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The Relationship of Learning Styles, Study Habits, and Self-Efficacy to Mathematics Performance among Grades Four and Five Pupils

Gemma C. Teope

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**THE RELATIONSHIP OF LEARNING STYLES, STUDY HABITS,
AND SELF-EFFICACY TO MATHEMATICS PERFORMANCE
AMONG GRADES FOUR AND FIVE PUPILS**

A Thesis Presented to:
The Faculty of the College of Graduate Studies and
Teacher Education Research
Philippine Normal University
The National Center for Teacher Education
Taft Avenue, Manila

In partial fulfillment of the requirement for the degree of
Master of Arts in Education
With Specialization in Child Study

by:

GEMMA C. TEOPE
March 2014

APPROVAL SHEET

In partial fulfillment of the requirements for the degree of Master of Arts in Education with specialization in Child Study, this thesis **entitled “THE RELATIONSHIP OF LEARNING STYLES, STUDY HABITS, AND SELF-EFFICACY TO MATHEMATICS PERFORMANCE AMONG GRADES FOUR AND FIVE PUPILS”** prepared and submitted by MRS. GEMMA C. TEOPE, who is hereby recommended for approval and acceptance.

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ABSTRACT

Title: The Relationship of Learning Styles, Study Habits, and Self-Efficacy to Mathematics Performance Among Grades Four and Five Pupils

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Key Concepts: Learning Styles, Study Habits, Self-Efficacy, Math Performance

This study utilized the descriptive-survey and correlational methods to investigate the relationship of learning styles, study habits, and self-efficacy to mathematics performance of 167 female grades four and five pupils in Holy Spirit School, Cubao, Quezon City. They were classified as High Achievers, Average Achievers, and Low Achievers based on their mathematics performance. Three sets of standard questionnaires were used - Memletics Learning Styles Questionnaire, Math Study Skills Self-Survey, and Mathematics Self-Efficacy Scale.

The data gathered were analyzed using statistical treatments, namely, frequency count, percentage, ranking, and Pearson product moment correlation. The results revealed that Aural Style is the predominant learning style as a whole and also when

the learners are classified according to their math level of achievement.

The overall level of intermediate pupils' study habits is Good. However, under three levels of classifications, only High Achievers show better math study habits. While, Average and Low Achievers exhibit fair study habits. Then, the overall level of math self-efficacy of the respondents is Much Confidence. But when classified, High Achievers have Much Confidence, Average Achievers have Much Confidence and Some Confidence levels, and the Low Achievers possess Some Confidence in performing Math tasks.

Concerning Learning Styles and Math Performance, among the seven Memletics learning styles, only Logical Style when correlated with the Mathematics Performance results to moderate correlation. The rest of the learning styles, namely, Solitary, Physical, Visual, Social, Verbal, and Aural when correlated with math performance fall under low correlation. Both Solitary and Physical Styles when correlated with Math Performance obtain the lowest correlation.

In terms of the relationship of Math Study Habits with Math Performance, result shows moderately high correlation. And then, when it comes to the relationship of Math Self-Efficacy with Math Performance, it yields moderately high correlation.

The results of the study lead to the idea that there is a similar preference for Aural Style whether the respondents are categorized into three levels or not. Next to it is the Social Style. It appears that students grasp the lesson better when music is being played, when they hear the information and when they study in a group or with

somebody. Subsequently, no one from them exhibits multiple learning styles or a combination of the different learning styles.

Good study habits are being practiced by most of the respondents in general and by the High Achievers when classified into three groups. Most likely, they are utilizing the math study skills well. Then, Average and Low Achievers have typical or average study habits. It seems that although they use most of the math study habits dimensions regularly, they have not put much effort in enhancing the intensity of the way they utilize them.

As a whole, majority of the respondents have very high level of self-efficacy but when classified into three groups, their level of confidence vary as well. High Achievers and only half of Average Achievers have high level of self-efficacy while the other half of the Average Achievers and Low Achievers have average level of self-efficacy. Nevertheless, these are indicators of the respondents' positive outlook with their ability to perform math-related tasks.

The Pearson correlation reflects a significant relationship between Logical Learning Styles and Math Performance. On the other hand, the remaining six types of learning styles obtain insignificant relation to Math Performance. These signify that pupils who utilize Logical Style more often demonstrate good performance in their math endeavors, in contrast with those who prefer to use Aural, Social, Visual, Verbal, Physical and Solitary Styles.

Highly significant relationship exists between Study Habits and Math Performance. Students with very good and good levels of study habits are likely to succeed in math-related tasks. Conversely, those who practice average and below average study habits obtain low achievement in math activities.

Likewise, a high positive relationship is noted regarding Self-Efficacy and Math Performance. It was found that when pupils possess high math self-efficacy, they are more likely to exhibit an increase in knowledge and confidence in dealing with math subject. They tend to be ready to confront and solve any problem that comes their way. Whereas, students with low mathematics self-efficacy have a tendency to distance themselves from engaging in solving problems they perceive as difficult which lead to poor achievement in mathematics.

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Chapter 1

THE PROBLEM AND ITS BACKGROUND

Introduction

The learners' academic performance is one of the most significant aspects in the teaching-learning process. In fact, Akpau (in Yaku, 2012, p. 1) stressed that the main concern of the educationalists has always been in the improvement of the achievement level of students. Various tools are being utilized as means of assessing the learners' achievement accurately and fairly. A student's achievement level and school performance is always based on a combination of both built-in/informal evaluation (which includes quizzes, long test, etc.) and the more formal and periodic evaluation (such as standardized test, local and international achievement tests). Actual performance and tangible output such as special project, essay, and report are also considered as bases of performance evaluation.

To better gauge the students' weaknesses and strengths in various subjects such as Mathematics, Science, English, Filipino, and HeKaSi in elementary and Araling Panlipunan in high school, the Department of Education (DepEd) administers the National Achievement Test.

Unfortunately, the 2010 National Achievement Test (NAT), revealed that only 68% of the test items were answered correctly in the elementary level and only 46% in the secondary level. Then in 2011 NAT result, Quismundo (2011, p. 1) reported that almost two-thirds of the country's high schools fared poorly with some 67.10% of schools getting below average NAT scores. Of roughly 5,600 secondary schools, some 67.10% of schools scored within the "lower average" range (26 and 50% correct). Results among

elementary schools were considered fair for almost half of some 37,700 elementary schools scored from 51% to 75%.

The seriousness of the problem was confirmed earlier by the result of the 2008 Trends in International Mathematics and Science Study (TIMSS) assessment test. The Philippines ranked the lowest out of ten participating countries (Velasco, 2012, p.1) even with only the science high schools joining the Advanced Mathematics category.

The above data prompted Sen. Angara (in Horario, 2012, p. 1) to report in the Senate meeting that students' performance in terms of Science, Math and Technology remains lackluster. That, this dull performance of Filipino students remains to be a problem of the country.

This scenario challenged educators to seek for ways to improve the performance of the students, specifically in mathematics and science. Series of studies were conducted to look for factors that are beneficial for academic achievement.

A good number of researchers (Medina 2006, p.90; Zarch and Kadivar 2006, p.82; Velazquez 2007, p.128; Credel and Kuncel 2009, p.1; Balocnit 2010 p.45; et al.) have identified learning styles, study habits and self-efficacy as significant factors for pupils' academic performance.

Grantham (2005, p.1), pointed out that students have their own way of learning, a 'learning style', and they will learn best when there is a variety of learning opportunities that give them the chance to learn in their own way. Kizlik (2012, p.1) recognized this view and at the same time emphasized that success in high school and college is also dependent on one's ability to study effectively and efficiently. Then, Kendra (2013, p.1) further added that a student with a strong sense of self-efficacy,

perceives challenging problems as tasks to be mastered and builds a stronger sense of commitment to accomplish the task.

Learning styles, study habits and self-efficacy have been consistently recognized as determining factors of successful educational output. Teaching and learning process become more satisfying when the learners absorb the lesson through the aid of their preferred learning style, backed up by proper study habits and positive self-efficacy, particularly in math subjects.

The national and global concerns of the Department of Education regarding students' academic achievement are related to Holy Spirit School aspiration of attaining academic excellence. In the previous years of NAT implementation, Holy Spirit School (HSS) was one of the top 20 schools in Quezon City. A good number of pupils acquired very high scores in math. However, in the overall standing of the five-key major subjects, math performance had not been ranked as the topmost.

The above situations and the fervent desire to be of service to improve the quality of mathematics instruction, motivated the researcher to conduct a research to understand these learners' personal and academic variables – Learning Styles, Study Habits, Self-Efficacy, and Mathematics Performance.

The main purpose of this study is to find out the learning styles, study habits, and self-efficacy of the respondents in relation to their mathematics performance with the end goal of raising the intermediate pupils' academic achievement, particularly in the National Achievement Test.

Conceptual Framework

In most education psychologists' literatures, Learning Styles, Study Habits, and Self-Efficacy were identified as significant factors in the Academic/Math Performance of students. In this particular study, the researcher sought for the relationship of the said variables and the vital roles they played in the learning process.

Every learner is different. Bautista (2007, p. 436) pointed out that individuals have unique patterns for learning new and difficult information. The sum total of individual skills and preferences that make up the way a person perceives, gathers, and processes information is called Learning Styles (Gardner, 2007, p.1).

Learners may be categorized based on the following types of learning styles: The Visual-Auditory-Kinesthetic Learning Styles model (VAK), was the foremost formulated design. According to Phillips (2011, p. 1), this concept was first developed by psychologists and teaching specialists such as Fernald, Keller, Orton, Gillingham, Stillman and Montessori, starting in the 1920's. This design acknowledges the use of any of the three senses – seeing, listening, and moving to be able to learn new concepts effectively. These senses are called modalities. Modality is an educational term referring to the person's primary avenue of sensation.

A more recent version of this design is the Fleming's VARK model or Visual, Auditory, Reading/Writing Preference, and Kinesthetic or Tactile Learning Styles (Fleming, 2009, p.1). Neil Fleming modified the three-part model by adding a separate category, reading/writing but the theory of VARK is basically the same as that of the former model, except that Fleming recognized reading as qualitatively different from looking at pictures.

Among the many learning styles that had been studied and identified, this research adapted the Memletics Learning Styles Theory developed by Sean Whitely (in Ing, 2012, p.1). The reasons for utilizing it are as follows: the realistic aspect of it aids the people to easily identify themselves with visual, aural, verbal, physical, logical, social, or solitary by merely looking at each term and reading each one's characteristics and descriptions.

Second, many investigators and experts from different nations had used it as basis for their studies. This then, suggests assurance for its universal functionality. Third, the original design V-A-K is no longer enough means of classifying the learning styles of present generation due to life's complexity. Memletics learning styles considered the "multiple intelligences" designed by Howard Gardner in coming up with the multiple learning styles.

The following are the distinctive characteristics of each Memletics Learning Style as described by Whitely (in Ing, 2012, p. 1): The Visual Style pupils prefer using pictures, images, and spatial understanding. They do extremely well in making use of images, pictures, colors, and maps to construct information and communicate with others. They can visualize objects, plans and outcomes through their minds' eye. They also possess high spatial sense which lead to a better sense of direction. As they move out of a vehicle, an elevator, etc., their basic instincts guide them to the right path.

In Aural or Auditory Style the children prefer using sound and music. They often have excellent sense of pitch and rhythm, hence, it is expected that they can sing, play a musical instrument, or recognize the sounds of various instruments and songs. The Verbal Style learners combine the use of words in speech and in writing. They show confidence conversing verbally and in written form. Reading and scribbling are

their favorite pastime.

In Physical Style, the learners prefer using their body, hands and sense of touch to learn and understand the world around them. Obviously, they enjoy sports, exercise, and other physical activities. Logical Style learners favor the use of logic, mathematical reasoning and systems. They easily get familiarized with patterns and construct connections among what seems to be meaningless content.

Under Social Style, the students learn better in groups or with other persons around. They converse with ease whether in verbal or in non-verbal form. They can easily sense other peoples' motivations, intentions, feelings, or moods. Because of these qualities, they gain the confidence and trust of other people for their personal problems or concerns. And lastly, the Solitary Style learners are those who choose to work alone and use self-study. They value privacy, introspection, and independence. They can focus their thoughts and feelings on the topic presented to them.

The need to identify the learning style preferences of pupils is significant in the teaching-learning process. Learning styles convey how learners perceive, interact, and respond to their learning environment. Researches conducted such as the work of Lovelace (2005 p.176), on the Meta-Analysis of Experimental Research Based on the Dunn and Dunn Model proved that whenever a teaching style matches the predominant learning style, learning takes place, becomes easier, more meaningful, more challenging, and more lasting. More so, if it is reinforced by the second preference. On the other side, whenever there is a mismatch between these two components, learning becomes complicated and burdensome, thus, the child feels frustrated and discouraged. Children may also feel tense which may lead eventually to being physically ill. Furthermore,

frustration and stress may lead to unacceptable classroom behavior.

Another advantage of knowing one's learning style preference has something to do with the aspects of self-awareness and self-image. Recognizing ones' strengths and weaknesses will lead to better understanding why some parts of learning make them feel adequate and comfortable or the other way around. Learning style preference will also guide the students in adapting the learning process and the learning techniques to meet their specific strengths and improve their particular weaknesses. Lastly, expanding their range of styles will challenge them to find time to further enhance those styles which they seldom use.

Each one is capable of learning in all of the above mentioned learning styles but most people prefer one over the other. It is also essential to emphasize that no learning style is superior to any other. Each preference offers various concepts, skills, abilities, and perceptions to the learners.

Orcino (2010, p.285) suggested some points that parents as well as teachers can do and look into to sustain life-long love for learning: (1) Project a positive image of school – a place to learn new things which they can use in real life situations and not just to get high grades. (2) Let children reflect on how every lesson can help them contribute to society. (3) Ask the children what they want and can do for the society at present and in the future. (4) Find out what kind of learning styles the children have, and decide how to support their learning at home.

Miguel (2010 p. 283) stated that learning style is one aspect of the child's innate uniqueness which must be learned, recognized, acknowledged, and respected. She then, enumerated the following fallacies about learning which make studying

more difficult and boring: (a) Youngsters who cannot remember verbal instruction tend to be less intelligent than those who can. Researches reveal that each one's perceptual capabilities (visual, auditory, tactile, and kinesthetic) vary. (b) Most learners could achieve well academically if only they were self-motivated. Studies prove that pupils attain greater scores when taught using strategies that correspond to each one's learning styles.

The next fallacies are: (c) Whole group instruction is the best way to teach. Researches affirm that many pupils learn better when they are left alone. Others perform better in pair, in teams, or with adults. (d) Generally, it is easier for the older learners to adjust to a teacher's style. Studies provide evidence that people keep on learning in different ways. They must not be treated as if they were of the same learning styles. Instead, they should be given options and choices in accomplishing a task.

The second variable is termed as Study Habits. According to Losare (2009, p.13), study habits simply means how pupils manage their time in such a way that they can review and study the lessons in school regularly. Good study habits demand skills and competencies for learners in gathering new information and ideas, as they observe, listen, and read. Recording what they have gathered as they jot down, outline, and summarize. Making sense of the concepts acquired as they synthesize and relate them to prior knowledge and experience. Remembering by memory devices and recall techniques. And finally, applying new information and ideas through reporting, writing, and taking up test, and solving real life problems.

Villa (2009, p.14) expressed that the acquisition of good study habits is vital in molding the intellectual, emotional, and physical aspects of every child. Enhancement of

study habits at early stage of the learner's growth has long- lasting effect and serves as good foundation for success in academic advancement. Since it will not be developed in just one day or year, provision for an effective training program in practicing proper study habits should begin the moment the learner enters formal schooling and continually developed as he/she moves to the next level of education.

There are various ways of measuring the study habits of the students. One way to gauge it is through the six sub scales, designed by Dennis Congos (in Khurshid et al. 2012, p.36). They are as follows: test preparation, concentration, time management, text book, note taking, and memory.

Another popular way of assessing study habits is by means of the four sub dimensions designed by Dr. Carolyn Hopper (in Stapel, p. 7). The present study adapted this because it focuses on measuring the study skills specifically for math subject. The four sub dimensions or sections include: time and place for studying, study strategies for the class, math tests, and anxiety. Section 1: Time and Place for Studying pertain to the regular schedule and convenient venue for reviewing and accomplishing of homework . Section 2: Study Strategies are the techniques being used to understand the lesson better. Section 3: Math Test are the correct practices that must be done while taking the test. And then, Section 4: Anxiety is about ways on managing stress.

The third aspect is Self-Efficacy. This concept is attributed to Albert Bandura in his attempt to comprehend a person's adaptation and coping mechanisms. According to Teh (2007, p. 247) "for Bandura, a self-efficacious individual is one who believes that he or she can master a situation so that it will lead to positive outcomes. Berger (2006, p. 45) further described it as "the belief that a person succeeds because of his/her own ability."

As stated by Aronson, et al (2005, p. 485), self-efficacy aids the learner in two ways: (1) It influences his/her persistence and effort at a task. (2) Self-efficacy stimulates the way the whole system of the body responds while the person works to reach the goal. A person with low self-efficacy has a tendency to give up instantly, while the one with high self-efficacy focuses on a higher goal and shows persistence even in the face of failure resulting to greater opportunity for success.

Burger (2011, p. 317) explained how Bandura illustrates the difference between outcome expectation and efficacy expectation. Outcome Expectation pertains to the extent to which individuals believe their responses will direct them to a particular result while Efficacy Expectation leads to the extent to which people believe they can make such outcome a reality. For Bandura, efficacy expectations are better predictors of behavior than outcome expectations. Most likely, pupils will not study harder if they don't believe that it's attainable.

Apruebo (2009, p. 497) pointed out the four sources of self-efficacy: (1) Mastery Experiences explain that victorious past performances increase efficacy, on the other hand past failures decrease it. (2) Social Modeling pertains to vicarious experiences provided by other persons with the same competence, improve one's self-efficacy while observable failures of others weaken it. (3) Social Persuasion enhances self-efficacy only if that person believes the persuader. And lastly, (4) Physical and Emotional States such as strong fear, severe anxiety, or intense levels of stress tend to lower self-efficacy. They may provide success on simple tasks but not on complicated performances.

Bandura, et al. (in Kendra 2011, p.1) found out that people with a strong sense of self-efficacy: (a) view problems as tasks to be mastered, (b) form a stronger sense of commitment to the activities, and (c) recover quickly from disappointments.

To better gauge the self-efficacy of the respondents, this study adapted the mathematics task self-efficacy designed by Nancy Betz and Gail Hackett. It consists of eighteen statements which pertain to actual daily situations involving the use of math skills.

Seras (2009, p. 154) pointed out that the belief that mathematics is a difficult subject hampers the pupils' appreciation and desire to learn the subject. Although there is truth in it, much hardship awaits the child who finds mathematics a burden to his/her studies and feels a dislike for it. The primary responsibility and challenge as well to the math teacher then, is to stimulate the student's interest and appreciation of the subject.

The fourth aspect is the Mathematics Performance. O'Daffer (2008, p. 2) defined mathematics as a language of words and symbols that is used to communicate ideas of numbers, space, and real-world phenomena. For instance, the language of math can be utilized to find out how a child can go to school alone by passing through particular streets or by riding a public transport with pocket money.

For Bell (2013, p.1) academic achievement particularly in mathematics can be described as how well students meet standards set out by the Department of Education and the institution itself. These standards pertain to the capacity of the learners to comprehend and solve mathematical facts and being able to communicate their knowledge orally or using paper and pencil under the instruction and training given by the teacher.

Mathematics performance is the determinant of learners' learning styles, study habits, and self-efficacy towards the subject because it plays a large part in their mental organization and overall behavior. One of the best instruments to determine the level of performance in math is the pupil's rating or grade in the report card for it is already the summary of the various tasks (such as quizzes, project, recitation, etc.) accomplished for the whole grading period. Good math grade is the best reward the learners can receive – a motivating factor to sustain their interest for better future performance.

The discussions on learning styles, study habits, and self-efficacy towards math in relation to pupils' mathematics performance can be best recapitulated through Figure 1 presented on page 14. The three-dimensional cubes represent the three factors that have significant relationship to Mathematics Performance namely: Learning Styles, Study Habits, and Self-Efficacy.

Then, a double-headed arrow connects each factor to the circular figure which represents the Mathematics Performance. It symbolizes the ultimate goal of home and school partnership – to raise the mathematics achievement of all pupils whether they are high, average, or low achievers. The recent Grade Point Average (GPA) in math subject was used as basis.

The Multiple Intelligences Theory designed by Howard Gardner establishes and confirms that learning styles, study habits and self-efficacy variables are related to math performance. Whiteley, the proponent of Memletics Learning Styles,(in Ing 2012, p.1) based the Aural, Visual, Verbal, Physical, Logical, Social and Solitary Styles from Musical,

Spatial, Linguistic, Bodily-Kinesthetic, Logical-Mathematical, Interpersonal, and Intrapersonal Intelligences respectively.

The establishment of proper Study Habits, high Self-efficacy and better Math Performance are also influenced by the enhancement of Interpersonal, Intrapersonal, and Logical-Mathematical Intelligences. Arias (2009, p.9) pointed out that people who possess Interpersonal Intelligence interact well and sensitive to the feelings of others especially with their teachers, parents, and classmates. Students who have high intrapersonal intelligence are capable of understanding their own emotions, capabilities, goals, and motivations. And then, learners who are under the area of Logical-Mathematical Intelligence naturally excel in logical or numerical activities.

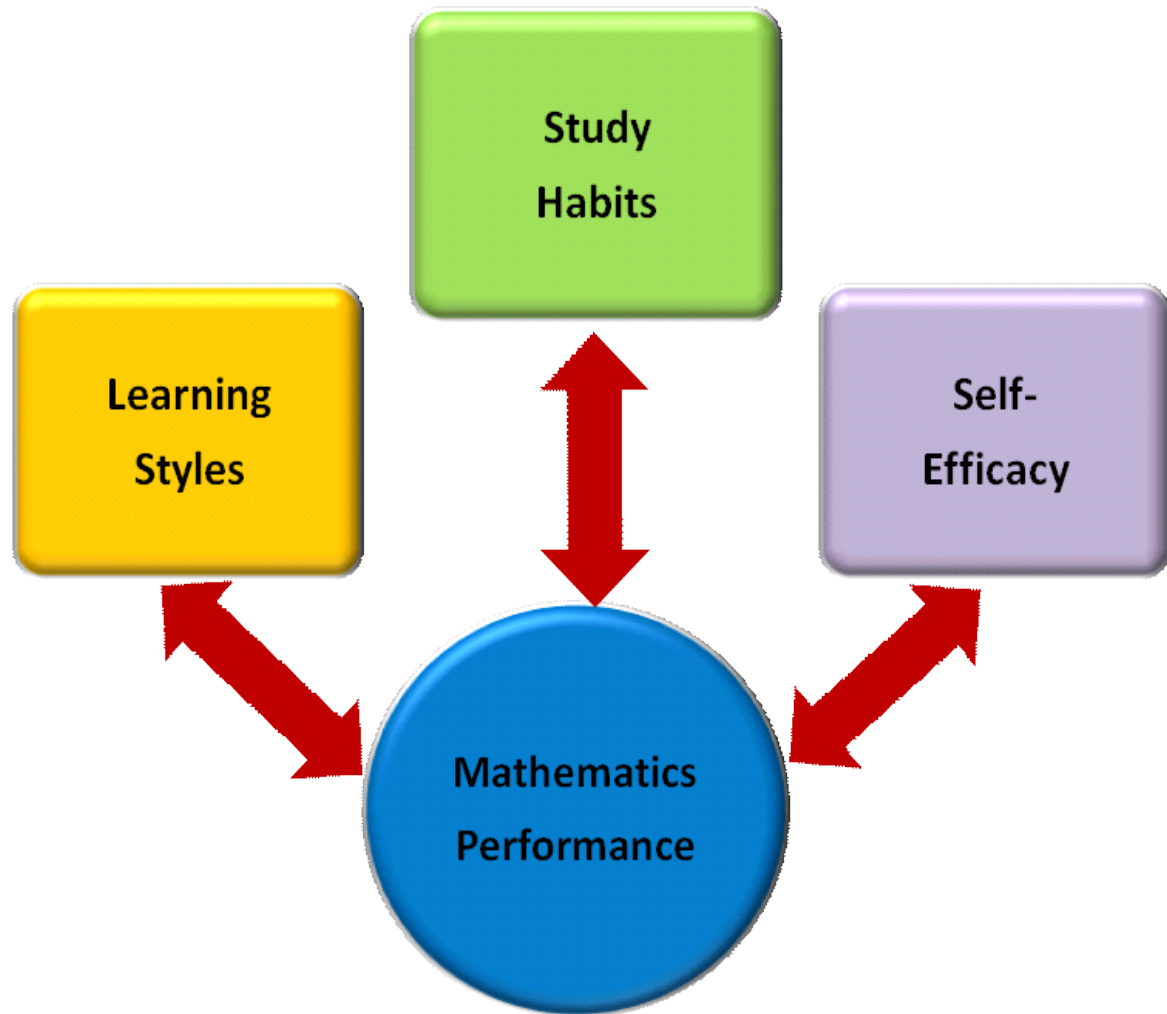


Figure 1: Conceptual Paradigm Regarding the Intermediate Pupils' Performance in Mathematics in Relation to Their Learning Styles, Study Habits, and Self-Efficacy

Statement of the Problem

This study endeavors to investigate the relationship of learning styles, study habits, and self-efficacy to the mathematics performance of grades four and five pupils. Specifically, the study seeks to answer the following questions:

1. What are the learning styles, study habits, and math self-efficacy of the intermediate pupils?
2. What are the learning styles, study habits, and math self-efficacy of the pupils when classified according to (a) high achievers, (b) average achievers, and (c) low achievers?
3. How do learning styles, study habits, and self-efficacy relate to mathematics performance?

Significance of the Study

The outcome of this study is a great help to the following sectors of the school community:

The curriculum planners, school administrators, and subject area coordinators may be guided about the significance of integrating learning styles, study habits, and self-efficacy in the formulation, evaluation, and revision of the instructional program for better academic performance, particularly in math subject.

The educators may be enlightened regarding the important role of learning style, study habits, and self-efficacy to the teaching-learning process. The identification of the pupils' dominant learning style and recognition of logical style as the most essential learning style, as well as their levels of study habits and self-efficacy may inspire math teachers and other subject teachers to be more effective in

handling and guiding the learners by employing the appropriate teaching strategies, learning tasks, and instructional materials that help improved pupils' academic achievement.

The guidance counselors may be made aware of the pupils' study related problems in connection with their scholastic achievement. The data gathered by the researcher may be considered as reliable documents for them to have deeper understanding of the grades 4-5 pupils. The research instruments employed may be utilized also to other grade levels, particularly the grade six and fourth year high school students, who will be taking the National Achievement Test in March. The results can be used also to improve the pupils and parental programs of the guidance office.

For the parents, to help them realize the need to discover the learning style of their children, to schedule a regular study hour at home in order to develop correct study habits, and to imbibe positive self-efficacy most especially in math subject.

Knowing their individual learning predisposition, study habits, and self-efficacy regarding math subject, the pupils are guided in initiating learning through their strongest learning style at the same time strengthening the weaker ones. Likewise, choosing the right study habits and boosting self-efficacy.

Future researchers maybe challenged to conduct further studies about the relationship of learning styles, study habits, and self-efficacy to pupils' academic performance to other grade level and other academic subjects as well. They may also conduct further investigation regarding the relationship of other factors (such as age, sex, motivation, e-learning, etc.) to aural style which appears to be the modern time predominant learning style of the students.

Lastly, for the researcher, the significance of the study is not just merely its completion or earning another degree as the end result, but more than that is her continuous growth and development in her chosen profession. To adapt teaching strategies and materials suited to the learning styles, study habits, self-efficacy, and interest of her pupils. And while working on these, her values such as patience, sense of responsibility, and resourcefulness are also being enhanced.

Scope and Delimitation of the Study

This study aimed at identifying the learning styles of the grades 4-5 pupils, their math study habits, as well as their math self-efficacy in relation to their mathematics performance. Academic performance, particularly in mathematics subject, is the heart of pupils' educational mission especially in facing the new challenges in the area of computer and other modern technologies. Similarly, to improve pupils' performance is the goal and mission of all educators. Moreover, learning styles, study habits and self-efficacy have been consistently recognized as determining factors of successful educational output. Hence, the findings of this study will be used as bases for the improvement of the mathematics instructional program with the ultimate goal of raising the mathematics achievement of the pupils.

The respondents were all female grades four and five pupils in Holy Spirit School Cubao, Quezon City, school year 2011-2012. There were seventy-four pupils (44.31%) in grade 4 level and 93 pupils (55.69 %) in grade five level with a total number of 167 pupils (100%). They were grouped according to their grade point average (GPA) in math. The three classifications were high achievers (grade point average of 90

and above), average achievers (grade point average from 83-89), and low achievers (grade point average of 82 and below).

Another delimitation of this study was the utilization of three standardized survey questionnaires as research instruments - Memletics Learning Styles Questionnaire, Math Study Skills Self-Survey, and Mathematics Self-Efficacy Scales.

The data were gathered and analyzed using descriptive-correlational methods and statistical treatments, namely, frequency count, percentage, ranking, and Pearson product moment correlation. Adherence to objectivity was observed.

Definition of Terms

There are various terms used in identifying the relationship of learning styles, study habits and self-efficacy with the mathematics performance of the respondents. The following terminologies are conceptually and operationally defined to help the readers better understand this research.

Aural/Auditory Style – prefers using sound and music. In this study, Aural

Style children are those who have excellent sense of pitch and rhythm. It is expected that they can sing, play a musical instrument, or recognize the sounds of various instruments and songs.

Average Achievers – are the pupils who belong to the top 50% of the class. In this study, they are the pupils who got grade point average ranging from 83-89 in the recent four grading periods.

High Achievers – are students who get high marks or good grades. They do the required work with excellent result. They tend to be well-organized and with good time-management skills. In this study, these are the pupils who

got grade point average ranging from 90 and above in the recent four grading periods.

Learning Styles – are the numerous manner by which learners perceive, interact with, and responds to the learning environment. In this study, these pertain to various approaches of learning which stress the fact that the learners comprehend, process and retain information in different ways.

Logical Style – prefers to use logic, reasoning, systems, and numbers. In this study, Logical Style learners are those who excel in mathematics, chess, computer programming and other logical or numerical activities. They easily get familiarized with patterns and construct connections among what seems to be of meaningless content.

Low Achievers – are pupils who do not perform well as expected. In this study, they are the pupils who got grade point average ranging from 82 and below in the latest four grading periods.

Math Grade Point Average (GPA) – refers to the average obtained by dividing the total number of grade points earned by the total number of credits taken. In this study, it pertains to the general average of the pupils in math subject in the recent four grading periods.

Math Performance – refers to the ability of students to analyze, reason out and communicate effectively as they pose, solve and interpret mathematical problems in a variety of situations. In this study, it refers to the capacity of the learners to comprehend and solve mathematical facts

and being able to communicate their knowledge orally or using paper and pencil.

Physical Style – prefers using one's body, hands, or sense of touch. In this study, Physical Style learners learn better by getting up and moving around. They enjoy sports, exercise, dance and other physical activities. They are also good at building and creating things.

Self-efficacy – is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations. In this study, it refers to the person's belief in his or her ability to succeed in a particular situation.

Social Style – desires to learn in groups or with other people. In this study, Social Style students converse with ease to others. They can easily sense other peoples' motivations, intentions, feelings, or moods. Because of these qualities, they gain the confidence and trust of other people for their personal problems or concerns.

Solitary Style – chooses to work alone and use self-study. In this study, Solitary Style learners value privacy, introspection, and independence. They are capable of understanding their own emotions, goals, and motivations. Hence, they can focus their thoughts and feelings on the topic presented to them.

Study habits/skills – are behavior patterns that are repeated until they become automatic. In this study, these are the actions the learners

perform regularly and habitually in order to accomplish the long term task of learning.

Verbal Style – prefers to use words both in speech and in writing. In this study, Verbal Style pupils express confidence conversing verbally and in written form. They show enthusiasm in telling stories and memorizing terminologies along with dates. Reading and scribbling are their favorite past time.

Visual Style – prefers using pictures, images, and spatial understanding. In this study, the Visual Style children do extremely well in making use of figures, colors, and maps to construct information and communicate with others. They can visualize objects, plans and outcomes through their minds' eye. They also possess high spatial sense which lead to a better sense of direction.

Chapter II

REVIEW OF RELATED LITERATURE

This chapter presents the literatures pertaining to the subject under study. It discusses the researches related to learning styles, study habits, and self-efficacy in relation to mathematics/ academic performance. It also provides findings and conclusions of past investigations that may support current findings and conclusions of this endeavor.

Learning Styles

The following researchers adapted various theories of learning styles namely: VAK Learning Style Theory, Dunn and Dunn Learning Styles Model, Kolb's Experiential Learning Style Theory, and Memletic Learning Styles Theory. Although these theories vary in some of the types of learning styles they promote, these researchers obtained some commonalities with their results.

In Francisco's (2007, p. 52) study, the most preferred learning style of the respondents was Interactive which is the counterpart of Collaborative/by Pairs/Group Learning types of learning style in Kutay (2006, p. 83), Velasquez (2007, p.128), and Abidin, Rezaee, Kiranjit, and Singh's (2010, p. 148) works. Kutay discovered that Turkish and American students both liked to study in pairs; however, more Turkish students preferred to study in pairs than American students. Whereas, the subjects of Abidin's, et al. (2010, p. 148), Madriaga (2010, p.118) and female students of Kia, Aliapour, and Ghaderi (2009, p. 12) strongly preferred Aural/Auditory learning style.

Majority of freshmen students in Alfonso's (2005, p. 105) work were visual learners. This learning style ranked second/third in the studies conducted by Francisco (2007, p. 52). Kia et al. (2009, p. 12), Abidin, et al. (2010, p. 148), and Madriaga (2010, p.118).

Both Abidin and Kutay had respondents who utilized more often the psychological preferences stimuli, which has four elements; Analytic, Global, Reflective and Impulsive. In the area of Variety, Madriaga's subjects and Kutay's Turkish respondents were both reported under Much Preferred level. Turkish students switched from one topic to another unlike the American students who preferred less variety while studying subjects. They also tend to move from one area to another before finishing a topic. Thus, they are studying different subjects at the same time. Whereas US students tend to finish one subject and then start another one.

The other major learning styles utilized by the respondents of the researchers mentioned above are as follows: Tactile/Kinesthetic/Physical, Logical, Verbal, and Solitary/Individual. According to Kutay (2006, p. 83), Tactile and/or Kinesthetic learners can learn more effectively when they are actively involved in doing tactile/kinesthetic activities rather than listening or reading. His Turkish subjects were found to be slightly more Tactile and/or Kinesthetic compared to American students.

The following researchers had different findings: In Baldomero's (2006, p.74) study, most of the respondents that failed in the High School Mathematics Achievement (HSMAT) test had a learning style profile of Passive-Active – Concrete – Abstract–Intermediate Personality – Superficial Deep. This denotes that more respondents are processing information passively and perceiving it concretely. Then Kia et al. (2009, p. 1) found out that their male students used mostly the Verbal Style.

Costales (2006 p.79) classified her respondents into two: High Achievers and Low Achievers whereas Abidin, et al. (2010, p. 148) classified their respondents into three: High Achievers, Moderate, and Low Achievers. The former one discovered that most of the students in both high and low performing groups were categorized as Accommodator type of learner. They were found to be practical or capable to accomplish something; receptive or open to suggestions. They seemed to enjoy doing and performing and willing to accept duties and responsibilities. The latter found out that High Achievement students were more Global than the Moderate and Low Achievement students. The High Achievers also preferred Group Learning variable than Low Achievers.

Finally, Abidin uncovered the existence of the different learning styles and a variety of major, minor and negligible learning styles among students, hence revealed the significant differences in students' overall academic achievement. Among the researchers mentioned above, he was the only one who had respondents possessing multiple learning styles or a combination of different learning styles. That multi-style learners tend to achieve more and score better than the learners with one or two learning styles.

With regards to correlation made between learning styles and math/academic performance, the following researchers came up with significant findings: Research studies carried out in Singapore schools by Ong-Ooi, Ng, Choy, Tee, Loh & Lim (2005 p.1) mirrored the positive results of students' learning styles with academic performance which was also found in studies carried out since the 1970s by Rita and Kenneth Dunn, proponents of Dunn & Dunn Learning Style Model.

Francisco (2007, p. 52) discovered that academic performance was significant in the learning styles of grade 6 pupils. Velasquez's (2007, p.128) findings revealed highly

significant relationship found between the students' academic performance and learning styles. Balocnit's (2010, p. 45) student respondents learned "well" with the use of the identified learning styles in general. And then, Costales (2006 p.79) noted a significant difference in the academic performance of high and low performing groups when classified according to their learning styles.

Negative results were observed by the following researchers about the correlation done between learning styles and math/academic achievement: Alfonso (2005, p. 105) claimed that there were no significant relationships found among variables employed in the study regarding learning style, brain dominance, and academic achievement in Mathematics. Baldomero (2006, p.74) discovered that the High School Mathematics Achievement Test (HSMAT) had no significant relationship to learning style of the respondent. Only 54% of the respondents slightly improved their performance in Mathematics.

In Balocnit's (2010, p. 45) report. as to institution, it was revealed that the student respondents did not significantly differ on how well they learned using the identified learning styles. Madriaga's (2010, p.118) freshmen obtained a "Fair" academic performance in Filipino. Learning styles preferences showed low significant relationship to academic performance in Filipino. Furthermore, Medina (2006) noted that learning style was not a significant moderator variable. Students' different modalities did not significantly affect the effectiveness of the treatment in developing conceptual understanding and performance.

Study Habits

The following researchers obtained some similarities with their findings regarding the level and description of their subjects' study habits:

In Francisco's (2007, p. 52) research, the study habits of the respondents was interpreted as "Much". Monticado's (2006, p. 125) students had good study habits and had highly favorable attitude towards school. Results from Ola and Morakinyo (2010, p. 9) suggested that homework and assignments, examinations, and written work were significant study habit variables associated with Brain Fog Syndrome (BFS). Both of them were convinced that contributions of study habits to BFS pathogenesis must be taken into consideration because of the possible implications for intervention studies.

Finally, most of the students in both high and low performing groups of Costales (2006 p.79) seemed to enjoy doing and performing and willing to accept duties and responsibilities. They were found to be externally motivated and more concerned with completing their work.

On the other hand, the following researchers' respondents exhibited not so good study habits: Ines (2005, p.73) revealed that her respondents sometimes accomplished their homework and managed their time. Their low profile of study habits and attitudes had significant difference with their five most identified problems namely finances, living conditions and employment, curriculum and teaching procedure, morals and religion, health and physical development and personal-psychological relations. Rather, these seemed to show that their difficulty in understanding the curriculum and the procedures in teaching could be attributed to their expressed negative opinions about their teachers. But then, these five most identified

problems of the respondents had significant relationship with their five dominant traits such as being less intelligent, emotionally less stable, zestful, being a “joiner” and tough-minded.

Alvior's (2006, p.89) and Deasis (2009 p. 99) subjects manifested poor study habits as well. Deasis revealed that her respondents' in terms of delay avoidance, they were “poor” and in terms of work methods, they were “good”. Respondents were weak on promptness in completing academic assignments and procrastinated. They also had tendency for wasteful delay and distraction.

Regarding the correlation made between study habits and math/academic performance, the following researchers come up with positive findings: Costales (2006 p.79) found out that study habits have significant relationship with academic performance of the students. That they seemed to enjoy doing and performing and willing to accept duties and responsibilities. And they were found to be externally motivated and more concerned with completing their work.

[Credé](#) and [Kuncel](#) (2009 p.1) claimed that study habit, skill, and attitude inventories and constructs were found to rival standardized tests and previous grades as predictors of academic performance, yielding substantial incremental validity in predicting academic performance. They also discovered that study motivation and study skills exhibited the strongest relationships with both grade point average and grades in individual classes.

In addition, significant variation in the validity of specific inventories was shown. Scores on traditional study habit and attitude inventories were the most predictive of performance, whereas scores on inventories based on the popular depth-of-processing

perspective were shown to be least predictive of the examined criteria. Overall, study habit and skill measures improved prediction of academic performance more than any other non cognitive individual difference variable examined to date. And because of these findings, [Credé](#) and [Kuncel](#) concluded that study habits should be regarded as the third pillar of academic success.

Similarly, Bashir and Matto (2012, p.2) discovered that a highly significant relationship exists between the various dimensions of study habits and the academic achievement of the students.

A contrasting finding on Study Habits and Math/Academic Performance correlation was observed by Monticado (2006, p. 125). The first year college respondents had satisfactory performance in Mathematics. A no significant influence was found to exist on their Study Habits and Mathematics Performance.

Self-Efficacy

Some commonalities concerning the level and description of self-efficacy were noted by the following researchers:

Sese's (2006, p. 98) summary of findings revealed that majority of nursing student respondents had a high level of self-efficacy. In Magno and Lahom's (2009, p. 17) study, college students (late adolescence) scored higher in self-efficacy than high school students (early adolescence). Simpson (2008, p. 77) determined that some students already possessed relatively high self-efficacy and motivation and there were those who manifested an average level of self-efficacy and motivation. They showed the greatest gains, however this improvement was just temporary. Then, Ouano (2011, p.1) concluded that adolescent students have lower self-efficacy when they are in the higher

academic level, but more dramatically lower among those strongly endorsed performance goal orientation.

Furthermore, Simpson stated that his respondents' high self-efficacy were probably attributed to the additional or alternative program which provided them more beneficial self-determination opportunities for their needs. They were able to learn the material, embrace it, and report higher self-efficacy, motivation, and academic achievement. For those who showed an average level of self-efficacy and motivation, the learning styles strategy benefited them greatly.

As to Medina's (2006, p.90) research, no significant difference was found in the level of self-efficacy between the Hypothetico-Deductive Learning Cycle group (HDLC group) and the conventional group after the treatment even though the HDLC group had significantly higher levels of self-efficacy in certain items in the self-efficacy portion of the Self-Efficacy and Task Value Scale (SATVS). Then, the male and female students had no significant difference in Conceptual Understanding but had significant differences in Self-efficacy and Task Value.

Regarding the correlation of Self-efficacy and Math/Academic Performance, the following results were declared: A positive linear trend was found between the level of Self-efficacy of senior students and their achievements in Related Learning Experience (RLE) based on their gross weighted average by Sese (2006, p. 98). Zarch and Kadivar (2006, p. 82) found out that Mathematics Ability had a direct and an indirect effect (via Mathematics Self-efficacy) on Mathematics Performance. These findings in line with other works support the hypothesized role of self-efficacy in Bandura's 1986 Social Cognitive Theory.

In the same way, Medina (2006) noticed positive correlations that exist among Academic Achievement, Conceptual Understanding, Self-efficacy, and Task Value beliefs. Although, the male and female students were found to differ in the strength of the correlations among these variables.

Ferla, et al. (2009 p. 502) observed that students' Academic Self-concept strongly influenced their Academic Self-efficacy beliefs and vice versa. That Academic Self-concept is a better predictor (and mediator) for Affective–motivational variables, while Academic Self-efficacy is the better direct predictor (and mediator) for Academic Achievement. And then, Magno and Lajom (2009, p.17) revealed that the contribution of Self-efficacy on Performance Orientation was significantly moderated by high school and college students. High school students with high self-efficacy increase their performance orientation. Self-efficacy and self-regulation strategies such as self–consequencing, organizing, and environmental structuring were important characteristics of mastery-oriented students.

In the study conducted by Kang (2010, p. 81), respondents were classified into two groups. It showed that the two-part intervention led to high Self-efficacy Judgments and to better Math Performance compared to students with special needs who were randomly assigned into a delayed treatment control group. Then, Li (2012, p.173) found out that there was a positive relationship between academic self-efficacy and academic achievement.

Surprisingly, Gregorio (2009, p. 102) obtained opposite findings regarding the correlation between interpersonal relationships specifically, the mother and the father, as each one was related to adolescent self-efficacy and academic performance. The

outcomes were as follows: Moderate positive relationship was observed in the respondents in terms of relationships with their mothers and female peers and average relationships with the father, male peers and teachers. No support was found that interpersonal relationship with teacher correlates with self-efficacy and academic performance. (3) Mother interpersonal relationship was inversely correlated with academic performance, while father interpersonal relationship was found to be directly correlated with self-efficacy. Self-efficacy was likewise found to have no significant influence on academic performance.

Synthesis

The related literatures discussed above regarding learning styles, study habits, self-efficacy and academic performance are highly related to the current study. They establish foundational information and supplementary facts that are necessary for better understanding of these four concepts. Their findings regarding the relationship of learning styles, study habits, and self-efficacy with the mathematics performance provide solid background on the outcome of the present study.

With the exemption of the studies conducted by Alfonso (2005, p. 105) Baldomero (2006, p. 74) and Madriaga (2010, p.118) regarding learning styles, all of them concluded that learning styles have significant influence on the academic performance of the students. That a positive correlation exists between the respondents learning styles and their mathematics performance. Because of this, the researcher looks forward to discover which of the seven learning styles have significant relationship to pupils' mathematics performance.

The present study focuses on determining the individual learning style of the respondents, their overall learning style preference, and their most common learning style when grouped as high achievers, average achievers, and low achievers. These data will impart a better background of the learners not only for their math teacher but also for the other subject teachers, guidance counselors, and parents.

Except for the study conducted by Monticado (2006, p.125), findings discussed on previous pages regarding study habits and academic performance provide important insights on the necessity of instilling good study habits among the students from elementary up to college level. These made the researcher more enthusiastic to discover whether the present respondents have acquired good study habits or not, and how these relate to their overall mathematics performance.

Finally, all the researches on self-efficacy presented above, with the exemption of the study conducted by Gregorio (2007, p. 102), stressed the significant effect of self-efficacy to the academic performance of the respondents. This motivated the researcher to discover also the inner beliefs of the current respondents regarding the tasks related to mathematics and how these relate to their actual performance. And as the study progresses, the group of respondents possessing the highest level of self-efficacy and vice versa can also be determined.

Chapter III

METHODOLOGY

This chapter discusses the various elements of the research process appropriate to the investigation. It includes the research design used, the participants, the instruments, the data gathering procedure, and the statistical treatment used.

Research Design

The study employed the descriptive-survey and correlational methods to determine the learning styles, study habits, and math self-efficacy in relation to the mathematics performance of grades four and five pupils in Holy Spirit School Cubao, Quezon City.

According to Fraenkel (2007, p.12) descriptive survey method “involves asking the same set of questions to a large number of individuals either by mail, telephone or in person.” It is usually presented in the form of a written questionnaire or ability test. Responses are often in the form of frequencies or percentages of those who answer in a particular way to each of the items.

Fraenkel (2007, p.11) further explains that correlational method “is done to determine relationships between two or more variables”. It tries to examine the extent to which one or more relationships of the same type exist. For Mertler (2005, p. 298) relationship “means that an individual’s status on one variable tends to reflect his/her status on the other.”

Descriptive method was utilized for the reason that the primary concern of this research is the acquisition of factual, accurate and systematic data based from the natural occurring environment of the respondents. This study tries to describe the

collected data and the situations without considering their cause and effect. Survey method as one of the three basic types of descriptive methods was used as means of gathering data.

Correlational method was also adapted to look for the relationship of the three variables namely learning styles, study habits, and self-efficacy to the mathematics performance of the pupils. The three possible results of a correlation can be a positive correlation, a negative correlation, and no correlation.

Specifically, the research centered on learning styles, study habits, and self-efficacy of grades four and five high achievers, average achievers, and low achievers in relation to their mathematics performance. The findings served as the bases for the improvement of the present mathematics program with the end goal of enhancing the mathematics achievement of the grades four and five pupils, particularly in the National and International Achievement Tests.

Research Locale

The study was conducted in Holy Spirit School (HSS), situated at 29 Ilang-Ilang Road, Cubao, Quezon City. It is one link of the chain of educational institutions owned and operated by the Missionary Servants of the Holy Spirit (S.Sp.S.) all over the world. Moved by the spirituality and charism of its founder, St. Arnold Janssen, the school began in 1967. Built in a quiet subdivision and with tall trees and beautiful plants around, HSS has maintained a conducive learning environment within two 3-storey buildings.

In pursuit of quality and relevant basic education, the Holy Spirit School (Elementary Department) applied for preliminary survey by the Philippine Accreditation

Association of Schools, Colleges, and Universities (PAASCU) on January 20-21, 1994. The formal accreditation was held on November 27-28, 1995. The re-survey happened in January 1999, in January 2005, and in January 2010, Level II or a five-year accreditation status was granted to HSS. Last May 2010, the school was again granted another five-year accreditation by the said prestigious organization.

The researcher has been teaching in this school for 22 years now. She handles mathematics subject of grades 1-2 levels. She also assumes administrative work as Student Activity Program (SAP) coordinator of grades 1-6 and Junior Servant Leader (JSL) moderator. She decided to have the Holy Spirit School as venue for her investigation for three reasons – feasibility , accessibility, and commitment.

Under feasibility, seeking permission from the administration was uncomplicated. The researcher was able to ask the support of her co-teachers for follow up and gathering of data. And the most important thing was the assurance for greater cooperation from the pupils as respondents.

Accessibility includes availability of the classroom as venue for the actual utilization of the researcher's instruments. The other necessary documents were provided immediately by the offices of the guidance and registrar.

Lastly, commitment pertains to the researcher's aspiration of taking part in upholding the Vision-Mission-Goals of the Holy Spirit School of molding students afire with the spirit of excellence through a concrete plan of action based on the outcome of this research.

Respondents of the Study

The respondents are all female grades four and five pupils in Holy Spirit School, Cubao, Quezon City, school year 2011 - 2012. This institution used to be an exclusive school for girls. It started accepting male pupils since June 2007 and the first batch is still in grade 3. Grades 4-5 pupils were chosen as respondents to better aid them in improving their performance in mathematics, particularly in the National Achievement Test which will be administered when they reached grade six level.

The grade four level has 2 sections with thirty-six and thirty-eight pupils per class while the grade five level has 3 sections with thirty, thirty-one, and thirty-two pupils per class. There are seventy-four pupils (44.31%) in grade four level and 93 pupils (55.69 %) in grade five level with a total number of 167 pupils (100%).

The three classifications of intermediate pupils are displayed in Table 1.a.

Table 1.a
Profile of the Respondents in Terms of Math
Performance Level

Respondents	F	%
High Achievers	85	50.90
Average Achievers	63	37.72
Low Achievers	19	11.38
Total	167	100

The 167 respondents were classified according to their level of achievements. The math grade point average was used as basis. The three classifications are High Achievers (grade point average of 90 and above), Average Achievers (grade point average from 83-89), and Low Achievers (grade point average of 82 and below). This was based on the criteria set by the mathematics department of Holy Spirit School to meet the goal of raising the academic standard of the institution. The criteria are also

used in selecting the pupils who will be joining the Advanced Math Class and the Math Remedial Class. There are eighty-five pupils (50.90%) under High Achievers category which is already more than half of the entire number of respondents. Next to it is the Average Achievers category which is composed of 63 pupils (37.72%). And finally, the category which has the least number of pupils (19 or 11.38%) belongs to Low Achievers.

The age classification of the respondents is shown in table 1.b.

Table 1.b.
Profile of the Respondents in Terms of Age

Age	High Achievers	Average Achievers	Low Achievers			
	f	%	f	%	f	%
9 yrs. Old	3	3.53	3	4.76	2	10.53
10 yrs. Old	42	49.41	24	38.10	6	31.58
11 yrs. Old	37	43.53	27	42.86	7	36.84
12 yrs. Old	3	3.53	8	12.70	4	21.05
13 yrs. Old	0	0.00	1	1.58	0	0.00
Total	85	100	63	100	19	100

The ages of High Achievers are 9, 10, 11, and 12. Out of eighty-five pupils, 42 (49.41%) fall under 10 years old which is the majority of the participants, 37 (43.53%) are 11 years old and three pupils (3.53%) belong to 9 years old and 12 years old categories respectively.

The ages of Average Achievers are 9, 10, 11, 12, and 13. Most of them are under 11 years old group – 27 pupils (42.86%). Followed by 10 years old bracket which has 24 pupils (38.10%). Next to it is 12 years old group with eight pupils (12.70%). Then, three pupils (4.76%) are 9 years old and only one pupil (1.58%) is

already 13 years old.

With regards to Low Achievers, 7 pupils (36.84%) belong to 11 years of age. Next bracket has six pupils (31.58%). Followed by four pupils (21.05%) having the age of 12. And only two pupils (10.53%) are under 9 years of age.

Research Instruments

This study utilized three sets of standardized questionnaires – Memletics Learning Styles Questionnaire, Math Study Skills Self-Survey, and Mathematics Self-Efficacy Scale.

Memletics Learning Styles Questionnaire

The Memletics Learning Styles Questionnaire (MLSQ) (<http://www.learning-styles-online.com/inventory/questions.php?cookieset=y>) is a computerized survey questionnaire designed by a team headed by Sean Whitely (2011) the proponent of Memletics Learning Styles Theory. This theory emphasizes seven learning styles namely: Visual, Social, Physical, Aural, Verbal, Solitary, and Logical.

Permission was asked from the assistant principal of Colegio San Agustin, Makati to conduct Trial Run of the said inventory. It was administered to sixty grades four and five pupils. The data were analyzed to determine the reliability using Cronbach's alpha method. The result of $\alpha = 0.83$ showed that the test has good reliability based on the standard categorization presented by Zaiontz (2013, p.3).

α	Indication
between .95 or higher	very high reliability
between .80 to .94	good reliability
between .60 to .79	acceptable reliability
between .59 and below	low reliability

Kia, Aliapour, and Ghaderi (2009, p. 5) and Moenikia and Babelan (2010, p. 7) utilized this instrument as well with their respondents and both obtained similar result of $\alpha = 0.81$.

This online learning styles inventory has 70 questions. The respondent is asked to rate her answers as follows:

0 – the statement is nothing like me

1 – the statement is partially like me

2 – the statement is very much like me

After accomplishing the form, the results automatically appear. The score for each learning style is presented accompanied by a graph. The scores are out of 20 for each style. A score of 20 signifies that the style is frequently utilized.

Math Study Skills Self-Survey

The Math Study Skills Self-Survey (MSSS) is also an online questionnaire originally designed by Dr. Carolyn Hopper, professor of Developmental Studies at Middle Tennessee State University, in the text "[Practicing College Study Skills](#)". It is being promoted by Purple Math (<http://www.purplemath.com/stdysrvy.htm>), a copyrighted property of Elizabeth Stapel (2012). Aside from the website of Purple Math, there are also around five websites (http://docsfiles.com/pdf_math_study_skills_inven-tory.html; http://www.smith.edu/qlcMath%20Study%20Skills%20Inven_tory.pdf; et al. that utilize this instrument which provide assurance of its usefulness.

In the e-mail of Dr. Hopper (See Appendix A, p. 77) to the researcher, she explained that the inventory has not been tested for reliability because her purpose is to use it only as learning strategy to make students aware of study habits they should

be using. But since there is no existing standardized instrument yet on study habits that focuses solely on mathematics study skills, the researcher decided to adapt it. But before utilizing the questionnaire formally, it underwent face validation and reliability testing.

Permission was also sought from the assistant principal of Colegio San Agustin in Makati, to conduct Trial Run and Face Validation of the said inventory. It was administered to sixty grades four and five pupils. Afterwards, some pupils and teachers were encouraged to give comments pertaining to the questionnaire in general.

The teachers and trial respondents' view on the logical sequence of the questions, possible changes in the terms used to enhance clarity of idea and alleviate ambiguity, information needed to be included or excluded, and other essential comments were noted. Then, through an e-mail (See Appendix B, p.78) from Dr. Hopper, the researcher was granted permission to do some modifications.

The data gathered were used to test the reliability of the instrument using Cronbach's alpha method. It yielded a result of $\alpha = 0.87$, indicating that the questionnaire has good reliability based on the standard categorization presented by Zaiontz (2013, p.3).

Based from the comments and feedbacks from the trial run, modifications were made to some terminologies. The result of the reliability test and the final draft of the questionnaire were forwarded to her advisers for approval.

Originally, the survey has thirty-three statements divided into five categories namely: Selecting a Math Class, Time and Place for Studying, Study Strategies for the Class, Math Tests, and Anxiety.

Since section 1: Selecting a Math Class is not applicable for the respondents because they are not allowed yet to choose the schedule and teacher for the math subject, the researcher excluded this portion. For this reason, the researcher could not use anymore the computerized scoring and did the manual scoring instead.

The remaining four sections were renamed as follows: Section 2: Time and Place for Reviewing/Doing Homework, Section 3: Strategies in Studying Lessons in School/Home, Section 4: Techniques in Taking Math Test, and Section 5: Ways in Handling Math Worries.

The pupil is tasked to rate her response that is closest to her current practices and attitudes as follows:

0 - never even thought about doing it

1 - almost never

2 - sometimes

3 - almost always

Scoring :

71 – 84 Very Good Math Study Skills

57 – 70 Good Math Study Skills

43 – 56 Average Math Study Skills

42 and below Below Average Math Study Skills

Mathematics Self-Efficacy Scales

The third questionnaire is the Mathematics Self-Efficacy Scales (MSES), a standardized test, constructed by Dr. Nancy Betz and Dr. Gail Hackett and distributed by Mind Garden, Inc. (2009). It underwent content validity through a detailed and

comprehensive specification of the domain of interest. Concurrent validity was based on statistically significant correlations between MSES scores and other measures of attitudes towards mathematics which were as follows: math anxiety ($r=.56$), confidence in doing math ($r=.66$), perceived usefulness of math ($r=.47$), and others. Its internal consistency reliability values (coefficient alpha) was .92 for the Math Tasks.

MSES is composed of two parts namely: Part 1: Everyday Math Tasks and Part 2: Math Courses. The researcher decided to disregard the second part of the questionnaire because the content is about college courses which are not applicable to the respondents. Some terminologies under Part 1 were modified to suit the level of understanding of the respondents upon consultation from their present math teacher.

The pupil is instructed to denote how much confidence she has that she could successfully accomplish each Math task based on the following 10-point confidence

scale:	0	No Confidence at all
	1 - 3	Very Little Confidence
	4 - 5	Some Confidence
	6 – 7	Much Confidence
	8 – 9	Complete Confidence

The average score is obtained by computing the total response numbers given to each of the 18 items in the scale and dividing that sum by 18.

The three survey questionnaires are divided into four parts:

Part I: Demographic Profile of the Respondents

The following personal information were obtained from the pupils:

- a. math GPA

b. age

Part II: Memletics Learning Styles Questionnaire

The content of the items assisted in identifying the preferred learning style of pupils whether Visual, Social, Physical, Aural, Verbal, Solitary, and Logical.

Part III: Math Study Skills Self Survey

The content of the items aided in determining the study habits of grades 4-5 pupils in terms of Time and Place for Study, Study Strategies for the Class, Math Tests, and Anxiety.

Part IV: Mathematics Self-Efficacy Scale

The content of the items helped out in revealing the personal belief of grades 4-5 pupils regarding their capability of accomplishing math-related tasks.

Data Gathering Procedure

The researcher sought the permission from Sr. Florencia Tubaña, the principal of Holy Spirit School, Ilang-Ilang, Cubao, Quezon City for the actual testing of the questionnaires regarding Learning Styles, Study Habits, and Math Self-Efficacy in relation to Mathematics Performance of grades 4-5 pupils, school year 2011-2012.

During the actual survey which took place last March 18-20, 2012, the researcher explained briefly the objectives of the investigation and the instruction indicated in the three questionnaires as means of establishing rapport. The participants were assured of the anonymity and confidentiality of their responses. Copies of the form were distributed. The retrieval of the forms were done right after accomplishing them through the help of the advisers.

The questionnaires intended for the pupils who were not around on the scheduled dates were administered to them as soon as they arrived.

Responses were recorded, classified, tallied, tabulated, and presented in tabular and graphical forms.

Data Analysis Procedure

According to Mertler (2005, p. 348) the term statistics has two meanings. The first one is “ it refers to summary statements resulting from data analysis, such as mean, median, and coefficient of correlation.” While the second one is , “ it refers to the procedures by which data are analyzed mathematically.” Both definitions of statistics are essential in this study.

Before arriving at the conclusions and recommendations, the data gathered were treated statistically. Shown below are the statistical treatment or a set of formulas to which the data gathered were subjected.

1. Frequency to determine the occurrence of data.
2. Percentage to identify frequency of respondent's answer.
3. Ranking – arranging of frequency from highest to lowest or from the most down to least preferred.
4. Pearson Product Moment Correlation – to determine the relationships of the given variables.

Furthermore, the results from the Pearson r coefficient of correlation were interpreted based on the standard categorization presented by Sevilla (1992, p. 280).

r	Indication
between .80 to 1.00	high correlation
between .60 to .79	moderately high correlation
between .40 to .59	moderate correlation
between .20 to .39	low correlation
between .01 to .19	negligible correlation

5. Statistical graph – bar graph

Chapter IV

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the results, analyses, and interpretation of data regarding the respondents' learning styles, study habits, and self-efficacy in relation to their mathematics performance. The data gathered are presented in tabular form with the aid of statistical treatment for analysis and interpretation purposes.

1. Learning Styles of the Intermediate Pupils

The learning styles of the 167 respondents are displayed in Table 2.a.

Table 2.a
Description of Learning Styles of
Intermediate Pupils

Learning Styles	f	%
Aural Style	64	38.32
Social Style	43	25.25
Visual Style	30	17.96
Verbal Style	12	7.19
Physical Style	8	4.79
Logical Style	6	3.59
Solitary Style	4	2.40
Total	167	100

The maximum score obtained by each pupil in the seven Memletics learning styles is considered as the criterion for the preferred prominent learning style. It can be seen that most of the learners prefer to use Aural Style (64 pupils or 38.32%). Followed by the Social Style with forty-three pupils (25.75%). Third in rank is the Visual Style with thirty children (17.96%). Fourth in the order is Verbal Style with twelve girls (7.19%). The fifth one is the Physical Style with eight students (4.79%). Logical Style ranks sixth with six children (3.59%). Then, Solitary Style is considered

the least favored with only 4 respondents (2.40%).

Based on the data presented, it seems that Aural Style is the most preferred learning style of the intermediate pupils. It appears that they learn better when they listen to sound or music. They tend to be fond of speaking out loud, talking to themselves, and listening to themselves talk. The second mostly used is the Social Style while the opposite of it, the Solitary Style, is the least preferred one. It seems that these pupils find studying in a group very beneficial. They have the tendency to enjoy games or tasks that involve other people. And, only a handful of them prefer to work alone and use self-study. These preference for Aural and Social Styles of the intermediate pupils is probably due to the fact that they are still very young and dependent of their parents.

Logical Style which pertains to the use of one's brain for logical and mathematical reasoning is second to the least preferred learning style. It seems that most of the respondents have not utilized often the skills in recognizing patterns, classifying information, and doing computations. These skills are indeed necessary in accomplishing math-related tasks.

The above results conform with some of the findings of Kia et al. (2009, p.10) and Moenikia and Babelan (2010, p.3). They also found out that their female subjects' most preferred learning style is Aural. Visual Style ranks third also in Kia's study. Logical Style and Solitary Style rank sixth and seventh also in Moenikia's research. However, Social Style, which ranks second in the researcher's study, ranks third in Moenikia's work. And then, the least preferred learning style in Kia's study.

Study Habits of the Intermediate Pupils

The study habits of the intermediate learners are depicted in table 2.b.

Table 2.b
Description of the Study Habits of Intermediate Pupils

Category of Math	f	%	Rank
Study Skills			
Very Good	15	8.98	3
Good	83	49.70	1
Average	55	32.93	2
Below Average	14	8.39	4
Total	167	100	

Most of the learners have Good study habits, 83 out of 167 (49.70%). Followed by fifty-five pupils (32.93%) who are considered having Average study habits. Then, fifteen girls (8.98%) are practicing Very Good study habits while 14 (8.39%) of them fall under Below Average.

Based on the given data, the general category of the respondents' study habit is Good. It looks like that they are using well the math study skills regarding time and place for studying, study strategies in the classroom and at home, techniques in taking the math test, and ways in combating math anxiety. However, only fifteen pupils (8.98%) out of 167 are practicing Very Good study habits. They are most likely using almost all the study skills needed to become more successful in math.

There are fourteen girls (8.39%) whose study habits are considered poor or Below Average. It seems that they spend less time in utilizing the study skills regarding time and place for studying, study strategies in the classroom and at home, techniques in taking

the math test, and means in preventing math anxiety. Furthermore, they might be having a difficult time in their math class.

Monticado (2006, p.125) obtained similar finding about the respondents' overall study habits discussed above. Her subjects have Good study habits and have highly favorable attitude towards school. Whereas Alvior (2006, p. 89) and Deasis (2009, p. 99) discovered that their respondents have Poor study habits.

Math Self-Efficacy of the Intermediate Pupils

The math self-efficacy of the learners is presented in Table 2.c.

Table 2.c
Description of the Math Self-Efficacy of Intermediate Pupils

Category of Math Self-Efficacy	f	%	Rank
Complete Confidence	40	23.95	3
Much Confidence	76	45.51	1
Some Confidence	48	28.74	2
Very Little Confidence	3	1.80	4
Total	167	100	

Majority of the respondents express Much Confidence level (76 or 45.51%) ranging from 6.0 to 7.0 averages. Followed by, forty-eight pupils (28.74%) who possess Some Confidence, 4.0 to 5.0 averages. Then, forty girls (23.95%) declare that they have Complete Confidence, 8.0 to 9.0 averages. And only three learners (1.80%) have Very Little Confidence, 1.0 to 3.0 averages.

Based on the data presented, the overall level of self-efficacy of the respondents is Much Confidence. Next to it is Some Confidence. These are indicators of the respondents' positive outlook with their ability to perform math-related tasks. A

good number of students also show Complete Confidence, 40 pupils out of 167. Possessing very high confidence seems to move them to exhaust more effort to complete the task successfully. And there are only three girls whose self-efficacy are considered poor or have Very Little Confidence. Most likely, they are having difficult time in math class.

Barker (2010, p.20) used also the Mathematics Self-Efficacy Scales (MSS). Since his respondents were college students, he utilized both Part 1 (Math Tasks) and Part 2 (College Courses). But it also came out that the overall level of self-efficacy of his respondents for math-related tasks is Much Confidence.

2. Learning Styles of the Pupils When Classified According to High Achievers, Average Achievers, and Low Achievers

The learning styles of the three classifications of learners are shown in Table 3.a.

Table 3.a
Description of Respondents' Learning Styles When Grouped According to Achievement

Learn ing Styles	High Achie vers			Avera ge Achie vers			Low Achie vers		
	f	%	Rank	f	%	Rank	f	%	Rank
Aural	31	36.47	1	25	39.68	1	8	42.11	1
Social	21	24.71	2	18	28.57	2	4	21.05	2
Visual	16	18.82	3	11	17.46	3	3	15.79	3.5
Verbal	9	10.59	4	2	3.18	6	1	5.26	5
Logical	5	5.88	5	1	1.59	7	0	0.00	6.5
Physical	2	2.35	6	3	4.76	4.5	3	15.79	3.5
Solitary	1	1.18	7	3	4.76	4.5	0	0.00	6.5
Total	85	100		63	100		19	100	

Out of eighty-five pupils, 31 (36.47%) prefer Aural or Auditory Style which is the majority of the participants. Next, twenty-one girls (24.71%) favor the use of Social Style. Sixteen learners (18.82%) like Visual Style. Nine girls (10.59%) utilize Verbal Style. When it comes to Logical Style, five children (5.88%) are using them. Then, only two pupils (2.35%) and a child (1.18%) favor the Physical and Solitary Styles respectively.

Just like High Achievers, most of the Average Achievers are at home with Aural Style— 25 pupils (39.68%). Followed by Social Style which has 18 pupils (28.57%). Eleven pupils (17.46%) make use of Visual Style. Both Physical and Solitary Styles rank fourth for having three children (4.76%) in each of them who are in favor of these learning styles. Second to the last is the Verbal Style with only two girls (3.18%). And the least preferred is the Logical Style with one pupil only (1.59%).

With regards to Low Achievers, majority of them are also accustomed to Aural Style, eight pupils (42.11%). Next is the Social Style with four pupils (21.05%). Both Visual and Physical Styles rank third for having three children (15.79%) in each of them. Only one pupil (5.26%) prefers Verbal Style. And then, no one utilizes Logical and Solitary as learning styles.

From the given data, it appears that the most preferred learning style of the High Achievers, Average Achievers, and Low Achievers is the Aural Style. These pupils seem to grasp the lesson better when music is being played or when they hear sounds. They tend to remember information accurately when instructions are given verbally.

The second learning style that the three groups of respondents utilize more often is the Social Style. It appears that they prefer to learn or do a task with the

presence of other people like teacher, parent, tutor, classmate(s), or friend(s). The third useful learning style for the three groups of respondents is the Visual Style. These pupils have the tendency also to take information through sight and like to learn through reading, diagrams, charts, graphs, maps, and pictures.

The least preferred learning style of the High Achievers is the Solitary Style. For the Average Achievers is the Logical Style and for the Low Achievers, both Logical and Solitary Styles. Logical Style may not be the least preferred one for the High Achievers but it ranks fifth to the last. It seems that many of them have difficulty absorbing concepts that involve logic, reasoning and system, more so if they are left on their own.

In comparison with the study conducted by Abidin, et al. (2010, p. 148) some commonalities and differences are noted. Their respondents were also categorized as High Achievers, Average (Moderate) Achievers, and Low Achievers. Aural (Auditory) Style is also their most preferred learning style. Only High Achievers declare Social (Group) Style as the second useful learning style not like in the researcher's respondents. Visual Style ranks second while in the researcher's respondents, it ranks third. Solitary (Individual) Style ranks the least preferred one in all groups of learners unlike in the researcher's study, only High Achievers and Low Achievers consider it as the least. Furthermore, most of their subjects possess multiple learning styles or a combination of different learning styles in contrast again with the researcher's respondents.

Study Habits of Pupils When Classified According to High Achievers, Average Achievers, and Low Achievers

The study habits of the three classifications of pupils are displayed in Table 3.b.

Table 3.b
Description of Respondents' Study Habits When Grouped According to Achievement

Category of Math Study Skills	High Achievers		Average Achievers			Low Achievers			
	f	%	Rank	f	%	Rank	f	%	Rank
Very Good	15	17.65	2	0	0.00	4	0	0.00	4
Good	55	64.71	1	27	42.86	2	1	5.26	3
Average	13	15.29	3	28	44.44	1	14	73.69	1
Below Ave.	2	2.35	4	8	12.70	3	4	21.05	2
Total	85	100		63	100		19	100	

Majority of the High Achievers have Good study habits with a total of fifty-five respondents (64.71%) out of 85. Followed by Very Good with fifteen children (17.65%). Thirteen girls (15.29%) have Average study habits and there are two pupils (2.35%) who have Below Average study habits.

Most of the Average Achievers practice Average study habits, 28 (44.44%) out of 63. It has only a point gap to the next level which is Good with twenty-seven respondents (42.86%). There are eight girls (12.70%) whose study habits are Below Average and no one exhibits Very Good study habits.

With regards to Low Achievers, most of them have Average study habits, fourteen pupils (73.69%) out of 19. Four pupils (21.05%) fall under Below Average study habits. Only one pupil (5.26%) shows Good study habits and then no one is practicing Very Good study habits.

The above results indicate that the High Achievers have Good math study habits. Most likely, they are utilizing the math study skills well especially those that pertain to time and place for reviewing, study strategies in and out of the classroom, techniques in taking the math examination, and approaches to resist math anxiety. The Average and Low Achievers are exhibiting Average study habits. It seems that although they use most of the math study skills regularly, they have not put much effort to enhance the intensity of the way they utilize them.

Out of 85, only fifteen pupils from High Achievers have reached the Very Good level of study habits and then none from Average and Low Achievers. They are most probably utilizing well the math study skills and are doing better in accomplishing math tasks.

The findings above are related to the study conducted by Sarwar, et al. (2009, p. 207). Their respondents were classified only into two categories – High and Low Achievers. Nevertheless, similar results were obtained. High Achievers have also better study habits as compared to low achievers. They are more effortful and vigorous in accomplishing the study skills regarding time table (time and place for studying), revise daily what they learn in the class (study strategies) and are usually not nervous during the exam (techniques in taking the math test) compared to Low Achievers.

Math Self-Efficacy of the Pupils When Classified According to High Achievers, Average Achievers, and Low Achievers

The math self-efficacy of the three classifications of learners are shown in table 3.c.

Table 3.c
Description of Respondents' Math Self-Efficacy When Grouped According to Achievement

Category of Math Self-Efficacy	High Achievers		Average Achievers			Low Achievers			
	f	%	Rank	f	%	Rank	f	%	Rank
Complete Confidence	33	38.83	2	7	11.12	3	0	0.00	4.5
Much Confidence	44	51.76	1	28	44.44	1.5	4	21.05	2
Some Confidence	8	9.41	3	28	44.44	1.5	12	63.16	1
Very Little Confidence	0	0.00	4.5	0	0.00	4.5	3	15.79	3
No Confidence	0	0.00	4.5	0	0.00	4.5	0	0.00	4.5
Total	85	100		63	100		19	100	

More than half of the High Achievers gain Much Confidence with a total of forty- four respondents (51.76%) out of 85. Followed by Complete Confidence level (33 or 38.83%). Some Confidence ranks third with eight children (9.41%). And then, no one expresses Very Little Confidence and No Confidence.

When it comes to Average Achievers, majority of the respondents are categorized under Much Confidence and Some Confidence levels. Each of these two groups garners 28 (44.44%) respondents. Seven pupils (11.12%) express Complete Confidence. And then, no one conveys Very Little Confidence and No Confidence.

Regarding Low Achievers, out of nineteen respondents, 12 (63.16%) profess that they have Some Confidence. Four pupils (21.05%) believe that they have Much Confidence. Three of them (15.79%) feel that they have Very Little Confidence. And then, no one admits having Complete Confidence and No Confidence.

The above findings imply that generally, High Achievers have acquired Much Confidence with their math self- efficacy. It seems that their very high spirit lead them in accomplishing the math activities competently and obtaining high grades as well. The Average Achievers fall under two levels of self-efficacy, Much Confidence and Some Confidence. Most probably, they also have high regard for their capacity to do a particular task. And the Low Achievers' overall self-efficacy is Some Confidence. Most likely, their positive viewpoint enables many of them to strive in spite of the difficulty they experience while working.

The findings of Jahangard and Zandieh (2010, p.75) affirm the results mentioned above even if the focus of their study was writing self-efficacy and not on math self-efficacy. The results of the two-way ANOVAs suggested that High Achievers' writing self beliefs are significantly higher than Low Achievers. In the researcher's study, the High Achievers show high level of confidence (Much Confidence) than Low Achievers (Some Confidence only).

3. Relationship of Learning Styles, Study Habits, and Self- Efficacy to Mathematics Performance

Learning Styles in Relation to Mathematics Performance

The relationship of learning styles to math performance is demonstrated in table 4.

Table 4
Description of Respondents' Learning Styles in Relation to Mathematics Performance

Variables	Pearson r	Interpretation
Solitary and Math Performance	0.20	Low Correlation
Physical and Math Performance	0.20	Low Correlation
Visual and Math Performance	0.21	Low Correlation
Social and Math Performance	0.24	Low Correlation
Verbal and Math Performance	0.27	Low Correlation
Aural and Math Performance	0.28	Low Correlation
Logical and Math Performance	0.54	Moderate Correlation

Logical Style when correlated with Math Performance shows moderate correlation ($r = 0.54$). Pupils who scored high with Logical Style were the ones who got high grade point average (GPA) in math and vice versa.

Sean Whiteley (in Ing 2012, p.1) synthesized the Memletics Learning Styles from the brain model: [Multiple Intelligences](#) of [Howard Gardner](#). Logical Style seems to be the most needed learning style in enhancing the logical-mathematical intelligence. Furthermore, the moderate correlation result between Logical Style and Math Performance seems to imply that the former one is related to the learners' performance. This finding suggests that students with Logical Style preference demonstrate good performance in their math endeavors.

The rest of the learning styles when correlated with math performance fall under low correlation. Both Solitary and Physical Styles when correlated with Math Performance obtain the lowest correlation ($r = 0.20$). But looking closely at the gaps in between, from Solitary Style to Aural style, results suggest that they show slight difference. Scores gained from these learning styles did not create much impact with the math grade point average (GPA) of the learners. It appears then that Solitary Style, Physical Style, Visual Style, Social Style, Verbal Style, and Aural Style are not related to Mathematics Performance of the pupils.

The findings cited above are affirmed by: Madriaga (2010, p.118) who found out that learning styles preferences of her subjects showed low significant relationship to academic performance in Filipino. Likewise, studies done by Alfonso (2005, p. 105), Medina (2006, p.90), and Baldomero (2006, p.74) revealed that learning styles preferences of their respondents had no significant relationship with academic achievement in mathematics.

Study Habits in Relation to Mathematics Performance

Study Habits when correlated with the Mathematics Performance of the respondents results to moderately high correlation ($r = 0.60$). Pupils who got high scores with their study habits were the ones who got high grade point average (GPA) in math and the other way around. It appears then that Study Habits are highly related to Mathematics Performance of the learners.

The findings discussed above are further confirmed by the following investigations: In the study done by Hussain (2006, p. 41), study habits resulted in

improvement in the respondents' academic achievement particularly in mathematics. While [Credé](#) et al. (2009 p.1) claimed that study habits exhibit the strongest relationships with both grade point average and grades in individual classes. Both of them concluded that study habits affect students' achievement.

Self-Efficacy in Relation to Mathematics Performance

Self-Efficacy when correlated with the Math Performance of the respondents generates moderately high correlation ($r = 0.62$). This correlation suggests that pupils who are confident with their abilities tend to complete the math-related tasks successfully. Pupils who got high scores with their self-efficacy were the ones who got high grade point average (GPA) in math and vice versa. It appears that self-efficacy is an important factor in the mathematics performance of the pupils.

Chapter V

SUMMARY, CONCLUSIONS AND RECOMMENDATION

This chapter presents the general summary of results and findings, conclusions drawn from the results and the recommendations based from the conclusions.

The main purpose of the study is to find out the relationship of learning styles, study habits, and self-efficacy to the mathematics performance of grades four and five pupil respondents. The specific objectives are to determine the learners' learning styles, study habits, and self-efficacy as a whole group and as classified into three levels namely, high achievers, average achievers, and low achievers. The findings are used as bases to aid in improving the performance of the pupils specifically in mathematics subject.

The descriptive-survey and correlational methods were employed in the development of the investigation. The data gathered were treated statistically using frequency count, percentage, ranking, and Pearson product moment correlation. Adherence to objectivity was observed.

Based on the analysis and interpretation of data gathered, the following findings are hereby summarized:

1. Learning Styles, Study Habits, and Self-efficacy of the Intermediate Pupils

With regards to the respondents' overall learning styles, most of the learners prefer to use Aural Style, 64 out of 167 (38.32%). Followed by the Social Style with forty-three pupils (25.75%). Third is the Visual Style with thirty children (17.96%). Fourth in the order is Verbal Style with twelve girls (7.19%). The fifth one is the Physical Style with

eight students (4.79%). Logical Style ranks sixth with six children (3.59%). Then, Solitary Style is considered the least favored with only 4 respondents (2.40%).

In terms of the children's study habits, majority of the respondents have Good study habits which is 83 out of 167 (49.70%). Followed by fifty-five pupils (32.93%) who are considered having Average study habits . Then, fifteen girls (8.98%) are practicing Very Good study habits while 14 (8.39%) of them fall under Below Average study habits.

Concerning the pupils' overall math self-efficacy, most of them express Much Confidence level (76 or 45.51%) ranging from 6.0 to 7.0 averages. Next, forty-eight pupils (28.74%) possess Some Confidence, 4.0 to 5.0 averages. Then, forty girls (23.95%) declare that they have Complete Confidence, 8.0 to 9.0 averages. And only three learners (1.80%) have Very Little Confidence, 1.0 to 3.0 averages.

2. Learning Styles, Study Habits, and Self-efficacy of the Respondents Under Three Classifications

When it comes to the learning styles of the respondents grouped according to their level of math performance, the High Achievers prefer Aural or Auditory Style which is the majority of the participants. Followed by twenty-one girls (24.71%) who are in favor of Social Style. Sixteen learners (18.82%) like Visual Style. Nine girls (10.59%) utilize Verbal Style. When it comes to Logical Style, five children (5.88%) are using them. Then, only two pupils (2.35%) and a child (1.18%) favor the Physical and Solitary Styles respectively.

Most of the Average Achievers are also at home with Aural Style – 25 pupils (39.68%), followed by Social Style which has 18 pupils (28.57%). Eleven pupils

(17.46%) make use of Visual Style. Both Physical and Solitary Styles rank fourth for having three children (4.76%) each. Second to the last is the Verbal Style with only two girls (3.18%). And the least preferred is the Logical Style with one pupil only (1.59%).

Just like High and Average Achievers, majority of the Low Achievers are also accustomed to Aural Style, 8 out of 19 (42.11%). Followed by the Social Style with four pupils (21.05%). Both Visual and Physical Styles rank third for having three children (15.79%) who are in favor of these learning styles. Only one pupil (5.26%) prefers Verbal Style. Then, no one utilizes Solitary and Logical as learning styles.

Regarding the study habits of the respondents' categorized into three groups, most of the High Achievers have Good study habits with a total of fifty-five respondents (64.71%) out of 85, followed by Very Good with fifteen children (17.65%). Thirteen girls (15.29%) have Average study habits and there are two pupils (2.35%) who have Below Average study habits.

Most of the Average Achievers practice Average study habits, 28 (44.44%) out of 63. It has only a point gap to the next level which is Good with twenty-seven respondents (42.86%). There are eight girls (12.70%) whose study habits are Below Average and no one exhibits Very Good study habits.

With regards to Low Achievers' study habits, majority of them have Average study habits. Fourteen pupils (73.69%) out of 19. Four pupils (21.05%) fall under Below Average study habits. Only one pupil (5.26%) shows Good study habits and then no one is practicing Very Good study habits.

As to the self-efficacy of the respondents classified according to their level of math performance, more than half of the High Achievers gain Much Confidence with a total of forty-four respondents (51.76%) out of 85. Followed by Complete Confidence level with thirty-three children (38.83%). Some Confidence ranks third with eight pupils (9.41%). And then, no one expresses Very Little Confidence and No Confidence.

When it comes to Average Achievers, majority of the respondents are categorized under Much Confidence and Some Confidence levels. Each of these two groups garners 28 learners (44.44%). Seven pupils (11.12%) express Complete Confidence. And then, no one discloses having Very Little Confidence and No Confidence.

Regarding Low Achievers, twelve of them (63.16%) profess that they have Some Confidence. Four pupils (21.05%) believe that they have Much Confidence. Three of them (15.79%) feel that they have Very Little Confidence. %). And then, no one admits having Complete Confidence and No Confidence.

3. Relationship of Learning Styles, Study Habits, and Self- Efficacy to Mathe-matics Performance

Concerning Learning Styles and Math Performance, among the seven Memletics learning styles, only Logical Style when correlated with the Mathematics Performance results to moderate correlation ($r = 0.54$). The rest of the learning styles, namely, Solitary, Physical, Visual, Social, Verbal, and Aural when correlated with math performance fall under low correlation. Both Solitary and Physical Styles when correlated with Math Performance obtain the lowest correlation ($r = 0.20$).

In terms of the relationship of Math Study Habits with Math Performance, result shows moderately high correlation ($r = 0.60$).

When it comes to the relationship of Math Self-Efficacy with Math Performance, result yields moderately high correlation ($r = 0.62$).

Conclusions

From the foregoing findings, the following conclusions are drawn:

1. The analysis of the data reveals a similar preference for Aural Style whether the respondents are categorized into three levels or not. Next to it is the Social Style. It appears that they grasp the lesson better when music is being played, when they hear the information and when they study in a group or with somebody. Subsequently, no one from them exhibits multiple learning styles or a combination of the different learning styles.
2. Good study habits are being practiced by most of the respondents in general and by the High Achievers when classified into three groups. Most likely, they are utilizing the math study skills well. Then, Average and Low Achievers have typical or average study habits. It seems that although they use most of the math study habits dimensions regularly, they have not put much effort in enhancing the intensity of the way they utilize them.
3. As a whole, majority of the respondents have high level of self-efficacy but when classified into three groups, their level of confidence vary as well. High Achievers and only half of Average Achievers have high level of self-efficacy while the other half of the Average Achievers and Low Achievers have moderate level of self-

efficacy. Nevertheless, these are indicators of the respondents' positive outlook with their ability to perform math-related tasks.

4. The Pearson correlation reflects a significant relationship between Logical Learning Styles and Math Performance. On the other hand, the remaining six types of learning styles obtain insignificant relation to Math Performance. These signify that pupils who utilize Logical Style more often demonstrate good performance in their math endeavors, in contrast with those who prefer to use Aural, Social, Visual, Verbal, Physical and Solitary Styles.

Highly significant relationship exists between Study Habits and Math Performance. Students with very good and good levels of study habits are likely to succeed in math-related tasks. Conversely, those who practice average and below average study habits obtain low achievement in math activities.

Likewise, a high positive relationship is noted regarding Self-Efficacy and Math Performance. It was found that when pupils possess high math self-efficacy, they are more likely to exhibit an increase in knowledge and confidence in dealing with math subject. They tend to be ready to confront and solve any problem that comes their way. Whereas students with low mathematics self-efficacy have a tendency to distance themselves from engaging in solving problems they perceive as difficult which lead to poor achievement in mathematics.

Recommendations

In view of the findings and conclusions, the following recommendations are hereby offered by the researcher:

1. The identification of each student's learning style may empower the teacher

and the student to take active control of the learning environment. Aural, being the most preferred learning style of the learners, may be taken into consideration by the teacher while giving instruction. Music can be applied for better understanding and retention of math concepts and skills. Auditory learners may use word association, record lectures and study notes, listen to videos, and conduct group discussions.

2. Logical Style is one of the least utilized learning style, yet appeared to be the most essential among the seven Memletics learning styles for better mathematics performance. Awareness of this finding, may guide the educators in the selection of appropriate instructional methods, activities, tools and materials that will nurture and strengthen this learning style. The use of step-by-step and chronological approaches may help absorbed mathematical concepts easily. At the same time, learners may create outlines to help process and retain new information.

3. In view of the fact that logical learning style, study habits, and self-efficacy significantly relate to math performance, educators may formulate a more effective instructional program to enhance them in order to promote high academic achievement and better performance in national and international tests. They are also encouraged to be more sensitive to students who are underachievers due to apprehension to utilize logical style, poor study habits, and low self-efficacy.

4. Guidance counselors may provide an updated record of the pupils' learning style preference, study habits, and self-efficacy so they can better assist the learners and at the same time inform their teachers, parents/guardians regarding these factors which are attributed to successful learning.

5. A follow-up assessment on learning styles, study habits, and self-efficacy of the pupils may be administered also as a sort of check-up to note some improvements and to determine if assistance is still necessary.

6. Curriculum planners, school administrators, and subject area coordinators may consider learning styles, study habits, and self-efficacy in planning, evaluating, and revising the existing instructional program. They are encouraged to work in cooperation with teachers, parents, and students for greater assurance of academic improvement.

7. A seminar workshop concerning learning styles, study habits, and self-efficacy may be conducted as part of school development program to make the teachers, parents, and pupils aware of these concepts as contributing factors to successful teaching, learning, and academic performance.

8. Future researchers are challenged to conduct similar studies not only in Mathematics but also in other subjects like English, Science, or MAPE and to other grade levels as well to validate or negate the findings of this study. Aural Style, which seems to be the preferred learning style of the present generation, may be considered also in coming up with a study regarding its relationship to other factors such as age, sex, motivation, e-learning environment, and teaching style.

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Appendices

Appendix A

Request Letter for Approval of the Utilization of Math Study Skills Self-Survey and Its Validity and Reliability Documentation

From: Gemma Teope [gemmateope@yahoo.com]

Sent: Thursday, February 25, 2012 10:29 PM

To: Carolyn Hopper

Subject: Request for validity and reliability of Math Study Skills Inventory Test

Dear Dr. Carolyn Hopper,

Warm Greetings!

I'm a graduate student at Philippine Normal University, taking up Master of Arts in Education with specialization in Child Study. I'm presently working on my thesis entitled "Relationship of Learning Styles, Study Habits, and Self-Efficacy to the Mathematics Performance of Grades 4-5 Pupils". I found your Math Study Skills Self-Survey (Sections 2-5) published on line by Purple Math (<http://www.purplemath.com/stdysrvy.htm>) very appropriate in assessing Math study habits of my respondents.

Part of my thesis is to provide a documentation of the validity and reliability of the instruments used. In this regard, I would like to ask your permission to utilize it and be provided the information regarding the validity and reliability of the said instrument. This information coming from you is required for the approval of my work.

Thank you so much and I look forward to your affirmative reply the soonest!

Sincerely yours,
Gemma C. Teope

E-mail of Dr. Carolyn Hopper

35 17	<u>Carolyn Hopper</u>	From
35 17	<u>Gemma Teope</u>	To

The inventory is strictly anecdotal. I use it in a learning strategies class to make students aware of habits they probably should be using. You are welcome to use it ,but I have run no validity and reliability tests.

Carolyn

Dr. Carolyn Hopper
U1010K Coordinator, University Studies
Middle Tennessee State University | University College
1301 E. Main Street,
Box 171, Murfreesboro, TN 37132
Office: 615-898-2157
The Study Skills Help Page
<http://www.mtsu.edu/~studskl/>
Practicing College Learning Strategies, 5th edition
ISBN: 0547199961

Appendix B Request for Modification of Math Study Skills Inventory Test

From: Gemma Teope [gemmateope@yahoo.com]

Sent: Sunday, August 18, 2013 7:41 AM

To: Carolyn Hopper

Subject: Re: Request for Modification of Math Study Skills Inventory Test

Dear Dr. Carolyn Hopper,

Thank you for allowing me to utilize the Math Study Skills Self-Survey for my research entitled "The Relationship of Learning Styles, Study Habits and Self-efficacy to Mathematics Performance Among Grades Four and Five Pupils.

For my respondents, who are all elementary pupils, to better understand the above said online questionnaire, I would like to ask for your permission to slightly modify the descriptions from sections second to fifth as follows:

Section 2: Time and Place for Studying	Time and Place for Reviewing/Doing Homework
Section 3: Study Strategies for the Class	Strategies in Studying Lessons in School/Home
Section 4: Math Tests	Techniques in Taking Math Test
Section 5: Anxiety	Ways in Handling Math Worries

Rest assured that due recognition will be observed to you as the author and to Purple Math website of Ms. Elizabeth Stapel.

I look forward to your affirmative reply the soonest.
Sincerely,

Mrs. Gemma C. Teope

RE: Request for Modification of Math Study Skills Inventory Test

from Carolyn Hopper to you

[Show Details](#)

35
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Make whatever modifications you need to make.

Carolyn

Dr. Carolyn Hopper
U1010K Coordinator, University Studies
Middle Tennessee State University | University College
1301 E. Main Street,
Box 171, Murfreesboro, TN 37132
Office: 615-898-2157
The Study Skills Help Page
<http://www.mtsu.edu/~studskl/>
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Appendix C
Letter for Approval of Trial Run
March 1, 2012

Dr. Amelia G. Ronquillo
Assistant Principal, Grade School
Colegio San Agustin
Dasmariñas Village, Makati City

Dear Dr. Ronquillo,

Warm Greetings!

I am at present enrolled in Thesis Writing (ED 600) for the Degree of Master of Arts in Education with specialization in Child Study at Philippine Normal University. My research is entitled “The Relationship of Learning Styles, Study Habits, and Self-Efficacy to Mathematics Performance Among Grades 4-5 Pupils”. In this connection, I would like to seek your permission to administer the Memletics Learning Styles, Math Study Skills Self-Survey, and Mathematics Self-Efficacy questionnaires to grades 4-5 pupils for trial run and face validation purposes only. The actual respondents will be the grades 4-5 pupils of Holy Spirit School, Cubao, Quezon City.

Attached herewith are the copies of the said questionnaires.

Thank you so much and I look forward to your affirmative response regarding this matter.

Sincerely yours,

Mrs. Gemma C. Teope

Appendix D

Letter of Approval for Actual Administration of Questionnaires

March 16, 2012

Sr. Florencia Tubaña, S.Sp.S.

Holy Spirit School

Principal

Dear Sr. Florencia,

Greetings in the Holy Spirit!

I am at present enrolled in Thesis Writing(ED 600) for the Degree of Master of Arts in Education with specialization in Child Study. My research is entitled “Learning Styles, Study Habits, and Self-Efficacy: Their relationship with Mathematics Performance”. In this connection, I would like to seek your permission to administer the following questionnaires to grades 4-5 pupils:

Memletics Learning Styles Inventory

Mathematics Self-Efficacy Scale

Math Study Skills Self-Survey

Attached herewith are the copies of my questionnaires.

The findings can be used as basis for the improvement of the mathematics instructional program to further enhance the mathematics achievement of the pupils. This study will also be the researcher’s response to the recommendation of the team of accreditors from the Philippine Accrediting Association of Schools, Colleges, and Universities (PAASCU) to conduct research along the area of mathematics under a particular grade level.

Thank you so much and I look forward to your affirmative response regarding this matter.

Sincerely yours,

Mrs. Gemma C. Teope

