COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG GRADE SIX PUPILS

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APPROVAL SHEET

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DEDICATION

To my dearest wife,

CORSING

And to our three children,

JUNJI,

JUNJUN &

JOEY

I dedicate this humble work.

JAIME

ABSTRACT

This study attempted to assess the cognitive, psychomotor and affective abilities of grade six pupils in elementary mathematics in the three central schools in Catbalogan Samar and their relationship with one another. The analytical-descriptive research method was employed in this study with a teacher-made achievement test of 45 analyzed test items as the main instrument in gathering data. The respondents are composed of 150 pupils coming from the three central schools in Catbalogan, selected through simple random sampling. After the means of each of the three ability levels have been solved, L.R. Gay's Pearson r was used to test the hypothesis. However since there are three variables involved, the researcher resorted to treating two variables at a time. A scale was provided as a guide for interpreting the obtained correlation. The conclusions of the study are the following: (a) since the performance and mastery levels of pupils are unsatisfactory, it follows that the instruction in elementary mathematics for the grade six pupils in the three central schools has not effectively satisfied the established standard of 75 percent, and (b) since there is a very high correlation among the three domains, it may be concluded that those who are deficient in cognitive ability are equally deficient in psychomotor and affective abilities and those who are good in one domain are also good in the other two domains. Based on the findings and conclusions of this study, the following recommendations are made: (1) more studies and researches should be conducted to find out the

causes of low achievement levels of the pupils in elementary mathematics, (2) mathematics teachers should continue giving equal emphasis not only in the teaching of the three domains but also when evaluating their performance. Teacher-made tests must emphasize equally these skills, and (3) teachers, administrators, curriculum planners and other school officials should collectively make provisions to improve the ability levels of the pupils through instructional redirection.

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Chapter 1

THE PROBLEM

Introduction

The recent advances and interest in technology, statistical method, electronics and automatic computers make it evident that the level of education in mathematics must be raised. This situation presents a challenge to all teachers of mathematics from the kindergarten until college.

It is believed that children must understand the structure of the number system and the ways in which it operates in the performance of computations. To ensure understanding, the children should learn to perform number operations with intelligence and insight. They should also learn what contributions number has made to scientific and social progress. They should have experiences that will develop resourcefulness and ingenuity in perceiving and dealing with quantitative aspects of social situations. They should participate in meaningful activities which would lead them to appreciate the role of measurement in life. In short, the modern mathematics program must be both realistic and functional.

Current theories of learning emphasize the importance of helping children to discover meaning. Learn-

ing is regarded as a gradual process. Not all children learn in the same way or at the same rate. Therefore, it is necessary to provide a wide variety of experiences varying from the simple to the complex, so that childrem of different abilities can work at levels of abstractness which they understand.[1]

Most mathematics teachers are at a loss as to the proper assessment of the abilities of their pupils' performance on the three levels of educational objectives. It cannot be denied that most often there is an imbalance in the construction of test questions, that it follows also that there might be disparity in the performance of the pupils on the three domains - cognitive, psychomotor and affective. It is the observation of this researcher that most of the test items in mathematics belong to the cognitive domain, which is true also in other subject areas. Is it because that the largest proportion of educational objectives fell into this domain? Or is it because most of the teachers in the three central schools in Catbalogan find difficulty in classifying the taxonomy of educational objectives?

Hopefully the findings of this study will be use-

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[1]Florentina L. Gorospe, Modern Mathematics Handbook, (Manila: St. Mary's Publishing, 1970, p. 9.

ful to some mathematics teachers in determining which of the three domains should be given emphasis in teaching mathematics, as well as in the construction of test questions. This may also give the grade six pupils in the three central schools in Catbalogan some insights on how they perform in terms of cognitive, psychomotor and affective abilities.

Theoretical Framework

Education experts have created a threfold division of educational objectives: cognitive, psychomotor and affective.[2] They found that most of the objectives stated by teachers could be placed rather easily in one of the three domains or classifications.

Cognitive objectives emphasize remembering or reproducing something which has presumably been learned, as well as objectives which involve the solving of some intellective task for which the individual has to determine the essential problem and then reorder given material or combine it with ideas, methods, or procedures previously learned. Cognitive objectives vary from simple recall of material learned to highly original and creative ways of combining and synthesizing new ideas and materials. It is

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[2]Benjamin S. Bloom, et al, Taxonomy of Educational Objectives, (New York: David McKay Co., 1975), p. 6.

found that the largest proportion of educational objectives fell into this domain.

Psychomotor objectives which emphasize some muscular or motor skill, some manipulation of material and objects, or some act which requires neuromuscular coordination, are found most frequently related to handwriting and speech and to physical education, trade, and technical courses.

Affective objectives emphasize a feeling tone, an emotion, or a degree of acceptance or rejection. They vary from simple attention to selected phenomena to complex but internally consistent qualities of character and conscience. A large number of such objectives is found in literature expressed as interests, attitudes, appreciations, values, and emotional biases.

The reader will undoubtedly recognize that such a threefold division is as ancient as Greek philosophy and that philosophers and psychologists have repeatedly used similar tripartite organizations: cognition, conation, and feeling, thinking, willing, and acting; etc. Modern research on personality and learning raises serious questions about the value of these simple distinctions.[3]

Basically, the question posed by modern behavioral

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[3]Ibid, p. 7.

science research is whether a human being ever does thinking without feeling, and acting without thinking. It seems very clear that each person responds as a total organism whenever he does respond. In spite of this, research on aptitudes and interests does reveal quite small correlations between aptitudes and interests.

Conceptual Framework

The schema of the conceptual framework is drawn below:

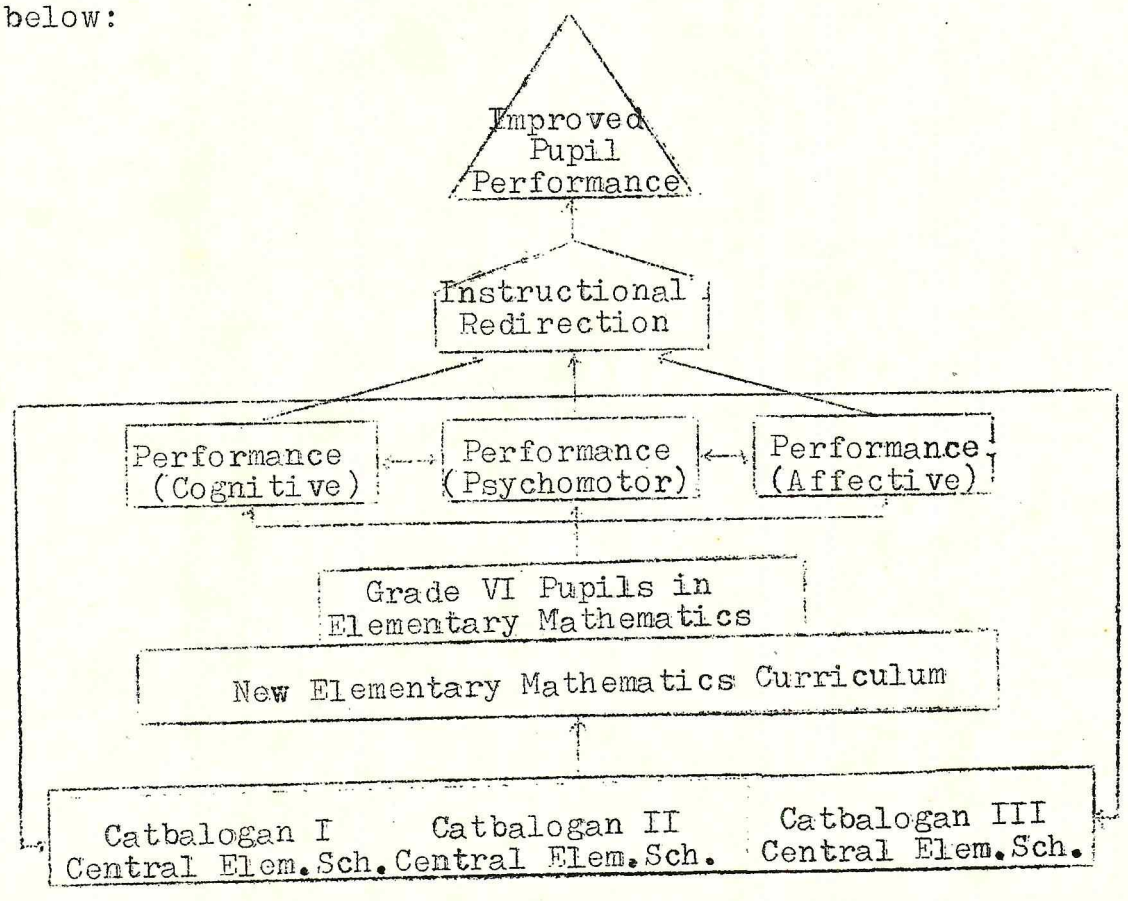

Figure I. Conceptual Model of the Study

The conceptual model shows that the research environment covers the three central schools in Catbalogan, Samar. These schools are implementing the New Elementary School Curriculum in which Elementary Mathematics is among the subjects.

The arrows that connect the three domains show the relationships between the cognitive, psychomotor and affective abilities in elementary mathematics among the grade six pupils in the afresaid schools. The result of the study may provide feedbacks for the teachers, administrators and other school officials to make improvements, modifications, and instructional redirection so that eventually improved pupils performance will be attained.

Statement of the Problem

This study attempted to assess the cognitive, psychomotor and affective abilities of grade six pupils in elementary mathematics in the three central schools in Catbalogan, Samar and their relationship with one another. Specifically, it sought answers to the following questions:

1. What are the mean scores of the grade six pupils in elementary mathematics in the three central schools in Catbalogan, Samar in terms of:

   a. cognitive domain

   b. psychomotor domain

   c. affective domain

2. What are the mastery levels of these pupils under the three domains?

3. Is there a significant relationship in the mean scores in elementary mathematics among these grade six pupils in terms of the three domains?

Hypothesis

The performance in elementary mathematics of the grade six pupils in the three central schools in Catbalogan, Samar in terms of cognitive, psychomotor and affective domains are significantly related.

Importance of the Study

The total development of the child is of paramount importance that should be considered when the teacher is preparing his lesson. The child should be taught not only to remember things which have been previously learned. He should be taught how to react properly, show interests, attitudes, appreciations, values and emotional biases. He should also know how to use his muscular or motor skills to manipulate things, or some other acts which require neuromuscular abilities. In short, the kind of teaching that should be imparted to the child should make him develop into a well-rounded individual.

It is on this premise that this study was conducted. Its results may be useful to mathematics teachers and other school officials in determining if the pupils

have thoroughly mastered the skills under each domain. The mean performance scores in each skill may suggest which of these skills need emphasis in teaching. The extent of relationship between the three domains may be a good basis for the administrators and curriculum planners to plan for improvements so that at least there should be no wide disparity on the three levels of learning.

Scope and Delimitation

This study is focused on the relationship of the achievement of the grade six pupils in the three central schools in Catbalogan, Samar in terms of cognitive, psychomotor and affective domains during the school year 1988-1989. The respondents included 150 pupils in elementary mathematics selected through simple random sampling from the three central schools in Catbalogan, Samar, broken down as follows: 50 pupils coming from Catbalogan I Central Elementary School, 50 pupils from Catbalogan II Central Elementary School, and another 50 pupils coming from Catbalogan III Central Elementary School. The researcher requested through proper channels from the teachers handling these pupils to show their test questions including their accompanying tables of specifications for said test questions, where the researcher selected the test items classified into three domains. There were 45 selected test items after having gone through item analysis which

were finally answered by the respondent pupils, 15 items each from cognitive, psychomotor and affective skills.

Definition of Terms Used

For purposes of this study, the following terms are defined according to how they are used:

Administrators. As used in this particular study, they are the district supervisors, the elementary school principals, the head teachers and other curriculum planners.[4]

Affective domain. It is a field of activity which emphasizes interests, decisions, feelings, attitudes, emotional biases, values and appreciations.[5]

Cognitive domain. It is a field of activity which gives emphasis on remembering something that has been previously learned; it may involve something of intellective task for which the individual has to determine the essential problem and then reorder given materials presumably been learned before.[6]

Mathematics. This is a science that deals with the relationship and symbolism of numbers and magnitudes

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[4]Carter V. Good, Dictionary of Education, (New York: McGraw-Hill Book Company, 1959), p. 18.

[5]Bloom, loc. cit.

[6]Bloom, op. cit. p. 8

and that includes quantitative operations of the solution of quantitative problems.[7] As used in this study it deals with the fundamental operations that lead to the solution of questions or problems involving whole numbers, rational numbers, geometry, measurement, graphs and scales.

Psychomotor domain. It is a sphere or field of activity with objectives on the development of muscular or motor skills, manipulation of materials and objects.[8] In this particular study, it involves problem solving.

Respondents. They are the grade six pupils in elementary mathematics from the three central schools of Catbalogan, Samar who were randomly selected to answer the test questions used in this study.

Taxonomy of educational objectives. It is the classification of educational goals; i.e. cognitive, psychomotor and affective domains.[9]

Teachers. They are the ones who teach pupils/students as a profession.[10] In this particular study they are the ones who handle the mathematics classes where the respondents in this study belong.

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[7] Philip Babcock Gove, Webster's Third New International Distionary, (Springfield, Massachusetts: G. and C. Meriam Co., 1976), p. 761.

[8] Bloom, loc. cit.

[9] Ibid, p. 5.

[10] Gove, op. cit. p. 770.

Chapter 2

REVIEW OF RELATED LITERATURE AND STUDIES

Significant literature and studies that delve into some aspects of this research have been surveyed and patiently reviewed to give insights to the researcher. Some literature and previous researches that have implications and relevance to this particular study are herein presented.

LITERATURE

On Evaluation of Pupils' Achievement

In order to evaluate the pupils achievement, it is necessary to determine to what extent the objectives specified in the plan were achieved by the pupils. It is desirable to determine whether any other important outcomes occured that were not expected.

If the achievement of the objectives requires that the pupils acquire new knowledge, develop new skills, or modify their attitudes, the objectives must be defined in terms of the pupils' performance at the end of the process.[11] Then the objectives can be used to select or

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[11] Alan Osborne, An In-Service Handbook for Mathematics Education, (Virginia: The National Council of Teachers of Mathematics, Inc., 1977), p. 195.

develop appropriate instruments of appraisal or observation and collect and analyze the data generated by the use of the instruments. The information derived from the analysis of the data must provide sufficient evidence for competent curriculum planners and evaluators to judge whether the objectives and consequently the goals of the plan or program have been achieved.

The evaluation begins by defining essential parts of the problem in such a way that the achievement of each part implies that an acceptable solution to the problem has been determined. For example, the identified problem of a school system might be lack of any systematic procedures for selecting textbook materials for an elementary mathematics program. To accomplish this task, the problem might begin by developing a set of criteria for use in evaluating each series of textbooks under consideration for the program. Some of the essential elements of a textbook program to be considered are:[12]

1. mathematical content
2. methods of presentation
3. testing and maintenance activities
4. provisions for individual differences

Although it is likely that each of these areas will

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[12]Ibid, p. 197.

be separated into their essential parts, it seems reasonable that the solution to the original problem is implied by establishing a set of criteria for evaluating each of the essential parts of the elementary mathematics programs available.

Values of the Taxonomy

Education experts envisioned several major values arising from the attempt to order desired outcomes. In the first instance, the actual sharing in the process of classifying educational objectives would help them clarify and tighten the language of educational objectives.[13] They were aware that all too frequently educational objectives are stated in meaningless platitudes and cliches. Some view them as an opportunity to use a type of prose found frequently in the superlatives employed by advertising men and the builders of political flatforms. If, however, educational objectives are to be given direction to the learning process and to determine the nature of the evidence to be used in appraising the effects of learning experiences, the terminology must become clear and meaningful.

It was hoped that the statement of an objective in

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[13] Bloom, loc. cit.

similar terms by different workers would make possible a definite classification of that objective and would also permit exact inferences about the kinds of behaviors expected of the pupils. The ideal would be educational objectives stated so clearly that the authors of the objective would know exactly what they meant and the readers of the objectives would have equally clear idea of what was intended.

A second value to be derived from the creation of a classification scheme would be to provide a convenient system for describing and ordering test items, examination techniques, and evaluation instruments. Test materials have to be classified as to content and objectives so that they could be determined quickly what was available and useful for a particular task in examination development.

An even more important value education experts hoped to secure from the classification scheme was that of comparing and studying educational programs. If programs have similar objectives, do they involve similar or different learning experiences? The classification could be used as tools in classifying and organizing educational research results.

Finally, experts are seeking something beyond a simple classification scheme. They envisioned the possibility that they might select principles of classifying

educational outcomes which would reveal a real order among these outcomes. If such an order was confirmed by various types of observations and research findings, the order and principles and arrangement should be of value in the development of a theory of learning which would be relevant to the complex as well as simple types of human learning. At the very least, the discovery of some of the principles of ordering human-learning outcomes should define the types of findings that a useful theory must be able to explain.

Through a planned work sessions education experts finally created a threefold division of educational objectives: cognitive, psychomotor and affective.

The Philosophy of Elementary School Mathematics

Mathematics is a science of numbers. It deals with the rules, principles, and processes that regulate the uses of the numbers, and the operations involving number and quantitative procedures. The primary function of the modern mathematics program is to develop in children the ability to use numbers and number operations intelligently and skillfully, and the ability to apply quantitative processes effectively in social situations both in and out of the school.[14]

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[14]Gorospe, loc. cit.

The philosophy behind modern mathematics teaching is self-discovery. The learner is lead to discover for himself what he has to learn. The teacher's job is to guide the child to this discovery by asking questions to help him see the common elements in the cases or situations presented.

Obviously, for the learner to discover the solutions to problems by himself, some principles of the new approach to the teaching of elementary mathematics are:

a. Induction. Induction or "discovery" is probably the most widely accepted principle of modern mathematics teaching. Literally, every new mathematics approach utilizes the idea of learning by discovery, although teachers may have different ways of bringing about this discovery.

We say then, that modern mathematics teaching involves a method of induction rather than deduction - deduction being the term applied to the more traditional ways of presenting mathematics to children. In deductive teaching the children are made to memorize, usually by rote, the mathematical or arithmetical concepts in particular, appropriate situations. The inductive method, on the other hand, works in the reverse. Here the children are presented with a number of different situations, each of which is a particular embodiment of the concepts we should like them to learn.

b. Experience as the foundation of learning. Again, nearly every one of the newer approaches to mathematics emphasizes the fact that experience is necessary if learning is to take place. This, of course, directly derives from the principle of induction, for the embodiments of the concepts must be directly experienced before that concept can be abstracted. Learning calls for a great deal of first-hand experiences.

c. Multiple embodiment. Concepts must be experienced in as many different particular situations as possible. This is necessary before the pure concept may be distilled from all irrelevances. There should be only one common property being the concept to be learned.

d. Intrinsic motivation. All too often in the elementary classroom, the rule rather than the exception for motivating learning has been extrinsic, utilizing punishment and reward; a child is rewarded if he gives the correct response and is punished if he does not. Many adults have many unpleasant memories of elementary teachers who used this rule much too well. The problem of the teacher instructing in the new mathematics is not to try to find ways of motivating the child; rather, it is to try not to stifle the child's natural motivation - his curiosity. Properly done, this reliance upon the child's curiosity is called intrinsic motivation.

e. Pupil-centered learning. In the traditional classroom, the source of all correct facts was the teacher. The teacher imparted these facts, and the children accepted and memorize them. This is known as teacher-centered or teacher-dominated learning.

However, according to the principle previously discussed, the teacher is no longer the source, the purveyor of the correct facts; rather the correct facts must derive from the children's own experience. No longer should the teacher sit at his desk giving the facts right and left; his role is to come down to the children and guide them along, helping them in their discovery of things. The philosophy of modern mathematics teaching is, by its very nature, designed to keep unstoppered the vital contents of the child's mind - its creativity and independence. The prospects of such a philosophy put into general teaching practice are truly exciting.

The Major Differences Between the Traditional Arithmetic and Modern Mathematics Teaching[15]

Differences in Curriculum. Traditional arithmetic was regarded as a tool subject. The chief function of instruction was to make certain that the children mastered

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[15] Ibid, pp. 7-15.

the computational skills as tools to be used whenever the need arose. Under such circumstances little was done to develop an understanding of the number operations or to show how they were applied in daily life. Learning was regarded as a more or less mechanical process, and repetitive drill was the chief toll used to insure mastery of the skill to be developed. The children were asked to memorize rules without understanding why.

Modern mathematics recognizes that the content of mathematics is part of the culture of the race. The transmission of this knowledge requires systematic instruction and, therefore, must be carefully planned. To insure understanding, the children should learn to perform number operations with intelligence and insight. They should also learn what contributions number has made to scientific and social progress.

Differences in the selection and orientation of curriculum content. The traditional arithmetic made use of prepared courses of study and textbooks. These materials were given out by a central office to the field for the teacher's use following a definite organization of subject matter and content. The content outline was prepared for uniform use by teachers throughout the country.

The modern mathematics curriculum includes a variety of carefully selected learning experiences in which

number functions directly. At the elementary school level, more closely the work in mathematics is integrated with its practical applications to the affairs of life, the more productive the experience will be. The new mathematics program consists of rich, vital, systematic, well-integrated experiences that are adapted to the needs, interests, aptitude, and stage of maturity of the children.

Differences in instruction. Traditionally, arithmetic instruction has been based on the doctrine of formal discipline. According to this theory, the mind consists of separate faculties each susceptible to training. The view was held that the more rigorously the special faculty of number was trained, the stronger it would be, and the more widely and fruitfully it would be employed. Teachers relied on much drill to produce mastery. Usually there was little concern about the usefulness of what was taught.

In the modern mathematics program a very different point of view prevails. The mathematics classroom is regarded as a learning laboratory. Modern teaching procedures emphasize the importance of making what the child learns both mathematically meaningful and social significant. Learning is regarded as a gradual growth process.

Differences in instructional materials and content. In the traditional arithmetic, teaching was done largely by verbal methods. The teacher demonstrated methods of

computation that the children were to learn, and the children memorized the procedure.

In the new mathematics, the children are led to the discovery of facts and solutions. The children participate in guided learning experiences. The teacher attempts to make the classroom stimulating and attractive. Community resources are used to vitalize and enrich learning in the classroom.

Differences in the provision for individual differences. Traditionally, children were taught by what was called the lock-step system. All children were taught, regardless of their ability to learn arithmetic, in the same way and were given the same assignment of work.

The teacher in new mathematics employ a wide variety of procedures to provide for individual differences. These methods include the grouping of children according to their needs and the rates at which they learn, using a variety of learning aids that will lead to understanding and skill, and adjusting goals to level of ability.

Differences in techniques of evaluation. Teachers have always used tests, either standardized or teacher-prepared, to determine how well their pupils are learning arithmetic. The tests measured a very narrow range of outcomes, usually computational ability and problem solving. The uses of such tests had led teachers to emphasize the

computational aspects of arithmetic and to neglect other impotant values.

In the new approach, the evaluation of outcomes has come to be regarded as a continuing process participated in by both teacher and learners as an integral part of the teaching learning situations. Evaluation has been extended to include a much broader range of outcomes, including knowledge of the meaning of numbers and the structure of the number system understanding, as well as skill in, work with number operations, the ability to utilize quantitative procedures and measurement in social situations, and interests related to mathematics. A much wider variety of appraisal is being applied in mathematics, including systematic informal testing, observation of behavior, personal interviews, inventories of interests and work habits, methods of evaluating creative products, and procedures for studying group relationships.

The Revised Learning Continuum[16]

The revised edition of the Elementary Learning Continuum (ELC) paves the way for a much improved instructional system that would make possible the realization of long-sought goals of education in the elementary

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[16] MEC-BEE, Elementary Learning Continuum, 1980.

level. The projects started in 1976 and has as its target the identification of educational objectives considered basic - the learning-to-learn skills, knowledge, habits, and values which are fundamental elements of capabilities for enlightened daily living.

The Learning Continuum is a listing of expected learning outcomes in different curricular areas from Kindergarten to Grade VI arranged hierarchically from the easiest to the most difficult, from the simplest to the most complex. These outcomes are stated in terms of cognitive, affective, and psychomotor behaviors that the child is expected to acquire to enable him to participate in the improvement and enjoyment of the quality of life, as shown in Appendix N.

A new feature in the revised Elementary Learning Continuum is the inclusion of Key Behavior Indicators (KBIs), which are value-oriented and are expressed in terms of behaviors and attitudes and individual should internalize as he learns the basic literacy, numeracy and citizenship skills. While moral values may be learned through direct instruction, it is believed that they can be more become a part af the learner's make-up if they are given stress and are considered an integral part of the learnings in every subject area.

STUDIES

Tenefrancia[17] conducted a comparative study of the first through fourth year mathematics grades of 123 senior students from a public high school in Manila who have chosen at least one elective in the fourth year. Likewise, a comparison of the mathematics grades of the students in the four curriculum years was made. The comparison was done first by taking the students as a whole, and then grouping them according to the mathematics elective they chose. The findings show that:

1. Grades of the students in mathematics courses from first to fourth year differed significantly.

2. As to curriculum years, significant differences noted between the first and fourth year, first and third year, second and fourth year, second and third year.

The study made by Tenefrancia has some similarities as well as differences with the present study. Both studies compare the grades of students in mathematics. Tenefrancia compared the first through fourth year mathematics grades. On the other hand, the present study compared the relationship of pupils' performance on the three levels of educational objectives/domains.

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[17]Nenita Tenefrancia, "A Comparison of the First Year Through Fourth Year Mathematics Grades of the Senior Students in a Public High School in Manila" (unpublished master's thesis, CEU, October, 1973).

Santos[18] in a comparative study of mathematical abilities of boys and girls found out that sex does not affect the differences in mathematics abilities. Mendoza[19] conformed with the findings of Santos that sex is not significantly related to mathematics achievement.

Cortez[20] made a comparative study of the mathematics achievement of 229 students enrolled in general secondary and secondary vocational agriculture curricula at Central Mindanao University High School for 1976-1977 with the view of improving mathematics instruction. The normative survey was employed using a teacher-made achievement test for gathering data. Pre-test and post-test were administered to determine how much the students have achieved. Results of the study showed that students performed significantly better in the post-test than in the pre-test.

The aforementioned studies are related to the

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18 [18]Aurora Santos, "A Comparative Study of the Mathematics Abilities of Boys and Girls" (unpublished master's thesis, Abad Santos Educational Institution, Manila: 1955).

[19]Elizabeth Mendoza, "Factors Associated with Mathematics Achievement of College Entrants of Philippine Union College" (unpublished seminar paper, U.P., Diliman, Q.C., 1981).

[20]Purificacion Cortez, "A Comparative Study of the Freshmen Students Enrolled in General Secondary and Secondary Vocational Agriculture Curricula at Central Mindanao University High School for 1976-1977" (unpublished master's thesis, Siliman University, Dumaguete City, 1978).

present study in the sense that although the former were all comparative studies while the latter dealt on the relationships, all results of the tests were compared.

Another study was conducted by Cero[21] on the relationship of the teacher-given ratings to the district achievement test scores of grade six pupils in arithmetic, english and social studies. He used the results of the district achievement test in the three subject areas and correlated them with the final ratings of pupils gathered from their permanent records. Her findings showed that there was a very high degree of correlation between the paired variables. The implication was that the marks given by the teachers were reliable.

Andres made a study on the correlation between the pupils' performance in elementary mathematics achievement test and their final scholastic grades. The respondents in her study consisted of grade five pupils enrolled in the district of Angadanan, San Guillermo, during the school year 1978-1980. She used the correlation method in her study. The computed value of r which was 0.73 showed that there was a very high correlation between the final

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[21] Paterno Cero, "A Study on the Relationship of the Teacher's Ratings to the District Achievement Test Scores of the Grade Six Pupils of Jagna Central Elementary School Division of Bohol 1969-1970", (unpublished master's thesis, Rafael Palma College, City of Tagbilaran, 1970).

grades given by the teachers and the performance of the pupils in the achievement test. The study also found out the factors that affect the relationship between the pupils' test results in the achievement test in elementary mathematics and their final grades with the use of questionaires and checklists which were presented to 16 teachers handling grade five mathematics classes in the district. Based from the answers drawn from the teachers, the main reason to explain the low performance of some pupils in the achievement test was the inavailability of and/or inadequacy of curriculum materials.[22]

Another study was written by Nuez[23] on the relationship between reading achievement and modern mathematics achievement among the grades five and six pupils. It was found that there was very high correlation between reading and modern mathematics. This study also revealed that mathematics is dependent upon reading, meaning that

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[22]Lelima Andres, "Correlation Between Pupils Performance in Elementary Mathematics V Achievement Test and Their Final Scholastic Grades," (unpublished master's thesis, Baguio City Vocational Normal School, 1980).

[23]Victoria Nuez, "The Relationship Between Reading Achievement and Modern Mathematics Achievement Among the Grades Five and Six Pupils of Guadalupe Elementary School in 1968-1969 and in 1969-1970," (unpublished master's thesis, Colegio de San Jose Recoletos, Cebu City, 1971).

those pupils who are good in reading are also good in mathematics. This is specially true on problem solving and in the interpretation of mathematical sentences.

Another study on relationship of pupils' performance was conducted by Perez.[24] Her study was about the relationship between the mathematical ability and language ability of grade six pupils in the three central schools of the three districts in Catbalogan, Samar, during the school year 1984-1985.

Her study revealed that there is a moderate or substantial evidence of significant relationship between the achievement score and the scholastic achievement in elementary mathematics although there is a slight evidence of correlation between the achievement score and the scholastic achievement in communication arts English. It also show that there was slight evidence of significant relationship between the achievement scores in the two subjects and finally the study revealed a substantial evidence of significant relationship between the scholastic achievement in elementary mathematics and in communication arts English.

The study conducted by Perez has very significant

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[24]Tomasa R. Perez, "Mathematical and Language Abilities of Grade Six Pupils of the Three Central Schools in Catbalogan, Samar," (unpublished master's thesis, Samar State Polytechnic College, Catbalogan, Samar, 1987).

bearing with the present study not only because incidentally both were conducted in the division of Samar particularly in the three central schools in Catbalogan, but both are studies on relationship of pupils' performance.

Pacolor[25] in his comparative study on the achievement in mathematics of the four-year technical and the teacher education students found out that there is no significant difference in their achievement either in the pre-test or in the post-test conducted for both groups.

Relationship with the Present Study

All the foregoing literature and studies reviewed in this chapter have relevance to the present study in the sense that all studies herein presented are concerned with achievement/performance in mathematics. They may differ in some aspects such as the grade levels of respondents, the instrumentation used, the methods of gathering and interpretation of data, the statistical measures employed and the number of respondents but surely they are all about the performance abilities of the respondents.

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[25]Eusebio T. Pacolor, "A Comparison of the Achievement in Mathematics of the Four-Year Technical and Teacher Education Subjects" (unpublished seminar paper, MIST, Marikina, Metro Manila, 1983).

Chapter 3

METHODS AND PROCEDURES

This chapter presents the methods and procedures used in the conduct of this study including the research design, the statistical instruments used in gathering the necessary data, the sampling procedure of respondents, the data gathering process and the statistical measures used.

Methods and Research Design

This study on the relationship of pupils performance in terms of cognitive, psychomotor and affective abilities employed the analytical type of descriptive research method.

Research instrument. The main instrument used by the researcher in gathering data is a teacher-made achievement test composed of 45 items equitably prorated in accordance with the three domains - 15 items covering cognitive, 15 psychomotor, and 15 affective. Of these 45 items, 15 came from Catbalogan I Central Elementary School consisting of five items each for every level, 15 items from Catbalogan II Central Elementary School with the same coverage, and the other 15 items came from Catbalogan III Central Elementary School.

Although the grade six mathematics teachers of

these pupils are not direct respondents in this study, they were consulted particularly regarding the test questions administered during the first periodical test school year 1988-1989 which is the coverage of this study.

The researcher also consulted some master teachers who are usually the ones responsible in the construction of periodical and district tests. With their help a table of specification was prepared to include items based on the skills specified in the minimum learning competencies of the Elementary Learning Continuum. It was agreed that the format of the test be a multiple choice items with four options each as this is the format usually used in school term examinations. The length of the test was agreed to be about 45 items in one hour.

The trial test consisted of equal items for each skill to include nine items each on whole numbers, rational numbers, geometry, measurements, and graphs and scales. It was subjected to item analysis to determine the suitability of each item. Items ranging from easy to very difficult and with discrimination index ranging from marginal to discriminate well were selected for the final test. It was originally administered to 30 pupils of average mental ability who were not respondents to the present study.

The scores served as basis for the final test. Raw scores were recorded after marking the answer sheets. They were ranked and the 27 percent high group and the low group consisting of another 27 percent were sorted and tallied. The frequency of options and the percentage of correct options selected by both the high and low groups were entered. The index of facility or difficulty was computed by adding the correct responses of the upper group and the correct responses of the lower group, divided by the total number of pupils used in the analysis.

The index of discrimination was also solved by subtracting the number of pupils in the lower group responding to the correct options, from the pupils in the lower group responding to the correct option, and dividing by one half of the total number of pupils used in the analysis. From these indices only one item was improved as it was found out to be very easy.

Procedure

Sampling procedure. This study covered a representative population of the grade six pupils coming from the three central schools of Catbalogan, Samar. Since this utilized the simple random sampling, the researcher picked out 150 pupils from the three central schools of

Catbalogan through the use of the advisers' class records. Of the 150 pupils, 50 came from Catbalogan I Central Elementary School, 50 from Catbalogan II, and 50 from Catbalogan III Central. Out of the 50 pupils from each school, 25 were boys and 25 were girls picked out according to their numbers in the class records. The first 25 even numbers among the list of female pupils from the higher sections were the ones selected while the first 25 odd numbers among the list of male pupils were made respondents of this study.

Gathering data. After randomly selecting the pupils who were made respondents in this study, the researcher requested from the teachers involved, through the principals of the three central schools, for the test questions they administered during the first periodical examination. The selected 45 items previously discussed in this chapter were shown to his adviser, to the members of the panel during the pre-oral defense, and to the Dean of the Graduate Studies, Samar State Polytechnic College for their comments, suggestions, recommendations and approval.

As suggested during the pre-oral defense, the test had to be subjected to a trial run before it was finally tested to the respondent pupils, as there were revised items such as the changing of questions involving English system of measurement to metric system.

A trial run of the final test questions was conducted to a class of the highest section in Salug Elementary School, Catbalogan I district not necessarily for another item analysis but on certain aspects such as the final determination of the length of time and the proper grouping of test items according to domains for these aspects were not strictly observed during the former administration of the test. It was found out that the test questions could be answered within the regular class period of 40 minutes instead of one hour.

After the final revision of the test items, the researcher, with due permission of the Schools Division Superintendent for Samar, personally went to the respondents' schools to administer the final test to insure a 100 percent retrieval of the test questions and to closely supervise the respondents while taking the unannounced test in order to have valid, honest and unbiased result.

Treatment of data. The responses to the test questions were personally checked by the researcher immediately after the test had been administered. The data gathered in response to the questions were carefully tallied in separate master sheets and tabulated, separating the results of each of the three ability levels, by school. They were analyzed statistically in accordance with the most appropriate measure.

Statistical measure. The result of the test questions administered to the three central schools of Catbalogan was tallied separately then the researcher solved for the means of each of the three ability levels to find out the performance of the pupils in terms of the three domains.

After the means of each of the three ability levels have been solved, the Pearson r[26] was used to test the hyphothesis that the performance in elementary mathematics of the grade six pupils in terms of cognitive, psychomotor, and affective abilities are significantly related. However, since there are three variables involved, the researcher resorted to treating two variables at a time, such as; r_1 for X and Y variable, r_2 for X and Z variables, and r_3 for Y and Z variables, as shown in the following formula:

$$r_1 = \frac{\Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{N}}{\sqrt{\left[\Sigma X^2 - \frac{(\Sigma X)^2}{N}\right]\left[\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}\right]}}$$

Where:

X = the mean of cognitive abilities

Y = the mean of psychomotor abilities

ΣXY = the summation of X and Y

N = number of cases

r_1 = the obtained correlation coefficient of X and Y

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[26] L. R. Gay, Common Statistics for Educational Research, (New York: Mc Graw Hill Publishing Co., 1981), pp. 237-239.

$$r_2 = \frac{\Sigma XZ - \frac{(\Sigma X)(\Sigma Z)}{N}}{\sqrt{\left[\Sigma X^2 - \frac{(\Sigma X)^2}{N}\right]\left[\Sigma Z^2 - \frac{(\Sigma Z)^2}{N}\right]}}$$

Where:

X = mean of cognitive abilities

Z = mean of affective abilities

ΣXZ = summation of X and Z

N = number of cases

r_2 = correlation coefficient of X and Z

$$r_3 = \frac{\Sigma YZ - \frac{(\Sigma Y)(\Sigma Z)}{N}}{\sqrt{\left[\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}\right]\left[\Sigma Z^2 - \frac{(\Sigma Z)^2}{N}\right]}}$$

Where:

Y = mean of psychomotor abilities

Z = mean of affective abilities

ΣYZ = the summation of Y and Z

N = number of cases

r_3 = correlation coefficient of Y and Z

The following scale will provide a guide for interpreting the obtained correlation in this study:

Coefficient (r)	Relationship
$\pm$ .00 to $\pm$ .20	= neglible correlation
$\pm$ .20 to $\pm$ .40	= low correlation, present but slight
$\pm$ .40 to $\pm$ .70	= substantial or moderate correlation
$\pm$ .70 to $\pm$ 1.00	= high to very high correlation

Chapter 4

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the data gathered and their analysis and interpretation. These data are taken from the results of the teacher-made achievement test conducted to 150 respondent pupils of the three central schools in Catbalogan, Samar. For easy means of analysis and interpretation, the data are hereby presented in textual and tabular forms.

Pupils' Mean Scores in Elementary Mathematics in Terms of Cognitive, Psychomotor and Affective Domains

Table 1 shows that under the cognitive domain, the grade six elementary mathematics pupils of Catbalogan I Central Elementary School got a mean score of 8.82, Catbalogan II Central Elementary School obtained 8.30 and Catbalogan III Central Elementary School got 8.24. The aggregate mean score in the three schools under this domain is 25.36, thus yielding a grand mean of 8.45.

Under the psychomotor domain the same pupils obtained the following mean scores: Catbalogan I Central Elementary School, 9.00; Catbalogan II Central Elementary School, 6.64; and Catbalogan III Central Elementary School 7.18. The summation of the mean scores in terms of psychomotor domain in the three schools in 22.82 and the grand mean is 8.45.

Table 1

Pupils' Mean Scores in Elementary Mathematics in Terms of Cognitive, Psychomotor and Affective Domains by Schools

	Mean Scores by Domains			Total	Mean
	Cognitive (X)	Psycho-motor(Y)	Affective (Z)		
Catbalogan I Central	8.82	9.00	10.64	28.46	9.49
Catbalogan II Central	8.30	6.64	10.06	25.00	8.33
Catbalogan III Central	8.24	7.18	10.12	25.54	8.51
Total	25.36	22.82	30.82	79.00	26.33
Grand Mean	8.45	7.61	10.27	26.33	8.78

Under the affective domain Catbalogan I Central Elementary School obtained a mean score of 10.64; Catbalogan II Central Elementary School achieved 10.06, while Catbalogan III Central Elementary School got 10.12. The total mean score in the three schools under this domain is 30.82 thus giving a grand mean of 10.27.

Catbalogan I Central Elementary School
Pupils Mean Performance and Mastery Levels in Elementary Mathematics

As shown in Table 2 the grade six mathematics pupils of Catbalogan I Central Elementary School achieved a mean score of 8.82 or 58.80 percent with mastery level of 16

Table 2

Catbalogan I Central Elementary School Pupils' Mean Performance and Mastery Levels in Elementary Mathematics by Domains

Domain	No. of Items	No. Tested	No. Who Got 75% & Above	Mean Score	Mean % Score	Mastery Level	Interpretation
Cognitive	15	50	8	8.82	58.80%	16%	Unsatisfactory
Psychomotor	15	50	13	9.00	60.00%	26%	Unsatisfactory
Affective	15	50	22	10.64	70.93%	44%	Unsatisfactory
Total	45	50	6	28.46	63.24%	12%	Unsatisfactory ability

percent under the cognitive domain. This connotes an unsatisfactory performance. It means that based on the computation found in Appendix L-1, 16 percent or eight out of 50 pupils achieved above the standard score of 75 percent, which is 11.25. Of the 15 items under the cognitive domain only 8.82 or 58.80 percent were mastered by the pupils tested.

As regards the psychomotor domain, 13 out of 50 pupils got the standard score of 11.25 which is equivalent to 26 percent mastery level. Only nine or 60 percent of

the 15 test items were mastered by the pupils under this skill. The result is unsatisfactory, hence, reteaching of this skill is necessary.

Out of the same number of pupils tested under the affective objectives, 22 or 44 percent obtained the standard score of 11.25 or 75 percent and above. This means that 10.64 or 70.93 percent of the 15 items were answered correctly by the pupils. This result is still below the 75 percent average.

As a whole only six pupils or 12 percent out of 50 pupils got 75 percent of 45 items or 33.75 which is the standard score, based on the actual count of the raw scores found in Appendix I. Only 28.46 or 63.24 percent of the whole 45-item test was mastered by the grade six elementary mathematics pupils in Catbalogan I Central Elementary School. This result is lower than the standard 75 percent mastery level. There is therefore a need to reteach the lessons under the htree domains.

Catbalogan II Central Elementary School
Pupils' Mean Performance and Mastery
Levels by Domains

Table 3 indicates that under the cognitive domain the grade six elementary mathematics pupils of Catbalogan II Central Elementary School obtained a mastery level of 18 percent, as shown by the mean percentage score of 55.33.

Table 3

Catbalogan II Central Elementary School Pupils Mean Performance and Mastery Levels by Domains

Domain	No. of Items	No. Tested	No. Who Got 75% & Above	Mean Score	Mean % Score	Mastery Level	Interpretation
Cognitive	15	50	9	8.30	55.33%	18%	Unsatisfactory
Psychomotor	15	50	7	6.64	44.26%	14%	Unsatisfactory
Affective	15	50	10	10.06	67.06%	20%	Unsatisfactory
Total	45	50	6	25.00	55.55%	12%	Unsatisfactory Performance

It shows that only nine out of 50 pupils were able to obtain a standard correct answer of 11.25 and above. Only 55.33 percent of the number of items were mastered by the pupils. This is below the standard performance level of 75 percent.

Under the psychomotor items the mean percentage score of 44.26 percent with 14 percent mastery level is also unsatisfactory. The connotation here is that only seven out of 50 pupils got the standard score of 11.25, and only 44.26 percent of the test items were correctly answered by the pupils.

The percentage score of 67.06 percent with mastery level of 20 percent under the affective test items is still

below par. It shows that only 10.06 or 67.06 percent of the 15 items were correctly answered and only 10 out of 50 pupils were able to master the skills under this domain.

Out of the 50 pupils from Catbalogan II Central Elementary School who took the 45-item test only six got 75 percent and above the standard score of 33.75 as shown in Appendices J to J-3. Only 25 or 55.55 percent of the 45 items were correctly answered. The mastery level of 12 percent and the mean percentage score of 55.55 percent is below average. This means that the skills tested need reteaching to improve the performance of the pupils.

Catbalogan III Central Elementary School
Pupils' Mean Performance and Mastery
Levels by Domains

Table 4 reveals that under the cognitive domain the grade six elementary mathematics pupils of Catbalogan III Central Elementary School obtained a mean percentage score of 54.93 percent with eight percent mastery level. This connotes that only four out of the 50 respondent pupils achieved the standard score of 11.25. The mean performance score of 8.24 denotes that only 54.93 percent of the 15 items was mastered by the pupils. This result is unsatisfactory.

The mean percentage score of 47.86 percent with 14 percent mastery level under the psychomotor domain is

Table 4

Catbalogan III Central Elementary School Pupils' Mean Performance and Mastery Levels by Domains

Domain	No. of Items	No. Tested	No. Who Got 75% & Above	Mean Score	Mean % Score	Mastery Level	Interpretation
Cognitive	15	50	4	8.24	54.93%	8%	Unsatisfactory
Psychomotor	15	50	7	7.18	47.86%	14%	Unsatisfactory
Affective	15	50	14	10.12	67.46%	28%	Unsatisfactory
	45	50	4	25.54	56.75%	8%	Unsatisfactory Performance

also below the standard percentage of 75 percent. It shows that out of the 50 pupils tested only seven got the standard correct responses of 11.25 with 7.18 or 47.86 percent of the 15 items correctly answered as found in Appendix K-2. This is also an unsatisfactory performance.

Under the affective level of performance, 10.12 or 67.46 percent of the 15 items were mastered by the 50 pupils. The 28 percent mastery level under this skill indicates that 14 out of 50 pupils obtained the 75 percent standard score of the 15-item test. This performance is also below the average of 75 percent.

The total mean percentage score for the three domains which is 56.75 percent with mastery level of eight percent is far below the standard performance level of 75 percent. This means that based on the actual count from the raw data as found in Appendix K to K-3 with a grand mean score of 25.54, only 56.75 percent of the 45 test items were correctly answered by the 50 respondent pupils from Catbalogan III Central School. Out of this number of pupils only four of them or eight percent got the standard score of 33.75 which is the 75 percent of the 45-item test.

With this unsatisfactory performance there is a great need to reteach the lessons under the three domains.

Summarized Pupils' Performance and Mastery Levels of the Three Central Schools

The summarized performance and mastery levels of the pupils of the three central schools in Catbalogan in terms of cognitive, psychomotor and affective skills are shown in Table 5. It reveals that under the cognitive skill with the mean performance score of 8.45, the 150 respondents got a mean percentage score of 56.33 percent. There were 21 pupils out of 150 pupils or 14 percent who obtained the standard score of 11.25. This result connotes an unsatisfactory performance.

Under the psychomotor domain with 7.61 mean per-

Table 5

Summarized Pupils' Mean Performance and Mastery Levels of the Three Central Schools in Catbalogan in Terms of Cognitive, Psychomotor and Affective Domains

Domains	No. of Items	No. Tested	No. Who Got 75% & Above	Mean Score	Mean % Score	Mastery Level	Interpretation
Cognitive	15	150	21	8.45	56.35%	14%	Unsatisfactory
Psychomotor	15	150	27	7.61	50.73%	18%	Unsatisfactory
Affective	15	150	46	10.27	68.46%	30.66%	Unsatisfactory
	45	150	16	25.36	56.35%	10.66%	Unsatisfactory Performance

formance score, 50 percent of the 15 items was mastered by 27 out of 150 respondent pupils or 18 percent obtained the standard score of 11.25. This performance level is also far from satisfactory.

As regards the affective abilities of the pupils tested only 68.46 percent of the 15 items was correctly answered by the respondents and 46 out of 150 pupils or 30.66 percent achieved a standard score of 11.25. This result also connotes an unsatisfactory performance on this skill.

As a whole, the grand mean percentage score of the

three central schools in Catbalogan which is 56.33 percent with mastery level of 10.66 percent indicates that the performance level of the pupils is below average, and it means that only 56.35 percent of the 45 test items was mastered which is below the standard performance of 75 percent. Out of the 150 respondent pupils only 16 got the standard 75 percent of 45 items which is 33.75, as shown in Appendices I to K and based on the reselt found in Appendix L.

As shown by the foregoing results of the performance and mastery levels of the pupils in general, there is a great need to reteach the skills under all the three domains if only to improve the performance abilities of the pupils in the three central schools in Catbalogan.

Relationship Between the Mean Scores in Cognitive Abilities and Psychomotor Abilities of Elementary Mathematics Pupils (X and Y)

The degree of relationship between the mean performance scores in cognitive abilities and psychomotor abilities in elementary mathematics among the grade six pupils in the three central school in Catbalogan is shown in Table 6 based on the computation found in Appendix M-1.

Table 6 discloses that the mean score of cognitive abilities represented by X which is 25.36 and the

Table 6

Relationship Between the Mean Scores in Cognitive Abilities and Psychomotor Abilities of the Grade VI Elementary Mathematics Pupils

School	Mean Scores by Pairs of Variable		Obtained Correlation Between X & Y
	Cognitive (X)	Psychomotor (Y)	
Catbalogan I Central	8.82	9.00	
Catbalogan II Central	8.30	6.64	$r_1 = .95$
Catbalogan III Central	8.24	7.18	
Total	25.36	22.82	
Grand Mean	8.45	7.61	

mean score under psychomotor abilities represented by Y which is 22.82 obtained a correlation of .95. The obtained correlation of .95 connotes a very high correlation as shown by the legend of interpretation of results found in Chapter 3. This means that pupils who are good in cognitive skills are also as good in psychomotor skills.

Relationship Between the Mean Scores in Cognitive Abilities and Affective Abilities of Elementary Mathematics Pupils (X and Z)

Table 7 reveals the extent of correlation between the mean scores in cognitive abilities and affective abi-

Table 7

Relationship Between the Mean Scores in Cognitive . . Abilities and Affective Abilities of the Grade VI Elementary Mathematics Pupils

School	Mean Scores by Pairs of Variables		Obtained Correlation Between X & Z
	Cognitive (X)	Affective (Z)	
Catbalogan I Central	8.82	10.64	
Catbalogan II Central	8.30	10.06	$r_2 = .98$
Catbalogan III Central	8.24	10.12	
Total	25.36	30.82	
Grand Mean	8.45	10.27	

lities of the pupils in the three schools. It shows that the obtained correlation of the two variables based on the computation found in Appendix M-2 is .98. As shown by the legend for interpretation of the obtained correlation .98 indicates a very high correlation. This means that pupils who are good in cognitive skills are also as good in affective skills.

Relationship Between the Mean Scores in Psychomotor Abilities and Affective Abilities of Elementary Mathematics Pupils (Y and Z)

The obtained correlation between the mean scores

Table 8

Relationship Between the Mean Scores in Psychomotor Abilities and Affective Abilities of the Grade VI Elementary Mathematics Pupils

School	Mean Scores by Pairs of Variables		Obtained Correlation Between Y & Z
	Psychomotor (Y)	Affective (Z)	
Catbalogan I Central	9.00	10.64	
Catbalogan II Central	6.64	10.06	$r_3 = .99$
Catbalogan III Central	7.18	10.12	
Total	22.82	30.82	
Grand Mean	7.61	10.27	

in psychomotor abilties and affective abilities of the pupils from the three central schools in Catbalogan is revealed in Table 8. It discloses that based on the computed value of r_3 found in Appendix M-3 which is .99, there is a very high correlation between the psychomotor abilities and affective abilities of the pupils from the three schools. This interpretation is obtained from the same scale provided for in Chapter 3. This means that those pupils who are good in psychomotor skills are also good in affective skills.

As a whole, Tables 6, 7, and 8 reveal that the performance of the pupils under the three domains have very high correlation. These findings therefore, accepts the

hypothesis that the performance in elementary mathematics of the grade six pupils in the three central schools in Catbalogan in terms of cognitive, psychomotor and affective domains are significantly related. This is an indication that the three domains are supplementary with one another.

Chapter 5

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter deals with the summary, findings, conclusions and recommendations of the study.

Summary

This study was conducted to assess the cognitive, psychomotor and affective abilities of the grade six pupils in elementary mathematics in the three central schools in Catbalogan, Samar and their relationships with one another. Specifically, it sought answers to questions regarding the mean scores of the sample pupils in terms of the three domains, the extent of their performance or their mastery levels, under each domain and the degree of relationships of the performance of the pupils in terms of the three skills by using Gay's formula.

The primary focus of this study is to test the following hypothesis: The performance in elementary mathematics of the grade six pupils in the three central schools in Catbalogan, Samar in terms of cognitive, psychomotor and affective domains are significantly related.

The analytical-descriptive research method was employed in this study with a teacher-made achievement test as the main instrument used by the researcher in gathering data.

The result of this study is of importance to both teachers and administrators. They may serve as basis in determining whether or not the pupils have thoroughly mastered the skills under each domain. The mastery levels under each skill may suggest which of the skills need emphasis in teaching. They may also provide feedback for the administrators and other school officials to make supervisory and instructional redirection in order to attain quality instruction.

The important terms used in this study were properly defined for the convenience of those who may read this research work.

To give insights to the researcher and to enrich the content of this study, significant literature and studies relevant to this study were patiently reviewed. He consulted some mathematics teachers and master teachers particularly in constructing and analyzing the test questions.

Simple random sampling was adopted in selecting the respondents in this study where the researcher picked out the male and female respondents according to their number in the class records under the custody of their respective advisers.

The responses to the test questions were personally checked by the researcher, carefully tallied,

tabulated, and analyzed statistically in accordance with the most appropriate measure. Pearson r was used to test the hypothesis. A scale was also provided as guide for the interpretation of the obtained correlation of this study.

Findings. The findings of this study based on the computations found in Appendices I and series, J and series, K and series, L and series, and M and series are as follows:

1. The mean performance scores of the grade six pupils in elementary mathematics in the three central schools in Catbalogan in terms of the three domains are: Catbalogan I Central Elementary School got a mean score of 8.82 under cognitive domain; Catbalogan II Central Elementary School obtained 8.30 under the same domain; while Catbalogan III Central Elementary School got 8.24.

Under the psychomotor domain Catbalogan I Central Elementary School achieved a mean score of 9.00, while Catbalogan II Central Elementary School obtained 6.64, and Catbalogan III Central Elementary School got 7.18.

In terms of affective domain Catbalogan I Central Elementary School obtained a mean score of 10.64; Catbalogan II Central Elementary School, 10.06; and Catbalogan III Central Elementary School achieved 10.12.

As a summary the three central schools got an aggregate mean score of 25.36 thus yielding a grand mean of 8.45 under the cognitive domain. Under the psychomotor domain the three central schools obtained a summation of the mean scores of 22.82 and the grand mean of 8.45. In terms of affective domain the same schools had a total mean scores of 30.82 thus giving a grand mean of 10.27.

2. As regards the mastery levels of the pupils tested under the three domains the result revealed the following:

Catbalogan I Central Elementary School achieved a mean percentage score of 58.80 percent with a mastery level of 16 percent under the cognitive domain. This connotes an unsatisfactory performance. Under the psychomotor domain the pupils of this school achieved a mean percentage score of 60 percent with mastery level of 26 percent. This is also unsatisfactory. In terms of affective objectives the same pupils got a mean percentage score of 70.93 percent with 44 percent mastery level. This result is also unsatisfactory.

As a whole only 28.46 or 63.24 percent of the whole 45-item test was mastered by the grade six pupils in Catbalogan I Central Elementary School. This result is lower than the standard 75 percent mastery level and therefore it connotes an unsatisfactory performance.

Under the cognitive domain the grade six elementary mathematics pupils of Catbalogan II Central Elementary School obtained a mastery level of 18 percent with mean percentage score of 55.33 percent. This is below the standard performance level of 75 percent. Under the psychomotor items the mean percentage score of 44.26 percent with 14 percent mastery level achieved by the same pupils of Catbalogan II is also unsatisfactory. Under the affective test items these pupils got a percentage score of 67.06 percent with mastery level of 20 percent. This is also below par.

Out of the 50 pupils from Catbalogan II Central Elementary School who took the 45-item test only six got 75 percent standard score. Only 25 or 55.55 percent of the 45 items were correctly answered. The mastery level of 12 percent and the mean percentage score of 55.55 percent is below average.

Pupils from Catbalogan III Central Elementary School obtained a mean percentage score of 54.93 percent with eight percent mastery level under cognitive domain; 14 percent mastery level with mean percentage score of 47.86 percent under psychomotor; and 28 percent mastery level with mean percentage score of 67.46 percent under the affective domain. These mastery levels under the three domains obtained by the pupils of Catbalogan III Central Elementary School are all unsatisfactory.

As a summation of the mean percentage and mastery levels of the 150 pupils from the three central schools in Catbalogan, it was found out that under the cognitive skill the mean percentage score is 56.53 percent with mastery level of 14 percent. In terms of psychomotor domain the pupils obtained a mean percentage score of 50.73 percent with mastery level of 18 percent. As regards the affective abilities these pupils achieved a mean percentage score of 68.46 with 30.66 percent mastery level. As a whole, the grand mean percentage score of the three central schools in terms of the three domains is 56.35 percent with mastery level of 10.66. This connotes an unsatisfactory mathematical ability of the pupils in the three schools of Catbalogan.

3. The degree of relationship between the mean scores obtained by the pupils in the three central schools of Catbalogan in terms of the three domains revealed that:

The mean score under the cognitive abilities of the pupils which is represented by X is 25.36; while the mean score under the psychomotor domain which is represented by Y is 22.82. The obtained correlation between these two variables represented by 3_1 is .95. This obtained correlation connotes a very high correlation based on the legend for interpretation of results.

The 25.36 mean score under the cognitive domain when paired with the mean score under the affective domain represented by Z which is 30.82 yielded correlation coefficient of .98 which represents r_2. The .98 correlation coefficient reveals a very high correlation between the performance abilities of the pupils in terms of cognitive and affective domains.

The mean score of Y which is 22.82 when paired with Z which is 30.82 obtained an r_3 of .99. This means that there is a very high correlation between the performance abilities of the pupils in terms of psychomotor domains and affective domains.

The findings, therefore, accepts the hypothesis that the performance in elementary mathematics of the grade six pupils in the three central schools in Catbalogan in terms of cognitive, psychomotor and affective domains are significantly related.

This means that the pupils who are deficient in cognitive ability are equally deficient in psychomotor and affective abilities.

Conclusions

In consonnance with the foregoing findings the following conclusions are hereby presented:

1. Since there is a very high correlation among

the three domains, it may be concluded and generalized that those who are deficient in cognitive ability, are equally deficient in the psychomotor and the affective abilities and those who are good in one domain are also good in other domains.

2. Since the performance and mastery level of the pupils are unsatisfactory, it follows that the instruction in elementary mathematics for the grade six pupils in the three central schools has not effectively satisfied the established standard of 75 percent.

Recommendations

The researcher hereby recommends the following:

1. More studies and researches should be conducted to find out the causes of low achievement levels of the pupils in elementary mathematics.

2. Mathematics teachers should continue giving equal emphasis not only in the teaching of the three domains but also when evaluating their performance. Teacher-made tests must emphasize equally these skills.

3. Teachers, administrators, curriculum planners and other school officials should collectively make provisions to improve the ability levels of the pupils in elementary mathematics through instructional redirection.

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A P P E N D I C E S

APPENDIX A

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

July 10, 1986

The Dean of Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

S i r :

In my desire to start writing my thesis proposal, I have the honor to request approval of one of the following problems for my thesis; preferably number one.

1. COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG THE GRADE VI PUPILS IN THE THREE CENTRAL SCHOOLS IN CATBALOGAN, SAMAR

2. THEORETICAL AND COMPUTATIONAL PERFORMANCE IN ELEMENTARY MATHEMATICS AMONG GRADE VI PUPILS IN CATBALOGAN I DISTRICT, DIVISION OF SAMAR

3. LETIGATION OF ADMINISTRATIVE CASES AMONG SCHOOL OFFICIALS AND TEACHERS IN THE DIVISION OF SAMAR FROM 1980 to 1986.

I hope for your early favorable action on this request.

Very truly yours,

(SGD.) JAIME M. MABESA
Researcher

Recommending Approval:

(SGD.) ALEJANDRO E. CANANUA, M. Ed.
Head, Research and Publication

APPROVED:

(SGD.) DOMINADOR Q. CABANGANAN, ED. D.
Dean, Graduate Studies

APPENDIX B

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

GRADUATE SCHOOL

APPLICATION FOR ASSIGNMENT OF ADVISER

NAME MABESA JAIME MABANSAG
Family Name First Name Middle Name

CANDIDATE FOR DEGREE IN MASTER OF ARTS

AREA OF SPECIALIZATION ADMINISTRATION AND SUPERVISION

TITLE OF PROPOSED THESIS: COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG THE GRADE VI PUPILS IN THE THREE CENTRAL SCHOOLS IN CATBALOGAN, SAMAR

NAME OF REQUESTED ADVISER: MR. ALEJANDRO E. CANANUA

APPROVAL OF ADVISER _____ DISAPPROVAL _____

(SGD.) ALEJANDRO E. CANANUA
Adviser

APPROVED:

(SGD.) DOMINADOR Q. CABANGANAN Ed. D.
Dean, Graduate School

Date July 17, 1987

APPENDIX C

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

July 17, 1987
(Date)

Department : Graduate Studies

Name of Mentor : Asso. Prof. Alejandro E. Cananua

Dear Asso. Prof. Alejandro E. Cananua,

The Graduate Studies (department is pleased to appoint you as thesis mentor of Mr. Jaime Mabesa effective July 17 1987.

As thesis adviser, you are expected to meet with the student at least one hour once a week within the duration of thesis writing.

(SGD.) DOMINADOR Q. CABANGANAN, Ed.D.
Department Chairman

CONFORME:

(SGD.) ALEJANDRO E. CANANUA
Adviser

July 17, 1987
Date

APPENDIX D

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

September 20, 1988

The Dean of Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

S i r :

I have the honor to request that I be scheduled on October 1, 1988 to defend my thesis proposal entitled COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG THE GRADE VI PUPILS IN THE THREE CENTRAL SCHOOLS IN CATBALOGAN, SAMAR.

In this connection, I am submitting herewith five copies of my thesis proposal for distribution to the Dean and the panel members.

I hope for your favorable action on this matter.

Very truly yours,

(SGD.) JAIME M. MABESA
Researcher

Recommending Approval:

(SGD.) ALEJANDRO E. CANANUA
Adviser

APPROVED:

(SGD.) DOMINADOR Q. CABANGANAN, Ed. D.
Dean, Graduate Studies

APPENDIX E

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

GRADUATE SCHOOL

November 4, 1988

The Schools Division Superintendent
Division of Samar
Catbalogan, Samar

M a d a m :

I have the honor to request permission from your Office to administer the trial run of my achievement test for the study entitled "COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG THE GRADE VI PUPILS IN THE THREE CENTRAL SCHOOLS IN CATBALOGAN, SAMAR", to the grade six pupils of Salug Elementary School, Catbalogan I District, on the fourteenth day of November, 1988.

I hope for your favorable action on this matter.

Very truly yours,

(SGD.) JAIME M. MABESA
Graduate Student

APPROVED:

(SGD.) LYDIA MIRAS-LOPEZ
Schools Division Superintendent

APPENDIX F

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

GRADUATE SCHOOL

November 4, 1988

The Schools Division Superintendent
Division of Samar
Catbalogan, Samar

M a d a m :

I have the honor to request permission and approval from your Office to administer my achievement test for the study entitled "COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG THE GRADE VI PUPILS IN THE THREE CENTRAL SCHOOLS IN CATBALOGAN, SAMAR", within the month of November 1988.

Anticipating favorable action on this matter.

Very truly yours,

(SGD.) JAIME M. MABESA
Graduate Student

APPROVED:

(SGD.) LYDIA MIRAS-LOPEZ
Schools Division Superintendent

APPENDIX G

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

January 11, 1989

The Dean of Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

S i r :

I have the honor to request that I be scheduled on January 29, 1989 to defend my thesis entitled "COGNITIVE, PSYCHOMOTOR AND AFFECTIVE ABILITIES IN ELEMENTARY MATHEMATICS AMONG THE GRADE VI PUPILS IN THE THREE CENTRAL SCHOOLS IN CATBALOGAN, SAMAR".

In this connection, I am submitting herewith six (6) copies of my thesis for distribution to my adviser, the chairman and the members of the panel of examiners.

Anticipating favorable action on this matter.

Very truly yours,

(SGD.) JAIME M. MABESA
Graduate Student

Recommending Approval:

(SGD.) ALEJANDRO E. CANANUA
Adviser

APPROVED:

(SGD.) DOMINADOR Q. CABANGANAN, Ed. D.
Dean, Graduate Studies

APPENDIX H-1

Table of Specification

Content	Skills			No. of Items
	Cognitive	Psychomotor	Affective	
Whole Numbers	1, 7, 11 (3)	16, 21, 30 (3)	31, 37, 42 (3)	9
Rational Numbers	2, 8, 13 (3)	17, 22, 27 (3)	32, 38, 45 (3)	9
Geometry	3, 9, 12 (3)	18, 19, 28 (3)	33, 34, 39 (3)	9
Measurement	4, 10, 14 (3)	23, 24, 29 (3)	35, 40, 43 (3)	9
Graph & Scale	5, 6, 15 (3)	20, 25, 26 (3)	35, 41, 44 (3)	9
Total No. of Items	15	15	15	45

APPENDIX H-2

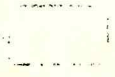
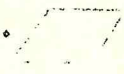
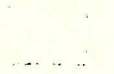
ACHIEVEMENT TEST IN
ELEM. MATHEMATICS VI

Test I. Direction: Read the sentence carefully and write the letter of the correct answer on the blank before each number.

___1. The identity element of addition is:
a. 0 b. 1 c. 2 d. 3

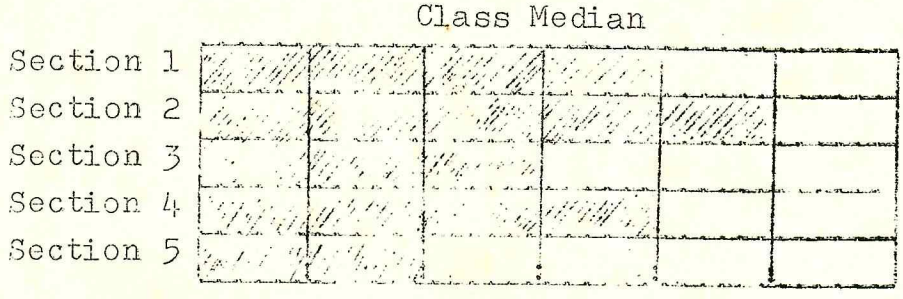
___2. 75% when expressed in decimal form is:
a. 7.5 b. .75 c. 75.00 d. 7.05

___3. Which of the following is a triangle?

a.  b.  c.  d. 

___4. There are 1,000 meters in one kilometer. What part of a kilometer is one meter?
a. .1 b. .01 c. .001 d. .0001

(5-6). Below is a horizontal graph on a class median in grade six mathematics in a certain school. Study the graph and answer each question found below:



___5. Which section has the highest median?
a. Section 1 c. Section 3 e. Section 5
b. Section 2 d. Section 4

___6. Which section has the lowest median?
a. Section 1 c. Section 3 e. Section 5
b. Section 2 d. Section 4

___7. What does Roman Numeral D stand for?
a. 50 b. 100 c. 500 d. 1,000

___8. What is the least common denominator for 1/4 plus 2/5?
a. 20 b. 15 c. 10 d. 8

___9. Which of the following figures has a right angle?
a.  b.  c.  d. 

___10. In a grade six class there are 10 boys and 20 girls. What is the ratio of boys to the number of girls?
a. 1:2 b. 1:3 c. 1:4 d. 1:5

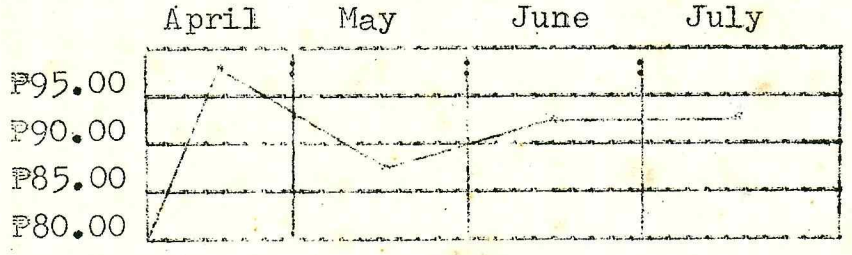
___11. In which of the following does the 4 means million?
a. 8,463,205 c. 3,640,142
b. 4,853,233 d. 4,604,238

___12. How many equal angles has a quadrilateral polygon?
a. 3 b. 4 c. 5 c. no angle

___13. Which of the following fraction is greater than one?
a. 2/5 b. 3/7 c. 2/11 d. 9/5

___14. If Peter can solve difficult problem in 3 minutes, how many difficult problems can he solve in half an hour?
a. 33 b. 27 c. 24 d. 10

___15. Antonio earned by selling newspaper. The following graph shows how much he earned each month.



How much did Antonio earn in June?
a. ₱80.00 c. ₱90.00
b. ₱85.00 d. ₱95.00

Test II. Direction: Solve the following problems and write the letter of the correct answer on the blank before each number.

___16. The product of 315 and 32 is:
a. 9,080 c. 10,080
b. 9,180 d. 10,180

___17. At the rate of 10% a year, what is the interest of ₱2,000.00 for one year?
a. ₱100.00 c. ₱300.00
b. ₱200.00 d. ₱400.00

(18-19). Study the following rectangle and answer the questions that follow:

15 meters

10 meters

___18. What is its perimeter?
a. 25 meters c. 100 meters
b. 50 meters d. 150 meters

___19. What is its area?
a. 25 sq. meters c. 100 sq. meters
b. 50 sq. meters d. 150 sq. meters

___20. A class in mathematics has a ratio of one boy to three girls. If there are nine boys how many are girls?
a. 12 girls c. 27 girls
b. 12 boys d. 27 boys

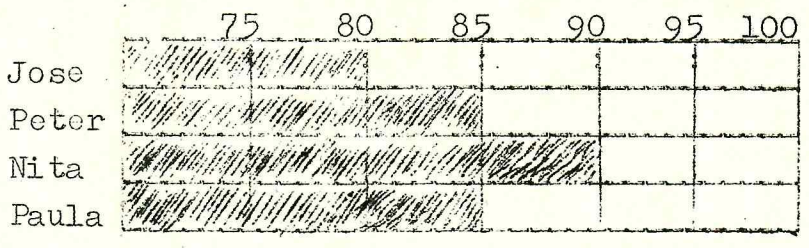
___21. Find N in "675 ÷ 5 = N".
a. 130 c. 140
b. 135 d. 145

___22. If you multiply 3/5 by 1/3 what is the product?
a. 3/15 c. 5/15
b. 4/15 d. 6/15

___23. Tita is 154 centimeters tall. She is 18 centimeters taller than Aurora. How tall is Aurora?
a. 162 cms. b. 164 cms. c. 136 cms. d. 146 cms.

___24. If one kilo of rice is equal to 4 chupas, how many chupas are there in ten kilos?
a. 9 chupas c. 45 chupas
b. 40 chupas d. 50 chupas

(25-26). Study the following graph of the scores of four pupils. Answer the questions that follow.

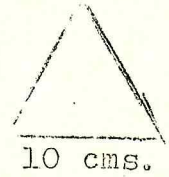


___25. What is the total score of the four pupils?
a. 300 b. 325 c. 340 d. 400

___26. How much is the difference between the combined scores of the two boys and the two girls?
a. 0 b. 10 c. 5 d. 15

___27. What is the sum of 2.35, .05, and 1.6?
a. .303 b. 4.47 c. 3.03 d. 4.00

___28. If the formula for finding the perimeter of a triangle is equal to the sum of its sides, what is the perimeter of the following triangle?



a. 24 cms. b. 34 cms. c. 54 cms. d. 124 cms

___29. A passenger bus travels at an average speed of 40 kilometers per hour. How many kilometers will it travel in one-half day?
a. 24 kilometers c. 480 kilometers
b. 100 kilometers d. 500 kilometers

___30. If Jose's grades in Elem. Mathematics are 85, 83, 86, and 90, what is his average grade?
a. 85 b. 86 c. 87 d. 88

Test III. Read the following sentences and select the letter of the answer which you think is most suited to your attitude, interest and decision.

___31. I enjoy solving problems with given numbers _____ than word problems.
a. a lot more c. more e. a lot less
b. a little more d. a little less

___32. It is easier to solve problems involving similar fractions than problems involving dissimilar fractions.
a. fully agree c. agree e. fully disagree
b. strongly agree d. disagree

___33. It is enjoyable to construct polygon than to solve word problems
a. fully agree c. agree e. fully agree
b. strongly agree d. disagree

___34. What is the most time you have ever spent working on geometrical figures until you become disinterested?
a. about five minutes d. about one day
b. about thirty minutes e. off and on for days
c. about one hour

___35. I use measuring devices in solving problems involving measurement.
a. very often c. sometimes e. never
b. often d. hardly ever

___36. Problems presented in graphs are ___ than problems without graphs.
a. very much easier c. easier e. very much harder
b. less easier d. harder

___37. Do you check the solution to mathematics problems?
a. never c. often times e. always
b. sometimes d. almost always

___38. I like multiplication with decimals ___ than multiplication with fractions.
a. a lot more c. more e. a lot less
b. a little more d. less

___39. Geometry is a/an ___ subject.
a. very difficult c. easy e. boring
b. difficult d. very easy

___40. I like solving problems involving the speed of cars and airplanes ___ than problems about the cost of rice and fish.
a. a little less c. more e. a lot more
b. less d. a little more

___41. Locating places on maps should also be done during mathematics class.
a. strongly agree c. disagree e. fully agree
b. agree d. strongly disagree

___42. How many of the assigned mathematics problems have you solved since the start of this school year?
a. 100% c. about 80% to 85% e. below 70%
b. about 90 to 95% d. about 70% to 75%

___43. My knowledge on measurement which I learned in mathematics is ___ in my science class.
a. absolutely useless c. useful
b. useless d. almost always useful

44. Scale drawing of objects is done in our mathematics class.
a. very often
b. quite often
c. often
d. sometimes
e. never

45. Counting money is _____ than solving problems involving money.
a. very much easier
b. less easier
c. easier
d. harder
e. much harder

APPENDIX H-3

ANSWERS KEY

Test I

1. a
2. b
3. d
4. c
5. b
6. e
7. c
8. a
9. c
10. a
11. b
12. b
13. d
14. d
15. c

Test II

16. c
17. b
18. b
19. d
20. c
21. b
22. a
23. c
24. b
25. c
26. b
27. d
28. b
29. b
30. b

Test III

31. a. .6
    b. .8
    c. 1.0
    d. .4
    e. .2

32. a. 1.0
    b. .8
    c. .6
    d. .4
    e. .2

33. a. 1.0
    b. .8
    c. .6
    d. .4
    e. .2

34. a. 1.0
    b. .8
    c. .6
    d. .4
    e. .2

35. a. .4
    b. .6
    c. 1.0
    d. .8
    e. .2

36. a. .4
    b. .6
    c. 1.0
    d. .8
    e. .2

37. a. .2
    b. 1.0
    c. .8
    d. .6
    e. .4

38. a. .4
    b. .6
    c. 1.0
    d. .8
    e. .2

39. a. .6
    b. 1.0
    c. .8
    d. .4
    e. .2

40. a. .6
    b. 1.0
    c. .8
    d. .4
    e. .2

41. a. .8
    b. 1.0
    c. .6
    d. .4
    e. .2

42. a. .4
    b. .8
    c. 1.0
    d. .6
    e. .2

43. a. .2
    b. .4
    c. 1.0
    d. .8
    e. .6

44. a. .4
    b. .6
    c. .8
    d. 1.0
    e. .2

45. a. .6
    b. .4
    c. 1.0
    d. .8
    e. .2

APPENDIX I

RAW SCORES COLLECTED FROM 50 PUPILS OF CATBALOGAN I CENTRAL ELEMENTARY SCHOOL

Respondents	Cognitive	Psychomotor	Affective	Total
1	14	14	10.6	30.6
2	12	12	12	36
3	10	14	11.8	35.8
4	12	11	12.8	35.8
5	9	13	12.4	34.4
6	11	12	11	34
7	11	12	9.4	32.4
8	11	10	11.4	32.4
9	11	12	9.4	32.4
10	10	11	10.6	31.6
11	9	10	13.2	32.2
12	7	12	12.2	31.2
13	10	11	10.2	31.2
14	9	11	10.4	30.4
15	9	10	11.2	30.2
16	8	10	12	30
17	10	10	10	30
18	9	11	10	30
19	10	10	9.8	29.8
20	10	9	10.8	29.8

RAW SCORES... (cont'd.)

Respondents	Cognitive	Psychomotor	Affective	Total
21	9	8	12.8	29.8
22	10	10	9.6	29.6
23	10	8	11.4	29.4
24	9	8	12.2	29.2
25	9	9	11	29
26	10	8	11.8	28.8
27	9	9	10.6	28.6
28	8	9	11.4	28.4
29	9	7	12.2	28.2
30	11	8	9.2	28.2
31	6	10	12	28
32	9	10	8.8	27.8
33	9	9	9.8	27.8
34	8	10	9.4	27.4
35	8	8	11.2	27.2
36	7	10	10.2	27.2
37	8	9	8.2	25.2
38	8	9	8.2	25.2
39	7	9	9	25
40	8	5	11.8	24.8

RAW SCORES... (cont'd.)

Respondents	Cognitive	Psychomotor	Affective	Total
41	9	4	11.4	24.4
42	5	8	11.2	24.2
43	7	7	9.8	23.8
44	8	5	10.2	23.2
45	6	7	10	23
46	6	6	10.2	22.2
47	7	6	8.8	21.8
48	9	1	11	21
49	4	5	10.6	19.6
50	5	3	8.6	16.6

APPENDIX I-1

COMPUTATION FOR MEAN SCORE UNDER COGNITIVE DOMAIN OF CATBALOGAN I CENTRAL ELEMENTARY SCHOOL

	f	d	fd
14	1	5	5
13	0	4	0
12	3	3	9
11	4	2	8
10	9	1	9
9	14	0	0
8	8	-1	-8
7	5	-2	-10
6	3	-3	-9
5	2	-4	-8
4	1	-5	-5
	N = 50		$\Sigma fd = 9$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 9 + \frac{-9}{50} \times 1$$

$$= 9 - .18 \times 1$$

$$= 9 - .18$$

$$M = 8.82$$

APPENDIX I-2

COMPUTATION FOR MEAN SCORE UNDER PSYCHOMOTOR DOMAIN OF CATBALOGAN I CENTRAL ELEMENTARY SCHOOL

	f	d	fd
14	2	5	10
13	1	4	4
12	5	3	15
11	5	2	10
10	11	1	11
9	8	0	0
8	7	-1	-7
7	3	-2	-6
6	2	-3	-6
5	3	-4	-12
4	1	-5	-5
3	1	-6	-6
2	0	-7	0
1	1	-8	-8
	N = 50		$\Sigma fd = 0$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 9 + \frac{0}{50} \times 1$$

$$= 9 + 0 \times 1$$

$$M = 9$$

APPENDIX I-3

COMPUTATION FOR MEAN SCORE UNDER AFFECTIVE DOMAIN OF CAUBALOGAN I CENTRAL ELEMENTARY SCHOOL

	f	d	fd
13	3	2	6
12	10	1	10
11	15	0	0
10	12	-1	-12
9	8	-2	-16
8	2	-3	-6
	N = 50		$\Sigma fd = -18$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 11 + \frac{-18}{50} \times 1$$

$$= 11 - .36 \times 1$$

$$= 11 - .36$$

$$M = 10.64$$

APPENDIX J

RAW SCORES COLLECTED FROM 50 PUPILS OF CATBALOGAN II CENTRAL ELEMENTARY SCHOOL

Respondents	Cognitive	Psychomotor	Affective	Total
1	14	12	11.2	37.2
2	12	12	12.4	36.4
3	11	12	11.8	33.8
4	11	13	10.6	33.6
5	11	12	10.4	33.4
6	10	12	11.2	33.2
7	11	9	12.6	32.6
8	10	12	10.6	32.6
9	12	9	10.4	31.4
10	10	10	11	31
11	11	9	11	31
12	11	9	10.2	30.2
13	9	9	12	30
14	13	5	11	29
15	11	9	8.8	28.8
16	10	7	11.6	28.6
17	9	8	10.2	27.2
18	10	6	10.2	26.2
19	10	7	8.4	25.4
20	10	5	10.4	25.4

RAW SCORES... (cont'd.)

Respondents	Cognitive	Psychomotor	Affective	Total
21	8	7	10.2	25.2
22	10	5	10	25
23	10	5	9.8	24.8
24	6	8	10.2	24.2
25	9	5	10.2	24.2
26	10	4	10	24
27	6	7	10.8	23.8
28	6	7	10.8	23.8
29	8	7	8.6	23.6
30	8	5	10.4	23.4
31	8	6	9.4	23.4
32	7	6	10	23
33	8	6	8.8	22.8
34	6	6	9.6	21.6
35	8	5	8.4	21.4
36	5	7	9.2	21.2
37	5	7	9.2	21.2
38	6	5	10	21
39	8	2	10.8	20.8
40	6	4	10.6	20.6

RAW SCORES... (cont'd.)

Respondents	Cognitive	Psychomotor	Affective	Total
41	5	5	10.2	20.2
42	5	4	10.8	19.8
43	7	3	9.2	19.2
44	4	5	9.8	18.8
45	7	3	8.4	18.4
46	7	2	9.2	18.2
47	6	2	9.6	17.6
48	5	2	7.6	14.6
49	1	4	9.4	14.4
50	4	1	7	12

APPENDIX J-1

COMPUTATION FOR MEAN SCORE UNDER COGNITIVE DOMAIN OF CATBALOGAN II CENTRAL ELEMENTARY SCHOOL

	f	d	fd
13 - 14	2	3	6
11 - 12	9	2	18
9 - 10	13	1	13
7 - 8	11	0	0
5 - 6	12	-1	-12
3 - 4	2	-2	- 4
1 - 2	1	-3	- 1
	N = 50		$\Sigma fd = 20$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 7.5 + \frac{20}{50} \times 2$$

$$= 7.5 + .4 \times 2$$

$$= 7.5 + .8$$

$$M = 8.3$$

APPENDIX J-2

COMPUTATION FOR MEAN SCORE UNDER PSYCHOMOTOR DOMAIN OF CATBALOGAN II CENTRAL ELEMENTARY SCHOOL

	f	d	fd
13	1	6	6
12	6	5	30
11	0	4	0
10	1	3	3
9	6	2	12
8	2	1	2
7	8	0	0
6	5	-1	-5
5	10	-2	-20
4	4	-3	-12
3	2	-4	- 8
2	4	-5	-20
1	1	-6	- 6
	N = 50		$\Sigma fd = -18$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 7 + \frac{-18}{50} \times 1$$

$$= 7 - .36 \times 1$$

$$= 7 - .36$$

$$M = 6.64$$

APPENDIX J-3

COMPUTATION FOR MEAN SCORE UNDER AFFECTIVE DOMAIN OF CATBALOGAN II CENTRAL ELEMENTARY SCHOOL

	f	d	fd
13	1	3	3
12	4	2	8
11	12	1	12
10	19	0	0
9	9	-1	-9
8	4	-2	-8
7	1	-3	-3
	N = 50		$\Sigma fd = 3$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 10 + \frac{3}{50} \times 1$$

$$= 10 + .06 \times 1$$

$$= 10 + .06$$

$$M = 10.06$$

APPENDIX K

RAW SCORES COLLECTED FROM 50 PUPILS OF CABALOGAN III CENTRAL ELEMENTARY SCHOOL

Respondents	Cognitive	Psychomotor	Affective	Total
1	15	11	10.6	36.6
2	13	12	10.8	35.8
3	10	12	11	33
4	10	12	11	33
5	10	9	12.8	31.8
6	9	11	11.2	31.2
7	9	11	11	31
8	11	8	11	30
9	8	12	10	30
10	10	9	11	30
11	11	9	9.6	29.6
12	10	7	12.2	29.2
13	9	10	9.6	28.6
14	10	8	10.4	28.4
15	10	9	8.6	27.6
16	9	8	10.4	27.4
17	7	8	12	27
18	8	8	10.8	26.8
19	10	7	9.6	26.6
20	9	6	11.4	26.4

RAW SCORES... (cont'd.)

Respondents	Cognitive	Psychomotor	Affective	Total
21	8	8	10.2	26.2
22	8	9	9	26
24	9	4	11.8	24.8
25	8	8	8.6	24.6
26	8	7	9.4	24.4
27	9	5	10	24
28	10	7	7.8	24.8
29	9	7	8	24
30	9	6	9	24
31	8	4	11.8	23.8
32	9	4	10.8	23.8
33	8	7	8.4	23.4
34	6	7	9.8	22.8
35	6	7	10.4	23.4
36	9	4	9.8	22.8
37	7	7	8.6	22.6
38	10	5	7.6	22.6
39	5	6	11.6	22.6
40	8	5	9.2	22.2

RAW SCORES... (cont'd.)

Respondents	Cognitive	Psychomotor	Affective	Total
41	10	3	9	22
42	5	4	11.8	20.8
43	4	8	8.8	20.8
44	4	6	10.6	20.6
45	6	5	9.4	20.4
46	6	4	9.8	19.8
47	5	3	10.6	18.6
48	3	7	8.4	18.4
49	6	2	9.6	17.6
50	4	5	8.4	17.4

APPENDIX K-1

COMPUTATION FOR MEAN SCORE UNDER COGNITIVE DOMAIN OF CATBALOGAN III CENTRAL ELEMENTARY SCHOOL

	f	d	fd
15	1	6	6
14	0	5	0
13	1	4	4
12	0	3	0
11	2	2	4
10	11	1	11
9	11	0	0
8	9	-1	- 9
7	3	-2	- 6
6	5	-3	-15
5	3	-4	-12
4	3	-5	-15
3	1	-6	- 6
	N = 50		$\Sigma fd = -38$

$$M = AM + \frac{\Sigma fd}{N} \times i$$

$$= 9 + \frac{-38}{50} \times 1$$

$$= 9 - .76 \times 1$$

$$= 9 - .76$$

$$M = 8.24$$

APPENDIX K-2

COMPUTATION FOR MEAN SCORE UNDER PSYCHOMOTOR DOMAIN OF CATBALOGAN III CENTRAL ELEMENTARY SCHOOL

	f	d	fd
12	4	5	20
11	3	4	12
10	1	3	3
9	5	2	10
8	9	1	9
7	10	0	0
6	4	-1	- 4
5	5	-2	-10
4	6	-3	-18
3	2	-4	- 8
2	1	-5	- 5
	N = 50		$\sum$fd = 9

$$M = AM + \frac{\sum fd}{N} \times i$$

$$= 7 + \frac{9}{50} \times 1$$

$$= 7 + .18 \times 1$$

$$= 7 + .18$$

$$M = 7.18$$

APPENDIX K-3

COMPUTATION FOR MEAN SCORE UNDER AFFECTIVE DOMAIN OF CATBALOGAN III CENTRAL ELEMENTARY SCHOOL

	f	d	fd
13	1	3	3
12	6	2	12
11	13	1	13
10	14	0	0
9	10	-1	-10
8	6	-2	-12
	N = 50		fd = 6

$$M = AM + \frac{fd}{N} \times i$$

$$= 10 + \frac{6}{50} \times 1$$

$$= 10 + .12 \times 1$$

$$= 10 + .12$$

$$M = 10.12$$

APPENDIX L-1

COMPUTATION FOR MEAN PERCENTAGE SCORE AND MASTERY LEVEL OF CATBALOGAN I CENTRAL ELEMENTARY SCHOOL UNDER EACH DOMAIN

$$\text{Mean Percentage Score} = \frac{\text{Mean}}{\text{Total No. of Test Items}} \times 100$$

$$MPS_{(\text{Cognitive})} = \frac{8.82}{15} \times 100$$

$$MPS_c = .588 \times 100$$

$$MPS_c = 58.8\% \text{ Below Average}$$

$$\text{Mastery Level} = \frac{\text{No. of Pupils who obtained the standard score of 11.25}}{\text{No. of pupils who took the test}} \times 100$$

$$M.L._{(\text{Cognitive})} = \frac{8}{50} \times 100$$

$$M.L._c = .16 \times 100$$

$$M.L._c = 16\% \text{ Unsatisfactory cognitive ability}$$

$$MPS_{(\text{psychomotor})} = \frac{9}{15} \times 100$$

$$MPS_p = .6 \times 100$$

$$MPS_p = 60\% \text{ Below average}$$

$$M.L._{(\text{psychomotor})} = \frac{13}{50} \times 100$$

$$= .26 \times 100$$

$$M.L._p = 26\% \text{ Unsatisfactory psychomotor ability}$$

$$MPS_{(affective)} = \frac{10.64}{15} \times 100$$

$$= .7093 \times 100$$

$$MPS_a = 70.93\% \text{ Below average}$$

$$M.L._{(affective)} = \frac{22}{50} \times 100$$

$$= .44 \times 100$$

$$M.L._a = 44\% \text{ Unsatisfactory affective ability}$$

$$MPS_{(cog., psycho., affect.)} = \frac{28.46}{45} \times 100$$

$$= .6324 \times 100$$

$$MPS_{cpa} = 63.24\% \text{ Below average}$$

$$M.L._{(cog., psycho., affect.)} = \frac{\text{No. of pupils who obtained the standard score of } 33.75}{\text{No. of pupils who took the test}} \times 100$$

$$= \frac{6}{50} \times 100$$

$$= .12 \times 100$$

$M.L._{cpa}$ = 12% of the pupils have mastered the lesson tested. Unsatisfactory performance.

APPENDIX L-2

COMPUTATION FOR MEAN PERCENTAGE SCORE AND MASTERY LEVEL OF CATBALOGAN II CENTRAL ELEMENTARY SCHOOL UNDER EACH DOMAIN

$$\text{Mean Percentage Score} = \frac{\text{Mean}}{\text{Total No. of Test Items}} \times 100$$

$$MPS_{(\text{cognitive})} = \frac{8.3}{15} \times 100$$

$$= .5533 \times 100$$

$$MPS_c = 53.33 \text{ Below Average}$$

$$\text{Mastery Level} = \frac{\text{No. of pupils who obtained the standard score of 11.25}}{\text{No. of pupils who took the test}} \times 100$$

$$M.L._c = \frac{9}{50} \times 100$$

$$= .18 \times 100$$

$$M.L._c = 18\%$$

$$MPS_{(\text{psychomotor})} = \frac{6.64}{15} \times 100$$

$$= .4426 \times 100$$

$$MPS_p = 44.26\% \text{ Below Average}$$

$$M.L._{(\text{psychomotor})} = \frac{7}{50} \times 100$$

$$= .14 \times 100$$

$$M.L._p = 14\%$$

$$MPS_{(affective)} = \frac{10.06}{15} \times 100$$

$$= .6706 \times 100$$

$$MPS_a = 67.06\% \text{ Below Average}$$

$$M.I._{(affective)} = \frac{10}{50} \times 100$$

$$= .2 \times 100$$

$$M.L._a = 20\%$$

$$MPS_{(cog.,psycho.,affect.)} = \frac{25}{45} \times 100$$

$$= .5555 \times 100$$

$$MPS_{cpa} = 55.55 \text{ Below Average}$$

$$M.L._{(cog.,psycho,affect.)} = \frac{\text{No. of pupils who obtained the standard score of } 33.75}{\text{No. of pupils who took the test}} \times 100$$

$$= \frac{6}{50} \times 100$$

$$= .12 \times 100$$

$M.L._{cpa}$ = 12% of the pupils have mastered the lesson tested. Unsatisfactory performance.

APPENDIX L-3

COMPUTATION FOR MEAN PERCENTAGE SCORE AND MASTERY LEVEL OF CATBALOGAN III CENTRAL ELEMENTARY SCHOOL UNDER EACH DOMAIN

$$\text{Mean Percentage Score} = \frac{\text{Mean}}{\text{Total No. of Test Items}} \times 100$$

$$MPS_{(\text{cognitive})} = \frac{8.24}{15} \times 100$$

$$= .5493 \times 100$$

$$MPS_c = 54.93\% \text{ Below Average}$$

$$\text{Mastery Level} = \frac{\text{No. of pupils who obtained the standard score of 11.25}}{\text{No. of pupils who took the test}} \times 100$$

$$M.L._{(\text{cognitive})} = \frac{4}{50} \times 100$$

$$= .08 \times 100$$

$$M.L._c = 8\%$$

$$MPS_{(\text{psychomotor})} = \frac{7.18}{15} \times 100$$

$$= .4787 \times 100$$

$$MPS_p = 47.86\% \text{ Below Average}$$

$$M.L._{(\text{psychomotor})} = \frac{7}{50} \times 100$$

$$= .14 \times 100$$

$$M.L._p = 14\%$$

$$MPS_{(affective)} = \frac{10.12}{15} \times 100$$

$$= .6746 \times 100$$

$$MPS_a = 67.46\% \text{ Below Average}$$

$$M.L._{(affective)} = \frac{14}{50} \times 100$$

$$= .28 \times 100$$

$$M.L._a = 28\%$$

$$MPS_{(cog.,psycho.,affect.)} = \frac{25.54}{45} \times 100$$

$$= .5675 \times 100$$

$$MPS_{cpa} = 56.75\% \text{ Below Average}$$

$$M.L._{(cog.,psycho.,affect.)} = \frac{\text{No. of pupils who obtained the standard score of } 33.75}{\text{No. of pupils who took the test}} \times 100$$

$$= \frac{4}{50} \times 100$$

$$= .08 \times 100$$

$M.L._{cpa}$ = 8% of the pupils have mastered the lesson tested. Unsatisfactory performance.

APPENDIX L-4

SUMMARY OF MEAN PERCENTAGE SCORE AND MASTERY LEVEL OF THE THREE CENTRAL SCHOOLS UNDER EACH DOMAIN

$$MPS_{(\text{cognitive I-III})} = \frac{\text{Mean}}{\text{No. of Items}} \times 100$$

$$= \frac{8.45}{15} \times 100$$

$$MPS_{c\ I-III} = 56.33\% \text{ Below Average}$$

$$M.L._{(\text{cognitive I-III})} = \frac{\text{No. of pupils who obtained standard score of 11.25}}{\text{No. of pupils who took the test}} \times 100$$

$$= \frac{21}{150} \times 100$$

$$= .14 \times 100$$

$$M.L._{c\ I-III} = 14\%$$

$$MPS_{(\text{psychomotor I-III})} = \frac{7.61}{15} \times 100$$

$$= .5073 \times 100$$

$$MPS_{p\ I-III} = 50.73 \text{ Below Average}$$

$$M.L._{(\text{psychomotor I-III})} = \frac{27}{150} \times 100$$

$$= .18 \times 100$$

$$M.L._{p\ I-III} = 18\%$$

$$MPS_{(affective\ I-III} = \frac{10.27}{15} \times 100$$

$$= .6846 \times 100$$

$$MPS_{a\ I-III} = 68.46\%\ Below\ Average$$

$$M.L._{(affective\ I-III)} = \frac{46}{150} \times 100$$

$$= .3066 \times 100$$

$$M.L._{a\ I-III} = 30.66\%$$

$$Grand\ MPS = \frac{Grand\ M}{Total\ No.\ of\ Items} \times 100$$

$$= \frac{25.36}{45} \times 100$$

$$= .5635 \times 100$$

Grand MPS = 56.35% Below Average

$$Grand\ M.L. = \frac{No.\ of\ pupils\ who\ obtained\ standard\ score\ of\ 33.75}{No.\ of\ pupils\ who\ took\ the\ test} \times 100$$

$$= \frac{16}{150} \times 100$$

$$= .1066 \times 100$$

Grand M.L. = 10.66% of the pupils have mastered the lesson tested. Unsatisfactory performance.

APPENDIX M-1

COMPUTATION OF RELATIONSHIP BETWEEN COGNITIVE (X) AND PSYCHOMOTOR (Y) ABILITIES

(r_1)

	X	Y	X^2	Y^2	XY
Catbalogan I Central	8.82	9.00	77.7924	81.0000	79.3800
Catbalogan II Central	8.30	6.64	68.8900	44.0896	55.1120
Catbalogan III Central	8.24	7.18	67.8976	51.554	59.1632

$\Sigma X = 25.36$ $\Sigma Y = 22.82$ $\Sigma X^2 = 214.5800$ $\Sigma Y^2 = 176.6420$ $\Sigma XY = 193.6552$

$$\Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{N}$$

$$r_1 = \frac{}{\sqrt{\left[\Sigma X^2 - \frac{(\Sigma X)^2}{N}\right]\left[\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}\right]}}$$

$$= \frac{193.6552 - \frac{(25.36)(22.82)}{3}}{\sqrt{\left[214.5800 - \frac{(25.36)^2}{3}\right]\left[176.6420 - \frac{(22.82)^2}{3}\right]}}$$

$$= \frac{193.6552 - \frac{578.7152}{3}}{\sqrt{\left[214.5800 - \frac{643.1296}{3}\right]\left[176.6420 - \frac{520.7524}{3}\right]}}$$

$$= \frac{193.6552 - 192.9051}{\sqrt{[214.5800 - 214.3765]\,[176.6420 - 173.5841]}}$$

$$= \frac{.7501}{\sqrt{[.2035]\,[3.0579]}} = \frac{.7501}{.6222826}$$

$$= \frac{.7501}{.7884}$$

r_1 = . 95 Very high correlation

APPENDIX M-2

COMPUTATION OF RELATIONSHIP BETWEEN COGNITIVE (X) AND AFFECTIVE (Z) ABILITIES
(r_2)

	X	Z	X^2	Z^2	XZ
Catbalogan I Central	8.82	10.64	77.7924	113.2096	93.8448
Catbalogan II Central	8.30	10.06	68189	101.2036	83.4980
Catbalogan III Central	8.24	10.12	67.8976	102.4144	83.3888
	$\Sigma X=25.36$	$\Sigma Z=30.82$	$\Sigma X^2=214.5800$	$\Sigma Z^2=316.8276$	$\Sigma XZ=260.7316$

$$r_2 = \frac{\Sigma XZ - \frac{(\Sigma X)(\Sigma Z)}{N}}{\sqrt{\left[\Sigma x^2 - \frac{(\Sigma X)^2}{N}\right]\left[\Sigma Z^2 - \frac{(\Sigma Z)^2}{N}\right]}}$$

$$= \frac{260.7316 - \frac{(25.36)(30.82)}{3}}{\sqrt{\left[214.58 - \frac{(25.36)^2}{3}\right]\left[316.8276 - \frac{(30.82)^2}{3}\right]}}$$

$$= \frac{260.7316 - \frac{781.5952}{3}}{\sqrt{\left[214.5800 - \frac{643.1236}{3}\right]\left[316.8276 - \frac{949.8724}{3}\right]}}$$

$$= \frac{260.7316 - 260.5317}{\sqrt{[214.58 - 214.3765][316.8276 - 316.6241]}}$$

$$= \frac{.1999}{\sqrt{[.2035][.2035]}}$$

$$= \frac{.1999}{.0414122} = \frac{.1999}{\sqrt{.2034998}}$$

r_2 = .98 Very high correlation

APPENDIX M-3

COMPUTATION OF RELATIONSHIP BETWEEN PSYCHOMOTOR (Y) AND AFFECTIVE (Z) ABILITIES

(r_3)

	Y	Z	Y^2	Z^2	YZ
Catbalogan I Central	9.00	10.64	81.0000	113.2096	95.7600
Catbalogan II Central	6.64	10.06	44.0896	101.2036	66.7984
Catbalogan III Central	7.18	10.12	51.5524	102.4144	72.6616
	$\Sigma Y = 22.82$	$\Sigma Z = 30.82$	$\Sigma Y^2 = 176.6420$	$\Sigma Z^2 = 316.8276$	$\Sigma YZ = 235.2200$

$$r_3 = \frac{\Sigma YZ - \frac{(\Sigma Y)(\Sigma Z)}{N}}{\sqrt{\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}} \quad \sqrt{\Sigma X^2 - \frac{(\Sigma Z)^2}{N}}}$$

$$= \frac{235.2200 - \frac{(22.82)(30.82)}{3}}{\sqrt{176.6420 - \frac{(22.82)^2}{3}} \quad \sqrt{316.8276 - \frac{(30.82)^2}{3}}}$$

$$= \frac{235.2200 - \frac{703.3124}{3}}{\sqrt{176.6420 - \frac{520.7524}{3}} \quad \sqrt{316.8276 - \frac{949.8724}{3}}}$$

$$= \frac{235.2200 - 234.43746}{\sqrt{176.6420 - 173.584} \quad \sqrt{3168276 - 316.6241}}$$

$$= \frac{.78254}{\sqrt{3.0579} \quad \sqrt{.2035}}$$

$$= \frac{.78254}{.622826} = \frac{.78254}{.78884}$$

$r_3 = .99$ Very high correlation

APPENDIX N

OBJECTIVES IN ELEMENTARY MATHEMATICS FOR GRADE VI UNDER THE MLC FOR FIRST GRADING PERIOD

I. WHOLE NUMBERS

A. Comprehension of Whole Numbers

1. Reads and writes numbers through billions in figures and in words.

B. Comprehension of Addition

1. Adds 5- or more digit numbers with five or more addends with sums through billions without and with regrouping in all places.

C. Application of Addition

1. Solves word problem involving addition of whole numbers including money with sums up to billions.
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation to be used

D. Comprehension of Subtraction

1. Subtracts 5- or more digit numbers from 6- or more digit numbers without and with regrouping in all places and involving three or more zeroes in minuend.
   1.1. Subtracts 5- or more digit numbers from 6- or more digit numbers without regrouping.

E. Application of Subtraction

1. Solves word problem involving subtraction of whole numbers including money.
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation to be used

APPENDIX N (continued)

F. Application of Addition and Subtraction

1. Solves 2-step word problems involving addition and subtraction of whole numbers including money.
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the hidden (question(s)

G. Comprehension of Multiplication

1. Multiplies 5- or more digit factors by 2- to 3-digit factors without and with regrouping with zero difficulty.
   1.1. Multiplies 4- to 5-digit factors with or without regrouping

H. Application of Multiplication

1. Solves word problems involving multiplication including money.
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation to be used

I. Application of Addition, Subtraction and Multiplication

1. Solves 2- to 3-step word problems involving addition, subtraction and multiplication including money.
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the hidden question(s)
         - the operation(s) to be used

J. Comprehension of Division

1. Divides 5- or more digit numbers by 2- or more digit numbers without or with remainder and with zero difficulty.
   1.1. Divides 5- or more digit numbers by 2-digit numbers without or with remainder.

APPENDIX N (continued)

K. Application of Division

1. Solves word problems involving division including money
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

L. Application of the Four Fundamental Operations

1. Solves 2- to 3-step word problems involving any two or three of the four fundamental operations including money
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the opreation(s) to be used

II. RATIONAL NUMBERS

A. Comprehension of Fractions

1. Visualizes proper fractions/improper fractions and mixed forms

B. Comprehension of Addition of Fractions

1. Adds dissimilar fractions in simple and mixed forms with no common denominators without and with regrouping in the sum.

C. Application of Addition of Fractions

1. Solves word problem involving addition of dissimilar fractions
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

D. Comprehension of Subtraction of Fractions

1. Subtracts dissimilar fractions in simple and mixed forms without or with regrouping.

APPENDIX N (continued)

E. Application of Subtraction of Fractions

1. Solves problems involving subtraction of fractions
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

F. Application of Addition and Subtraction of Fractions

1. Solves 2-step problems involving addition and subtraction of fractions
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation to be used

G. Comprehension of Multiplication of Fractions

1. Multiplies a fraction in mixed form by a whole number

H. Application of Multiplication of Fractions

1. Solves word problems involving multiplication of numbers in mixed forms
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

I. Comprehension of Division of Fractions

1. Visualizes division of a fraction by a fraction

J. Application of Division of Fractions

1. Solves word problems involving division of fractions
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

APPENDIX N (continued)

K. Application of the Four Fundamental Operations Involving Fractions

1. Solves 2- to 3-step word problems using any two or three of the four fundamental operations involving fractions
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation to be used

L. Comprehension of Ratio and Proportion

1. Forms ratios and proportions of sets/numbers
   1.1. Uses colon (:) in writing ratios and proportions

M. Application of Ratio and Proportion

1. Solves word problems involving ratio and proportion
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

N. Comprehension of Decimals

1. Reads and writes decimals through ten thousandths

O. Comprehension of Addition and Subtraction of Decimals

1. Adds and subtracts decimals through ten thousandths without or with regrouping

P. Application of Addition and Subtraction of Decimals

1. Solves word problems involving either addition or subtraction of decimals including money
   1.1. Analyzes word problems
      1.1.1. Tells
         - what is asked
         - what is/are given
         - the operation(s) to be used

APPENDIX N (continued)

Q. Comprehension of Multiplication of Decimals

1. Multiplies hundredths by hundredths

R. Application of Multiplication of Decimals

1. Solves word problems involving multiplication of decimals including money

1.1. Analyzes word problems
1.1.1. Tells:
- what is asked
- what is/are given
- the operation(s) to be used

S. Comprehension of Division of Decimals

1. Divides:
1.1. Mixed decimals by whole numbers

T. Application of Division of Decimals

1. Solves word problems involving division of decimals including money.
1.1. Analyzes word problems
1.1.1. Tells:
- what is asked
- what is/are given
- the operation(s)

U. Comprehension of Percentage

1. Gives the meaning of the elements used in solving percentage problems
1.1. Base
1.2. Rate
1.3. Percentage

V. Application of Percentage

1. Solves word problems involving finding percentage/rate/base
e.g. discounts, commission, and interest

APPENDIX N (continued)

III. GEOMETRY

A. Comprehension of Polygon

1. Construct congruent polygon
   1.1. Visualizes congruence of angle/polygons

IV. MEASUREMENT

A. Comprehension of Area

1. Finds the area of plane figures in equate metre/centemetre

B. Application of Measurement of Area

1. Solves word problems involving area of plane figures
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

C. Comprehension of Volume

1. Finds the volume of rectangular solids
   1.1. Tells the unit of measure used for measuring the volume of rectangular solids

D. Application of Measurement of Volume

1. Solves situations involving measurement of volume
   1.1. Analyzes word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

E. Comprehension of Meter Reading

1. Reads and interprets:
   1.1. Electric meter/water meter

APPENDIX N (continued)

F. Application of Meter Reading

1. Solves word problems involving electric and water consumption
   1.1. Analyze word problems
      1.1.1. Tells:
         - what is asked
         - what is/are given
         - the operation(s) to be used

V. GRAPHS, MAPS, AND SCALES

A. Comprehension of Graphs

1. Reads and interprets data presented in a circle/bar/horizontal graph

B. Comprehension of Maps and Scales

1. Locates places on the map or globe
   - longitude
   - latitude

LIST OF FIGURE AND TABLES