THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS

A Thesis

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The Faculty of the Graduate School

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In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Teaching Mathematics

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APPROVAL SHEET

This thesis, entitled "THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS" has been prepared and submitted by RHOLYNA GABON TILLES, who having passed the comprehensive examination, is hereby recommended for oral examination.

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The Researcher

DEDICATION

This humble work is dedicated to my parents,

Mr. Rogelio Marquez Tilles and Mrs. Paulina Gabon Tilles,

my brother, Rogelio "Rhogie" Gabon Tilles, Jr.

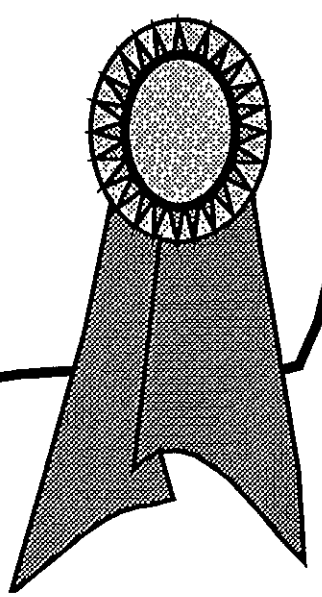
my sister, Rhonna Gabon Tilles

grandparents, relatives, friends

and to the mathematics

teachers.

Rholyn



ABSTRACT

This study attempted to determine the effect of integrated approach on students' performance in freshmen Mathematics at Samar Regional School of Fisheries. In this study, the researcher used the experimental method of research using the pre-test and post-test control group design. This was employed on the 44 first year high school students of Samar Regional School of Fisheries through purposive sampling, matching their first grading grade in Mathematics. The samples were divided into two groups – 22 students for the experimental group and another 22 students for the control group. Most of the subjects of the study were 13 years of age. In the experimental group, the average rating in the entrance examination result was 68.64, 5 students got a rating lower than the average grade, 8 students were within the range of the mean, and 9 students obtained a score higher than it. The experimental and control groups had more or less the same level of entry behaviour on the basis of their sex, age, entrance examination results, first grading grades in Mathematics I and pre-test mean scores. This connotes that the experiment was free from bias in terms of the results arrived at. The utilization of integrated methods can be tried out as an alternative strategy in teaching other secondary mathematics courses. An experimental study to determine the effect of integrated methods on academic performance of students in other disciplines will be conducted.

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Chapter 1

THE PROBLEM: ITS BACKGROUND

Introduction

Mathematics is as old as civilization itself. By the Neolithic Period, as life became settled and villages began to appear, writing and counting became increasingly useful. With counting, the history of mathematics began. To count the passage of time, to weave intricate patterns in basket or fabrics, and to apportion goods, crops, and livestock required a basic sense of arithmetic (Grolier Encyclopedia of Knowledge, 1995:185).

The earliest knowledge of mathematics is preserved in Egyptian papyruses, Babylonian cuneiform tablets, and Greek manuscripts. They indicate that the first mathematical concerns involved arithmetic, algebra, geometry and trigonometry. Mathematics has been regarded as essential to liberal education at least, since Plato maintains that proficiency in mathematics is a prerequisite for the study of philosophy. Today, a good education in mathematics is important because of its usefulness in careers such as environmental studies, business, engineering, medicine and psychology, as well as in the biological, mathematical, and

physical sciences. Knowledge of mathematics also helps students understand calculators and computers (Grolier Encyclopedia of Knowledge, 1995:185-186). The foregoing history of mathematics implies that mathematics came to being even in the early civilization of man in which they used it in their daily activities. With this, it is a must that the love and study about the subject should be developed and continued in all of us in order to experience the benefits of mathematics. This can be realized when everybody is aware of the objectives of mathematics, and tries to achieve and utilize it to the fullest.

The goal of mathematics education is to encourage the use of precise and accurate thinking to solve problems. A minimal mathematics proficiency, educators believe, will require students to learn the arithmetic of whole numbers and rational numbers (with both decimal and fractional notation), to be able to measure in standard units and convert from one unit to another, to estimate and approximate, to use graphs and other methods of organizing and interpreting data to see patterns and trends, and to understand probabilistic ideas, the geometry of two and three dimensions, and the place of functions in science and

mathematics (Grolier Encyclopedia of Knowledge, 1995: 185). For the attainment of this aim, the mathematics instruction should enable the students to master mathematical knowledge, and should arouse and develop among them the appreciation for mathematics as it will make them realize how they can use it in solving their daily problems.

In addition, whether one is a child or an adult, he uses mathematics in some way everyday of his life. Mathematics, if one knows how to use it properly, can help him solve all sorts of problems quickly and accurately. But if one doesn't know mathematics, these problems can frustrate and confuse him (The World Book of Math Power, 1994:585).

However, mathematics which is an exact science, is considered by most students particularly in Samar Regional School of Fisheries as the most difficult subject they ever have because it is hard for them to achieve high ratings in the said subject. This fact is supported with the average grade of the first year high school students of SRSF for the last five years. During school years 1994 - 1995, 1995 - 1996, 1996 - 1997, 1997 - 1998, and 1998 - 1999, the average grade were 75.30, 79.00, 79.00, 78.83, and 75.68, respectively. Also, during the foregoing school years, the

dropout rates were 8%, 7%, 6%, 6%, and 6%, respectively. Obviously, students in SRSF perform poorly in Mathematics. The high dropout rate implied that most students find the subject very difficult. To continue will cause them embarrassment before their classmates, teachers and parents. For this concern, the teachers play a very significant role in creating a desire in the students to learn the subject, as it is a great help in adjusting with the different things occurring in our fast changing world. Furthermore, the students should be helped to become aware of how vital mathematics is to our technologically-oriented society (Coronel, 1993:i).

The researcher believes that the foregoing reality can be improved through the use of new approaches in teaching mathematics. These approaches cater to the needs of each learner in the classroom in order to attain their optimum development. With this ultimate aim, teachers may use approaches and methods which have been tried abroad and therefore may not work perfectly well in the Filipino classroom setting. The teacher's prudent choice in the use of these approaches and methods as well as techniques may work wonders in his daily instruction by adopting these approaches in the Philippine setting (Unitas, 1990:223).

One of these approaches in teaching is the integrated approach which involves the combination of two given methods or two techniques in one given lesson. The combination aims at making learning a total process; what is learned in one method is further strengthened in the other method or what one teaching method lacks is properly compensated by the other (Garcia, 1995:152).

From the above mentioned reasons, the researcher became interested to conduct the study on the effect of the integrated approach in teaching Mathematics I on the performance of high school freshmen in Samar Regional School of Fisheries so that these students will improve their performance in the said subject.

Statement of the Problem

This study attempted to determine the effect of integrated approach on students' performance in freshmen mathematics of Samar Regional School of Fisheries.

Specifically, it sought answers to the following questions :

1. What is the profile of the subjects as indicated by their :

   1 . 1 sex;

1 . 2 age;

1 . 3 entrance examination results; and

1 . 4 first grading grades in mathematics?

2. What is the mean performance score in mathematics of the two groups of subjects in the :

2 . 1 pretest?

2 . 2 posttest?

3. Is there a significant difference between the pretest mean scores of the experimental and control groups?

4. Is there a significant improvement in the mathematics performance of students in the experimental group as reflected in their pretest and posttest results?

5. Is there a significant improvement in the performance of students in the control group as reflected in their pretest and posttest results?

6. Is there a significant difference between the posttest mean scores of the experimental and control group?

7. What instructional redirections can be drawn from the result of this study?

Null Hypotheses

The following null hypotheses were presented in the attempt to answer the problems posed in this study :

1. There is no significant difference between the pretest mean scores of the experimental and control groups.

2. There is no significant improvement in the mathematics performance of students in the experimental group as reflected in their pretest and posttest results.

3. There is no significant improvement in the mathematics performance of students in the control group as reflected in their pretest and posttest results.

4. There is no significant difference between the posttest mean scores of the experimental and control groups.

Theoretical Framework

This study was anchored on the law of effect. This law was formulated by Thorndike which states that : When a modifiable connection between a stimulus and a response has been made, it is strengthened if it results in satisfaction and weakened if it leads to annoyance. However, in 1932, Thorndike modified his position. Satisfaction, according to his new statement, strengthens the connections, but annoyance does not weaken it. Rather, annoyance aids learning that it encourages the learner to try something else. He believes that the strengthening

effect of satisfaction is more universal, more inevitable, and more direct than the weakening effect of annoyance. In other words, Thorndike's latest view was that punishment may not lead to unlearning depending on what it causes the individual to do. This statement is supported by studies of Gates as cited by Gregorio (1976: 106-107).

The foregoing law is supported by Lardizabal (1994: 31), when she discussed the theory of motivation, particularly the affective arousal theory. According to this theory, behavior may be accompanied by pleasant or unpleasant connotations. Activity that is pleasant tends to be repeated. The reverse is true. Hence, emotion or affect may be a determinant of behavior. Feelings and emotions, therefore, serve as motives.

From the above mentioned theories, the common denominator is the effect of the activity performed by the individual in which in most cases, those that are pleasant tend to be repeated and strengthened, and those that are unpleasant tend to be avoided or weakened. With these facts, the teachers should not take for granted their students' feelings as far as learning is concerned in as much as it is their task to anticipate and provide activities that will produce satisfaction or pleasure on

the part of the learners so that they will be able to have an optimistic point of view or good performance towards the activities they are undertaking and especially that of mathematics in particular. According to Bentham (1935: 210), felicity or happiness was the end of human conduct and that happiness consisted of maintaining pleasure and diminishing pain.

The effect of the learning process is a satisfaction on the part of the learners if the theory of individual differences is taken into consideration. This theory implies for making use of procedures that will suit individual characteristics such as needs, interests, and physical and mental maturity. However, it is proven through research that no one possesses all the information, skills, or resources necessary for the highest possible quality presentation of any activity. Thus, cooperative learning is encouraged to be used as another method of teaching the students. With these facts, Garcia (1995:152) pointed out that the integrated approach, which involves the combination of two given methods or two techniques in one given lesson, should be utilized in the teaching-learning process.

Conceptual Framework

The conceptualization of this study is shown in figure 1 on the next page. The first frame at the bottom defines the research environment, which includes, among others the input consisting of secondary freshmen in Samar Regional School of Fisheries as the subjects of the study. They had been divided into two groups, namely the experimental and control groups. The center frame shows the instrument used in the conduct of this research, which was composed of pretest and the kind of teaching strategy given to each group of subjects. It also includes the redirections formulated on the basis of the result of this study. The top frame presents the output of the study, which were optimistic point of view and good performance in mathematics.

Significance of the Study

As far as the effect of integrated approach on students' performance in Mathematics I was concerned, the findings of this study would benefit the following specific groups of people in the educational community, to wit:

To the Students. Students would be motivated to study their mathematics lesson because every member in each group

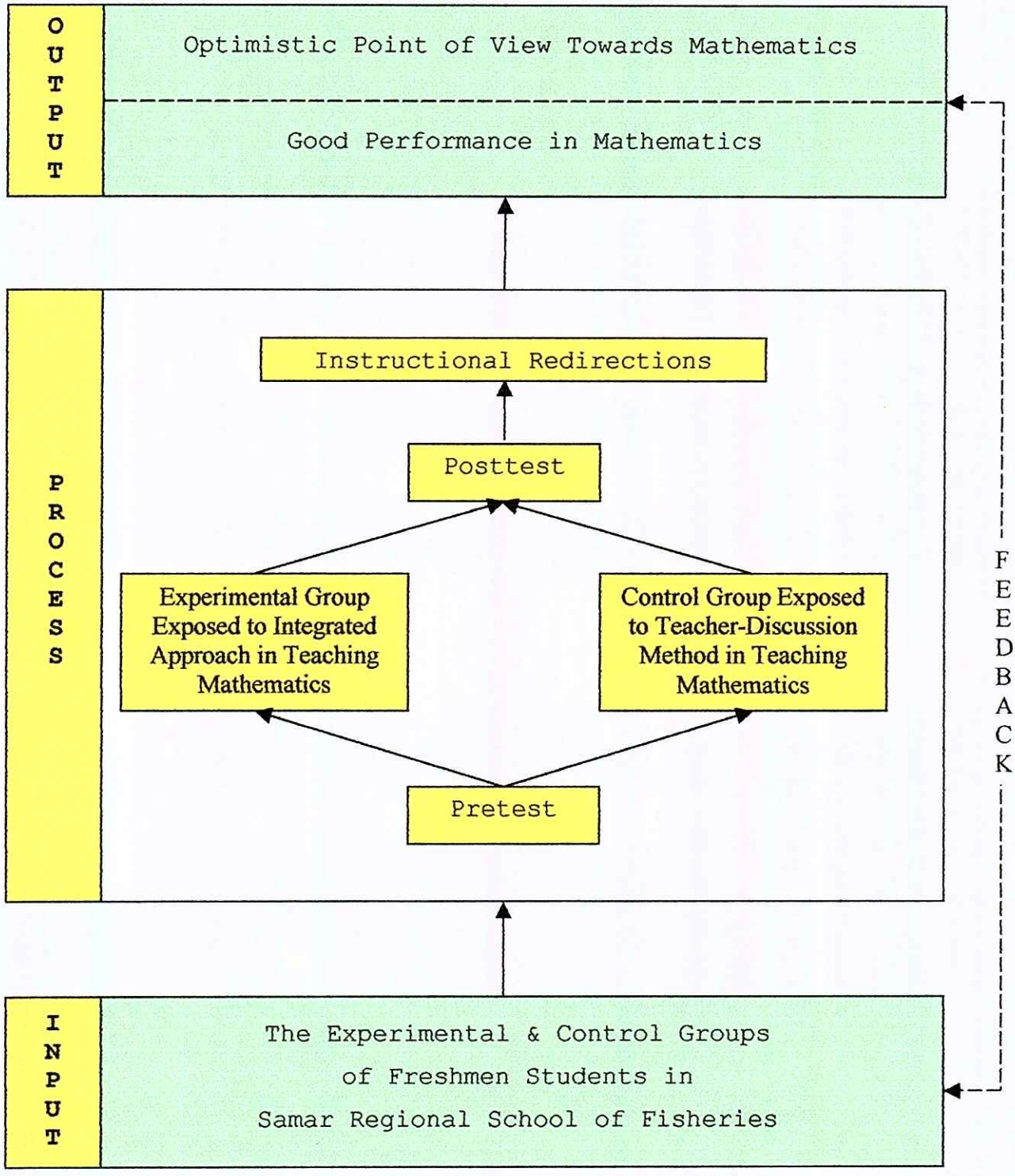

Figure 1: The conceptual framework of the study showing the research environment as the input, the process, which facilitates in coming up with redirections geared towards the goal of the study which is an optimistic point of view towards mathematics and good performance in mathematics.

tried to help each other so that all of them learn the lesson being studied. Even during vacant time, they could still discuss their lesson in mathematics together with their classmates/friends in the sense that each student had a material for studying the lesson. Each student could express his ideas for the reason that it was easier to explain their own opinion when they were only talking with their peers. Moreover, the students could learn also even without the presence of a teacher. They could focus their attention to obtain better grades in the said subject by improving their study habits, learning styles, and attitudes towards mathematics.

To the Mathematics Teachers. The results would encourage them to use integrated approach in teaching mathematics especially that it was better than teacher-discussion method. With the use of integrated approach in teaching mathematics, the teachers exerted less effort in the discussion of the lesson because he only acted as a facilitator of learning and not as the only expert in the said subject matter. They could even do some sort of recording the performance of their students during their classes time.

To the Administrators. The findings would serve as a guide in making policies and programs for mathematics subjects and mathematics activities. They would encourage their mathematics teachers to use integrated approach in teaching mathematics in the sense that it would yield a better performance of the students in mathematics as compared of those students taught by the use of lecture-discussion method. They would provide extra budget for their teachers who would use instructional materials for the benefit of their students.

To Other Researchers. The results of this study would provide the other researchers some background information, which might be useful in their own research work. They would be encouraged to conduct a similar study in order to prove the effectiveness of integrated approach in teaching mathematics in their own school.

Scope and Delimitation

This study was an experimental study which focused on comparing two methods of teaching Mathematics I at Samar Regional School of Fisheries. These two methods were integrated method and lecture-discussion method. The researcher confined the study to freshmen students enrolled

in Samar Regional School of Fisheries during the first semester, school year 1999 - 2000.

Only 44 students were made as subjects of this study. The subjects were divided into two groups: 22 students for the experimental group and 22 students for the control group. The experimentation was conducted for one grading period, that is from the first week of November to the third week of January or approximately ten weeks covering the topics on percent and ratio. It utilized a 50-item teacher-made and validated pretest and posttest as basic sources of data.

The study was limited to the conditions existing at Samar Regional School of Fisheries in so far as learning mathematics was concerned.

Definition of Terms

The following terms were defined for the purpose of clarification and understanding of this study.

Control Group. A group of 22 students who were exposed to teacher-discussion method in teaching mathematics.

Cooperative learning. Cooperative learning is the instructional use of small groups so that students work

together to maximize their own and each other's learning. Class members are organized into small groups after receiving instruction from the teacher. They then work through the assignment until all group members successfully understand and complete it. Cooperative efforts result in participants striving for mutual benefit so that all group members gain from each other' efforts, recognizing that all group members share a common fate, knowing that one's performance is mutually caused by oneself and one's colleagues, and feeling proud and jointly celebrating when a group member is recognized for achievement (Deutsch, 1962; Johnson and Johnson, 1989). In this study, it means a small group of students working together on their assigned task.

Effect. It means something that is produced by an agency or cause (Random House Webster's Dictionary, 1991 : 426). In this study, it means the result of integrated approach on students' performance in freshmen mathematics.

Experimental Group. A group of 22 students who were exposed to integrated approach in teaching mathematics.

Integrated Approach. It involves the combination of two given methods or two techniques in one given lesson.

The combination aims at making learning a total process; what is learned in one method is further strengthened in the other method or what one teaching method lacks is properly compensated by the other (Garcia, 1995:152). In this study, it refers to the combination of cooperative learning and modular instruction in teaching mathematics.

Mathematics. The science of numbers and their operations and relations between them and of space configurations and their structure and instrument (Meriam - Webster, 1974 : 431). In this study, it is applied to the mathematics subject offered to secondary students under the New Secondary Education Curriculum.

Modular Instruction. A technique modernizing the teaching process by using a set of modules suited to each student who is given a chance to advance at his own best rate through bypassing unnecessary instruction and satisfying his particular needs and he will, thus, in individual cases be able to earn his degree in considerably shorter time (Garcia, 1995: 180). In this study, it means a method of teaching with the aid of instructional modules.

Performance. The execution or accomplishment of work, acts, feats, etc. (Random House Webster's College

Dictionary, 1991 : 1003). In this study, it means the accomplishment of students in Mathematics.

Posttest. A particular process or method for trying or assessing some characteristics after conducting a particular activity (Random House Webster's College Dictionary, 1991: 1379). In this study, it means the sets of questions administered to the subjects after the conduct of the experimentation.

Pretest. A particular process or method for trying or assessing some characteristics before conducting specific activity (Random House Webster's Dictionary, 1991: 1379). In this study, it means the set of questions administered to the subjects before the conduct of the experimentation.

SRSF. This is an acronym for Samar Regional School of Fisheries, research locale of this study.

Student. He is one who attends a school (Meriam - Webster, 1974: 679). In this research, this refers to freshmen or first year secondary students enrolled in Samar Regional School of Fisheries during the school year 1999 - 2000.

Teachers. All persons engaged in teaching at the elementary and secondary levels, whether on full-time or

part-time basis including industrial arts or vocational teachers and all other persons performing supervisory and/or administrative function in all schools in the aforesaid levels and qualified to practiced teaching under the law (R.A. 7836,1994: Section 4b). In this study, these refer to persons teaching mathematics subject to secondary students at Samar Regional School of Fisheries.

Chapter 2

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter deals with the readings made by the researcher in the process of preparing this study. These readings are from different sources such as books, general references, periodicals, magazines, published and unpublished works here and abroad which were all noted in order to come up with a richer investigation.

Related Literature

As far as this study about the effect of integrated approach on students' performance in freshmen mathematics at Samar Regional School of Fisheries was concerned, it is a must that writings about approaches and methods of teaching will be quoted in this chapter.

According to Salandanan (1996: 44-45), the teacher of mathematics has two problems. The first is to provide his pupils mathematical experiences suitable to the state of development of their existing concepts and to fit this method of presentation to the pupil's concrete or formal level of thinking. The second is to develop the pupil's ability to analyze new material himself so that he can

synthesize his own concepts in ways most meaningful for him independently of the teacher. To solve these problems in ways that will meet the needs of the learners, the teacher needs to know and to use different teaching strategies. To execute lesson in mathematics successfully the teacher needs to: (1)Manage his classroom efficiently and with minimum disruptions; (2)Elicit active participation from his students; (3)Recognize and solve students' learning difficulties; (4)Communicate mathematical concepts precisely in the proper inductive sequence, and at a level consistent with the children's abilities; (5)Adapt the pace and direction of instruction to the group he is teaching; (6)Provide an atmosphere where mistakes are accepted as a part of learning and where students feel free to ask questions when they do not understand a concept; (7) Motivate students to learn mathematics; (8) Develop in students positive attitudes toward mathematics; and (9) Select and use methods appropriate for given behavioral concepts.

The method of teaching or the strategy a teacher may use depends largely on the objectives or goals of the learning process. In general, goals for student learning

in mathematics are classified into three: knowledge and skill goals, understanding goals and problem solving goals.

Teaching knowledge and skills. Basic skills and knowledge compose a large part of mathematical learning. Students are often required to memorize mathematical facts or to become proficient in using algorithms. The major characteristics of knowledge and skill goals is that they require automatic responses from the student. To achieve the automatic characteristic of knowledge and skill learning, a pupil must employ some form of repetition or practice in learning process.

Teaching understanding. The distinguishing characteristic of understanding goals is that understanding is to be applied, derived or used to deduce a consequence. Given some exercises, the student should be able to use the acquired understanding of a concept, some items of knowledge, and some skills to solve the exercises.

Teaching problem solving. Pupils who solve problems may be rewarded with bonus grades and/or special recognition. Some reward or praise should be bestowed upon the successful solver. It is well-known that positive reinforcement is an affective way to stimulate success.

Salandanan (1996: 53) further reiterated that many people have tried to define the slow learner and terms such as "backward", "retarded", "less able", "dull", etc. have been attached to them. Instead of trying to think of more labels for these children, we should start thinking of their needs. However, before we can consider ways of meeting their needs in mathematics we must first identify those needs. A child may be a slow learner for a number of reasons. He may be an underachiever in one subject of the curriculum only or in all subjects, or he may just need some extra help in one topic of one subject. According to Pringle as cited by Salandanan (1996:53), "too many unhappy children are being taught by unhappy teachers''. While Pringle is not referring just to mathematics, it is true that there are too many children at all age levels who are bored with the mathematics they are being taught. The classroom for slow learners should be bright and cheerful (not the dark corner of a corridor); there should be colorful charts on the wall and also lots of the children's own work. Materials and equipment should be in view and not locked in a cabinet. Dialogues with them can be very valuable and profitable. In addition, the following approaches are recommended in dialogues with slow

learners: (1)small group instruction, (2)peer teaching, and (3)remedial teaching.

According also to Salandanan (1996: 56), gifted pupils learn faster and need less explanation than the average or slow pupils. To aid in the discovery of the mathematically gifted children, diagnostic tests should be given. In some cases, brief written inventory tests are more useful. Children of all abilities tend to be interested in practical work and the teacher should not be misled into thinking that gifted children "do not need concrete materials" and they prefer to think in the abstract. It is essential that the teacher should be able to ask questions about the practical work the children are engaged in and to develop new ideas. A special enrichment programme would seem to be the best answer. The child follows normal mathematics curriculum but should be given extra "experiences". A teacher must be sensitive to the child's requirements and be prepared to search to learn and for new materials and ideas.

Prior to the discussion of Salandanan about the teaching strategies in mathematics, Rivera (1992:111-112) already pointed out that there is no fast rule in the choice of a strategy to be used in the same manner as there

is no single best strategy of teaching. To a skilled teacher, many of the methods have value, but there is a little reason to believe that the teacher should limit the teaching to only one. It is because each teaching-learning situation is different from every other and what proves to be effective to one teacher may not be so to another. Besides, a teacher who uses only one method is in danger of developing only one group of skills in his pupils and only one part of his own as a mentor. A learner who knows only one way of learning will find it hard to think what rich possibilities remain unused in his own mind. For this reason, the teacher should be familiar with several ways of handling a teaching-learning situation instead of only one. To select a method appropriate to a particular lesson, the following should be taken into consideration: (1)educational objectives and aims of the lesson, (2)nature of the subject matter, (3)nature of the learners, (4) what the teacher wants to emphasize, (5)school equipment and facilities, (6)teacher's own abilities and inclinations, (7)context of teaching situation, and (8)time requirement of the method.

The ideas of Rivera was supported by Garcia (1995:29-30) when he said that one's teaching effectiveness may

greatly increase depending on his ability to make the most out of the different teaching methods. His main preoccupation concerns is using the right method at the right situation and at the right time. In other words, he should be able to maximize his efficiency through the application of an appropriate method of teaching./

In order to achieve the aim stated by Garcia, history tells that there are some guidelines which prove to be useful that should be followed by the teachers. These are the following: (1) Teaching methods are means to an end, they are not the end of teaching. Emphasis is not to be placed on the method itself but rather more importantly on how it is used effectively to achieve certain specific goals of teaching e.g. intellectual development of students, improving their study habits, etc., (2) There is no such thing as the "best teaching method" - one teaching method may have worked well in one class but it does not mean that it will work well in another class. Every group of students should be treated unique by itself since there are distinct factors both inherent in and external of them that influence the learning process. The applicability of a teaching method should, therefore, consider a number of conditions, namely: (a)its responsiveness to the psychology

of students, (b) its suitability to the nature of the lesson itself, (c) the readiness of the teacher to employ it, and (d) the permissiveness of certain constraints to enable the teacher to carry out successfully.

Good teaching is characterized by the observance of certain basic principles (Gregorio, 1976:250-251): (1) Good teaching involves skill in guiding learning; (2) Good teaching is kindly and sympathetic; (3) Good teaching is cooperative; (4) Good teaching diagnoses difficulties; (5) Good teaching is remedial; and (6) Good teaching liberates the learners. With the emphasis on the third principle, one who aspires to be a good teacher knows that teaching is a cooperative affair between teacher and pupils. She has planned, therefore, to give the pupils abundant opportunity for cooperation in organization, management, participation in the discussion, recitation, and evaluation of results. She knows that if she does all the talking, she must have a good excuse for doing so, and that it is generally preferable to plan for much activity on the part of the children and to utilize their help in every way. In the classroom of such a teacher as here described, abundant activity among the children is the rule.

Any method, to be effective, must have the following characteristics (Gregorio, 1976:255-257): (1)The method must utilize the theory of self-activity; (2)The method must utilize the laws of learning; (3)The method must aid the learner in defining his own purposes by setting the situation for the emergence of a desirable purpose; (4)The method must start from what is already known to the pupils; (5)The method must be based on the accepted well-integrated educational theory and practice which is designed to unify the work of teaching and learning; (6)The method must provide for individual differences and make use of procedures that will suit individual characteristics such as needs, interests, and mental and physical maturity; (7)The method must stimulate the thinking and reasoning powers of the pupils;(8)The method must be suited to the progress of the pupils in skills, abilities, habits, knowledge, ideas, and attitudes; (9)The method must provide the learners with numerous and diverse learning experiences or activities; (10)The method must challenge and encourage the learner to farther activities which involve the process of differentiation and integration; (11)The method must provide opportunity for the learners to ask and to

answer questions; and (12)The methods to be used must be supplemented or implemented by other methods.

With the emphasis of the last characteristic of an effective method discussed by Gregorio, Garcia (1995: 151-152) gave the definition of integrated method. According to him, one by-word among educators is the term integration which means the process or practice of combining different elements and presenting them as one unifying whole. Integration is also employed as far as teaching methodology is concerned. Called integrated method, it involves combining two given methods or two techniques in one given lesson. The combination aims at making learning a total process; what is learned in one method is further strengthened in the other method or what one teaching method lacks is properly compensated by the other. Some of the teaching methods that are usually combined to form the so-called integrated method include (1)lecture-discussion, (2)demonstration lecture, (3)film-showing - discussion, (4)reporting-discussion, and (5)inductive-deductive.

From the ideas of Garcia, this study was anchored on the law of effect. This law was formulated by Thorndike which states that : When a modifiable connection between a stimulus and a response has been made, it is strengthened

if it results in satisfaction and weakened if it leads to annoyance. However, in 1932, Thorndike modified his position. Satisfaction, according to his new statement, strengthens the connections, but annoyance does not weaken it. Rather, annoyance aids learning that it encourages the learner to try something else. He believes that the strengthening effect of satisfaction is more universal, more inevitable, and more direct than the weakening effect of annoyance. In other words, Thorndike's latest view was that punishment may not lead to unlearning depending on what it causes the individual to do. This point of view of Thorndike was supported by Bentham (1935: 210) when he said that felicity or happiness was the end of human conduct and that happiness consisted of maintaining pleasure and diminishing pain. This was supported further by the studies of Gates as cited by Gregorio (1976: 106-107).

The foregoing law was also supported by Lardizabal (1994: 31), when she discussed the theory of motivation, particularly the affective arousal theory. According to this theory, behavior may be accompanied by pleasant or unpleasant connotations. Activity that is pleasant tends to be repeated. The reverse is true. Hence, emotion or affect

may be a determinant of behavior. Feelings and emotions, therefore, serve as motives.

From the above mentioned theories, the common denominator is the effect of the activity performed by the individual in which in most cases, those that are pleasant tend to be repeated and strengthened, and those that are unpleasant tend to be avoided or weakened. With these facts, the teachers should not take for granted their students' feelings as far as learning is concerned in as much as it is their task to anticipate and provide activities that will produce satisfaction or pleasure on the part of the learners so that they will be able to have an optimistic point of view or good performance towards the activities they are undertaking and especially that of mathematics in particular.

With the theoretical anchorage of this study, it is a must to discuss the effect of the two methods to be integrated in teaching mathematics lessons. With this concern, Dagoon (1986: 102-103) stated that self-activity promotes self-confidence, skill and objective living. Learning becomes purposeful because of a project activity which is performed to a finish. Self-activity makes instruction related to the actual needs and life condition.

In self-activity the teacher is only the facilitator of the learning process and his actual performance is characterized by the following: (1) The teacher acts as a mere guide to self-learning activity of the child; (2) The teacher becomes a partner in the learning process, he refrains from forcing his ideas; (3) The teacher's leadership only becomes overt in times of emergencies when reasonable choice of action is urgently needed; (4) The teacher never attempts to offer solution to problems only points how to formulate solutions; and (5) The teacher emphasizes self-evaluation and the learner must learn to evaluate his own performance. In all forms of instruction it is important that the principles involved should always develop in the learner self-activity, because this is the essence of self-reliance, objective Filipino movement, and the realization of the national development objectives. Teaching should develop man to be mature, responsible, self-directed, and self-reliant, to evolve a type of Filipino socio-economic and political leadership in this section of the world.

In addition to the above contention, Aquino (1989: 295) pointed out that students differ from one another physically, intellectually, socially and emotionally. Not

only do they differ from each other; they also have different relative levels of aptitude and achievement. Since each student is a unique individual, it is the teacher's responsibility to understand the needs, interests, and capacities of each pupil so that his educational growth and development can be intelligently guided and effectively provided for. It is essential for teachers who wish to improve their teaching to be more perceptive of students as individuals. Teachers can do this by becoming familiar with the characteristics of various types of students, by using the necessary procedures for learning about the abilities, interests, and problems of each student, and by acquiring techniques needed for working with different types of students such as the disadvantaged, the advantaged, the slow learner, the gifted, the emotionally disturbed, and the physically handicapped. Mastery of such techniques on the part of the teacher can enable her to individualize her instruction, thus ensuring for her success in working with individual differences.

The phenomenon of individual differences implies that no two learners are the same. Forty learners in a class means forty different individuals. Some are bright, others

are dull. Certain ones are gregarious and alert; certain others are shy, withdrawn and couldn't care less about what's going on. Some are friendly, others are self-centered and naughty. Some are healthy, others are frail and sickly for not having anything to eat for breakfast. The more discerning teachers know this, and they somehow try to provide differentiated learning experiences for the bright and for the slow learners. In some schools, homogeneous grouping is arranged. Classes are classified according to grade averages. Nevertheless, each group of learners would still consist of uniquely different individuals whose needs, motivations and problems are not the same but call for specific attention and concern. Understanding the Filipino individual might well be considered as the first stepping stone in the teacher's effort to help and enable his pupils or students to learn and grow. With it, the teacher would find it easier to establish rapport with them, and to fit his subject matter and methodology with the learners' interest and level of understanding. It is, therefore, an important responsibility of each teacher to keep studying his pupils or students and to spend time and earnest thought in doing so (Elevazo, 1995:91-92).

In support of the foregoing paragraph, Garcia (1995: 176-178) affirmed that one fundamental principle in teaching is the principle of individual differences. This principle is simply expounded as "no two individual students are exactly alike". It certainly implies that a teacher should not compare a student's abilities and potentials with those of another one. In the classroom, a teacher ordinarily presents one type of lesson and employs one kind of instructional method to all students irrespective of their many differences. Under this setup, some students are forced to catch up with bright ones, preventing the latter to advance even a little bit. Otherwise, the gap between them would be considerably wide. The learning outcomes are rather discouraging since both the slow and the bright students suffer in the process. On one hand, the slow students no matter how much they try can hardly cope with the same level that the bright ones can reach. Their efforts are usually futile and fruitless.

On the other hand, the progress of bright students is held in a standstill for they have to contend themselves with the lesson which seems to be very easy and unchallenging to them. Progressive educators raise a strong objection to general type of instruction - what is

good to one student must be necessarily good to another one. In fact, students progress at different rates, each one could only reach a particular level of learning. While the bright students ordinarily find the lesson insufficient to their own needs, the slow can hardly assimilate it. It follows naturally that the former need more lessons to take up while the latter need less lessons to cover. Considering the foregoing reality, the sensible teacher has to adopt one teaching style that will meet the different needs, interests, and abilities of his students. In this regard, the use of the so-called self-pacing method is in order. This method calls for an activity whereby provision is made for the individual student to set his own schedule for learning or rate of achievement, and to monitor his own progress. Based on this definition, the following are the characteristics of this method: (1)It is student oriented - he sets his own objectives for learning, he determines the learning tasks, and even evaluates his own achievement; (2)It requires the teacher to assume an entirely different role - this time he is more of a consultant which is the exact opposite of his traditional role in the classroom; and (3)It will result to widely differentiated students' accomplishment - for instance, in a series of fifty lessons

in a given subject, the forty students are differently located within the series although they have had a similar start. Some are advance, others are half-way through, and still others are lagging behind.

Garcia (1995: 180-182) further described that modular learning technique may be used as a teaching method in order to individualize instruction. Modules as instructional materials have concretized pretty well the principle of individual differences, allowing each student to proceed at his own pace. More intellectually superior students are expected to finish more modules; less bright ones are only capable of taking fewer modules. While the use of modules has been widely accepted as a desirable pedagogical practice, its actual utilization in classroom instruction is much to be desired. The following are the characteristics of a good module: (1)It should be self-contained; (2)It should be self-pacing; (3)Its topic or subject matter should be short enough and well-defined; (4)It should be adequately motivating; (5)It should provide opportunities for interaction with the learner; (6)Its objectives and activities should be properly sequenced; (7)It should be written in clear, correct language suitable to the level of the target learner; (8)It should be

accurate; (9)It should bear no wrong implications to or conflict with other subject matters or values; (10)It should utilize every opportunity to achieve affective outcomes of learning; (11)It should contain all the necessary components of a module; and (12)Components of the module should be highly supportive of each other .

Furthermore, modules have many advantages for teachers and students. For students, these are: (1)They work at their own pace; (2)They assume responsibility for learning; (3)They find that textbooks are not the only source of learning; (4)They know exactly what they have to learn; (5)They are encouraged to master the module; and (6)Competition for grades is reduced. For teachers, these advantages are: (1)They have time to pay attention to individual learning problems; (2)They can identify problems earlier; (3)They are free to serve as resource persons, to answer questions, and to help those who need help; and (4)There is better cooperation between teacher and students(Lardizabal, 1996: 199).

With the discussion about adopting instruction to individual differences, it is still a fact that students' learning goals may be structured to promote cooperative, competitive, or individualistic efforts. In contrast to

cooperative situations, competitive situations are ones in which students work against each other to achieve a goal that only one or a few can attain. In competition there is negative interdependence among goal achievements; students perceive that they can obtain their goals if and only if the other students in the class fail to obtain their goals (Deutsch, 1962;Johnson & Johnson, 1989).

Norm-referenced evaluation of achievement occurs. The result is that students either work hard to do better than their classmates, or they take it easy because they do not believe they have a chance to win. In individualistic learning situations, students work alone to accomplish goals unrelated to those of classmates and are evaluated on a criterion-referenced basis. Students' goal achievements are independent; students perceive that the achievement of their learning goals is unrelated to what other students do (Deutsch, 1962; Johnson & Johnson, 1989). The result is to focus on self-interest and personal success and ignore as irrelevant the successes and failures of others. There is a long history of on cooperative, competitive, and individualistic efforts. Since the first research study in 1898, nearly 600 experimental studies and over 100 correlational studies have been conducted. The multiple

outcomes studied can be classified into three major categories: achievement/productivity, positive relationships, and psychological health. The research clearly indicates that cooperation, compared with competitive and individualistic efforts, typically results in : (a) higher achievement and greater productivity, (b) more caring, supportive, and committed relationships, and (c) greater psychological health, social competence, and self-esteem.

The positive effects that cooperation has on so many important outcomes makes cooperative learning one of the most valuable tools educators have. Educators fool themselves if they think well-meaning directives to "work together", "cooperate", and "be a team", will be enough to create cooperative efforts among group members. Placing students in groups and telling them to work together does not in and of itself result in cooperation. Not all groups are cooperative. Sitting in groups, for example, can result in competition at close quarters or individualistic effort with talking. To structure lessons so students do in fact work cooperatively with each other requires an understanding of the components that make cooperation work.

Mastering the essential components of cooperation allows teachers to: (1) Take existing lessons, curricula, and courses and structure them cooperatively; (2) Tailor cooperative learning lessons to meet the unique instructional circumstances and needs of the curricula, subject areas, and students; and (3) Diagnose the problems some students may have in working together and intervene to increase the effectiveness of the student learning groups. The essential components of cooperation are positive interdependence, face-to-face promotive interaction, individual and group accountability, interpersonal and small group skills, and group processing. Systematically structuring those basic elements into group learning situations helps ensure cooperative efforts and enables the disciplined implementation of cooperative learning for long-term success (Johnson, Johnson, & Holubec, 1993).

Related Studies

Under this heading are several studies, which were reviewed and found out to have bearing or semblance with this present study.

Cananua (1998) conducted a research endeavor at Samar State Polytechnic College about the "Effectiveness of

Cooperative and Individualistic Students' Activities in Mathematics III Achievement". She noticed that mathematical abilities of the experimental and control groups at the start of the experimention were the same as reflected in their pretest result. Cooperative student activities were more effective than individualistic students activities in teaching mathematics. On cognitive achievement in mathematics, in terms of recall and comprehension, cooperative learning was equally effective as individualistic students activities. However, in terms of application and problem solving, the former was more effective than the latter. High, average, and low ability students using cooperative student activities performed better than their counterparts in the individualistic student activities. Moreover, cooperative student activities that used mixed ability grouping tend to be more effective for low ability and average ability students than for high ability groups. Both cooperative and individualistic student activities were effective strategies in increasing mathematics achievement of high ability students. Students who had positive attitude towards mathematics tend to have high mathematics achievement in cooperative learning group.

This study was similar to her study for the reason that: (1) The research design of the two studies was the true experimental design using the pretest-posttest control groups; (2) The lessons in the experimentation were all about Mathematics; and (3) The two studies tried to determine the most effective teaching strategy in mathematics. The two studies differed in: (1) The research locale, for the reason that her study was conducted at Samar State Polytechnic College while this present study was at Samar Regional School of Fisheries; (2) The subjects of her study were third year high school students while the subjects of this study were first year high school students; and (3) Her study determined the effectiveness of cooperative and individualistic learning on the performance of the students while this study determined the effect of integrated approach on the performance of the students.

"The Effectiveness of Damath in Teaching Basic Algebra and Improving Attitude Towards Mathematics of First Year Students in Sagkahan National High School" was another related study conducted by Carlobos (1998). In her study, she found out that: (1) Students exposed to playing Damath significantly gained much from the activity as reflected in their achievement test performance; (2) The pretest and

posttest mean scores according to sex yielded that the female group had a higher performance compared to the male group; and (3) The use of Damath, a self-motivated activity in the teaching and learning of Basic Algebra by freshmen students could be effective in improving performance and attitude.

This study was similar to her study because: (1) Both studies tried to know an effective teaching strategies that may affect the performance of students; (2) Both studies used the freshmen high school students as the subjects of the study; (3) The lessons taught were all about Mathematics I; and (4) Both studies produced a satisfying result in the sense that the treatment variable introduced to the subjects of the study affected much the students' performance in mathematics. The two studies differed on: (1) The research design, because she made use of the pre-experimental design with no control group; while this study used the true-experimental design using the pretest-posttest control group design; (2) Instruments used in the study in the sense that she utilized: (a) Manila Self-Administering Test for Mental Ability; (b) Self-Concept Inventory Sheets; (c) Attitude Scale; and (d)Achievement Test; while this study used (a)Documentary Analysis; (b)

Pretest/Posttest; (c) Observation; and (d) Modules of Dacula; and (3) The research locale of the study, for the reason that her study was conducted at Sagkahan National High School while this study was conducted at Samar Regional School of Fisheries.

In the unpublished work of Villanobos (1997) entitled "Peer Teaching and Mathematics Performance of High School Students" , she found out that peer teaching approach and the lecture- discussion method of teaching Mathematics II were equally effective as evidenced by the fact that hypothesis # 4, which stated that "There is no significant difference between posttest mean scores of the experimental and control groups" was accepted. This study was similar to her study in attempting to measure the effectiveness of some teaching strategies on the performance of students in mathematics, and both studies required the experimental method of research. They differed in the following: (1)The strategy of imparting the lesson because Villanobos used peer teaching approach while the present study used integrated approach in teaching mathematics; (2)The result of the study - the former discovered that peer teaching approach was good as the traditional method of teaching mathematics while the latter study found out that

integrated approach was better than lecture-discussion method; and (3) The subjects of his study were second year high school students while in the present study the researcher used first year high school students.

Dacula (1995) developed and validated modules on Percent and Ratio for Mathematics I at Wright Vocational School, Paranas, Samar. She found out in her study that the groups of subjects had the same entry level of behavior at the start of the experimentation. The two groups had a significant improvement in their performance. However, the improvement in the experimental group was significantly higher than that of the control group. In view of this, she concluded that the modular approach of teaching was more effective than the traditional lecture-discussion method as far as the topic percent and ratio was concerned. This was true because the students could go through the modules and learn its contents at their own rate, checked and repeated some sections of their work if needed, discovered processes and techniques in learning the lesson until the feeling of self-satisfaction was attained. Furthermore, she added that the module was appropriate and interesting to the first year high school students. From the foregoing conclusions, she recommended that: (1) The

developed module on percent and ratio should be used and evaluated in other schools to further confirm its effectivity; (2) Modular instruction is highly recommended to meet problems on individual differences and the need to develop independent and self-directed individuals; (3) Modules should be used to students with learning difficulties or the slow learners, to give them a chance to catch up with the lesson not well learned in the classroom. However, this should go hand in hand with the traditional instruction; (4) Modular instruction should be used to students with higher intelligence as often as possible in order to maximize learning process and output; (5) School administrators/officials should give full support and incentives to teachers who develop instructional materials for the improvement of classroom instruction; and (6) Modular instruction is strongly recommended for it helps the students learn to be independent, responsible, self-reliant and hardworking.

This study was similar to her study because: (1)Both studies utilized the experimental method of research; (2) The subjects of the study were both freshmen students; (3) The topics discussed were all about percent and ratio; (4)The two studies compared two methods of teaching

mathematics; (5) The subjects of the two studies had the same entry level of behavior at the start of the experimentation; and (6) The methods of teaching in both studies yield a significant improvement on the part of the learners, however the method being tested was more effective than the traditional method of teaching mathematics. They differed on: (1) The method used in the experimental group, Dacula's study utilized the modular approach of teaching mathematics while this study tested the effectiveness of integrated approach; and (2) The research locale of the studies - her study was conducted at Wright Vocational School while this study was at Samar Regional School of Fisheries.

The study about "The Effectiveness of Cooperative Learning in Teaching Mathematics" was conducted by Avelino (1995) at Tinabilan National High School, Palompon, Leyte. He found out that: (1) There was no significant difference between the scores of the pretest, weekly examinations and posttest between the experimental and control groups; (2) Significant gains of scores between the pretest and posttest was achieved by each of the two treatments; and (3)The results of the study showed that cooperative learning approach to the teaching of mathematics was

effective as the traditional lecture approach of teaching mathematics.

This study was similar to Avelino's study for the reasons that: (1) Both studies tried to know the best teaching approach in mathematics; and (2) Both discussed topics in mathematics. The two studies differed on their results in the sense that his study yielded that cooperative learning was effective as the traditional approach in teaching mathematics while this study proved that integrated approach in teaching was effective than the traditional method.

In the study entitled "Effectiveness of Instructional Module in Teaching Mathematics" of Villanueva (1995), she discovered that the two groups of subjects had the same entry level of behavior at the start and at the end of the experimentation. Lecture instruction and modular instruction could produce impressive results as attested to by the gains from pretest to the posttest results. The use of any of the teaching methods in teaching integers was effective. However, she recommended that the teacher and students might use modules as an effective remedial resource material. Moreover, it should be used by the teachers to remedy their problems on slow learners. For the

students who were away from classes due to reasons beyond their control, they could utilize the module to catch up with the lessons.

The present study was similar to that of Villanueva's study in the sense that: (1) Both studies tried to determine an effective method of teaching mathematics; (2) Both studies were experimental; (3) The subjects were first year high school students; and (4) The topics discussed were included in the Mathematics I course. They differed on: (1) The findings of the study because in Villanueva's study the two methods being compared produced the same performance level of the subjects while in this study the integrated method employed by the experimental group yielded a better result as compared to the traditional method of teaching; (2) The research locale of the study in the sense that the former was conducted at Samar State Polytechnic College while the latter at Samar Regional School of Fisheries; and (3) The purpose of the study because she determined the effectiveness of modular instruction while this present study tried the effectiveness of integrated method in teaching mathematics.

In the study entitled "The Art of Questioning: Its Relation to Students' Academic Achievement in High School

Mathematics I in Vocational Schools of the Province of Biliran", Elatico (1994) found out that: (1)The most frequently used type of question was that of memory type;(2) Teachers employed the techniques of questioning such as: a)Most of the teachers called on volunteers to answer questions; b) Teachers helped students give a complete and thoughtful responses by using appropriate pausing or wait time; c) Teachers increased the amount and quality of participation by following the procedure on question sequence techniques; (3) The academic achievement of students was of average level; (4) There was no significant relationship between the types of questions and the academic achievement of students;(5) There was no significant relationship between questioning technique and academic achievement of the students.

The present study was similar to the cited study in the sense that: (1) Both studies tried to determine the effect/relation of some variables on the performance of the students; (2) The subjects of the study were both freshmen high school students; and (3) The topic discussed were all about mathematics. They differed on: (1) The intervening variable being studied, in the sense, that in the study of Elatico, he made use of the art of questioning while this

study utilized the integrated method of teaching mathematics; and(2) The scope of the study for the reason that the former was conducted in the whole Province of Biliran while the latter was only in one school.

Another related study was the work of Pacolor (1993) about the "Determinants of Achievement in Mathematics of Fourth Year Secondary Students in Samar Island: An Input to a Model Training Design". In his study, he found out that: (1) The students who perceived that they have favorable or positive attitude towards the secondary mathematics curriculum were expected to have higher level of performance in the subject; (2)There was a negligible relationship between the students' achievement in mathematics and teachers educational qualifications; (3) There was a slight relationship between the students achievement in mathematics and teachers knowledge on content and attitude; (4) There was a moderate or substantial relationship between the students achievement in mathematics and teachers skills, teachers qualities, socio-economic status and study habits; and (5) There was a high relationship between students achievement in mathematics and their math scholastic ratings and attitudes towards the secondary mathematics curriculum.

This study was similar to that of Pacolor's study because: (1)Both studies determined some variables that may be used to improve the mathematics performance of the students; (2) The topic of both studies was about the mathematics curriculum; and (3) The main target of the two studies was the improvement of the mathematics performance of the students. They differed on: (1) The variables taken into consideration, in his study, the teacher factors and student factors, while in this study was the teaching method; and (2) The coverage of the study, in the sense, that his study was throughout the whole Samar island while this study was just concentrated in Samar Regional School of Fisheries.

Gordove (1992) studied the "Effectiveness of Self-learning Kits in Grade V Mathematics" in which he tried to discover an effective method in teaching mathematics in the elementary level. In his study, he found out that: (1) The subjects who were the Grade V pupils of Tarangnan Central School in Tarangnan, Samar had the same entry level of behavior or competency in mathematics particularly in geometry; and (2) The students who were exposed through the use of self-learning kits obtained higher scores in the posttest than those exposed through lecture-discussion

method. Based on the findings of his study, he recommended that: (1) Teachers should be encouraged to use self-learning kits on other learning areas of elementary mathematics; (2) The developed self-learning kits in Geometry should be used and evaluated in other schools to further confirm its effectivity; (3) School officials should give full support and incentives to teacher in the use and production of self-learning kits as an instructional materials for their school; and (4) The use of self-learning kits in Grade V and VI was highly recommended since it developed proper mathematical abilities and skills in the pupils.

The present study was similar to the previous study for the reasons that: (1) Both studies aimed to discover an effective method in teaching mathematics; (2) The experimental group in the two studies performed better than the control group; (3)The two studies proved that the methods that were experimented were effective than the traditional method; and (4) The topics discussed were all about mathematics. The two studies differed on: (1) The subjects of the study, his study used the Grade V pupils while this present study utilized the first year high school students; (2) The research locale of the studies,

his study was done at Tarangnan Central School while this study was conducted at Samar Regional School of Fisheries; and (3) The purpose of the study, his study was about the effectiveness of self-learning kits while this study was about the effect of integrated method in teaching mathematics.

Another related study was the work of Cugtas (1991). She found out that the grade III - I pupils of Catbalogan I Central Elementary School could perform the basic operations of mathematics. However, almost all in the fingermath class but only the fast learners in the control group could perform these operations with speed and accuracy. The experimental class enjoyed solving these basic operations using fingermath approach. For them, they were just playing with the use of their fingers. She further found out that the fingermath approach of teaching basic mathematical operations was more effective than the PRODED method since there was a significant difference between the results in the posttest of the control and experimental groups.

This study was similar to that of Cugtas in as much as: (1) The design of both studies was experimental; (2) Both tried to know the effectiveness of some teaching

approach in the performance of students in mathematics; and (3) The findings in both studies yielded a positive result on the part of the students. They differed on the following: (1) The strategy used, her study utilized the fingermath approach while the present study employed the integrated approach in teaching mathematics; (2) Her study used the grade III pupils while this present study utilized the freshmen students; and (3) Her research locale was Catbalogan I Central Elementary School while this study was Samar Regional School of Fisheries.

Estavillo (1998) studied about the "Modular Instruction, Conventional Method, and Modular-Conventional Combined in Teaching Science and Technology II" at Biri National High School (BNHS), Northern Samar. In his study, he found out the following: (1) The I.Q. level of the subjects were distributed almost equally among the normal/average, dull normal, and below normal; (2) The experimental group using modular instruction performed fairly; (3) The control group under the conventional method obtained a passing grade; (4) The second experimental group under the combined treatment had a good performance; (5) The combined method of instruction was the most effective, followed by the modular instruction, and least effective

was the conventional method; (6)There was no significant difference between sex and performance of students, thus sex was not a factor affecting the performance of the three groups of subjects; (7) There was no significant difference between I.Q. and performance; (8)There was a significant difference between the pretest and posttest result of both experimental and control groups, thus both increased in performance in Science and Technology II; and (9) The higher the I.Q. the better the performance of the control group but in the experimental group, they were almost equal in performance.

This study was similar to the previous study because (1)Both studies tried to discover the best strategy in teaching; and (2) Both studies proved that the effective teaching strategy was the combined or integrated method of teaching. The two studies differed on the following: (1) The topics that were discussed, his study discussed about the lessons in Science and Technology II while this study was about Mathematics I; (2) His subjects were second year high school students while the subjects of this study were first year high school students; (3) His study had three groups of subjects while this study had only two groups of subjects; and (4)His study considered the factors of I.Q.

and sex of the subjects while in this study considered only the sex of the subjects.

Another related study entitled "The Effects of Peer Tutoring on the Achievement in Physics of College Students'' was conducted by Tonido (1998). He found out that the mean gain score of the experimental group which was exposed to peer tutoring was a little bit higher than the control group exposed to the traditional method. This implied that students exposed to peer tutoring were encouraged to learn and achieve more when they were working with their peers in a cooperative groups. However, this difference was not significant. Consequently, the hypothesis which stated that there was no significant difference between the mean gain scores in Physics of the students exposed to peer tutoring and those exposed to traditional method of teaching was accepted. From these findings, she concluded that there was a very small difference in the mean gain of the college students in both groups, those exposed to peer tutoring and traditional method. Furthermore, this meant that the performance of the experimental group was equivalent to the performance of the control group.

The present study was similar to the aforementioned study for the following reasons: (1) Both studies aimed to discover an effective method of teaching; (2) Both studies required the true experimental design using the pretest - posttest control groups; (3) Both studies tried to determine the effect of some teaching strategy on the achievement or performance of the students; (4) Both studies needed an achievement test as the instrument in testing the hypotheses presented in the studies. They differed on following: (1) The subjects of the previous study were BSME and BSEE students while in this study, they were first year high school students; (2) The lessons taught in his experimentation were all about Physics while this study discussed lessons in Mathematics I; (3) The research locale of his study was at Leyte Institute of Technology while this study was at Samar Regional School of Fisheries; (4) The period of the experimentation was six weeks while in this study, the experimentation lasted for one grading period; and (5) His study proved that peer-teaching approach was as good as the traditional method while the result of this study implied that integrated approach in teaching was better than the traditional method.

Cajipo (1998) investigated the effects of peer tutoring on the self-concept and Physics achievement of sophomore college students of the Leyte Institute of Technology. The results were utilized as inputs to the counseling service of the guidance program of the institute. She found out that majority of the tutor and tutees obtained a "good" and "fair/passing" mid-term grades. In addition, it was noted that more tutors gained/improved their grades during the end-term evaluation as a significant result of peer tutoring along the academic discipline on focus. Moreover, it was observed that there was no significant difference on the respondents' academic performance in Physics between the mid-term and end-term evaluation but it had between the pretest and posttest scores on self-concept. The findings of the experiment along academic achievement in Physics did not bring satisfactory results in terms of the big magnitude of students in the improvement of their grades in Physics; it was therefore recommended by the researcher that more time be given to peer tutoring, say, even before the mid-term examination or right after the diagnostic test was administered.

This study was similar to the foregoing study in the sense that: (1) Both studies tried to determine the effect of some method of teaching on the performance of students; (2)Both methods used in the study were student-centered; and (3) Both studies were experimental. They differed on the following: (1) The topic studied, in his study was about physics while this current study was about mathematics; (2) The result of his study did not yield a significant improvement in the academic performance of the students but this study produced a satisfying result on the performance of the subjects; (3) His study was conducted at Leyte Institute of Technology while this study was at Samar Regional School of Fisheries; and (4) His subjects were sophomore college students while this researcher's subjects were freshmen high school students.

Another related study was the work of Kalingag (1994)entitled "The Effectiveness of Voices Tape Teaching on Student Achievement in Science and Technology IV" at Leyte National High School, Sagkahan National High School and San Jose National High School. In his randomized quasi-experimental study, he found out that: (1) The comparison between the experimental group and control group with respect to pretest and posttest scores had no

significant difference; (2) No significant difference in the achievement of students taught by the conventional method; (3)High school students needed very much the teacher's presence in the classroom, the use of the voiced tape would not be applicable to them; (4) The general results showed that although differences were observed between the two groups in favor of the control group, the differences did not reach statistical significance; and (5) No significant difference in the achievement of students taught using the voiced tape and the students taught by the conventional method.

This study was similar to the aforementioned study in the sense that both studies determined the effect of some approaches of teaching on the achievements of students. The two studies differed on the following: (1) The results of the previous study showed that the observed differences in the achievement of students taught by the two methods being studied did not reach statistical significance while in this study, the effect of integrated approach on students' performance was better than the effect of traditional method of teaching mathematics; (2) The lessons presented in the previous study were on topics about Science and Technology IV while in this endeavor, the

topics were all about Mathematics I; and (3)Her study was conducted at the three schools in the Province of Leyte while this study was conducted at only one school in the Province of Samar.

Another related study was the work of Acuin (1993). This study entitled "The Effects of Textbook-Based and Communication Skills to Caused Supplementary Materials in the Technology Home Economics I on the Students Performance''. In this study, the researcher discovered that the textbook-based and communication skills-focused supplementary materials developed in his study was effective in raising students' achievement level in Technology and Home Economics I. This implied the need to reproduce, disseminate and utilize these materials among all first year Technology and Home Economics students of the Leyte National High School as well as other public secondary schools.

This study was similar to the aforesaid study for the following reasons: (1) The appropriate design of the studies was the true experimental design using the pretest-posttest control group; (2) The subjects of the two studies were freshmen high school students; (3) Both studies tried to determine the effect of some variables on the

performance of the students; and (4) Both studies found out that the approach used in teaching produced effective result on the performance of the students. The two studies differed on: (1) The research locale for the reason that his study was conducted at Leyte National High School while this study was at Samar Regional School of Fisheries; and (2) The lessons he taught were all about Technology and Home Economics I while this study were about Mathematics I lessons.

Chapter 3

METHODOLOGY

This chapter deals with the methods and procedures used to answer the problems posed in this study. It presents the research design, the instrumentation, the sampling procedure, the data gathering procedure, and the corresponding statistical treatment of the data.

Research Design

The research method used in this study was the true experimental design using the pretest - posttest control group. This design involved the random assignment of subjects from a single population to the experimental and control groups. This two groups received initial measurement observations, called pretests (O_1 and O_2) so as to determine that both groups were equal in terms of key variables considered in the study, and served as a baseline for comparison purposes at the latter part of the experiment. Then, an intervention or treatment was introduced to the experimental group. The control group did not receive said intervention or treatment (x) but was left the way it was before getting involved in the experiment.

After some time which gave the intervention the "chance to work", a second round of measurement observations were made, called posttests (O_3 and O_4) It is expected that, since the experimental group received the intervention, then desired change should manifest in this group, not in the control group (Ardales, 1992 : 48).

Instrumentation

The following were the instruments for gathering data used in this study.

Documentary Analysis. One of the gathering information tools employed in this research was documentary analysis. The DECS Form 138 or Student's Progress Report Card of the subjects was used in getting the profile of the subjects in this study. The DECS Form 137 or the Permanent Record was utilized to determine the average performance grade of students enrolled in Samar Regional School of Fisheries for the last five years.

Pretest/Posttest. A 70-item test was prepared by the researcher in the process of determining the baseline for comparison and achievement of the subjects. This 70-item test was made after making a table of specifications. This test was given to the second year high school students in

order to determine the validity of the test. This test was revised based on the result of an item analysis. This test was reduced to 50-item test which served as the pretest and posttest of the subjects and became the main instrument in this study. The pretest was given before the start of the experimentation. On the other hand, the posttest which contained the same test items as the pretest was administered by the researcher after the experiment. These tests were designed to determine the mathematical performance of the students.

Observation. This was one of the instruments used in this study. This instrument was one of the earliest methods for acquiring knowledge (Ardales, 1987: 67). The researcher made use of the non-participant observation or NPO in the sense that the researcher did not participate in the activities of the students and the said students were unaware that they were being observed so that all of them did their activities the way they usually went about it. The researcher personally observed the activities being undertaken by each student especially during their practice tasks. The members of the experimental group were making the assigned task even during their vacant time and aside from that each student tried to express his own

understanding about the topic being studied. The members of the control group also participated in whatever task assigned to them by their teacher.

Modules. As one of the research instruments, the researcher used the developed and validated modules of Ms. Valentina W. Dacula of Wright Vocational School, Paranas, Samar. The lessons in the modules were about Mathematics I, particularly on percent and ratio. The modules were divided into nine lessons, namely: (1) Percent, (2) Percent Problem of Type A - Finding the Percentage, (3) Percent Problem of Type B - Finding the First Factor or Rate, (4) Percent Problem of Type C - Finding the Second Factor or Base, (5) Computing Discount, Marked Price, and Sales Price, (6) Borrowing and Lending Money, (7) Ratio, (8) Equal Ratios, and (9) Problem Solving in Equal Ratios.

Validation of the Instrument.

A 70-item test was constructed based on the table of specifications (Appendix I, page 113) using knowledge, comprehension, application and higher than application of cognitive abilities. The test was shown to the research adviser and some mathematics teachers for their comments

and suggestions for possible improvements. It aimed to establish the content validity of the test.

The original draft of 70-item test was tried-out among sophomore students who had taken their Mathematics I in the previous year. After the try-out, the items were subjected to an item-analysis in order to determine the index of difficulty and the index of discrimination. The test was revised based on the result of the analysis. The validated test contained only 50 items (Appendix K, page 123).

To ensure uniformity in the administration of the test, the researcher personally administered the try-out. The test factors such as room, time and conduct of the test were taken into consideration to avoid bias in the results.

Kuder-Richardson Formula 20. The formula below was used to determine the reliability coefficient of the instrument (Calmorin, 1994: 69).

$$r_{xx} = \left(\frac{N}{N-1}\right)\left(\frac{SD^2 - \sum p_i q_i}{SD^2}\right)$$

Where:

N = number of items

SD^2 = variance of scores on test

p_i = proportion of individuals passing item i

q_i = proportion of individuals failing item i

The formula below for the discrimination index was used (Calmorin, 1994:135):

$$D.I. = \frac{RU - RL}{N}$$

The formula below for the index of difficulty was used (Calmorin, 1994:135):

$$I.D. = \frac{RU + RL}{2N}$$

where:

RU = refers to the correct responses made by the members in the upper group

RL = refers to the correct responses made by the members in the lower group

N = refers to the number of students in each group

The interpretation of the index of difficulty was:

0.00 - 0.20 very difficult item

0.21 - 0.80 moderately difficulty

0.81 - 1.00 very easy item

Ebel (1972:37) used the following criteria for judging the discriminating power of an item:

0.40 - 1.00 high discrimination

0.30 - 0.39 satisfactory discrimination

0.20 -	0.29	marginal discrimination
-1.00 -	0.19	poor discrimination

Sampling Procedure

Purposive sampling technique was done to the subjects of the study. The first grading grade in mathematics was the basis of distributing the members of the control and experimental groups. To avoid bias in the experimental results, the first grading grade was matched or equated correspondingly to assure equivalency. To illustrate further, if the first grading grade of student x in the experimental group was 90, it was matched correspondingly with the student y in the control group who should have also a grade of 90. However, some of the students in the experimental group did not have a counterpart on the control group. To solve this problem, group matching was used. Hence, 22 students from section A were identified as the experimental group and 22 students from section B as the control group. The mean performance grade of the experimental group was 82.23 while the control group was 81.40. Using the t-test for independent samples at 5% level of significance, the difference of 0.83 between the two sample means was not significant for the reason that the

computed t was 1.31 which was lesser than the tabulated t of 2.018.

Data Gathering

The researcher conducted three phases of activities namely: pre-experimental phase, experimental phase and post-experimental phase.

Pre-experimental Phase. On November 3, 1999 , a sort of orientation was given to the subjects of the study. After that, the same pretest with the same time allotment of one hour and fifteen minutes was given to the two groups of subjects for the purpose of determining the baseline for comparison at the latter part of the experiment. In addition, it provided the researcher with a means of checking whether or not the two groups are really similar. That is, whether matching assignment actually succeeded in making the experimental and control groups equivalent.

Experimental Phase. The experimentation period was conducted by the researcher during their original schedule of their math class. The experimental group had a class in Mathematics every morning at 7:20 to 8:00 during Mondays and the other days at 7:35 to 8:15. This was the schedule of the first year A students for the reason that there is

a flag ceremony every Monday. The control group had a class at 8:15 to 8:55 in the morning from Monday to Friday. The 40-minute class instruction was recited for the months of November and January. For the month of December, the 40-minute period was reduced to 30-minute period everyday in order to give time for the practice of the Teachers' Day celebration and Christmas Festival. The experimental group had a class at 7:30 to 8:00 every Monday and at 7:45 to 8:15 for the other days. The control group had a class at 8:15 to 8:45 everyday. The experimentation period lasted for 45 days which was broken down as follows:18 days, 12 days and 15 days for the months of November, December and January, respectively. During the experimentation period, the experimental group was exposed to the integrated approach in teaching mathematics while the control group was exposed to the traditional method of teaching.

All first year A students of Samar Regional School of Fisheries were exposed to the integrated method of teaching Mathematics. However, only 22 out of 48 students or 46% of the total number of students had been considered as the subjects of the study because the 26 students in the said section had no counterpart in the other section. Their grades in Mathematics during the first grading period were

very much higher than the grades in the second section. The first year A students had been divided into six groups with eight members in each group - 3 males and 5 females. This groupings lasted only for 2.5 weeks for the reason that the time they finished the module was very long as compared to the expected time to finish the said module. This problem was explained to them, thus another heterogeneous groupings were made with only three students in each group.

Each student had a module during the experimentation so that they could study their lesson in their respective houses. Whatever they learned from the module, it was shared to the other members of the group. Each one was required to submit an individual practice task aside from the practice task of the whole group. They were not allowed to proceed to the next module if they did not obtain a score of at least 75% of the total number of items. They knew immediately the result of the practice task in the sense that they checked their own work. Announced and unannounced quizzes were also given to them in order to measure the learning they earned from the modules. Moreover, the researcher utilized the validated module of Dacula (1995).

In the control group, only 22 out of 47 students or 47% of the total number of first year B students had been considered as the subjects of the study. However, all of them were exposed to the teacher-discussion method of teaching mathematics I. The seatwork, exercises and assignments were given to the students in which they undertook those activities individually.

Factors that influenced the extent of the study such as conduciveness of the classroom, ventilation, light and the teacher were controlled to eliminate or minimize the possible effect of the above mentioned variables other than the one being studied.

Post-experimental Phase. The test that was given in the pre-experimental phase was given again to the subjects in order to determine the effect of integrated approach on students' performance in mathematics. It determined the knowledge and skills the students have acquired from the two different methods of instruction. This also provided the researcher the posttest mean scores. This test was conducted on January 25, 2000 with one hour and fifteen minutes time allotment.

Statistical Treatment

The researcher utilized several statistical tools in analyzing the raw data collected. These were the frequency count, mean, SD, t-test for dependent samples and t-test for independent samples.

Frequency count. The frequency count was used to analyze the subjects' profile such as sex, age, entrance examination result and first grading grade in mathematics.

Mean. The mean was utilized to (1) obtain the average first grading grade of the students in Mathematics, (2) determine the mean performance score of the two groups of subjects in the pretest, and (3) know the mean performance score of the two groups of subjects in the posttest.

t-test for independent samples. To answer hypothesis # 1 and hypothesis # 4 which stated that there is no significant difference between the pretest mean scores of the experimental and control groups, and there is no significant difference between the posttest mean scores of the experimental and control groups, respectively, the t-test for independent samples was used. It was computed using the following formula (Walpole, 1982:311).

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

with d.f. = $n_1 + n_2 - 2$

where:

t = computed t-value

X_1 = mean of the first group

X_2 = mean of the second group

S_1^2 = sample variance of the first group

S_2^2 = sample variance of the second group

n_1 = number of cases of the first group

n_2 = number of cases of the second group

t-test for dependent samples. To answer hypothesis # 2 and hypothesis # 3 which stated that there was no significant improvement in the mathematics performance of students in the experimental group as reflected in their pretest and posttest results, and there was no significant improvement in the mathematics performance of students in the control group as reflected in their pretest and posttest results, respectively, the t-test for dependent samples was applied. The formula below was used (Freund & Simon, 1992:327).

$$t = \frac{\bar{d}}{S_d/\sqrt{n}}$$

with d. f. = n - 1

where:

t = computed t-value

d = mean of the difference between the two groups compared

S_d = standard deviation of the observed differences

n = number of pairs

d.f. = degrees of freedom

Chapter 4

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the presentation of data gathered from the subjects through the use of documentary analysis, pretest and posttest, observation, and modules. The data consist of students' profile, pretest score and posttest score which are presented correspondingly as to the specific questions raised from the statement of the problem.

Profile of the Subjects

To obtain the exact picture of the students' profile, a documentary analysis using the DECS Form 138-A or Student's Progress Report Card and result of the entrance examination filed at the head teacher's office of the related department of SRSF, was done by the researcher. A personal interview was also conducted by the researcher to verify the accuracy of some data. There were 44 first year students acted as the subjects of this study, 22 students for the experimental group and 22 students for the control group.

Table 1 shows the frequency distribution of sex of the

Table 1

Sex of Students

Sex	Experimental Group		Control Group	
	No. of Students	Percent (%)	No. of Students	Percent (%)
Male	11	50.00	11	50.00
Female	11	50.00	11	50.00
Total	22	100.00	22	100.00

subjects of the study. In each group, eleven students were males and eleven students were females. This indicated that there was an equal number of males and females in both groups.

For the age of the subjects, Table 2 shows that 55% or 12 students in the experimental were 13 years old, 36% or 8 students were 12 years old and 9% or 2 students were 16 years old. In the control group, 50% or 11 students were13 years old, 14% or 3 students were 12 years old and the remaining 36% or 8 students were 14 to 18 years old. It can be gleaned from the data that most of the subjects of the study were 13 years of age. Considering the standard deviation of each group, the age distribution in the experimental group was very much closer to each other than

Table 2

Age Level of Students

Age	Number of Students (Experimental Group)	Percent (%)	Number of Students (Control Group)	Percent (%)
12	8	36.00	3	14.00
13	12	55.00	11	50.00
14	0	0.00	4	18.00
15	0	0.00	1	4.50
16	2	9.00	1	4.50
17	0	0.00	1	4.50
18	0	0.00	1	4.50
Total	22	100.00	22	100.00
Mean	12.91		13.68	
Standard Deviation	1.08		1.52	

that of the control group. The mean entrance examination result of the experimental group was 68.64 while the control group was 65.64. As reflected in Table 3, 5 students obtained a rating below the mean, 8 students were within the range of the mean and 9 students from the experimental group got a rating above it. For the control group, 9 students got a rating below the mean, 9 students were within the range of the mean and the remaining 4 students received a rating above the mean. For the

Table 3

Entrance Examination Result

Score	Frequency (Experimental Group)	Percent (%)	Frequency (Control Group)	Percent (%)
60 - 62	3	14.00	6	27.00
63 - 65	2	9.00	3	14.00
66 - 68	8	36.00	9	41.00
69 - 71	3	14.00	3	14.00
72 - 74	4	18.00	1	4.00
75 - 77	0	0.00	0	0.00
78 - 80	1	4.50	0	0.00
81 - 83	1	4.50	0	0.00
Total	22	100.00	22	100.00
Mean	68.64		65.64	
Standard Deviation	5.25		3.47	

computed standard deviation, 5.25 of the experimental group proved to be greater than 3.47 of the control group. This indicated that the control group was a homogeneous group than the experimental group in terms of their entrance examination results.

The first grading grade in mathematics of the subjects is shown in Table 4. The mean grade of the experimental group was 82.23 while the control group was 81.40. To determine if the difference of 0.83 between the two sample

means was significant, the t-test for independent samples was employed. The computed t was 1.31 which proved to be lesser than the tabulated t of 2.018. The computation implied that the difference was insignificant. Furthermore, this data served as the basis for the distribution of the subjects in the study. However, considering their standard deviation, the experimental group was more homogeneous than the control group in terms of their first grading grade in mathematics.

Table 4

First Grading Grade in Mathematics

Grade	Frequency (Experimental Group)	Percent (%)	Frequency (Control Group)	Percent (%)
78 - 79	1	4.50	5	23.00
80 - 81	6	27.00	7	32.00
82 - 83	12	55.00	6	27.00
84 - 85	2	9.00	2	9.00
86 - 87	1	4.50	2	9.00
Total	22	100.00	22	100.00
Mean	82.23		81.40	
Standard Deviation	1.81		2.35	
Computed t = 1.31		Tabular t = 2.018		I = Not Significant

Pretest Results of the Experimental and Control Groups

As reflected in Table 5, the highest pretest score in both groups was 21. The lowest score in the experimental group was three while in the control group was seven. The total score in the experimental group was 304 with a mean of 13.82 while in the control group was 312 with a mean of 14.18. The standard deviation of 4.33 of the experimental group and 3.69 of the control group, implied that the pretest scores of the control group were more closer to each other than that of the experimental group. With the use of t-test for independent samples, the difference of 0.36 between the two sample means was insignificant at 5% level of significance for the reason that the computed t of 0.297 proved to be lesser than the tabulated t of 2.018. Thus, the first null hypothesis which stated that "There is no significant difference between the pretest mean performance scores of the experimental and control groups" was accepted. The observed difference between their pretest mean scores was not significant. This results implied that the entry behavior of the two groups were the same prior to experimentation.

Table 5

Pretest Scores of the Experimental and Control Groups

Student Number	Pretest	
	Experimental Group	Control Group
1	16	13
2	17	11
3	11	11
4	21	15
5	16	21
6	11	15
7	18	13
8	16	14
9	10	15
10	7	15
11	15	15
12	11	7
13	16	21
14	7	14
15	16	20
16	16	15
17	10	10
18	15	17
19	3	9
20	18	9
21	18	18
22	16	14
Total	304	312
Mean	13.82	14.18
Standard Deviation	4.33	3.69
Computed t = 0.297	Tabular t = 2.018	I = Not Significant

Pretest and Posttest Results of the Experimental Group

Table 6 shows the pretest and posttest scores of the experimental group. It is reflected in the table that all of the subjects received a higher score in the posttest than in the pretest. As discussed earlier, the highest score obtained in the pretest was 21 and the lowest score was 3 resulting a mean of 13.82. In the posttest, the highest score was 39 and the lowest score was 12 which gave a mean score of 22.36. The data gave the difference of 8.54. The standard deviation obtained of the experimental group in the pretest was 4.33 while in the posttest was 5.37. Initially, it could be observed that there was an improvement in the mathematical performance of the experimental group after the experimentation. In analyzing the data, t test for dependent samples was used. At 5% level of significance, the computed t was 7.97 which was higher than the tabulated t of 1.721. This resulted to the rejection of the null hypothesis which stated that "There is no significant improvement in the mathematics performance of the students in the experimental group as reflected in their pretest and posttest results". This implied that there was an

improvement on the performance of the subjects who were exposed to integrated approach of teaching mathematics.

Table 6

Pretest and Posttest Scores
of the Experimental Group

Student Number	Pretest Scores	Posttest Scores
1	16	27
2	17	39
3	11	23
4	21	26
5	16	24
6	11	23
7	18	19
8	16	20
9	10	24
10	7	15
11	15	17
12	11	22
13	16	23
14	7	21
15	16	18
16	16	24
17	10	12
18	15	26
19	3	15
20	18	24
21	18	24
22	16	26
Total	304	492
Mean	13.82	22.36
Standard Deviation	4.33	5.37
Computed t = 7.97	Tabulated t = 1.721	I = Significant

Pretest and Posttest Results of the Control Group

The pretest and posttest scores of the control group are given in Table 7. As reflected in the table, not all of the subjects obtained a higher score in the posttest as compared to the pretest. Five students got a score in the posttest lower than the score in the pretest, and one student had the same score in the pretest and posttest while the rest obtained an increase in the posttest score. The highest score in the pretest was 21 and the lowest score was 7. The highest score obtained in the posttest was 27 and the lowest score was 11. A total score of 312 and 404 was obtained by the subjects in the control group during the pretest and posttest, respectively. The sample means obtained in the pretest and posttest were 14.18 and 18.36, respectively. The standard deviation received by the control group in the pretest was 3.69 while in the posttest was 4.47. The t test for dependent samples was utilized to verify if a significant difference existed between the two sets of data. The computed t was 3.89 which proved to proved to be higher than the tabulated t of 1.721 at 5% level of significance with 21 degrees of freedom. This result implied the rejection of the null hypothesis which

Table 7

Pretest and Posttest Scores
of the Control Group

Student Number	Pretest Scores	Posttest Scores
1	13	15
2	11	15
3	11	17
4	15	21
5	21	19
6	15	26
7	13	10
8	14	21
9	15	22
10	15	19
11	15	12
12	7	18
13	21	21
14	14	27
15	20	23
16	15	11
17	10	15
18	17	16
19	9	14
20	9	20
21	18	19
22	14	23
Total	312	404
Mean	14.18	18.36
Standard Deviation	3.69	4.47
Computed t = 3.89	Tabulated t = 1.721	I - Significant

stated that "There is no significant improvement in the mathematics performance of the students in the control group

as reflected in their pretest and posttest results" . Like in the case of the experimental group, the control group showed marked improvement after they were taught percent and ratio with the use of traditional method which is the teacher-discussion.

Posttest Results of the Experimental and Control Groups

The posttest scores of the subjects in the experimental and control groups are reflected in Table 8. The highest score obtained by the experimental group was 39 while the highest score obtained by the control group was 27. Moreover, the lowest scores for the experimental and control groups were 12 and 11, respectively. The total score obtained by the experimental group was 492 with a mean of 22.36. The total score got by the control group was 404 with a mean of 18.36. The standard deviation of the experimental group was 5.37 while that of the control group was 4.47. This result implied that the control group was a homogeneous group than the experimental group. Evidently, it could be observed that the mean score of the experimental group in the posttest was higher than that of the control group by 4.00. The difference between the two sample means

was compared with the use of t test for independent samples in order to know if the said difference was significant.

Table 8

Posttest Scores of the Experimental and Control Groups

Student Number	Posttest	
	Experimental Group	Control Group
1	27	15
2	39	15
3	23	17
4	26	21
5	24	19
6	23	26
7	19	10
8	20	21
9	24	22
10	15	19
11	17	12
12	22	18
13	23	21
14	21	27
15	18	23
16	24	11
17	12	15
18	26	16
19	15	14
20	24	20
21	24	19
22	26	23
Total	492	404
Mean	22.36	18.36
Standard Deviation	5.37	4.47
Computed t = 2.68	Tabulated t = 2.018	I = Significant

The computed t of 2.68 was greater than the tabulated t of 2.018. This yielded to the rejection of the fourth null hypothesis which stated that "There is no significant difference between the posttest mean scores of the experimental and control groups". This indicated that the experimental group who were exposed to integrated approach in teaching mathematics performed better than the control group who were exposed to the traditional method of teaching. Hence, integrated method was more effective than the traditional method of teaching percent and ratio.

Instructional Redirections

Based on the results of the study, the following were the instructional redirections:

1. Students should not consider mathematics as the most difficult subject in the sense that it would only hinder to their better understanding of the said subject.

2. Teacher-discussion method still produced a good result in the teaching-learning process, however there was a need for the teacher to exert more effort in presenting the lessons.

3. Teacher-discussion method was teacher-centered approach in teaching mathematics.

4. Integrated approach was a material-centered and student-centered approach in teaching mathematics.

5. The integrated approach in teaching mathematics was better than the traditional method of teaching mathematics.

6. Teachers were encouraged to utilize the integrated approach in teaching mathematics.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

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

Summary of Findings

Based on the data gathered by the researcher through the use of different instruments such as documentary analysis, pretest/posttest and an observation, the following results were obtained:

1. There were eleven males and eleven females in each group in this study.

2. Most of the subjects of the study were 13 years of age.

3. In the experimental group, the average rating in the entrance examination result was 68.64, 5 students got a rating lower than the average grade, 8 students were within the range of the mean and 9 students obtained a rating higher than it.

4. The average rating of the control group in the entrance examination was 65.64, 9 students received a rating lower than the mean, 9 students were within the range

of the mean, and the remaining 4 students got a score higher than the average.

5. The average rating for the first grading period in mathematics of the students in the experimental group was 82.23 while in the control group was 81.4. The difference of 0.83 was insignificant.

6. The pretest mean performance score of the experimental group was 13.82 while that of the control group was 14.18.

7. The posttest mean performance score of the experimental group was 22.36 while the control group was 18.36.

8. There was no significant difference in the pretest mean performance scores of the two groups of subjects for the reason that the computed t of 0.297 was less than the tabular t of 2.018 which implied the acceptance of the first null hypothesis which stated that "There is no significant difference between the pretest mean scores of the two groups of subjects".

9. Based on the pretest and posttest scores of the experimental group, the computed t of 7.972 was higher than the tabulated t of 1.721. This led to the rejection of the second null hypothesis which stated that "There is no

significant improvement in the mathematics performance of students in the experimental group as reflected in their pretest and posttest results".

10. As reflected in the pretest and posttest results of the control group, the computed t of 3.89 was higher than the tabular t of 1.721. This indicated the rejection of the third null hypothesis which stated that "There is no significant improvement in the mathematics performance of students in the control group as reflected in the pretest and posttest results".

11. The fourth hypothesis, "There is no significant difference between the posttest mean scores of the experimental and control groups" was rejected due to the fact that the computed t of 2.68 was greater than the tabular t of 2.018.

Conclusions

Based on the findings of the study, the following conclusions were derived:

1. The experimental and control groups had more or less the same level of entry behavior on the basis of their sex, age, entrance examination results, first grading grades in Mathematics I and pretest mean scores. This meant that

the experiment was free from bias on the basis of the results arrived at.

2. The performance of the experimental group in the posttest was significantly better than the performance in the pretest and, therefore learning through integrated method took place.

3. The performance of the control group in the posttest was significantly better than its performance in the pretest; thus, learning through the teacher-discussion or teacher's usual method took place.

4. The integrated method of teaching was more effective than the teacher-discussion or usual method of teaching as far as the topic percent and ratio was concerned.

Recommendations

Based on the foregoing conclusions, the following recommendations are made:

1. The utilization of integrated method be tried out as an alternative strategy in teaching other secondary mathematics courses.

2. An experimental study to determine the effect of integrated method on academic performance of students in

other disciplines be conducted.

3. Seminars about integrated method in teaching mathematics should be conducted.

4. Integrated method in teaching mathematics should be given greater emphasis in the subject "Strategies of Teaching in the Major Field" of BSE Math students.

5. Other studies about integrated approach should be conducted in other learning areas and institutions to confirm its effectiveness.

6. Other studies about integrated approach in teaching mathematics should be conducted wherein the researcher should take into consideration the intelligent quotient (I.Q.) of the subjects of the study.

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APPENDICES

APPENDIX A

Letter for Approval of the Problem

Samar State Polytechnic College
Catbalogan, Samar

January 18, 1999

Rizalina M. Urbiztondo, Ed.D.
Dean, Graduate & Post-Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

Madam:

In my desire to start writing my thesis proposal, I have the honor to submit for approval one of the following research problems preferably problem number 1.

1. THE ATTITUDES OF STUDENTS TOWARDS MATHEMATICS INSTRUCTION IN SAMAR REGIONAL SCHOOL OF FISHERIES: BASIS FOR CURRICULAR REDIRECTIONS.

2. THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS.

3. THE DIFFICULTIES IN LEARNING MATHEMATICS ENCOUNTERED BY FRESHMEN STUDENTS IN THE PRIVATE AND PUBLIC SCHOOLS IN CATBALOGAN, SAMAR.

I hope for your early and favorable action on this request.

Very truly yours,

(SGD.) RHOLYNA G. TILLES
Researcher

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean, Graduate & Post-Graduate Studies
Samar State Polytechnic College

APPENDIX B

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar
SCHOOL OF GRADUATE STUDIES

APPLICATION FOR ASSIGNMENT OF ADVISER

NAME: Tilles, Rholyna Gabon
(Surname) (First Name) (Middle Name)

CANDIDATE FOR DEGREE: Master of Arts in Teaching

AREA OF SPECIALIZATION: Mathematics

TITLE OF PROPOSED THESIS/DISSERTATION: The Effect of Integrated Approach on Students' Performance in Freshmen Mathematics.

(SGD.) RHOLYNA G. TILLES
Applicant

(SGD.) EUSEBIO T. PACOLOR, Ph.D.
Name of Designated Adviser

APPROVED:

(SGD.) RIZALINA M.URBIZTONDO,Ed.D.
Dean, Graduate Studies

CONFORME:

(SGD.) EUSEBIO T. PACOLOR, Ph.d.
Adviser

In 3 copies: 1st copy - for the Dean
2nd copy - for the Adviser
3rd copy - for the Applicant

APPENDIX C

Application for Pre-Oral Defense

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar
GRADUATE & POST-GRADUATE STUDIES

August 10, 1999

The Dean
Graduate School
Samar State Polytechnic College
Catbalogan, Samar

Madam:

I have the honor to apply for Pre-Oral Defense of my thesis entitled THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS, on the date convenient for your office.

Very truly yours,

(SGD.) RHOLYNA G. TILLES
Graduate Student

Recommending Approval:

(SGD.) EUSEBIO T. PACOLOR, Ph.D.
Adviser

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean, Graduate & Post-Graduate Studies

Date: September 14, 1999
Time: 10:35 A.M.

APPENDIX D

Request for Permission to Administer Achievement Test

August 5, 1999

Bonifacio S. Villanueva, Ed.D.
Vocational School Superintendent II
Samar Regional School of Fisheries
Catbalogan, Samar

Dear Sir:

I have the honor to request permission to administer a test to the sophomore secondary students in connection with my master's thesis entitled THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS on August 6, 1999.

Hoping for your favorable consideration on this request.

Respectfully yours,

(SGD.) Miss RHOLYNA G. TILLES
Researcher

Recommending Approval:

(SGD.)Mrs.GAIL G.CALUMPIANO
Head Teacher III
(Related)

(SGD.) Mr. LOLITO O. AMPARADO
Head Teacher III
(Vocational)

(SGD.) LATIP S. ABDURAHMAN, Ph.D.
Principal II

APPROVED:

(SGD.) BONIFACIO S. VILLANUEVA, Ed.D.
Superintendent II

APPENDIX E

Request to Conduct an Experiment

October 25, 1999

Latip S. Abdurahman, Ph.D.
Principal II/Officer-In-Charge
Samar Regional School of Fisheries
Catbalogan, Samar

Sir:

In connection with my master's thesis entitled "THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS'', I have the honor to request permission to conduct the experimental phase of my study from October 1999 to January 2000 to the freshmen students of Samar Regional School of Fisheries.

I hope for your favorable approval on this request.

Respectfully yours,

(SGD.)RHOLYNA GABON TILLES
Researcher

Recommending Approval:

(SGD.)Mrs.GAILG.CALUMPIANO
Head Teacher III (Related)

(SGD.)Mr.LOLITO O. AMPARADO
Head Teacher III (Vocational)

Approved:

(SGD.)LATIP S. ABDURAHMAN, Ph.D.
Principal II/Officer-In-Charge

APPENDIX F

Request for Schedule for Final Orals

Republic of the Philippines
Samar State Polytechnic College
Catbalogan, Samar

March 4, 2000

Eusebio T. Pacolor, Ph.D.
Dean, Graduate and Post-Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

Sir:

I hereby respectfully request that I be scheduled for a final oral defense of my thesis entitled "THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS'', on March 12, 2000.

I hope for your kind and favorable action on this matter.

Very respectfully yours,

(SGD.) RHOLYNA GABON TILLES
MAT Math Student

Recommending Approval:

(SGD.) EUSEBIO T . PACOLOR, Ph.D.
Adviser

Approved:

(SGD.) EUSEBIO T. PACOLOR, Ph.D.
Dean, Graduate & Post-Graduate Studies

APPENDIX G

Request for Permission to Use Modules

October 4, 1999

Ms. Valentina W. Dacula
Wright Vocational School
Paranas, Samar

Madam :

In connection with my master's thesis entitled "THE EFFECT OF INTEGRATED APPROACH ON STUDENTS' PERFORMANCE IN FRESHMEN MATHEMATICS'', I have the honor to request permission to utilize in my study your developed and validated module on percent and ratio.

I hope for your favorable approval on this request.

Respectfully yours,

(SGD.) Rholyna Gabon Tilles
Reseacher

Noted :

(SGD.)EUSEBIO T. PACOLOR, Ph.D.
Adviser

Approved:

(SGD.)MS. VALENTINA W. DACULA
Mathematics Teacher

APPENDIX H

List of Topics

TOPICS	Number of Days
Orientation & Pretest	2
Percent	7
Problems on Percent	8
Computing the Discount, Sale Price and Marked Price	15
Borrowing and Lending Money	7
Ratio	3
Equal Ratios	5
Posttest	1
Total	48

APPENDIX I

Table of Specifications for Achievement Test Construction

TOPICS	COGNITIVE SKILLS TESTED				
	Knowledge	Comprehension	Application	Higher Than Application	Total
I. Using Percent and Ratio					
1. Percent	1,2,3	17,18	33,34,35	51A, 52S, 53E	11
2. Problems on Percent	4,5	19,20,21	36,37,38	54A, 55A, 56A	11
3. Computing the Discount, Sale Price and Marked Price	6,7,8	22,23,24	39,40,41	57S, 58S, 59E, 60E	13
4Borrowing & Lending Money	9,10,11	25,26	42,43,44	61A, 62A, 63S	12
5. Ratio	12,13,14	27,28,29	45,46,47	64S, 65S, 66S, 67S	12
6. Equal Ratios	15,16	30,31,32	48,49,50	68A, 69A, 70E	11
Total	16	16	18	20	70

Legend:

A - Analysis
S - Synthesis
E - Evaluation

APPENDIX J

Initial Form of the Test Instrument

MATHEMATICS

Direction: Read each item carefully. Select the best answer from the given choices. Write only the letter corresponding to your answer on your answer sheets. DO NOT WRITE ANYTHING ON THIS QUESTIONNAIRE.

1. What do you mean by the word "percent"?
   a. hundredths
   b. thousandths
   c. tenths
   d. ten thousandths

2. What is the Latin word of percent?
   a. per cantum
   b. per centum
   c. percent
   d. per hundred

3. Which of the following is the other way of writing a fraction or a decimal?
   a. whole number
   b. percent
   c. quotient
   d. percentage

4. In 10% of 30 = n, n is a product. What operation will be used in order to find the value of n?
   a. multiplication
   b. division
   c. addition
   d. subtraction

5. In 20% of n = 100, n is a factor. What operation will be used in order to find the value of n?
   a. multiplication
   b. division
   c. addition
   d. subtraction

6. What is the other term applied to the regular price of an article?
   a. net price
   b. list price
   c. sale price
   d. all of the above

7. What is the term applied to the price of an article after the discount has been deducted?

a. mark price
b. discount
c. net price
d. list price

8. When a discount is stated as a percent numbers it is called:
a. deduction
b. price
c. discount rate
d. ratio

9. What formula are you going to use to compute the interest of an amount invested in any business?
a. 1 = P - R - T
b. 1 = P - R - T
c. 1 = P x R x T
d. 1 = P + R + T

10. What do you call that amount being paid when money is deposited in or borrowed from the bank?
a. rate
b. time
c. principal
d. interest

11. In the formula I = Prt, t should be :
a. per day
b. per week
c. per annum
d. per month

12. The ratio between two numbers is written as :
a. a : b
b. a / b
c. a - b
d. all of the above

13. Which of the following means that a is to b ?
a. For every number (a) in the first group, there is a corresponding number (b) in the second group.
b. For some number (a) in the first group, there is a corresponding number (b) is the second group.
c. For all number (a) in the first group, there b a corresponding number (b) in the second group.
d. For very number (a) in the first group, there is no corresponding number (b) in the second group.

14. The statement of comparison of two groups is called ?
a. proportion
b. ratio
c. percent
d. decimal

15. If the product of the extremes is equal to the product of the means, the two ratios is said to be:
a. proportion
c. proper ratio

b. ratio d. cross multiplication

16. What do call the end numbers in equal ratios ?
a. proportion c. extremes
b. ratio d. means

17. What is 80% of 85 students ?
a. 68 c. 93
b. 77 d. 101

18. Which of the following means 60% ?
a. 60 out of 10 c. 60 out of 1000
b. 60 out of 100 d. 60 out of 10000

19. 12 is 30 % of n : What is the value of n ?
a. 36 c. 40
b. 38 d. 42

20. What operation is used to find the missing number in the expression " 10% of 30 = n "?
a. addition c. division
b. subtraction d. multiplication

21. What operation is used to find the missing percent in the expression " n % of 250 = 50"?
a. addition c. division
b. subtraction d. multiplication

22. What is the regular price of a t-shirt sold for ₱ 90.00 at 20% reduction ?
a. ₱ 121.50 c. ₱ 221.50
b. ₱ 112.50 d. ₱ 112.00

23. What are you going to do to find the discount (r %) when the market price (D) and the rate of discount (MP) are given ?
a. multiply the marked price by the rate of discount.
b. divide the marked price by the rate of discount.
c. add the marked price by the rate of discount.
d. Subtract the marked price by the rate of discount.

24. What will you do to find the sale price of an article ?
a. multiply the discount from the marked price.
b. divide the discount from the marked price.
c. add the discount from the marked price.

d. subtract the discount from the marked price.

25. Which of the following will be used to find the Interest of ₱ 350.00 for 1 year at 5 % per annum.
a. I = (₱ 350.00) (5%) (1)
b. I = (₱ 350.00) (.05%) (12)
c. I = (₱ 350.00) (0.5%) (1)
d. I = (₱ 350.00) (.005) (1)

26. Which of the following situations illustrate that a person is us a wise man?
a. A wise person saves all of his income.
b: A wise person saves a portion of his income.
c. A wise person did not save a portion of his income.
d. A wise person borrow money from his colleagues.

27. In a class of 48 student, there are 25 girls. What is the ratio of girls to boys ?
a. 25 : 23
b. 23 : 25
c. 25 : 48
d. 48 : 25

28. In class of 50 students there are 21 boys and 29 girls. What is the ratio of boys to girls ?
a. 21 : 50
b. 21 : 29
c. 29 : 50
d. 29 : 21

29. In a group of 10 BSE Mathematics students, there are 2 honor students. What is the ratio of honor students to the whole group of students ?
a. 5 : 1
b. 5 : 2
c. 1 : 5
d. 1 : 10

30. Which of the following is a proportion ?
a. 1 : 2 = 2 : 1
b. 3 : 6 = 1 : 2
c. 2 : 3 = 4 : 5
d. ½ : ½ = 2 : 4

31. In a proportion, a/b = c/d, (a) (d) and (b) (c) are sometimes referred to us :
a. extremes
b. cross products
c. terms
d. means

32. What process should be apply in order to check whether or not the two ratios is a proportion ?
a. cross division
b. cross multiplication
c. cross addition
d. cross subtraction

33. In class of 40 students, 38 were promoted. What part of the class was retained ?
a. 5 %
b. 95%
c. 38 %
d. 40%

34. Argel ordered a new car. He paid the car dealer a deposit of 2/25 of the price of the car. Write This number as a percent.
a. 8%
b. 80%
c. 0.08%
d. 88%

35. To make a reservation for a trip, Rholyna Travel Agency as for a deposit of 3/20 of the price of the trip. Write this number as a percent.
a. 15%
b. 1.5%
c. .15%
d. 150%

36. In a test of 25 questions, Emma made 4 mistakes only. What percent did she answer correctly?
a. 18%
b. 21%
c. 29%
d. 84%

37. Imelda saved ₱ 3.00 by buying a kilo of milk fish instead of buying them individually. ₱ 3.00 is 10% of the price for a kilo of milk fish. What is the price ?
a. ₱ 3.00
b. ₱ 30.00
c. ₱ 33.00
d. ₱ 300.00

38. Of the 152 first year students of SRSF, 95% passed the first quarter examinations. How many students passed?
a. 142
b. 143
c. 144
d. 145

39. What was the price of a pair of shoes which was tagged at ₱ 30.00 and given a 10% discount?
a. ₱ 40.00
b. ₱ 35.00
c. ₱ 27.00
d. ₱ 25.00

40. What rate of discount is given if a lady's blouse that regularly sells for P 80.00 is sold for P60.00?
a. 75%
b. 25%
c. 60%
d. 80%

41. What is the list price of an article sold at P 30.00 with a 25% discount ?
   a. ₱ 20.00 c. ₱ 40.00
   b. ₱ 30.00 d. ₱ 50.00

42. How much money must be invested at 15% interest annually to earn ₱ 500.00 monthly ?
   a. ₱ 50,000.00 c. ₱ 15,000.00
   b. ₱ 40,000.00 d. ₱ 30,000.00

43. What is the annual rate of interest if you borrow ₱ 1,000.00 and pay back ₱ 1,200.00 at the end of of one year ?
   a 20% c. 10%
   b. 12% d. 30%

44. What is the total amount due after three years if you borrow ₱ 100.00 at 10% per annum, compounded annually ?
   a. ₱ 133,00 c. ₱ 110.00
   b. ₱ 121.00 d. ₱ 115.00

45. Write the ratio 1 : 50 in percent form.
   a. 1% c. 2%
   b. 50% d. 20%

46. Lito's monthly salary is ₱ 1,000.00, while his father's salary is ₱ 1,500.00. What is the ratio of Lito's salary to his father's salary ?
   a. 1,500 : 1000 c. 3 : 2
   b. 15 : 10 d. 2 : 3

47. An inventory shows 3000 washers and 2000 bolts ? What is the ratio of washers to bolts ?
   a. 3 : 2 c. 2000 : 3000
   b. 2 : 3 d. 200 : 300

48. In the expression 2 : 3 = 8 : n . What is n ?
   a. 6 c. 18
   b. 12 d. 10

49. If diesel fuel costs ₱ 7.00 per liter, how much would 6 liters cost ?
   a. ₱ 42.00 c. ₱ 13.00
   b. ₱ 7.00 d. ₱ 24.0

50. Candies are priced at 3 pcs. for ₱ 2.00. How many candies can you buy for ₱ 14.00 ?
a. 12 c. 42
b. 21 d. 24

51. In class of 50 students, 46 are present, what percent of the class is absent ?
a. 8% c. 80%
b. .08% d. .8%

52. The sticker price on a new car is P 562,000.00. The sales tax is 8%. Find the total cost, including the tax.
a. ₱ 44,960.00 c. ₱ 606,960.00
b. ₱ 4,496.00 d. ₱ 60,696.00

53. 90 out of a hundred can be written as :
a. 9% c. 900%
b. 90% d. .09%

54. Mrs. Bacsal was given a 10% commission on the house and lot that she sold for ₱ 65,000.00. Find the amount of her commission.
a. ₱ 650.00 c. ₱ 44.00
b. ₱ 6,500.00 d. ₱ 45.00

55. The inspectors in a factory rejected 3 pieces as imperfect. This represent 1 ½ % of the daily production. How many pieces were produced ?
a. 220 c. 22
b. 2200 d. 22000

56. Due to heavy rains, 24% of the 40 students of the class was absent, how many were present ?
a. 10 c. 30
b. 20 d. 40

57. Children's summer clothes originally priced at ₱ 85.00 are advertised at 40% discount during the sale. What is the sale priced of the clothes ?
a. ₱ 34.00 c. ₱ 44.00
b. ₱ 51.00 d. ₱ 45.00

58. Cynthia bought a bag marked 40% off. She saved ₱ 600.00. What was the original price of the bag ?'

a. ₱ 150.00 c. ₱ 240.00
b. ₱1,500.00 d. ₱ 2,400.00

59. What is the sale price of an article marked ₱ 200.00, when the ratio of discount are 20% & n %.
a. ₱ 160.00 c. ₱ 144.00
b. ₱ 140.00 d. ₱ 124.00

60. The marked priced of a book is ₱ 40.00. How much is the selling price if 20% discount is given to those who buy more than 10 copies ?
a. ₱ 8.00 c. ₱ 80.00
b. ₱ 32.00 d. ₱ 320.00

61. How much money must be invested at 15% interest annually to earn ₱ 500.00 monthly?
a. ₱ 40,000 c. ₱ 4,000
b. ₱ 6,000 d. ₱ 60,000

62. Find the interest of ₱ 350.00 for one year at 5% per annum.
a. ₱ 175.00 c. ₱ 1.75
b. ₱ 17.50 d. ₱ 1750.00

63. What will happen to the interest if the rate and the principal remain the same while the time in years increases?
a. The interest will increase.
b. The interest will remain the same.
c. The interest will decrease.
d. The interest will not change.

64. Which of the following is an abstract number that contains no unit of measurement, but if the numbers compared have units of measurement, they must be expressed in the same unit?
a. factor c. decimal
b. multiple d. ratio

65. The Matilla's family has a monthly income of ₱ 3,00.00. The budget last month is broken down as follows:

food.	₱ 1,500.00
shelter	1,000.00
clothing	400.00
savings	100.00

What was the ratio of the money spent for food to the income?

a. 2:1
b. 3:2
c. 1:2
d. 2:3

66. What do you mean by the phrase: "Only 3 out of 5 students in the class passed the examination"?
a. 60% of the students passed the examination
b. 40% of the students passed the examination
c. 0.6% of the students passed the examination
d. 0.4% of the students passed the examination

67. Why fractions are also called rational number?
a. The statement of comparison between two groups can be expressed as a fraction.
b. The statement of comparison between two groups can be expressed as a product.
c. The statement of comparison between two groups can be expressed as factors.
d. The statement of comparison between two groups can be expressed as terms.

68. If it takes 12 minutes to saw a log into 3 pieces, how long would it take to saw it into 4 pieces?
a. 16 minutes
b. 13 minutes
c. 12 minutes
d. 20 minutes

69. Two numbers are in the ratio 4:3. The number 20 is in that same ratio to a fourth number, what is the fourth number?
a. 30
b. 25
c. 20
d. 15

70. If 3 cats kill 3 rats in 3 minutes, then how many cats will it take to kill 30 rats in 30 minutes?
a. 30 cats
b. 3 cats
c. 300 cats
d. 10 cats

Prepared by:

Miss RHOLYNA GABON TILLES

Researcher

APPENDIX K

Final Form of the Test Instrument

MATHEMATICS

Direction: Read each item carefully. Select the best answer from the given choices. Write only the letter corresponding to your answer on your answer sheets. DO NOT WRITE ANYTHING ON THIS QUESTIONNAIRE.

1. What is the Latin word of percent?
   a. per cantum
   b. per centum
   c. percent
   d. per hundred

2. Which of the following is the other way of writing a fraction or a decimal?
   a. whole number
   b. percent
   c. quotient
   d. percentage

3. In 10% of 30 = n, n is a product. What process are you going to use to find the value of n?
   a. multiplication
   b. division
   c. addition
   d. subtraction

24. In 20% of n = 100, n is a factor. What operation will be used in order to find the value of n?
   a. multiplication
   b. division
   c. addition
   d. subtraction

5. The regular price of an article is the same as its:
   a. net price
   b. list price
   c. sale price
   d. all of the above

6. The price of an article after the discount has been deducted is called:
   a. mark price
   b. discount
   c. net price
   d. list price

7. The discount stated as percent number is called:
   a. deduction
   c. discount rate

b. price
d. ratio

8. The amount being paid when a money is deposited in or borrowed from the bank is called:
a. rate
c. principal
b. time
d. interest

9. In computing the interest, the time should be :
a. per day
c. per annum
b. per week
d. per month

10. Which of the following means that a : b ?
a. For every number (a) in the first group, there is a corresponding number(b) in the second group.
b. For some number (a) in the first group, there is a corresponding number (b) is the second group.
c. For all number (a) in the first group, there is a corresponding number (b) in the second group.
d. For very number (a) in the first group, there is no corresponding number (b) in the second group.

11. The statement of comparison of two groups is called ?
a. proportion
b. ratio
c. percent
d. decimal

12. The product of the extremes is equal to the product of two ratios is a:
a. proportion
c. proper ratio
b. ratio
d. cross multiplication

13. What is the end numbers in equal ratios ?
a. proportion
c. extremes
b. ratio
d. means

14. What is 80% of 85 students ?
a. 68
c. 93
b. 77
d. 101

15. Which of the following means 60% ?
a. 60 out of 10
c. 60 out of 1000
b. 60 out of 100
d. 60 out of 10000

16. What is the value of n in expression "12 is 30% of n"?

a. 36
b. 38
c. 40
d. 42

17. What operation is used to find the missing number in the expression "10% of 30 =n"?
a. addition
b. subtraction
c. division
d. multiplication

18. What operation is used to find the missing percent in the expression "n % of250=50"?
a. addition
b. subtraction
c. division
d. multiplication

19. What is the regular price of a t-shirt sold for ₱ 90.00 at 20% reduction ?
a. ₱ 121.50
b. ₱ 112.50
c. ₱ 221.50
d. ₱ 112.00

20. What are you going to do to find the discount (r %) when the market price (D) and the rate discount (MP) are given ?
a. multiply the marked price by the rate of discount.
b. divide the marked price by the rate of discount.
c. add the marked price by the rate of discount.
d. subtract the marked price by the rate of discount.

14. There are 48 students in a class, 25 are girls. What is the ratio of girls to boys?
a. 25 : 23
b. 23 : 25
c. 25 : 48
d. 48 : 25

22. In class of 50 students there are 21 boys and 29 girls. What is the ratio of boys to girls?
a. 21 : 50
b. 21 : 29
c. 29 : 50
d. 29 : 21

23. In a group of 10 BSE Mathematics students, there are 2 honor students. What is the ratio of honor students to the whole group of students ?
a. 5 : 1
b. 5 : 2
c. 1 : 5
d. 1 : 10

24. Which is an example of a proportion?
a. 1 : 2 = 2 : 1
b. 3 : 6 = 1 : 2
c. 2 : 3 = 4 : 5
d. ½ : ½ = 2 : 4

25. In a proportion, a/b = c/d, (a) (d) and (b) (c) are referred to as :
   a. factors
   b. cross products
   c. terms
   d. means

26. What process should be apply in order to check whether or not the two ratios is a proportion ?
   a. cross division
   b. cross multiplication
   c. cross addition
   d. cross subtraction

27. In class of 40 students, 2were promoted. What part of the class was retained ?
   a. 5 %
   b. 95%
   c. 38 %
   d. 40%

28. Argel ordered a new car. He paid the car dealer a deposit of 2/25 of the price of the car. Write 2/25 in percent.
   a. 8%
   b. 80%
   c. 0.08%
   d. 88%

29. To make a reservation for a trip, Rholyna Travel Agency asks for a deposit of 3/20 of the price of the trip. Write 3/20 in percent.
   a. 15%
   b. 1.5%
   c. .15%
   d. 150%

30. Emma made 4 mistakes in her 25 item test. What percent did she answer correctly?
   a. 18%
   b. 21%
   c. 29%
   d. 84%

31. Of the 152 first year students of SRSF, 5% failed the first quarter examination. How many students passed the said examination?
   a. 142
   b. 143
   c. 144
   d. 145

32. What was the price of a pair of shoes which was tagged at ₱ 30.00 and given a 10% discount?
   a. ₱ 33.00
   b. ₱ 3.00
   c. ₱ 27.00
   d. ₱ 25.00

33. What rate of discount is given if a lady's blouse that regularly sells for ₱ 80.00 is sold for P60.00?

a. 75%
b. 25%
c. 60%
d. 80%

34. What is the market price of an article sold at P 30.00 with a 25% discount ?
a. ₱ 20.00
b. ₱ 30.00
c. ₱ 40.00
d. ₱ 50.00

35. What is the annual rate of interest if you borrow P 1,000.00 and pay back P 1,200.00 at the end of one year ?
a 20%
b. 12%
c. 10%
d. 30%

36. Lito's monthly salary is ₱ 1,000.00, while his father's salary is ₱ 1,500.00. What is the ratio of Lito's salary to his father's salary ?
a. 1,500 : 1000
b. 15 : 10
c. 3 : 2
d. 2 : 3

37. In the expression 2 : 3 = 8 : n . What is n ?
a. 6
b. 12
c. 18
d. 10

38. If diesel fuel costs ₱ 7.00 per liter, how much would 6 liters cost ?
a. ₱ 42.00
b. ₱ 7.00
c. ₱ 13.00
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39. Candies are priced at 3 pcs. for ₱ 2.00. How many candies can you buy for ₱ 14.00 ?
a. 12
b. 21
c. 42
d. 24

40. In class of 50 students, 46 are absent, what percent of the class is absent ?
a. 8%
b. .08%
c. 80%
d. .8%

41. 90 out of a hundred can be written as :
a. 9%
b. 90%
c. 900%
d. .09%

42. Mrs. Bacsal was given a 10% commission on the house and lot that she sold for ₱ 65,000.00. Find the amount of her commission.

a. ₱ 650.00 c. ₱ 44.00
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43. The inspectors in a factory rejected thirty three pieces as imperfect. This represent 1.5 % of the daily production. How many pieces were produced ?
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b. 2200 d. 22000

44. Children's summer clothes originally priced at ₱ 85.00 are advertised at 40% discount during the sale. What is the sale price of the clothes ?
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b. ₱ 51.00 d. ₱ 45.00

45. What is the selling price of a book with a marked price of ₱ 40.00 and a discount of 20%?
a. ₱ 8.00 c. ₱ 80.00
b. ₱ 32.00 d. ₱ 320.00

46. Find the interest of ₱ 350.00 for one year at 5% per annum.
a. ₱ 175.00 c. ₱ 1.75
b. ₱ 17.50 d. ₱ 1750.00

47. ₱ 3,000 is the monthly income of Matilla's family. The budget last month was broken down as follows:

food.	₱ 1,500.00
shelter	1,000.00
clothing	400.00
savings	100.00

What was the ratio of the money spent for food to the income?
a. 2:1 c. 1:2
b. 3:2 d. 2:3

48. The phrase "only 3 out of 5 students in the class passed the examination" means:
a. 60% of the students passed the examination
b. 40% of the students passed the examination
c. 0.6% of the students passed the examination
e. 0.4% of the students passed the examination

49. If it takes 12 minutes to saw a log into 3 pieces, how long would it take to saw it into 4 pieces?

a. 16 minutes
b. 13 minutes
c. 12 minutes
d. 20 minutes

50. 4 : 3 is the ratio of two numbers. The number 20 is in that same ratio to a fourth number, what is the fourth number?
a. 30
b. 25
c. 20
d. 15

Prepared by:

MISS RHOLYNA GABON TILLES

Researcher

APPENDIX L

Item Analysis of Achievement Test

Item No.	Upper Group	Lower Group	Difficulty Index	Interpretation	Discrimination Index	Interpretation	Decision
1	5	9	0.41	MD	-0.24	PD	D
2	12	4	0.47	MD	0.47	HD	R
3	6	1	0.21	MD	0.29	MD	R
4	13	12	0.74	MD	0.06	PD	I
5	8	3	0.32	MD	0.29	MD	R
6	2	0	0.06	VD	0.12	PD	I
7	2	1	0.09	VD	0.06	PD	I
8	10	8	0.53	MD	0.12	PD	I
9	7	9	0.47	MD	-0.12	PD	D
10	14	11	0.74	MD	0.18	PD	I
11	4	2	0.18	VD	0.12	PD	I
12	0	5	0.15	VD	-0.29	PD	D
13	9	8	0.50	MD	0.06	PD	I
14	6	2	0.24	MD	0.24	MD	R
15	3	3	0.18	VD	0	PD	I
16	7	5	0.35	MD	0.12	PD	I
17	14	5	0.56	MD	0.53	HD	R
18	10	4	0.41	MD	0.35	SD	R
19	0	0	0	VD	0	PD	I
20	12	6	0.53	MD	0.35	SD	R
21	12	8	0.59	MD	0.24	MD	R
22	6	2	0.24	MD	0.24	MD	R
23	12	6	0.53	MD	0.35	SD	R
24	2	2	0.12	VD	0	PD	I
25	4	6	0.29	MD	-0.12	PD	D
26	6	6	0.35	MD	0	PD	I
27	4	4	0.24	MD	0	PD	I
28	15	7	0.65	MD	0.47	HD	R
29	6	1	0.21	MD	0.29	MD	R
30	8	5	0.38	MD	0.18	PD	I
31	3	3	0.18	VD	0	PD	I
32	10	6	0.47	MD	0.24	MD	R
33	5	4	0.26	MD	0.06	PD	I

34	5	4	0.26	MD	0.06	PD	I
35	6	6	0.35	MD	0	PD	I
36	1	1	0.06	VD	0	PD	I
37	10	7	0.50	MD	0.18	PD	I
38	5	4	0.26	MD	0.06	PD	I
39	1	1	0.06	VD	0	PD	I
40	10	6	0.47	MD	0.24	MD	R
41	4	1	0.15	VD	0.18	PD	I
42	2	3	0.15	VD	-0.06	PD	D
43	7	3	0.29	MD	0.24	MD	R
44	2	2	0.12	VD	0	PD	I
45	0	3	0.09	VD	-0.18	PD	D
46	6	2	0.24	MD	0.24	MD	R
47	7	11	0.53	MD	-0.24	PD	D
48	7	2	0.26	MD	0.29	MD	R
49	15	7	0.65	MD	0.47	HD	R
50	9	5	0.41	MD	0.24	MD	R
51	9	6	0.44	MD	0.18	PD	I
52	4	3	0.21	MD	0.06	PD	I
53	7	1	0.24	MD	0.32	SD	R
54	9	4	0.38	MD	0.29	MD	R
55	4	4	0.24	MD	0	PD	I
56	4	3	0.21	MD	0.06	PD	I
57	8	4	0.35	MD	0.24	MD	R
58	4	2	0.18	VD	0.12	PD	I
59	3	5	0.24	MD	-0.12	PD	D
60	3	1	0.12	VD	0.12	PD	I
61	6	5	0.32	MD	0.06	PD	I
62	5	1	0.18	VD	0.24	MD	R
63	7	7	0.41	MD	0	PD	I
64	1	3	0.12	VD	-0.12	PD	D
65	4	2	0.18	VD	0.12	PD	I
66	7	5	0.35	MD	0.12	PD	I
67	7	8	0.44	MD	-0.06	PD	D
68	12	5	0.50	MD	0.41	HD	R
69	3	2	0.15	VD	0.06	PD	I
70	1	2	0.09	VD	-0.06	PD	D

where :
E = Easy
A = Average
D = Difficult
PD = Poor Discrimination

S = Satisfactory Discrimination
MD = Marginal Discrimination
HD = High Discrimination
R = Retain
I = Improve
D = Discard

APPENDIX M

Computation of Reliability of the Test Instrument

Student Numbe	Score (X)	X - X	$(X - X)^2$
1	47	23	529
2	45	21	441
3	40	16	256
4	39	15	225
5	37	13	169
6	36	12	144
7	35	11	121
8	34	10	100
9	34	10	100
10	33	9	81
11	28	4	16
12	27	3	9
13	26	2	4
14	26	2	4
15	26	2	4
16	26	2	4
17	25	1	1
18	24	0	0
19	24	0	0
20	24	0	0
21	24	0	0
22	24	0	0
23	24	0	0
24	24	0	0
25	23	-1	1
26	23	-1	1
27	23	-1	1
28	22	-2	4
29	21	-3	9
30	21	-3	9
31	21	-3	9
32	20	-4	16
33	19	-5	25
34	19	-5	25
35	19	-5	25

36	18	-6	36
37	18	-6	36
38	17	-7	49
39	17	-7	49
40	16	-8	64
41	15	-9	81
42	15	-9	81
43	14	-10	100
44	14	-10	100
45	14	-10	100
46	13	-11	121
47	12	-12	144
48	10	-14	196
Total		4	3490

Item Number	f	p_i	q_i	$p_i q_i$
1	25	0.52	0.48	0.2496
2	28	0.58	0.42	0.2436
3	41	0.85	0.15	0.1275
4	27	0.56	0.44	0.2464
5	10	0.21	0.79	0.1659
6	3	0.06	0.94	0.0564
7	39	0.81	0.19	0.1539
8	25	0.52	0.48	0.2496
9	25	0.52	0.48	0.2496
10	22	0.46	0.54	0.2484
11	28	0.58	0.42	0.2436
12	28	0.58	0.42	0.2436
13	22	0.46	0.54	0.2484
14	37	0.77	0.23	0.1771
15	39	0.81	0.19	0.1539
16	19	0.40	0.60	0.2400
17	39	0.81	0.19	0.1539
18	38	0.79	0.21	0.1659
19	12	0.25	0.75	0.1875
20	29	0.60	0.40	0.2400
21	18	0.38	0.62	0.2356
22	43	0.90	0.10	0.0900
23	12	0.25	0.75	0.1875

24	30	0.62	0.38	0.2356
25	14	0.29	0.71	0.2059
26	42	0.88	0.22	0.1936
27	17	0.35	0.65	0.2275
28	15	0.31	0.69	0.2139
29	29	0.60	0.40	0.2400
30	12	0.25	0.75	0.1875
31	13	0.27	0.73	0.1971
32	6	0.12	0.88	0.1056
33	21	0.44	0.56	0.2464
34	16	0.33	0.67	0.2211
35	18	0.38	0.62	0.2356
36	13	0.27	0.73	0.1971
37	35	0.73	0.27	0.1971
38	37	0.77	0.23	0.1771
39	22	0.46	0.54	0.2484
40	17	0.35	0.65	0.2275
41	28	0.58	0.42	0.2436
42	32	0.67	0.33	0.2211
43	9	0.19	0.81	0.1539
44	7	0.15	0.85	0.1275
45	7	0.15	0.85	0.1275
46	18	0.38	0.62	0.2356
47	15	0.31	0.69	0.2139
48	26	0.54	0.46	0.2484
49	28	0.58	0.42	0.2436
50	21	0.44	0.56	0.2464
Total				10.1764

$$SD^2 = \frac{\sum (X - X)^2}{N - 1}$$

$$SD^2 = 3490/48 - 1$$

$$SD^2 = 74.25531915$$

$$r_{xx} = \left(\frac{N}{N - 1}\right)\left(\frac{SD^2 \text{ -- } \sum p_i q_i}{SD^2}\right)$$

$$r = \left(\frac{50}{50 - 1}\right) \left(\frac{74.25531915 - 10.1764}{74.25531915}\right)$$

$$r = (1.020408163)\ (0.862953925) = 0.880565229$$

APPENDIX N

Alphabetical Listing of Subjects of the Study

Student Number	Experimental Group	Control Group
	Boys	**Boys**
1	Ansong, Meldee N.	Bernardino, Arnel P.
2	Arualan, Gabriel I.	Cananua, Ronnel S.
3	Bayani, Adonis B.	Costelo, Jeffrey M.
4	Brazas, Alexis D.	Dayot, Richie C.
5	Morada, Leunamee N.	Japzon, Philip B.
6	Mendoza, Cylmen L.	Mercolita, Marvin E.
7	Nario, Rowell B.	Moreno, Reynaldo E.
8	Opre, Fernando V.	Palma, Juan M.
9	Paña, Crisanto A.	Polancos, Ricky C.
10	Pore, Jose A.	Pore, Casandro M.
11	Verzosa, Nelson G.	Yboa, Teofilo P.
	Girls	**Girls**
12	Aguillon, Josephine D.	Alegro, Sunshine P.
13	Alaga, Josephine D.	Areno, Herlyn A.
14	Baa, Cristina T.	Bernardino, Abegail P.
15	Lipit, Isabel D.	Gapay, Danica D.
16	Marco, Deborah L.	Ilo, Rodelyn I.
17	Miraflor, Yhla Mae C.	Jabien, Analyn D.
18	Mores, Emelyn M.	Marco, Analyn M.
19	Niego, Rufina M.	Mission, Bebilyn R.
20	Palacio, Evelyn Q.	Pisngot, Mary Jane G.
21	Porcil, Angielyn L.	Prudenciado, Reynalyn
22	Villaflor, Analyn V.	Serrida, Lorna A.

APPENDIX O

Sex and Age of Students

Student Number	Experimental Group		Control Group	
	Sex	Age	Sex	Age
1	M	13	M	14
2	M	13	M	13
3	M	12	M	14
4	M	13	M	12
5	M	13	M	13
6	M	13	M	14
7	M	12	M	13
8	M	13	M	13
9	M	13	M	12
10	M	12	M	17
11	M	12	M	18
12	F	12	F	13
13	F	16	F	13
14	F	13	F	15
15	F	13	F	13
16	F	12	F	12
17	F	13	F	13
18	F	13	F	13
19	F	13	F	16
20	F	12	F	13
21	F	12	F	13
22	F	16	F	14

APPENDIX P

Entrance Examination Result
And
First Grading Grade in Mathematics I

Student Number	Entrance Exam. Result (Experimental Group)	First Grading Grade (Experimental Group)	Entrance Exam. Result (Control Group)	First Grading Grade (Control Group)
1	73	84	63	86
2	73	87	69	82
3	74	81	66	81
4	69	82	65	82
5	60	82	70	82
6	66	82	67	80
7	81	83	67	84
8	68	80	64	82
9	66	83	67	87
10	67	81	68	81
11	64	83	69	81
12	62	83	66	80
13	78	85	62	82
14	69	81	62	85
15	70	83	66	82
16	72	82	67	79
17	66	81	62	78
18	61	83	66	80
19	67	83	74	78
20	67	80	62	79
21	66	78	62	81
22	63	82	60	79

APPENDIX Q

Result of Quizzes
(Experimental Group)

Date	November				December			January						Σ
	5	15	16	24	7	14	17	3	7	12	17	18	20	
No. of Items / Student No.	15 A	3 U	10 U	13 U	5 U	5 A	5 A	5 U	5 U	15 U	14 A	13 A	10 A	
1	8	2	1	9	3	4	5	2	4	4	13	6	6	67
2	8	3	4	8	4	5	5	5	4	13	14	12	5	90
3	7	0	4	9	2	4	3	4	5	4	12	10	6	70
4	7	1	2	6	3	4	3	-	1	12	6	10	10	65
5	8	1	1	1	2	4	1	-	4	9	13	12	9	65
6	9	1	2	8	2	4	2	-	4	10	12	11	10	75
7	9	1	2	1	2	4	3	2	5	8	5	12	9	63
8	6	1	4	8	2	1	2	-	4	8	10	10	7	63
9	10	3	4	1	2	4	4	3	4	9	13	11	7	75
10	5	1	4	4	2	4	1	0	3	12	7	5	9	57
11	5	1	2	1	2	4	5	-	5	12	7	8	7	59
12	11	0	4	9	2	5	3	-	4	8	11	13	7	77
13	6	0	4	5	2	5	3	-	5	14	12	13	10	79
14	11	-	1	9	2	5	3	-	5	9	12	7	10	74
15	7	0	4	6	2	4	3	1	4	10	10	9	8	68

16	7	1	2	7	2	4	3	-	5	6	14	13	10	74
17	4	1	4	1	1	4	3	-	5	10	8	10	9	60
18	10	0	4	8	3	5	3	-	4	14	12	9	10	82
19	8	1	2	9	2	4	3	3	4	10	7	9	7	69
20	7	1	4	9	2	4	3	5	1	12	12	9	10	79
21	5	1	4	3	2	4	3	-	5	12	12	6	5	62
22	9	1	4	8	3	4	3	-	4	8	12	11	9	76

Legend :

A = Announced Quiz

U = Unannounced Quiz

- = Absent

APPENDIX R

Result of Quizzes
(Control Group)

Date	November												Dec		January							Σ
	3	4	5	10	11	15	16	18	19	23	24	29	7	9	3	5	7	12	17	18	20	
No. of Items / Student No.	5	5	10	5	5	5	5	3	6	3	5	5	2	5	5	5	5	10	3	7	5	109
1	3	4	8	5	4	5	4	3	5	2	3	–	1	–	–	4	5	2	0	6	3	67
2	0	–	–	1	1	2	0	0	0	2	0	0	2	–	–	4	0	4	–	1	–	17
3	–	2	8	3	1	0	0	3	2	3	4	–	0	3	–	5	–	–	0	0	5	39
4	5	2	2	1	1	2	2	–	1	2	2	3	2	5	–	4	0	–	0	1	1	36
5	1	–	0	2	0	–	–	0	1	2	1	–	0	–	–	2	1	1	–	2	1	14
6	–	4	10	5	3	4	2	3	3	3	–	1	2	–	–	4	–	–	–	2	3	49
7	5	5	4	5	–	3	2	–	–	–	0	3	0	3	0	5	0	4	1	0	3	43
8	0	5	0	1	0	1	1	0	3	0	3	0	0	3	2	1	0	4	0	1	3	28
9	–	4	–	5	4	3	–	–	3	2	0	–	2	–	–	–	2	2	1	6	3	37
10	0	3	0	3	0	2	1	3	2	3	2	–	0	5	1	2	0	2	1	0	1	31
11	4	2	–	2	3	1	0	0	–	2	2	0	0	3	–	4	0	–	0	1	–	24
12	5	5	–	–	1	2	0	3	0	–	2	–	0	5	–	3	0	–	–	3	1	30
13	3	3	4	5	–	4	1	3	0	–	3	2	2	2	–	–	0	6	1	0	–	39
14	5	4	4	5	2	5	2	3	4	1	5	–	2	4	4	5	5	–	–	6	3	69

15	4	5	4	5	4	4	2	3	4	2	3	3	2	4	–	–	3	6	–	1	3	62
16	–	1	6	0	0	0	0	1	1	3	2	–	1	5	2	4	–	–	0	1	1	28
17	–	2	0	1	2	0	0	2	2	–	0	–	0	4	–	0	0	–	–	–	–	13
18	2	2	–	0	2	2	0	2	0	–	2	–	0	–	3	3	0	2	–	–	–	20
19	–	3	0	1	1	0	0	0	–	0	0	2	1	0	–	3	0	2	0	0	1	14
20	4	2	0	–	2	2	0	3	2	–	2	3	1	4	4	2	1	–	–	0	–	32
21	–	5	0	–	0	1	–	–	–	1	3	–	1	4	–	–	–	4	–	–	1	20
22	–	2	–	–	–	3	0	3	–	2	–	–	–	–	–	3	–	2	0	0	1	16

APPENDIX S

Computation of t-value of Pretest Results Between the Experimental and Control Groups

Student Number	Pretest Scores (Experimental Group)	Pretest Scores (Control Group)
1	16	13
2	17	11
3	11	11
4	21	15
5	16	21
6	11	15
7	18	13
8	16	14
9	10	15
10	7	15
11	15	15
12	11	7
13	16	21
14	7	14
15	16	20
16	16	15
17	10	10
18	15	17
19	3	9
20	18	9
21	18	18
22	16	14
Total	304	312
Mean	13.82	14.18
Standard Deviation	4.33	3.69
Computed t = 0.297	Tabular t = 2.018	I = Not Significant

$$t = \frac{X_1 - X_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$t = \frac{13.82 - 14.18}{\sqrt{\frac{(22 - 1)(18.79) + (22 - 1)(13.60)}{22 + 22 - 2}\left(\frac{1}{22} + \frac{1}{22}\right)}}$$

$$t = \frac{-0.36}{\sqrt{\frac{394.59 + 285.6}{42}\left(0.09090909\right)}}$$

$$t = \frac{-0.36}{\sqrt{1.472272713}}$$

$$t = \frac{-0.36}{1.213372454}$$

$$t = -0.29669373 \qquad \text{with d.f.} = n_1 + n_2 - 2$$

APPENDIX T

Computation of t-value of Pretest and Posttest Scores of the Experimental Group

Student Number	Pretest Scores	Posttest Scores
1	16	27
2	17	39
3	11	23
4	21	26
5	16	24
6	11	23
7	18	19
8	16	20
9	10	24
10	7	15
11	15	17
12	11	22
13	16	23
14	7	21
15	16	18
16	16	24
17	10	12
18	15	26
19	3	15
20	18	24
21	18	24
22	16	26
Total	304	492
Mean	13.82	22.36
Standard Deviation	4.33	5.37
Computed t = 7.97	Tabulated t = 1.721	I = Significant

$$t = \frac{\bar{d}}{S_d/\sqrt{n}}$$

with d. f. = n - 1

$$t = \frac{-\ 8.55}{(\ 5.030642037\ )\ /\ \sqrt{22}}$$

$$t = \frac{-\ 8.55}{(\ 5.030642037\ )\ /\ 4.69041576}$$

$$t = \frac{-\ 8.55}{1.072536486}$$

$$t = -\ 7.971756776$$

APPENDIX U

Computation of t-value of Pretest and Posttest Scores of the Control Group

Student Number	Pretest Scores	Posttest Scores
1	13	15
2	11	15
3	11	17
4	15	21
5	21	19
6	15	26
7	13	10
8	14	21
9	15	22
10	15	19
11	15	12
12	7	18
13	21	21
14	14	27
15	20	23
16	15	11
17	10	15
18	17	16
19	9	14
20	9	20
21	18	19
22	14	23
Total	312	404
Mean	14.18	18.36
Standard Deviation	3.69	4.47
Computed t = 3.89	Tabulated t = 1.721	I - Significant

with d. f. = n - 1

$$t = \frac{\bar{d}}{S_d/\sqrt{n}}$$

$$t \doteq \frac{-4.18}{5.04 \;/\; (4.69041576)}$$

$$t = \frac{-4.18}{1.07453161}$$

$$t = -3.89006704$$

APPENDIX V

Computation of t-value of Posttest Results Between the Experimental and Control Groups

Student Number	Posttest Scores Experimental Group	Posttest Scores Control Group
1	27	15
2	39	15
3	23	17
4	26	21
5	24	19
6	23	26
7	19	10
8	20	21
9	24	22
10	15	19
11	17	12
12	22	18
13	23	21
14	21	27
15	18	23
16	24	11
17	12	15
18	26	16
19	15	14
20	24	20
21	24	19
22	26	23
Total	492	404
Mean	22.36	18.36
Standard Deviation	5.37	4.47
Computed t = 2.68	Tabulated t = 2.018	I = Significant

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$t = \frac{22.36 - 18.36}{\sqrt{\frac{(22-1)(28.87) + (22-1)(19.96)}{22 + 22 - 2}\left(\frac{1}{22} + \frac{1}{22}\right)}}$$

$$t = \frac{4}{\sqrt{\frac{606.27 + 419.16}{42}\left(0.09090909\right)}}$$

$$t = \frac{4}{\sqrt{2.219545432}}$$

$$t = \frac{4}{1.489813892}$$

$$t = 2.68$$

CURRICULUM VITAE

CURRICULUM VITAE

Name	:	RHOLYNA GABON TILLES
Address	:	Purok 2, Barangay Maulong Catbalogan, Samar
Date of Birth	:	May 16, 1977
Place of Birth	:	Catbalogan, Samar
Civil Status	:	Single
Father	:	Rogelio Marquez Tilles Brgy. Captain, Brgy. Maulong
Mother	:	Paulina Gabon Tilles Elementary Grades Teacher Catbalogan IV Central School
Brother	:	Rogelio Gabon Tilles, Jr. 3rd Year Engineering Student SSPC, Catbalogan, Samar
Sister	:	Rhonna Gabon Tilles 1st Year High School Student SRSF, Catbalogan, Samar

EDUCATIONAL BACKGROUND

Kindergarten:		Catbalogan I Central Elementary School Catbalogan, Samar, 1983-1984
Primary Grades	:	Catbalogan I Central Elementary School Catbalogan, Samar, 1984-1988
Intermediate	:	Maulong Elementary School Brgy. Maulong, Catb., Samar, 1988-1990
Secondary	:	Samar Regional School of Fisheries Catbalogan, Samar, 1990-1994

Tertiary	:	Samar State Polytechnic College Catbalogan, Samar, BSE Mathematics, 1994 – 1998
Graduate Studies:		Samar State Polytechnic College Catbalogan, Samar, 1998-2000
Degree Being Pursued	:	Master of Arts in Teaching
Major	:	Mathematics

AWARDS AND DISTINCTIONS

Elementary	:	Class Achiever (Grade I to IV) Second Honors (Grade V) First Honors (Grade VI)
Secondary	:	Consistent First Honors Student Class Valedictorian Awardee, Philippine Senate Gold Medal for Academic Excellence Awardee, Gerry Roxas Leadership Award Awardee, The Insular Life Educational Foundation Gold Eagle Award Awardee, Youth Leadership Excellence Award Awardee, Vocational Proficiency Award – Fish Preservation
Tertiary	:	Dean's Lister (BSE I & III) Awardee, Active Filipino Club Officer President's Lister (BSE II, 1st Semester) Magna Cumlaude (BSE Mathematics)

ACHIEVEMENT (EXTRA-CURRICULAR ACTIVITIES)

School Organizations :

S.Y. 1990-1991
Vice-President, Homeroom Organization
Business Manager, FAHP Sub-Chapter Level

S.Y. 1991-1992
President, Homeroom Organization
2nd Year Representative, SRSF SSC

S.Y. 1992-1993
President, Homeroom Organization
President, Junior Organization
Vice-President, Math Club

S.Y. 1993-1994
President, Homeroom Organization
President, Senior Organization
President, FAHP (Sub-Chapter & Chapter Level)
Vice-President, SRSF SSC
Editor-in-Chief, Maquedance (Official Organ of the Student Body of SRSF)
S-4, SRSF CAT-I

S.Y. 1994-1995
President, Homeroom Organization
MMO, Filipino Club

S.Y. 1995-1996
Secretary, D'Platonians
Secretary, FFPCC (Sub-Chapter Level)
Treasurer, BSE Math Major Students Organizations
Auditor, HELE-I Organization

S.Y. 1996-1997
Treasurer, Barangay Level (BSE Math III)

Vice-Mayor, Municipal Level (BSE Math Major)
Board Member, Provincial Level (Education Department)
Secretary, Number Sense Club
Secretary, D'Platonians

S.Y. 1997-1998
Chairman, Barangay Level (BSE Math IV)
Mayor, Municipal Level (BSE Math Major)
Vice-President, Student-Teacher Organization
Secretary, Provincial Level (Education Department)
Secretary, SED 413 Class
Auditor, SS 411 Class
Secretary, Foundations of Education Class (Graduate Studies)

S.Y. 1998-1999
Muse, MAT Math Organization

Community Organizations:

SK Councilor, Brgy. Maulong (Dec. '92 - May '96)
SK Auditor, Brgy. Maulong (Dec. '92 - May '96)
Member, 4-H Club of the Philippines (C.Y. 1994-present)
SK Chairwoman, Brgy. Maulong (June '96 - present)
SB Ex-Officio Member, Brgy. Maulong (June '96 - present)
Municipal Federation Vice President, 4-H Club of the Philippines (C.Y. 1997-1998)
Auditor, Municipal Agricultural and Fishery Council of Catbalogan (C.Y. 1997-1998)
Provincial Federation Vice President, 4-H Club of the Philippines (C.Y. 1998-2000)

Member, Samar Youth Movement (C.Y. 1999)

Other Organizations: Member, National Organization of Professional Teachers (NOPT - C.Y. 1998-present)
Member, Philippine Association of Graduate Education (PAGE - C.Y. 1999)

SEMINARS/TRAININGS ATTENDED

Regional Junior and Senior Encampment on February 20-26, 1992 at Marina Yulo-Vargas Regional Training & Program Center, Capitol Hills, Cebu City.

GSP International Peace Jubilee Camp on April 5-12, 1992 at Conception R. Gonzales National Program & Training Center, Novaliches, Quezon, City.

FAHP-FFP Work Conference on December 4-8, 1992 at Balangiga National Agricultural School, Balangiga E. Samar.

31st National Rizal Youth Leadership Institute on December 26-29, 1993 at Teachers' Camp, Baguio City.

FAHP- FFP Pre-Work Conference on September 23-24, 1993 at Samar National Pilot Opportunity School of Agriculture, E. Samar.

FAHP-FFP Work Conference on February 22-24, 1994 at SNPOSA, E. Samar.

Seminar Workshop on Campus Journalism on July 22-24, 1994 at Samar State Polytechnic College, Catbalogan, Samar.

Re-Echo Seminar Workshop on World Youth Day on April 21-23, 1995 at GSP Building, Catbalogan, Samar.

Anti-Drugs Encounter and Task Force Prevention Staff Training Seminar on April 30, 1996 at BSP Building, Catbalogan, Samar.

Y0outh Forum on Population and Sustainable Development on June 7, 1996 at Casa Anson, Tacloban, City.

Training on "Barangay at Pulisya Laban sa Krimen and on Fire Brigade" on November 25-29, 1996 at Samar Gymnasium, Catbalogan, Samar.

The Basic Orientation Seminar on the Integrated Sangguniang Kabataan Organizational Leadership and Reorientation "ISKOLAR" Program on April 21-23, 1997 at SRSF, Catbalogan, Samar.

Nutrition Advocacy on July 18, 1997 at Capitol Session Hall, Catbalogan, Samar.

Drug Symposium on November 14, 1997 at BSP Building, Catbalogan, Samar.

Test Construction Seminar Workshop on November 20-21, 1997 at Samar State Polytechnic College, Catbalogan, Samar.

Annual Orientation Seminar for Teacher Education Senior Students on February 18, 1998 at SSPC, Catbalogan, Samar.

Leadership Skills Training For Farm Youth on October 5-8, 1998 at ATI-RTC, San Vicente, Alang-alang, Leyte.

Regional Youth Congress of YHES (Youth for Human and Ecological Security) on October 28-29, 1998 at Leyte Productivity and Training Center, Candahug, Palo, Leyte.

Literacy Facilitators Training on November 12-13, 1998 at Maqueda Bay Hotel & Restaurant, Catbalogan, Samar.

SYM 1st Youth Congress on December 29, 1998 at SSPC Function Hall, Catbalogan, Samar.

Barangay Civil Registration Seminar Workshop on July 21-23, 1999 at Samar Regional School of Fisheries, Catbalogan, Samar.

ELIGIBILITY

Career Service Subprofessional Examination, December 1, 1996, Catbalogan, Samar - 85.92%

Presidential Decree #907 - Honor Graduate, Magna Cumlaude, March 18, 1998.

Licensure Examination for Teachers, August 1-2, 1998, Tacloban City - 81.60%

LIST OF FIGURES AND TABLES