly on luck. He prefers Monopoly because it requires luck and skill. If he's alone, Edison likes to play action video games as long as they are not too violent.

- A. Edison dislikes violence.
 - B. Edison enjoys Monopoly.
 - C. Edison plays chess very well.
 - D. Edison enjoys playing games.
- _____ 10. Edelyn is watching too much television. A toddler shouldn't be spending hours staring blankly at a screen. Worse yet, some of her wild behavior have been inspired by those awful cartoons she watches. We need to spend more time reading books with her and pull the plug on the TV!
- A. Books are good.
 - B. All cartoons are bad.
 - C. Watching a lot of television isn't good for Edelyn.
 - D. Edelyn should be restricted in watching television.
- _____ 11. Edric, I can't eat or sleep when you are gone. I need to hear your scratchy voice and see your lovely toothless smile. I miss that special way that you eat soup with your fingers. Please come home.
- A. Edric, I miss you.
 - B. Edric, you have bad manners.
 - C. Edric, you should see a dentist.
 - D. Edric, I want to hear your voice.
- _____ 12. Someday we will all have robots that will be our personal servants. They will look and behave much like real humans. We will be able to talk to these mechanical helpers and they will be able to respond in kind. Amazingly, the robots of the future will be able to learn from experience. They will be smart, strong, and untiring workers whose only goal will be to make our lives easier.
- A. Robots will replace humans in the future.
 - B. Robots will look and behave much like real humans.
 - C. Someday we will all have robots that will be our personal servants.
 - D. We will be able to talk to these mechanical helpers and they will be able to respond in kind.

D. Making Inference

Read the story below. Answer the questions and write the letter of the correct answer on the space before each number.

Leanne almost jumped out of bed when she saw the time.

“Oh, my!” That was all she could say. She immediately took a bath, ate breakfast and brushed her teeth. Then, she went back to her room and put on her uniform. She gathered all her things, and out she went to wait for her school bus.

“Just tell Mother I already left for school,” she told Yaya.

“You are leaving early today,” Yaya commented. “You have class today?”

Leanne hardly heard what Yaya said, but she did not bother to ask her anymore. Outside, Leanne opened her book and did some reading while waiting for her ride. The bus was taking too long to arrive, and she was getting worried. She would be very late. She was about to make some calls when she remembered something.

“How can I forget?” she asked herself. Shaking her head, she went back to her room, changed her uniform and went back to bed.

____ 13. Why did Leanne almost jump out of bed?

- A. Leanne felt warm.
- B. Leanne woke up late.
- C. The weather was very warm.
- D. Leanne was looking for her shoes.

____ 14. Why did Leanne not tell her mother that she was leaving for school already?

- A. She forgot about her mother.
- B. Her bus was already outside.
- C. She was not used to doing that.
- D. She thought her mother was still asleep.

- ____ 15. Who do you think would Leanne most likely call while waiting for her bus?
- A. her mother
 - B. her classmate
 - C. the bus driver
 - D. the policeman
- ____ 16. How do you think Leanne would react to what happened?
- A. She would just laugh it off.
 - B. She would get mad at herself.
 - C. She would be ashamed of herself.
 - D. She would be disappointed at herself.

E. Drawing Conclusions

Study the situations below. Write the letter of your answer on the space before the number.

- ____ 17. It was late Monday morning, but father was still lying in bed. He was sweating. Mother was giving him a pill and a glass of water.
- A. Father was sick.
 - B. Father needs rest.
 - C. The weather was warm.
 - D. Father was lazy to go to work.
- ____ 18. Mother was very busy in the kitchen. She had prepared special dishes for dinner. Then, she set the table for ten people.
- A. Mother was a chef.
 - B. Mother was going on a trip.
 - C. Mother was expecting some guests.
 - D. Mother was going to feed their pets.
- ____ 19. Father closed the trunk of the car. He checked and saw that the car was full of gas, the cooler was full of ice, and the tents and sleeping bags were already piled into the car. Everyone was happy and excited.
- A. The family will go camping.
 - B. The family will attend a party.
 - C. The family will have a vacation.
 - D. The family will visit a sick friend.

____ 20. A girl entered the classroom with a smile on her face. After a while, the principal sadly asked her to bring her things and go to her office. The girl _____.

- A. received a bad news
- B. forgot her homework
- C. got an award from the school
- D. was in trouble with the principal

APPENDIX E
Scoring Rubric of Problem Solving Test



CLARET SCHOOL OF QUEZON CITY

UP Village, Diliman, Quezon City
 Tel. No. 921- 65- 87 FAX #9218136

GRADE SCHOOL DEPARTMENT

Rating	Description
4	• Shows - o complete understanding of the problem and its mathematical language, terms and symbols - o adequate and correct organized process and computation - o appropriate strategy in solving the problem • Satisfies what is asked and labels answers correctly
3	• Shows - o complete understanding of the problem and its mathematical language, terms and symbols - o adequate and correct organized process and computation - o appropriate strategy in solving the problem • But - o does not write the correct answer due to carelessness and other factors - o does not label answers properly to satisfy what is asked in the problem
2	• Shows an understanding of the problem and some of its mathematical language, terms and symbols but contain minor flaws in the process of solving or computing for the answer • Does not label answers properly to satisfy what is asked in the problem
1	• Shows - o little or incomplete understanding of the problem and its mathematical language, terms and symbols - o disorganized, incomplete and inaccurate process or solution - o unlabeled answers - o correct answer only
0	• Shows no response to the problem presented due to lack of or no understanding of the problem including its mathematical language, terms and symbols

APPENDIX F
Evaluation Checklist for the Assessment of Test Questions
and Scoring Rubric

Instruction: Below is a questionnaire to evaluate the attached instrument. The said instrument is a set of mathematical word problems together with its scoring rubric. Please write your comments and suggestions about the appropriateness and clarity of each statement.

I. Personal Data

Please supply the information called for.

Name _____

Sex _____ Age _____ Civil Status _____

Years of Teaching Experience _____

Educational Attainment

	Course	Institution	Year Graduated
Post Graduate	_____	_____	_____

Graduate	_____	_____	_____
----------	-------	-------	-------

Undergraduate	_____	_____	_____
---------------	-------	-------	-------

School Affiliation _____

Subject/s Taught _____

Position / Designation _____

II. Evaluation Instrument

A. For Test Questions

Direction: Listed below are items that will be used to evaluate the acceptability of the test questions given the table of specification. Kindly encircle the corresponding number of your choice based on the following scale:

- 5 – strongly agree
- 4 – agree
- 3 – undecided
- 2 – disagree
- 1 – strongly disagree

A. Format and Design

- | | | | | | |
|--|---|---|---|---|---|
| 1. The printed material is clear and understandable. | 5 | 4 | 3 | 2 | 1 |
| 2. The layout is proportional and attractive. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

B. Content

- | | | | | | |
|--|---|---|---|---|---|
| 1. The test questions are suitable for the target level. | 5 | 4 | 3 | 2 | 1 |
| 2. The test contains the different types of problems. | 5 | 4 | 3 | 2 | 1 |
| 3. The test measures the pupils' ability to comprehend and answer word problems. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

C. Clarity

- | | | | | | |
|---|---|---|---|---|---|
| 1. The language used is appropriate for the pupils. | 5 | 4 | 3 | 2 | 1 |
| 2. The structure, style and format are appropriate to the target level. | 5 | 4 | 3 | 2 | 1 |
| 3. The direction is clear and specific. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

B. For Scoring Rubric

Direction: Listed below are items that will be used to evaluate the acceptability of the scoring rubric. Kindly encircle the corresponding number of your choice based on the following scale:

- 5 – strongly agree
- 4 – agree
- 3 – undecided
- 2 – disagree
- 1 – strongly disagree

A. Format and Design

- | | | | | | |
|---|---|---|---|---|---|
| 1. The format of the rubric is simple. | 5 | 4 | 3 | 2 | 1 |
| 2. The design is suitable to the level of the pupils. | 5 | 4 | 3 | 2 | 1 |
| 3. The rubric can be understood by the rater. | 5 | 4 | 3 | 2 | 1 |
| 4. The rubric is user-friendly. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

B. Content

- | | | | | | |
|--|---|---|---|---|---|
| 1. The rubric contains the necessary components to be evaluated. | 5 | 4 | 3 | 2 | 1 |
| 2. The contents relate to measureable attributes. | 5 | 4 | 3 | 2 | 1 |
| 3. The rubric focuses on how pupils express their learning. | 5 | 4 | 3 | 2 | 1 |
| 4. The items in the rubric are adequate. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

C. Objectivity

- | | | | | | |
|--|---|---|---|---|---|
| 1. The rubric is fair and free from bias. | 5 | 4 | 3 | 2 | 1 |
| 2. A given rater can acquire consistent scores across time using the rubric. | 5 | 4 | 3 | 2 | 1 |
| 3. Two independent raters can achieve consistent scores using the rubric. | 5 | 4 | 3 | 2 | 1 |
| 4. The rubric does not give an advantage to a subset of people. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

D. Clarity

- | | | | | | |
|--|---|---|---|---|---|
| 1. The description in the rubric are expressed in a language that is understandable. | 5 | 4 | 3 | 2 | 1 |
| 2. The criteria are expressed in terms of observable attributes. | 5 | 4 | 3 | 2 | 1 |
| 3. There is a clear basis for assigning scores at each scale point. | 5 | 4 | 3 | 2 | 1 |
| 4. The separation between score levels is clear. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

Usefulness

- | | | | | | |
|---|---|---|---|---|---|
| 1. The rubric is a valuable assessment tool. | 5 | 4 | 3 | 2 | 1 |
| 2. The rubric provides the pupils with a clear set of criteria. | 5 | 4 | 3 | 2 | 1 |
| 3. The rubric promotes pupils' awareness of what is expected and how their answers are to be evaluated. | 5 | 4 | 3 | 2 | 1 |
| 4. The rubric is manageable and practical. | 5 | 4 | 3 | 2 | 1 |

Comments: _____

APPENDIX G
Summary of Experts' Validation of Word Problem Test
and Scoring Rubric

A. For Mathematics Test

Item	Expert 1	Expert 2	Expert 3	Mean	Interpretation
A. Format and Design					
1. The printed material is clear and understandable.	5	5	5	5.0	strongly agree
2. The layout is proportional and attractive.	5	5	5	5.0	strongly agree
B. Content					
1. The test questions are suitable for the target level.	4	5	5	4.7	agree
2. The test contains the different types of problems.	5	4	4	4.3	agree
3. The test measures the pupils' ability to comprehend and answer word problems.	5	4	5	4.7	agree
C. Clarity					
1. The language used is appropriate for the pupils.	5	5	5	5.0	strongly agree
2. The structure, style, and format are appropriate to the target level.	5	5	4	4.7	agree
3. The direction is clear.	4	5	5	4.7	agree

Interpretation

- 5 – strongly agree
- 4 – agree
- 3 – undecided
- 2 – disagree
- 1 – strongly disagree

B. For Scoring Rubric

Item	Expert 1	Expert 2	Expert 3	Mean	Interpretation
A. Format and Design					
1. The format of the rubric is simple.	5	5	5	5.0	strongly agree
2. The design is suitable to the level of the pupils	3	5	5	4.3	agree
3. The design can be understood by the rater.	4	5	5	4.7	agree
4. The rubric is user friendly.	5	5	5	5.0	strongly agree
B. Content					
1. The rubric contains the necessary components to be evaluated.	5	5	5	5.0	strongly agree
2. The contents relate to measurable attributes.	5	5	5	5.0	strongly agree
3. The rubric focuses on how pupils express their learning.	5	5	5	5.0	strongly agree
4. The items in the rubric are adequate.	4	4	4	4.0	agree
C. Objectivity					
1. The rubric is fair and free from bias.	5	5	5	5.0	strongly agree
2. A given rater can acquire consistent scores across time using the rubric.	5	5	5	5.0	strongly agree
3. Two independent raters can achieve consistent scores using the rubric.	5	5	5	5.0	strongly agree
4. The rubric does not give an advantage to a subset of people.	5	5	5	5.0	strongly agree
D. Clarity					
1. The descriptions in the rubric are expressed in a language that is understandable.	5	5	5	5.0	strongly agree
2. The criteria are expressed in terms of observable attributes.	5	5	5	5.0	strongly agree
3. There is a clear basis for assigning scores at each scale point.	5	5	5	5.0	strongly agree
4. The separation between score levels is clear.	5	5	5	5.0	strongly agree

E. Usefulness					
1. The rubric is a valuable assessment tool.	5	5	5	5.0	strongly agree
2. The rubric provides the pupils with a clear set of criteria.	5	5	5	5.0	strongly agree
3. The rubric promotes pupils' awareness of what is expected and how their answers are to be evaluated.	5	5	5	5.0	strongly agree
4, The rubric is manageable and practical.	5	5	5	5.0	strongly agree

Interpretation

- 5 – strongly agree
- 4 – agree
- 3 – undecided
- 2 – disagree
- 1 – strongly disagree

APPENDIX H

Summary of Experts' Validation of Reading Comprehension Test

Item	Expert 1	Expert 2	Expert 3	Mean	Interpretation
A. Format and Design					
1. The printed material is clear and understandable.	5	5	5	5.0	strongly agree
2. The layout is proportional and attractive.	5	5	5	5.0	strongly agree
B. Content					
1. The test questions are suitable for the target level.	5	4	4	4.3	agree
2. The test contains the different types of problems.	4	5	4	4.3	agree
3. The test measures the pupils' ability to comprehend.	4	4	4	4.0	agree
C. Clarity					
1. The language used is appropriate for the pupils.	4	5	5	4.7	agree
2. The structure, style, and format are appropriate to the target level.	5	5	5	5.0	strongly agree
3. The direction is clear.	5	5	5	5.0	strongly agree

Interpretation

- 5 – strongly agree
- 4 – agree
- 3 – undecided
- 2 – disagree
- 1 – strongly disagree

APPENDIX I
Computation of Pearson Product-Moment Correlation Coefficient
Word Problem and Reading Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
1	8	13	64	169	104
2	12	12	144	144	144
3	11	15	121	225	165
4	11	18	121	324	198
5	11	14	121	196	154
6	12	15	144	225	180
7	12	15	144	225	180
8	11	14	121	196	154
9	10	14	100	196	140
10	15	17	225	289	255
11	12	15	144	225	180
12	11	13	121	169	143
13	11	14	121	196	154
14	5	14	25	196	70
15	15	14	225	196	210
16	4	18	16	324	72
17	19	18	361	324	342
18	15	16	225	256	240
19	7	14	49	196	98
20	8	16	64	256	128
21	12	10	144	100	120
22	10	12	100	144	120
23	20	16	400	256	320
24	8	10	64	100	80
25	14	17	196	289	238
26	15	16	225	256	240
27	9	10	81	100	90
28	8	12	64	144	96
29	14	17	196	289	238
30	16	17	256	289	272
31	8	16	64	256	128
32	5	17	25	289	85
33	17	15	289	225	255

APPENDIX I
Computation of Pearson Product-Moment Correlation Coefficient
Word Problem and Reading Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
34	15	17	225	289	255
35	6	12	36	144	72
36	12	18	144	324	216
37	7	6	49	36	42
38	18	15	324	225	270
39	10	7	100	49	70
40	8	13	64	169	104
41	11	13	121	169	143
42	15	18	225	324	270
43	11	11	121	121	121
44	6	15	36	225	90
45	14	14	196	196	196
46	17	17	289	289	289
47	4	10	16	100	40
48	9	14	81	196	126
49	14	15	196	225	210
50	18	15	324	225	270
51	13	13	169	169	169
52	5	10	25	100	50
53	11	16	121	256	176
54	13	10	169	100	130
55	5	8	25	64	40
56	6	14	36	196	84
57	8	10	64	100	80
58	18	12	324	144	216
59	16	15	256	225	240
60	8	10	64	100	80
61	16	17	256	289	272
62	13	16	169	256	208
63	14	14	196	196	196
64	10	15	100	225	150
65	20	15	400	225	300
66	12	11	144	121	132

APPENDIX I
Computation of Pearson Product-Moment Correlation Coefficient
Word Problem and Reading Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
67	11	18	121	324	198
68	6	10	36	100	60
69	16	14	256	196	224
70	3	6	9	36	18
71	13	11	169	121	143
72	8	12	64	144	96
73	14	16	196	256	224
74	16	17	256	289	272
75	6	7	36	49	42
76	15	15	225	225	225
77	13	16	169	256	208
78	6	13	36	169	78
79	14	13	196	169	182
80	19	19	361	361	361
81	15	13	225	169	195
82	19	19	361	361	361
83	14	14	196	196	196
84	13	18	169	324	234
85	11	16	121	256	176
86	14	15	196	225	210
87	11	14	121	196	154
88	8	16	64	256	128
89	11	12	121	144	132
90	6	13	36	169	78
91	19	14	361	196	266
92	4	11	16	121	44
93	4	9	16	81	36
94	10	11	100	121	110
95	8	13	64	169	104
96	10	14	100	196	140
97	14	12	196	144	168
98	9	11	81	121	99
99	13	17	169	289	221

APPENDIX I
Computation of Pearson Product-Moment Correlation Coefficient
Word Problem and Reading Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
100	13	19	169	361	247
101	7	13	49	169	91
102	7	13	49	169	91
103	16	16	256	256	256
104	13	17	169	289	221
105	9	13	81	169	117
106	12	15	144	225	180
107	12	16	144	256	192
108	13	12	169	144	156
109	12	13	144	169	156
110	10	17	100	289	170
111	17	18	289	324	306
112	14	14	196	196	196
113	18	16	324	256	288
114	14	17	196	289	238
115	10	9	100	81	90
116	5	14	25	196	70
117	20	17	400	289	340
118	5	11	25	121	55
119	14	16	196	256	224
120	14	18	196	324	252
121	11	18	121	324	198
122	11	15	121	225	165
123	6	9	36	81	54
124	11	12	121	144	132
125	6	11	36	121	66
126	12	15	144	225	180
127	16	18	256	324	288
128	12	12	144	144	144
129	12	15	144	225	180
130	11	16	121	256	176
131	13	17	169	289	221
132	7	10	49	100	70

APPENDIX I
Computation of Pearson Product-Moment Correlation Coefficient
Word Problem and Reading Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
133	11	18	121	324	198
134	19	19	361	361	361
135	18	13	324	169	234
136	12	12	144	144	144
137	4	7	16	49	28
138	9	14	81	196	126
139	13	17	169	289	221
140	16	14	256	196	224
141	11	11	121	121	121
142	15	18	225	324	270
143	12	6	144	36	72
144	8	11	64	121	88
145	17	18	289	324	306
146	9	14	81	196	126
147	13	15	169	225	195
148	8	15	64	225	120
149	5	17	25	289	85
150	15	16	225	256	240
151	14	14	196	196	196
152	13	11	169	121	143
153	10	8	100	64	80
Σ	1767	2139	22895	31277	25671

$$\begin{aligned}
 r &= \frac{N}{\frac{153 (25671) - (1767) (2139)}{(1767)^2 [153 (31277) - (2139)^2]} \\
 &= \frac{3927663 - 3779613}{282769.34} \\
 &= \frac{148050}{282769.34}
 \end{aligned}$$

r = 0.52 - Moderate relationship

Interpretation of *r*

0	-	± 0.20	Negligible relationship
± 0.21	-	± 0.40	Slight relationship
± 0.41	-	± 0.70	Moderate relationship
± 0.71	-	± 0.90	Marked or High relationship
± 0.91	-	± 1.00	Very high or Perfect relationship

APPENDIX J
Computation of Pearson Product-Moment Correlation Coefficient
Mathematics and Reading Achievement Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
1	26	27	676	729	702
2	24	25	576	625	600
3	31	36	961	1296	1116
4	20	21	400	441	420
5	26	23	676	529	598
6	22	23	484	529	506
7	21	18	441	324	378
8	16	18	256	324	288
9	31	21	961	441	651
10	28	20	784	400	560
11	24	26	576	676	624
12	21	7	441	49	147
13	30	16	900	256	480
14	26	33	676	1089	858
15	28	28	784	784	784
16	19	21	361	441	399
17	40	31	1600	961	1240
18	35	29	1225	841	1015
19	24	24	576	576	576
20	17	15	289	225	255
21	23	18	529	324	414
22	19	8	361	64	152
23	39	36	1521	1296	1404
24	23	7	529	49	161
25	27	29	729	841	783
26	18	20	324	400	360
27	14	9	196	81	126
28	20	19	400	361	380
29	33	26	1089	676	858
30	34	32	1156	1024	1088
31	21	21	441	441	441
32	30	23	900	529	690
33	32	24	1024	576	768

APPENDIX J
Computation of Pearson Product-Moment Correlation Coefficient
Mathematics and Reading Achievement Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
34	29	27	841	729	783
35	40	30	1600	900	1200
36	34	19	1156	361	646
37	21	8	441	64	168
38	39	24	1521	576	936
39	16	11	256	121	176
40	13	26	169	676	338
41	25	10	625	100	250
42	26	25	676	625	650
43	25	18	625	324	450
44	16	18	256	324	288
45	26	27	676	729	702
46	33	30	1089	900	990
47	15	12	225	144	180
48	19	20	361	400	380
49	26	23	676	529	598
50	32	30	1024	900	960
51	24	27	576	729	648
52	23	17	529	289	391
53	18	32	324	1024	576
54	26	24	676	576	624
55	14	12	196	144	168
56	23	9	529	81	207
57	22	14	484	196	308
58	27	17	729	289	459
59	30	26	900	676	780
60	15	13	225	169	195
61	35	29	1225	841	1015
62	26	28	676	784	728
63	30	14	900	196	420
64	32	16	1024	256	512
65	39	33	1521	1089	1287
66	27	28	729	784	756

APPENDIX J
Computation of Pearson Product-Moment Correlation Coefficient
Mathematics and Reading Achievement Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
67	32	36	1024	1296	1152
68	22	16	484	256	352
69	23	31	529	961	713
70	15	9	225	81	135
71	23	11	529	121	253
72	21	19	441	361	399
73	38	34	1444	1156	1292
74	33	34	1089	1156	1122
75	20	11	400	121	220
76	32	28	1024	784	896
77	24	24	576	576	576
78	22	23	484	529	506
79	27	24	729	576	648
80	31	32	961	1024	992
81	23	18	529	324	414
82	40	28	1600	784	1120
83	24	30	576	900	720
84	30	39	900	1521	1170
85	32	25	1024	625	800
86	37	30	1369	900	1110
87	29	23	841	529	667
88	19	20	361	400	380
89	32	27	1024	729	864
90	21	12	441	144	252
91	40	32	1600	1024	1280
92	16	17	256	289	272
93	20	10	400	100	200
94	24	12	576	144	288
95	22	17	484	289	374
96	29	31	841	961	899
97	20	27	400	729	540
98	19	20	361	400	380
99	25	26	625	676	650

APPENDIX J
Computation of Pearson Product-Moment Correlation Coefficient
Mathematics and Reading Achievement Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
100	33	32	1089	1024	1056
101	22	21	484	441	462
102	21	11	441	121	231
103	35	31	1225	961	1085
104	30	34	900	1156	1020
105	27	27	729	729	729
106	23	20	529	400	460
107	23	21	529	441	483
108	29	18	841	324	522
109	22	26	484	676	572
110	29	30	841	900	870
111	34	28	1156	784	952
112	28	20	784	400	560
113	21	27	441	729	567
114	31	33	961	1089	1023
115	25	20	625	400	500
116	19	24	361	576	456
117	33	25	1089	625	825
118	6	15	36	225	90
119	21	17	441	289	357
120	27	33	729	1089	891
121	24	26	576	676	624
122	27	21	729	441	567
123	20	18	400	324	360
124	20	28	400	784	560
125	17	23	289	529	391
126	25	24	625	576	600
127	38	34	1444	1156	1292
128	30	29	900	841	870
129	26	20	676	400	520
130	25	21	625	441	525
131	34	30	1156	900	1020
132	13	10	169	100	130

APPENDIX J
Computation of Pearson Product-Moment Correlation Coefficient
Mathematics and Reading Achievement Tests

Respondent	Math Score (X)	Reading Score (Y)	X²	Y²	XY
133	23	31	529	961	713
134	36	26	1296	676	936
135	17	30	289	900	510
136	27	18	729	324	486
137	21	13	441	169	273
138	24	13	576	169	312
139	31	31	961	961	961
140	34	25	1156	625	850
141	29	18	841	324	522
142	36	21	1296	441	756
143	27	7	729	49	189
144	6	19	36	361	114
145	23	17	529	289	391
146	22	21	484	441	462
147	20	23	400	529	460
148	17	16	289	256	272
149	16	16	256	256	256
150	38	35	1444	1225	1330
151	34	27	1156	729	918
152	23	18	529	324	414
153	12	11	144	121	132
Σ	3907	3440	107263	85866	92654

$$\begin{aligned}
 r &= \frac{N}{\sqrt{[N - (\sum x)^2 / N] [N - (\sum y)^2 / N]}} \\
 &= \frac{153 (92654) - (3907) (3440)}{\sqrt{(3907)^2 [153 (85866) - (3440)^2]}} \\
 &= \frac{14176062 - 13440080}{\sqrt{1222716.81}} \\
 &= \frac{735982}{1222716.81}
 \end{aligned}$$

r = 0.60 - Moderate relationship

Interpretation of *r*

0	-	± 0.20	Negligible relationship
± 0.21	-	± 0.40	Slight relationship
± 0.41	-	± 0.70	Moderate relationship
± 0.71	-	± 0.90	Marked or high relationship
± 0.91	-	± 1.00	Very high or perfect relationship

APPENDIX K
Certificate of Authenticity
(see next page)

APPENDIX L
Certificate of Editing
(see next page)

CURRICULUM VITAE

PERSONAL DATA

Name	Ederlyn Diño-Esteban
Address	Bucal 4A, Maragondon, Cavite
Date of Birth	June 6, 1985
Place of Birth	Maragondon, Cavite
Civil Status	Married
Religion	Catholic



EMPLOYMENT

Claret School of Quezon City	2006 – present
Special Teacher	2006 – 2007
Grade 5 Teacher	2007 – 2009
Grade 4 Teacher	2010 – 2013
Grade 5 Teacher	2013 – present

EDUCATIONAL BACKGROUND

Tertiary Level	Philippine Normal University	2006
	Manila	
	Cum Laude	
Secondary Level	Cavite National Science High School	2002
	Cavite	
Elementary Level	Bucal IV Elementary School	1998
	Cavite	
	Valedictorian	