CORRELATES OF STUDENTS' PERFORMANCE IN DIFFERENTIAL CALCULUS (MATH 214)

A Thesis

Presented to

The Faculty of the Graduate School

Samar State Polytechnic College

Catbalogan, Samar

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts in Teaching (Mathematics)

ALVIN M. NACARIO

March 2003

APPROVAL SHEET

In partial fulfillment of the requirements for the degree Master of Arts in Teaching Mathematics, the thesis entitled "Correlates of Students' Performance in Differential Calculus (Math 214)" has been prepared and submitted by ALVIN M. NACARIO, who having passed the Comprehensive Examination, is hereby recommended for oral examination.

EUSEBIO T. PACOLOR, Ph.D.
Adviser

Approved by the Committee on Oral Examination on March 15, 2003 with a rating of PASSED.

MARILYN D. CARDOSO, Ph.D.
Dean, College of Education
Chairman

FELISA E. GOMBA, Ph.D.
Member

RODRIGO G. ESTRADA, Ph.D.
Member

Accepted and approved in partial fulfillment of the requirements for the degree of Master of Arts in Teaching Mathematics.

EUSEBIO T. PACOLOR, Ph.D.
Dean, College of Graduate Studies

Date of Examination:
March 15, 2003

ACKNOWLEDGMENT

The researcher wishes to thank the following people for their inputs, time, ideas and patience in assisting the researcher for the completion of this study;

Dr. Leonardo V. Tanael, OIC president of SSPC for approving his thesis aid;

Dr. Eusebio T. Pacolor, Dean of the graduate studies of Samar State Polytechnic College, the researcher's adviser, for professional guidance, encouragement, unselfish assistance in the completion of this study;

The chairman and members of the committee on Oral Examination, Dr. Marilyn D. Cardoso, Dean, College of Education, Engr. Felisa E. Gomba, Head, Research and Extension Services, Engr. Rodrigo G. Estrada, former Dean of the College of Engineering, for their valuable suggestions, constructive criticism for the refinement of the manuscript;

Dr. Teresita T. Neypes, for some assistance extended in the preparation of the manuscript, and for her enthusiastic and unending support;

Dr. Phebe Nacionales, Head, Guidance Services of SSPC for being approachable and understanding and Ms.

Rhea Jabonette for providing the copy of entrance examination results of the respondents;

Engr. Ma. Lourdes P. Amante, Dean, College of Engineering, for her concern, moral support and encouragement;

Ms. Rachel R. Obiena, for her wholehearted support in helping the researcher in encoding the manuscipt;

My fellow instructors in the College of Engineering for their kind help, who in their own special way inspired the researcher to finish his study;

His mother, Trinidad M. Nacario, his brothers and sisters, Yuchi and Victoria, Mayda and Orly, Karen and Ruben, Mitus, Arsenio Jr., Eva and Geoffrey, for their unending progress, love, concern and financial assistance;

His ever dearest wife, Edna, for her undying prayers, unfading love, understanding and patience, and to his daughter, Mary Diehl Lorraine, and his sons, Alvin Reinzi and Alvin Kent Ande, who have served as inspiration of the researcher.

DEDICATION

Dedicated –

To my beloved wife, ***Edna,***

To my daughter ***Mary Diehl Lorraine,***

and

To my sons ***Alvin Reinzi*** and ***Alvin Kent Ande***

Also to my mother ***Nanay Trining,***

To my brothers ***Yuchi, Mitus, Arsenio, Jr.***

and

To my sisters ***Mayda, Karen*** and ***Eva***

ABSTRACT

This study determined the correlates of intellective and non-intellective factors, which affected the achievement of SSPC sophomore engineering students in Differential Calculus (Math 214) for the school year 2002-2003. This study employed the descriptive method of research using correlational analysis. The problem under consideration focused on finding variables whether they were in close correlation with engineering students' performance in advanced mathematics. There is a negligible correlation between achievement in Math 214 and type of high school attended with an r equal to -0.01. This implies that the type of high school attended has no relation with the academic achievement in Math 214. Less than 10% of the students' achievement in Math 214 is related to achievement in Advance Communication Arts since r2 = 6.25. More than 10% of the students' achievement in Differential Calculus (Math 214) is related to their attitude towards mathematics as revealed by r2 equal to 10.89. Based on the findings in this study, their academic achievement in Differential Calculus was moderately affected by factors such as academic achievements in College Algebra, Trigonometry, Analytic Geometry and Communication Arts. It is concluded that the academic achievement in College Algebra, Trigonometry, Solid Mensuration, Analytic Algebra, Communication Arts, Attitudes towards Mathematics are the best predictor of their academic performance in Math 214. Conclusions point out that the result of this study implies a need for good training and a mastery of basic mathematics skills, and reading skills. It further implies the need for re-training for Mathematics teachers especially in techniques and approaches in the teaching of mathematics.

TABLE OF CONTENTS

Chapter 1

THE PROBLEM AND ITS SETTING

Introduction

Lack of mathematical and communication skills make it difficult for students to tackle basic mathematics subjects. This is so, because mathematical activities require a working knowledge of the basic mathematical concepts, including a thorough understanding of the fundamentals of algebra, geometry, arithmetic and also the ability to interpret graphs and figures (Batas, et al, 1994:26). This is also borne out by the common observation of teachers stating that failing marks in most subjects, particularly in mathematics are oftentimes attributed to several factors such as lack of basic mathematical skills/ knowledge, poor instructional methodologies, inadequate instructional materials, ineffective teachers, students' negative attitude towards the subject, poor comprehension of what is read by the students, and deficiency in understanding the English language.

Vacca (1981:1) cited Toffler (1920), stating that education must teach the individual comprehension skills

such as how to classify and reclassify information, how to evaluate its veracity, how to change categories when necessary, how to move from concrete to abstract and back, how to look at problems from new direction and the like.

Another problem attributed to the students' behavior which seems to affect mathematical performance is the indifference towards schoolwork. There seem to be lack of motivation and interest, hence it remains a challenge to instructors.

Gines, et al (1998:230) explains that motives have three important functions in behavior. One is energizing the motivated pupil is demonstrably active and his activity is maintained at relatively high levels until relevant goals or rewards are attained. Aroused motives will in general make the individual more alert. A pupil for example, who is interested in mathematics, is likely to stick to his lesson in mathematics until he achieves the correct solution to all its problems. The behavior sequence maybe disrupted when he fails to achieve success in the solutions of problems or by the distracting influence of stronger conflicting and competing motives that may or may not be related to mathematics.

Motives have a directing function. They determine many possible behavior responses that are likely to be most appropriate. Example, in a mathematics class, the pupil's idea will be organized around mathematical processes.

Motives have a selecting function. Reinforcement, consequences, and feedback will determine which of a number of responses will be selected and usually a number of interpretations and ideas are available at each choice point and some of these achievement of pupil's goals (Gines, et al 1998:230).

Bernstein (1955:283-288) mentioned that higher interest results in more creative responses, which show that learners are learning actively and thinking about the material in that particular subject. She further said that for a child to learn a thing his interest must be captured and to capture his interest the child must be able to comprehend what he reads and hear.

Recent academic achievement of students presents a total picture on how a student performs in school. Educators and researchers believe that academic achievement depends most importantly on reading comprehension skills of a person. To be able to cope with

a wider and much more demanding task after formal schooling one has to develop a high level of reading comprehension skills. Success in academic achievement does not depend on intelligence alone, but on many other factors. Based on the series of related studies that the researchers came across, he came to believe the statement above, that intelligence alone is not an effective means of predicting academic performance. Aside from the intellectual ability of a student that contributes to his school performance, many studies revealed that non-intellective factors such as sex, age, attitude towards mathematics, monthly income of parents, educational background of parents, and type of high school attended affect students' academic performance.

Students learn mathematics in many ways and different rates of speed. Some are able to acquire new skills and they understand very quickly, while others need more learning experiences before they can master the skill or concept being introduced.

If a "tri-MATHLON" of education exists, it would require a proficiency in math education, learning styles, and state standards. It would particularly demand intense discipline because each requires a high-level training

schedule. The winner in such would be educators who successfully combine an expertise in mathematical concepts, an understanding of the individual learning styles of students, and knowledge of the state standards.

However, today most math educators still practice the traditional math education. This traditional math programs have inhibited students from working for success in math. Traditionally, they lead children to apply rote procedures and processes without understanding the underlying concepts. If mathematics instruction is to develop creative, mathematical minds, then the methods used in the presentation and instruction must be examined hence, this study (Burke, 2001:96).

Effects of this traditional approach to teaching mathematics, is also felt in Samar State Polytechnic College, specifically among first year engineering students. Authorities in this field, specific of the mathematics faculty of SSPC, College of Engineering observed and mentioned the wide variations and differences in mathematical skill performance among the engineering students; first year specially. They observed that while some students can easily hurdle course requirements and make it to the top or to upper

scholastic brackets in the class, others aside from the majority who are on the average, settle at the bottom. They may have just barely passed all subjects or may have failed.

It has also been noticed and verified on records (from registrar's records, appendix G) that the performance of SSPC engineering students both the electrical and civil engineering students, for the last three years (SY 1999-2002) showed a declining percentage of passers in Differential Calculus (Math 214); for the school year 1999-2000; 67.44 percent out of 43 students passed Differential Calculus, and 32.56 percent got incomplete grades. For the school year 2000-2001, out of 98 students enrolled in Differential Calculus (Math 214) 55.10 percent passed the subject and 39.89 percent failed. The students' mortality in this subject went up due to increasing percentage of failure in the subject, excluding those marked with "INC" and "dropped". In the school year 2001-2002 there was a high mortality, with only 37.65 percent passers out of 81 students in Differential Calculus and 62.35 percent did not even last in their Differential Calculus classroom until the end of the semester; this 62.35 percent dropped the subject.

The researcher believes that a study on the correlates of intellective and non-intellective factors affecting the students' mathematical achievement may serve as a base reference for the improvement of the teaching-learning environment in the college of engineering, specially the teaching-learning process in Differential Calculus.

Statement of the Problem

This study attempted to determine the correlates of intellective and non-intellective factors, which affected the achievement of SSPC sophomore engineering students in Differential Calculus (Math 214) for the school year 2002-2003.

Specifically, it sought the answer to the following questions:

1. What is the profile of the sophomore engineering students with respect to the following factors?

    1.1 Intellective factors

        1.1.1 College entrance test;

        1.1.2 Achievement in College Algebra (Math 115);

1.1.3 Achievement in Trigonometry and Solid Mensuration (Math 114);

1.1.4 Achievement in Analytic Geometry (Math 124);

1.1.5 Achievement in Communication Arts (Engl. 113);

1.1.6 Achievement in Advance Communication Arts (Engl. 123)?

1.2 Non- Intellective factors

1.2.1 Sex;

1.2.2 Age;

1.2.3 Attitude towards mathematics;

1.2.4 Monthly income of parents;

1.2.5 Educational Background of parents;

1.2.6 Type of high school attended?

2. Is there a significant relationship between the students' achievement in Differential Calculus and the intellective and non-intellective factors?

3. To what extent do the above-mentioned factors when taken singly predict individual achievement in Differential Calculus (Math 214)?

4. What implications for instructional redirections may be derived from the result of the study?

Hypotheses

This study attempted to test the following hypotheses.

1. There is no significant relationship between the achievement in Differential Calculus and the intellective and non-intellective factors when taken singly, namely:

1.1 College entrance test result;

1.2 Achievement in College Algebra (Math 115);

1.3 Achievement in Trigonometry and Solid Mensuration (Math 114);

1.4 Achievement in Analytic Geometry (Math 124);

1.5 Achievement in Communication Arts (Engl. 113);

1.6 Achievement in Advance Communication Arts (Engl. 123);

1.7 Sex;

1.8 Age;

1.9 Attitude towards mathematics;

1.10 Monthly income of parents;

1.11 Educational background of parents;

1.12 Type of high school attended

Theoretical Framework

This study was anchored in the theory profounded by Leithold, Dela Fuente, Love and Rainville.

Leithold (1996:xiii) in his book "Calculus" has come up with some guidelines in support with the current calculus reform movement. With the ideas of making a reform with reasons. He gave seven (7) reasons to his idea of reform, but he warned that learning calculus can be of the most stimulating and exciting educational experience, and it can only be made possible if learners have the background knowledge of certain basic mathematical subjects such as Algebra, Geometry and precalculus.

This warning made obvious the need of a survey of the knowledge of learners on these basic mathematical skills, before they are brought face to face with advance mathematics, hence this study.

Dela Fuente et.al. (1989:9) believed on a "step-by-step" presentation of the principles to provide a clear comprehension of the subject. Leithold (1992:12) as cited by Dela Fuente, mentioned that students should gain an appreciation of mathematics or a logical science, and the subject matter should be expounded in such a way

that it conforms to the experience and maturity of the learners. The courses in mathematics he added should present a means to develop skills that will enable a person to study effectively more advance courses. Hence, mathematics, he said, should be meaningful.

Love and Rainville (1981:v&vi), explained that to stimulate the interest of the students in continuing mathematical studies, it pays to make the text more readable. One way to attain this is to arrange the materials, the topics and contents from the basic to more complicated. Authorities said that there is a balance between the desire for rigor and the students' ability to appreciate it.

They stated that one should present mathematical lessons with the intention to prove something rigorously; to present others with discussions aimed at making facts seem plausible. He should also attempt to increase both the students' maturity and his knowledge of the subject. The practice exercises must be constructed carefully to be able to develop gradually a considerable manipulative skill, and to add appreciably to the students' basic knowledge. The students must be prepared for specific

problems that they may encounter in more advanced courses.

The theories above also encouraged a survey not only on the students' experiences on intellective factors but also on the non-intellective factors, which as mentioned above would include sex, age, attitude towards mathematics, monthly income of parents, educational background of parents, and type of school last attended hence, the variables presented in the conceptual schema.

Conceptual Framework

The research paradigm (fig.1) presented in the following page, illustrates the factors that was investigated as to their relationship and interrelationships, as they affect achievement and success in mathematical tasks of SSPC second year engineering students.

The diagram shows the research environment, and focus of the study on the achievement of students in Differential Calculus as they are affected by the intellective factors and non-intellective factors namely, for Intellective factors: college entrance test, previous grades in College Algebra, Trigonometry and Solid

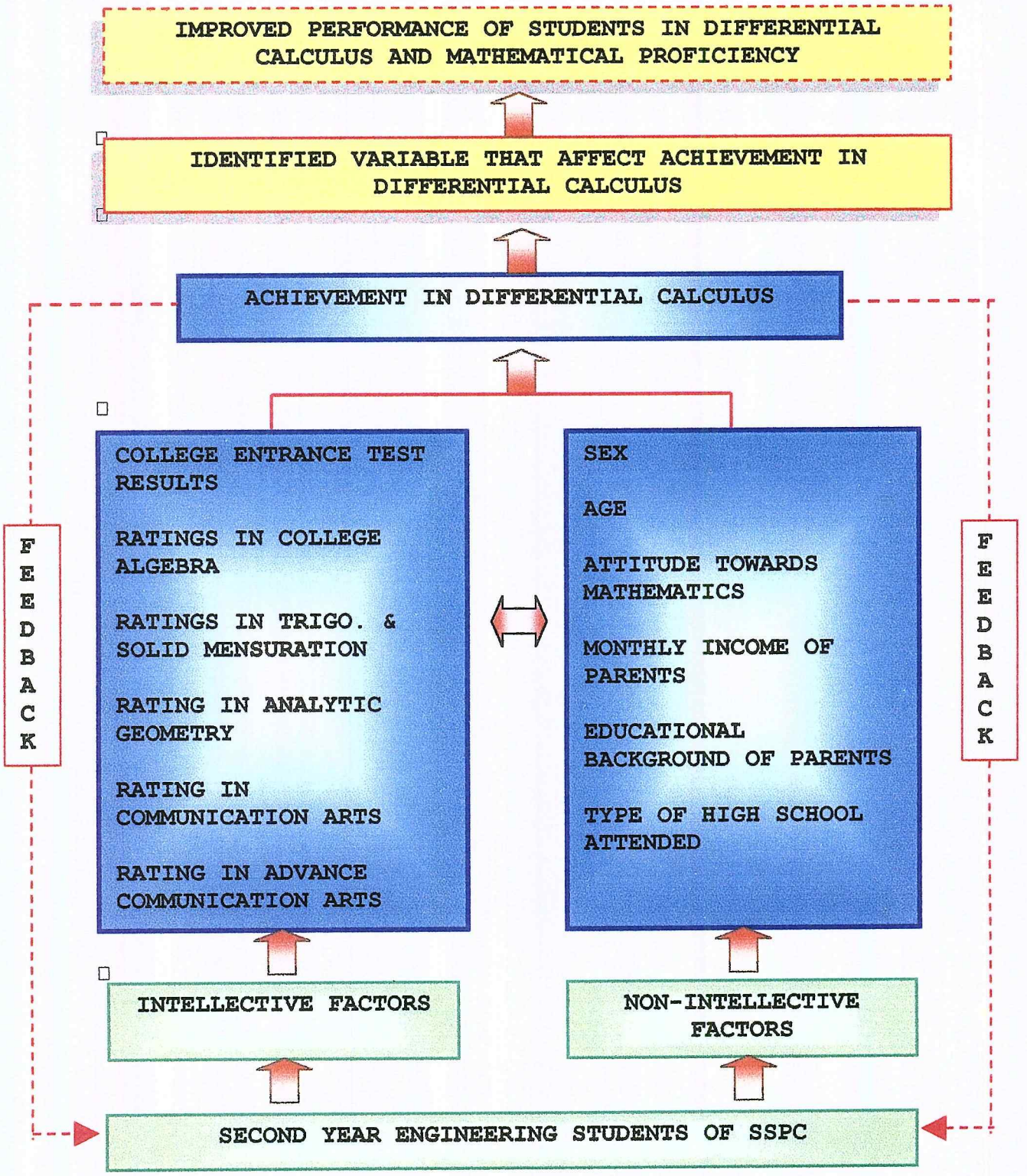

Figure 1. The Conceptual Framework of the Study

Mensuration, Analytic Geometry, and English; Non-intellective factors: sex, age, attitude towards mathematics, monthly income of parents, educational background of parents, and type of school last attended. The economic background of parents may also affect the school achievement of their children, as well as their educational background. The type of school last attended can also affect the achievement of the learners, relative to the quality of teaching the school provided as a background experience of the learner, while he was in the school during his/her high school days.

The base frame is the place and respondent of the study composed of the second year engineering students. The upper left side contains the intellective factors namely: College entrance test results, rating in College Algebra, rating in Trigonometry and Solid Mensuration, rating in Analytic Geometry, and rating in English.

The upper right side frame shows the non-intellective factors: sex, age, attitude towards mathematics, monthly income of parents, educational background of parents, and type of high school attended.

The research paradigm recognizes that achievement in mathematics is attributed to intellective and non-

intellective factors that contribute to academic success, as reflected in figure 1, which is the focus of the study. Since learning is closely associated with, or related to achievement, the researcher believes that the identification and description of the factors that may affect the achievement of SSPC engineering students in Differential Calculus will help in improving their mathematical proficiency. The instructor may then adapt their material and methods of instructions to the needs of the students, particularly the underachievers.

The identified variables after the study is reflected in the second box of the upper portion of fig. 1, which was found to affect the students' achievement in Differential Calculus. This shall serve as reference for the improvement of the teaching-learning situation in the mathematics classroom, specifically in Differential Calculus.

Significance of the study

The various sectors below that are concerned with, and are involved in improving students' mathematics performance shall serve/specially, the following concerns.

To Students. This study, shall contribute in encouraging them to be more appreciative of the value of mathematics and its importance in the pursuit of their chosen field of interest. The findings would make students aware of the factors affecting mathematics achievement, that would help them overcome the constraints and develop more wholesome attitudes and study habits, which shall help them become more skillful and competent in handling mathematical problems.

To Teachers. This would provide them information on what factors to cultivate, develop, and focus as to content and activities when creating a more effective and efficient material for learning mathematical skills. The findings would serve as guide in the preparation of syllabi and skill development programs on mathematics. This would also make teachers realize the importance of cultivating and developing among students' good attitude towards mathematics through pleasant experiences in mathematics classrooms and classroom activities. Moreover, identification of the important factors affecting student achievement in mathematics would provide inputs to teachers, who are responsible in

enhancing learning, as well as, improving factors that affect achievement negatively.

To Parents. This will encourage parents to be more supportive and more understanding on the needs of their children in the pursuit of their particular field of interest. The parents could help motivate and encourage their children to give importance to the learning of the subject content, and thus guide them in adopting proper attitude towards their studies, through their moral and financial support, by facilitating the availability of the learning materials their children need.

To School Administrators. The findings would be useful to school administrators as a guide in checking and encouraging faculty to come up with relevant quality and updated design of a mathematics course that would minimize difficulties in the learning of mathematics. It would also guide them in the procurement of mathematical teaching materials and facilities.

To Guidance Counselors. This would be useful to guidance counselor in their counseling of students regarding their problems in career choices and subject difficulties, thereby minimizing incidence of drop-outs and failures particularly in mathematics.

To the Future Researchers. The study could also serve as relevant literature for other researchers who are interested in finding out the correlates of students' performance in mathematics and other related subject areas that may be improved by other means.

Scope and Delimitation

This is a descriptive study to determine the extent of influence of some selected intellective (College entrance test, achievement in College Algebra, Trigonometry, Solid Mensuration, analytic Geometry, Communication Arts 113 and 123) and non-intellective factors (sex, age, attitude to math, monthly income of parents, educational background of parents, type of high school attended), believed to be related directly or indirectly to performance by engineering students of Samar State Polytechnic College, in Differential Calculus. The 81 respondents of the study were regular sophomore engineering students enrolled for the first time in the course Differential Calculus (Math 214) of SSPC.

The criterion measure in this study was the achievement or performance in Differential Calculus

represented by the students' Grades. The predictor variables included entrance test results, achievement in College Algebra, achievement in Trigonometry and Solid Mensuration, achievement in Analytic Geometry, achievement in English, sex, age, and attitude towards mathematics, monthly income of parents, educational background of parents and type of high school attended.

This study involved SSPC 2002-2003 second year students enrolled in the following courses offering Math 214 (Differential Calculus), under the College of Engineering, during the first semester of the given school year namely: Bachelor of Science in Civil Engineering (40 CE students), Bachelor of Science in Electrical Engineering (11 EE students) Bachelor of Science in Computer Engineering (17 CoE. students), and Bachelor of Science in Electronics Communication Engineering (13 ECE students).

Definition of Terms

The important terms used in this study and their conceptual and operational definitions are as follows:

Achievement. This refers to the accomplishment or proficiency of performance in a given skill or body of

knowledge (Good, 1973:7). In this study, this refers to the final grades of engineering students in their academic subjects like College Algebra, Trigonometry and Solid Mensuration, Analytic Geometry, Differential Calculus, and English.

College Algebra. This is a branch of mathematics that deals with general statements of relations, of numbers, values, vectors, etc., in the description of such relations (Webster, 1999:21). It is a study in elementary mathematics that gives opportunity for practice in rigorous logic. It gives education of the students in the nature of logical system. Makes the students realize that precise definitions are important, that explicit hypothesis is necessary, and any system of mathematics system of mathematics consists of these definitions and hypothesis, together with results which have been derived by logical reasoning (Vance, 1983: Preface).

Analytic Geometry. The branch of mathematics which deals with the properties, behaviors and solutions of points, lines, curves, angles, surfaces and solids by means of algebraic methods in relation to a coordinate system (Che, 1964:1).

Attitude. A manner showing ones feelings or thoughts; ones disposition, opinion, etc. (Webster, 1985:40). In this study, attitude refers to the 20 statements about student's favorable and unfavorable responses towards mathematics.

College Entrance Test. This refers specially to the test conducted by the guidance office of SSPC, which served as the bases for acceptance or rejection of student - applicants for enrollment in the College of Engineering.

Criterion Variable. The variable that is predicted in a prediction study (Frankel, 1994:549). In this study, it refers to the achievement or performance in Differential Calculus represented by the students' final grades.

Differential Calculus. That branch of Analysis which investigates the infinitesimal changes of constantly varying quantities when the relations between the quantities are given (Webster, 1999:188).

English 113 (Communication Arts)/ English 123 (Advance Communication Arts). This course prepares college freshmen with the basic and fundamentals of sentence construction. It covers topics preparatory to

the development of skill in both oral and written communication, enrichment exercises with comprehension and vocabulary are provided to sharpen the reading and listening skills of the learners. For mastery of topics presented, work exercises follow so that the learner will ultimately build confidence in answering and asking questions (SSPC Bulletin of Information, 2001-2002:79).

Intellective factors. In this study, it refers to the variables that may affect or influence the mathematical achievement of students namely: college entrance test result, previous grades in College Algebra, Trigonometry and Solid Mensuration, Analytic Geometry and English.

Non-Intellective factors. In this study, it covers the variables which may affect or influence the mathematical achievement of students' such as: Sex, Age, Attitude toward mathematics, Monthly Income of Parents, Educational Background of Parents, Type of high school attended.

Performance. An act of taking action in accordance with the requirements of a job (Great Illustrated Dictionary, 1984-1264). Operationally, it is the scores

of the students in Differential Calculus in teacher-made achievement test.

Predictor Variable. The variable from which projections are made in a prediction study (Frankel, 1994:555). In this study, it refers to the intellective and non-intellective factors of the students.

Trigonometry and Solid Mensuration. Trigonometry is the branch of mathematics that treats of the relations of the sides and angles of triangles and of the methods of applying these relations in the solution of problems involving triangles (Webster, 1999:1342). Solid Mensuration deals primarily with the various solids. When solving a problem in Solid Mensuration, draw an appropriate figure on which all dimensions are shown (Solid Mensuration, Kern and Bland, 2nd Ed.).

Chapter 2

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter presents a review of some related literature and studies read by the researcher from books, journals, unpublished materials, and information surfed and gathered from the Internet, which provided the researcher with better insights into the conduct of the study. It deals on various literatures and studies in relation to intellective and non-intellective factors on students' achievement particularly in mathematics.

Related Literature

This section presents a conceptual literature characterizing the students' intellective and non-intellective factors that are affecting their achievement in mathematics.

Skinner (1961:597) in fact explained, that the child's knowledge, ideas, skills, habits, attitudes and interests develop as a consequence of many contributing factors. These factors either enhance or cause difficulty in learning mathematics.

An analysis of all these causal factors involved reveals that there are both predisposing and precipitating factors and that, these may be regarded as biological, sociological, or psychological in nature. There may be certain structural weaknesses in the child due to heredity, brain damage, endocrine disorders, sensory defects, virus infections, malnutrition and the like. The impact of numerous environmental and sociological factors cannot also be discounted. All these factors affect the child's learning.

Aquino and Razon (1985:79-82) stated, that many different conditions affect the efficiency, as well as, the amount and quality of an individuals learning. Some of these conditions are his mental ability, attitude, degree of maturation, readiness, interest, goal, values, experiential background, mental and physical health previous achievement.

A positive attitude towards mathematics contributes to higher achievement in mathematics. Jadar and Quinn (1987:366) pointed that out and further said that in learning mathematics, students learn more effectively when they are interested in what they learn. They will

achieve better in mathematics if they like and enjoy the subject.

Salamat, et al (1995:101) explained that it is important to motivate students to take interest in understanding between the field of reality and the field of mathematics, and they learn better and faster, if they have the attitude of taking active part in the lessons.

Smith, et al (1961:271-274), explain that attitude and interests are closely related. Attitude represents general predispositions, and specific interests operate within this broader sphere. Interests are at times defined as positive attitudes towards objects or classes of objects to which we are attracted. An interest, they said, may be classified either as a trait or as an attitude, depending largely, or whether it is broad or narrow in its reference. Interests are learned responses, which predispose the organism to certain lines of activity, and which definitely facilitates attention. A trait or an attitude may favor actively of a given sort, without involving clear awareness and the concentrated activity involved is "paying attention" to something. They said that a child's intellectual, sensory and physical capabilities and limitations are

unique and they are powerful determinants of interest. To an extent, his interest pattern will be determined by his special fitness. The agile child may turn to physical competition for enhancing his self-esteem; the manually adept may achieve his success in arts or crafts; the intellectually favored may realize prestige in scholastic pursuits; this idea is supported by Getzels (1956) as cited by Smith et al. He defines interest as a characteristics disposition, organized through experience, which impels an individual to seek out particular objects, activities, understanding, skills, or goals for attention or acquisition.

Smith, et al (1961: 271-274), further emphasized that a child's curiosity and his tendency to explore lead him to acquire certainty of his interests. His capability however, may play an even more significant role in the development of his interests. His capabilities affect both his interest and his achievement. Example, a child who is skilled in math may be an avid reader of books dealing in math, but find other books boring.

They also mentioned that cultural factors also play an important role in determining our interests. We are

directed toward certain interests through our membership in particular culture, by specific organizations, by living in a particular area. To a certain extent, society decides what interests are appropriate to our age and sex.

Schools too, they said, can charm our interests toward certain ends. In general our schools emphasize middle-class attitudes, and standards of behavior.

Sex could also be a predictor of mathematics performance as pointed out by Deux, cited by Bank, et al, (1980: Vol. 72 No. 2) stating that sex is a strong predictor of human contact and many differences have been documented between the attitude, behavior and achievement of males and females. Females are superior to males in verbal ability from 10-11 years old and males are superior in qualitative skills and visual spatial ability from the onset of adolescence.

Archer and Lloyd (1985:10) documented gender differences in intellectual ability. They found male superiority in mathematical ability which they described also in early adolescence, and which may have been developed through environmental factors.

Levy (1990:1), as cited by Shemesh, stated that the male superior performance of cognitive task is due to their ability to extract spatial and logical relationships independently of the contextual components of the tasks. This ability helps them to cope with the rather abstract scientific concepts, especially when the concepts introduced are mathematically quantitative. Girls on the other hand, are less analytical, and they tend to elucidate the meaning of the concept from the connotative content. They also pass the ability to form association between conceptually seemingly unrelated ideas.

Webb (1998:5) reported that as to gender references, there exists poor attitude towards mathematics in both sexes. External and internal influences affect however, their perceptions and attitudes towards mathematics. He explains and warns that the relationship between performance in mathematics and attitudes towards mathematics are important.

Tyrel (1976:282), stated that a learner behaves creatively in Mathematics when; 1) He processes alternative approaches, group concepts intuitively, or display autonomy, flexibility, and freedom from

preservative rigidity in his discovery efforts; 2) The learner perceives learning by discovery as a unique and unexcelled generator of self-confidence, of intellectual excitement and of motivation for sustained problem solving and creative thinking; 3) The students discover techniques that are valuable for acquiring desirable attitudes toward inquiry, as well as, firm convictions about the existence and discoverability of orderliness in the universe. If the student has the aptitude in problem solving and involves a much different pattern of abilities than those required for understanding and abstract ideas, then he is able to solve problems for quality, flexibility, resourcefulness, improvement, originality and problem sensitivity, as well as, venturesomeness.

Froe and Lee (1969:11-12) as cited by Pacolor, asserts that many highly intelligent students fail, because they do inefficient work and have never learned how to study effectively and practice some effective study technique, that have to be learned and are never practiced such as in making plans, scheduling of work, note taking, using the library, solving word problems, and developing reading skills. Students who make this

effective study a practice show better academic achievement.

Kantowski (1974:13) said that those students' with a good knowledge base were most able to use the heuristics in geometry instructions. Kantowski (1977:14) also mentioned that he found little evidence among students of looking back even though the instruction had stressed it. Looking back he explained is examining the solution done by activities such as checking the result, checking the argument, deriving the result differently, using the result, or the method for some other problems, reinterpreting the problem, interpreting the result, or stating a new problem to solve. To develop among students this approach as described above is very necessary and development of such is very much influenced by attitude and styles of teaching by previous teachers. This was supported by Wilson's (1990:51) report on a comment by a teacher during an in-service training, saying that, "In school, there is no looking back". Many of the participants agreed to the statement.

Bowie (1998:74) in her discussions on learning theory approach to students' misconception of calculus explained that students' perception of algebra is largely

that of a "game of letter". Therefore, this resulted to the reconstruction of knowledge on calculus, based on their experiences with algorithmic procedures. Their errors indicate that they develop linking and extending mechanisms to deal with multiplicity of rules that are generated from this process of rehearsal.

Conte and Boos, (1980:71) mentioned that a student who has had experience in Solid College Calculus sequence should have no difficulty following the next advanced course in mathematics. Usually, advanced mathematical concepts, when they are used, are introduced carefully at a level suitable for undergraduate students and do not assume previous knowledge. There is a need for a little mathematical maturity before one goes on to the next advanced course.

With the ideas presented by the Cited authorities above, the researcher has decided to assess the mathematical performance of engineering students in relations to their background knowledge and mathematical exposures or mathematical course they have been subjected to; in order to assess their readiness for more advanced mathematics courses, and in order to be able to do some remediation via teaching learning plans, preparation of

mathematical teaching materials, and even in the sequencing of mathematical subjects by difficulty and by pre-requisite skill for the next advanced mathematical courses.

Donaldson (1999:8) mentioned that Calculus is one of the most important math subjects that must be mastered by any would-be engineer. He said, that all engineers must have a good grounding in the sciences, especially in chemistry. He especially mentioned that the materials taught in all required math classes are frequently used to explain engineering derivations, laws, proofs, and problem sets.

The Committee on Calculus by Filipino Educators, Inc. (1962:v&1) explained that calculus is an important background for preparation for advance mathematics courses, which are usually faced by science and engineering students. Calculus is an important branch of mathematical analysis and an effective and powerful tool in the applied fields. This makes mathematical ideas, clear, concise, complete and consistent. The phenomenal advancement and development of present day science in engineering are largely due to calculus.

The Committee stated that calculus deals with growth, motion, maxima and minima. It is used in the study of the orbits of planets and the path of man-made spaceships, in the design of airplanes, rocket ships, ocean liners, automobiles, electric and mechanical devices, skyscrapers, bridges, cyclotrons and radar systems; in the study of chemical changes and astronomical phenomena, etc. In the field of economics, calculus may facilitate solutions of problems of compound interests, annuities, probability and statistics.

Kilpatrick (1987:43) traced solving problems in mathematics, and proclaimed mathematics to be synonymous to problem-solving, that is, activities such as doing word problems, creating patterns, interpreting figures, developing geometric constructions, proving theorems, etc., which are necessary basic skills that must be developed at our early age, to prepare learners for the task in handling advanced mathematics such as differential calculus which is also the key to handling engineering mathematics embedded in their engineering courses.

Wilson (1990:51) mentioned that the cause of difficulty in the teaching of mathematics such as

differential calculus, is that traditional mathematics teaching models have the following defects: they depict problem solving as a linear process; present it as series of steps; they imply that solving mathematics problem is a procedure to be memorized, practiced, and habituated; they lead to an emphasis and answer getting. They teach to present their proofs in very concise terms, but the proofs they work for may fail to convey the dynamic inquiry that went on in constructing the proof.

Wilson (1967:50) presented on the other hand, the idea that general heuristics had utility only when preceded by task specific heuristics. This task specific heuristics were often specific to the problem domain, such as the tactic most students develop in working with trigonometric identities, to "convert all expressions to functions of sine and cosine and do algebraic simplification". However, he said, extensive knowledge base of domain specific information, algorithms, and a repertoire of heuristics are not sufficient during problem solving. The learner must also construct some decision mechanism to select from among the available heuristics, or to develop new ones, as problem situations are encountered. This means that they should develop the

skills to reflect during problem solving activities but such aspect is found wanting in many mathematics classes.

Wilson, P.S. (1993:24) mentioned the beliefs that mathematical problems are difficult to students, teacher, parents, policy makers and the general public hence, affect students' behavior to mathematics courses. It should be counteracted by developing a positive view among all those concerned, a belief that "they can do it" or "can do" conviction, so students will have self-confidence and determination to do mathematics and succeed. This negative attitude is a strong cause to the difficulty of students to learn or strive to learn math.

Webb (1998:6) cited possible causes of students' difficulty in mathematics. He mentioned that it has found that newly introduced math books/textbooks contain various significant mathematical errors, especially on new topics. Such possibilities could therefore be possible on other math books in other countries like the Philippines, and could be a possible factor for some erroneous learning, which would cause significant difficulties in higher mathematics or even in basic mathematics.

Craig (2001:24) in her discussion on factors affecting students' perception of difficulty in Calculus word problems explained that familiarity has the largest effect on perception of difficulty, followed by the context (realistic or not) and lastly by the presence or lack of a visual representation. The expert responses did not form as clear a hierarchy, suggesting that among experts, perception of difficulty is subjective.

Schoenfeld (1989:35&37) makes the following points which could be the possible causes of the difficulty of teaching higher mathematics or in particular, in Differential Calculus. He saw that in the classroom there are but few problems that students are exposed to, or they are only bite-size exercises designed to achieve subject matter mastery: few exceptions were clearly peripheral tasks that the students found enjoyable but are only considered to be recreations or rewards rather than the substance they are expected to learn; the advances in mathematics in the past decade have been largely in acquisition of a more enlightened goal structure, which only lead students to pick up the rhetoric - but not the substance - related to those goals.

Schoenfeld, et. al. (1982:38) also mentioned that novices attended to surface features of mathematics and problems, whereas experts categorized problem on the basis of the fundamental principles involved.

Silver (1979:39) also found that successful mathematics problem solvers were more likely to categorize math problems on the basis of their underlying similarities in mathematical structure.

The literature presented above by Ausubel, Jadar, Quinn, Freo and Lee, Dechant, Aquino and Rason, Clark, Archer and Lloyd, Levy, Silva Bowie, Kantowski, NCTM, Polya, Wilson, Webb, Craig, Schoenfeld, Silver, etc. gave the researcher an insight in determining some variables that were used in the conduct of this study. The researcher was able to find some results of previous studies that aroused the interest of the student toward mathematics, thus improving the students' performance and quality of education.

Newell, et al (1972: 25), Larkin (1980:18) and Bobrow (1964:2) all agree on the importance and need of allowing learners in mathematics to actively get involved in the construction of one's knowledge, and it is a great responsibility for a teacher to arrange situations and

contexts within which the learner constructs appropriate knowledge.

Wyle, et. al (1982:xi) have written their book aimed to make it easy and useful for study. To attain their purpose, they presented the topics in such a way that it would first answer the need of average analytical engineers or physicists, who wish to be reasonably familiar with the basic branches of post calculus mathematics, leading them step-by-step to the advance and complicated mathematical tasks.

This style of the authors strengthened the idea of the researcher to survey the present background of subjects on mathematical basic skills. He therefore has to include a survey on the background of students, to establish their readiness for advance mathematical courses and in order to establish a reference for any attempt to lead them to a successful experience in the next courses, and to guide instructors especially those of SSPC, where to start with the SSPC engineering students in mathematics classrooms.

The National Council of Teachers of Mathematics (1980:24) reported the belief of teachers towards the inclusion of problem solving in classroom activities,

stating that much activities is too difficult; it takes too much time; the curriculum is very full hence, there is no room for problems; it will not be measured and tested; that mathematics is sequential hence, students must master facts, procedures, and algorithms; appropriate mathematics problems are not available; that it is not in the textbooks; that basic facts must be mastered through and practice before attempting their uses in problem solving; this belief influenced instructors' teaching plans and activities hence, devoid students from a mastery of basic skills in mathematics; thus, depriving them from a good preparation for advance mathematics such as calculus.

The National Council of Teachers of Mathematics (NCTM) (1989:23-24) recommends to make problem solving the focus of school mathematics. It strongly stated that the art of problem solving is the heart of mathematics. Thus, it emphatically suggests that mathematics instruction should be designed for students to experience problem solving. The council supports its recommendations by the following reasons: that problem solving is a major part of mathematics. It is the sum and substance of our discipline, and to reduce the discipline to a set of

exercises and skills devoid of problem solving is misrepresenting mathematics as a discipline, and it is short changing the students; that mathematics has many applications, and often these applications represent important problems in mathematics which are used in work, in understanding, and in communication within other discipline, and that, there is an intrinsic motivation embedded in solving mathematics problems. Problem solving can stimulate interest and enthusiasm of the students; that problem solving can be fun. Many work on mathematics for recreation; that problem solving must be in the school mathematics curriculum to allow students to develop the art of problem solving, which is so essential to understanding of mathematics and appreciating it.

Polya (1973:26,Pv) cited the fact, that teachers often focus on various collection of well-defined tasks, to train students to execute these. When successful, they and their students fool themselves, by making believe that they have learned some powerful mathematical techniques, only to know that they were not able to use such techniques mechanically, since they lack some rudimentary thinking skills to allow them to "understand" the deceptive nature of math. He indicated that capable

math students when removed from the context of the course work will have difficulty doing some elementary mathematics for their level of achievement.

He also mentioned that most teachers today fill their allotted time with drilling. With this as a common routine operation will give much opportunity for the teachers to kill the students' interest, hamper their intellectual development, and misuse their opportunity. If the teacher however, will challenge the curiosity of the students by setting for them problems proportionate to their knowledge and capacity levels, and if such teacher will help the learner(s)to solve their problems with stimulating questions, the learner(s) may be given a task for and some means of, independent thinking.

To emphasize on the importance of learning mathematical skills, Polya (1973: 20-28) presented stages in solving mathematical problems: understanding the problem, making a plan, carrying out the plan, and looking back. These stages were designed to teach students "to think", but it suggests that it must not neglect the development among learners, the skill of identifying "What to think" or "What to do".

Schoenfeld (1985:17,33-34) mentioned that due to the importance of mathematics in man's daily task in order that he may live, he emphasized the need of establishing a fundamental goal of instruction in mathematics classes, such as to develop skills, knowledge, and abilities that can be transferred to tasks not explicitly covered in the curriculum,-tasks that require mathematical thinking or higher order thinking skills.

Smith, et al (1961:271-274) cited mathematics to have its own vocabulary and concepts. These vocabulary and concepts tend to be more peculiar to mathematics than are the vocabulary and concepts of sciences.

They explained that in mathematics, students must acquire a special vocabulary of words and symbols, which they can only apply to mathematics. This is so, because the written material of mathematics differs from most written materials. The term and symbols are specifically defined in well-written texts, every symbol is significant, concise, functional, and to the point. To study mathematics books, it would require thought and deliberation and the rate of reading is relatively slow and some would even need to be read several times.

In mathematics, technical terms referring to difficult concepts are likely to be introduced quickly and without explanation. Inadequate mastery of these fundamental terminology is one of the most important reasons for the difficulty encountered by so many persons of all ages in dealing with anything of a mathematical nature.

Therefore, they emphasized, that in mathematics, one must acquire meanings for a variety of symbols and they can only be learned in a step-by-step experiences. They are to be acquired from early age in sequential order. The learning of new terms and concepts is often dependent upon previously acquired concepts and learning's. This necessity for building new learning's on old learning's implies, that in mathematics, what is worth teaching must be taught well.

This statement of Smith and Dechant has greatly convinced the researcher that he must establish the relationship of a background knowledge on basic skills to attain success in advanced mathematics, thus he must be able to convince learners and instructors on the necessity of a mastery of mathematical skills step-by-

step, from the simplest to the most complicated for quality output, hence this study.

Dechant (1969:399-400) declared that there is reading in mathematics and this skill requires the pupil to comprehend a new set of symbols. The learner is required to react to numerical symbols that synthesize verbal symbols. He must develop the ability to read and compute, read deductively, translate formulas into meaningful relationships, and generally he must read slowly to get the information, facts, etc. In mathematics, she said, one concept is built on another and can have meaning only, on the basis of the understood meaning of the former. There is a necessity of introducing children at an early age into the steps of reading mathematics.

In the opinion of Silva (1978:5), one can even improvise his study habits to respond to the solution of mathematical problem which eventually, will lead him to develop critical thinking, a skill which is most useful and relevant in real life situation.

Related Studies

Several studies on the teaching learning of mathematics which are related to the present investigation were looked into by the researcher for further input and clarification on factors and processes involved.

A research dealing with factors influencing students' achievement in mathematics was conducted by Lariego (1990). He determined the home factors affecting sophomore students' attitudes toward mathematics and achievement in mathematics. He found out that favorable attitude toward mathematics and parents' educational involvement relate significantly with students' attitude towards mathematics. This students' attitude is significantly and positively related to their mathematical achievement. Students' Mathematics achievement and parents' involvement are the best predictors of students' attitude towards, mathematics and their achievement is best determined by their attitudes towards the subject, their fathers' occupation and parents' involvement with their mathematical activities.

Amporin (1994) in her study of predictive of academic achievement of first year high school students in St. Anthony School concluded that: (1) There were positive relationships between the school grade point average and the different variables such as: sex, IQ, study habits attitudes and study orientation; (2) There were significant differences among the IQ scores, high school and elementary grade point averages, study habits, attitudes and orientation of male and female respondents and; (3) There were significant predictor of high school grade point average namely: elementary grade point average and IQ.

Pacolor (1993) conducted a study on "Determinants of Achievements in mathematics of Fourth year Secondary Students in Samar Island: An Input to Model Training Design." The researcher utilized the descriptive method of research using comparative and correlational analysis. The study focused on variables namely: students' scholastics rating in mathematics, study habits and attitudes toward mathematics. Based on the findings of the study, he concluded that: (1) The average students, who perceived that they have proper study habits in mathematics are more likely to be good achievers in the

same subject; (2) On the average, students who perceive that they have favorable or positive attitude towards mathematics are expected to have higher level of performance in the same subject and (3) There is a high relationship between the students' achievement in math and their math scholastic ratings and attitudes toward the secondary mathematics program.

The studies conducted by Lariego, Amporin and Pacolor revealed the influence of some factors as they relate to students' achievement in mathematics. These studies have the same bearing with the present study because they all attempted to determine the relationships of some factors that affect or influence students' achievement in mathematics. However, they differ from the present study in terms of choice of setting, grade level, subject respondents and combination of factors, which determine the influence of students' achievement in mathematics.

A similar study on the intellective and non-intellective correlates of mathematics entry scales among the engineering freshmen was conducted by Lupot (1998). She found out that (1) approximately a majority of 87.3% of the students' manifests a lukewarm attitude toward

mathematics. (2) Male students perform better than female in their mathematics performance. (3) The performance of the students depends on the individual differences not on the type of school they came from. (4) The students performance depend in his work attitude to learn. (5) Mathematics entry scales, attitude toward mathematics and sex show significant relationship with their mathematics achievement but such achievement was inversely proportional to entry skills, the type of school, and self-concept.

The present study has the same bearing with the study of Lupot because it deals with the analysis of the intellective and non-intellective factors, which influence students' achievement in mathematics. They differ however in grade level, setting, content area, and the combination of factors that may influence mathematics achievement of the students.

Labine (1996) investigated the factors associated with the computational and problem solving skills in mathematics of special class freshmen students in Samar National School. Based on the result of the study, he found out that there is a very high relationship between students' test performance in mathematics and age, but

not significant with students' sex. However, in terms of study habits, attitudes and their elementary grade in mathematics, it was shown to have a substantial relationship with test performance in mathematics. He recommended that teachers should therefore emphasize the reading comprehension skills relating to problem solving such as sequencing of events, critical thinking through what, how and why of questions, making computations and evaluation. These skills in reading comprehension are necessary for problem solving in mathematics.

The present study has the same bearing with Labine's study since both have been concerned with relationship between student's achievement in mathematics and their non-intellective factors namely: sex, age, and attitude towards mathematics. However, they differ in setting, grade level of the respondents, content area, and the inclusion of intellective factors.

Sarmiento (1994) conducted a study on the readiness of first year engineering students at the Assumption University for the course College Algebra. The following conclusions were drawn: 1) Some freshmen Engineering students had an average performance in their High School and English; 2) The freshmen engineering students were

not prepared in all of the subject areas tested, except for the subject involving circles; and 3) Readiness for College Algebra was significantly related to all of the independent variables of the study.

College Algebra was most significantly related to the students' high school average, and work-method category of the study habits.

A very recent research dealing with factors affecting students' achievement in mathematics was conducted by Bejar (2001). The researcher utilized the descriptive method of research using comparative and correlation analysis. Based on the findings, the following conclusions were drawn: 1) The freshmen college student from SSCAF possessed the age characteristics of a typical student. Majority of the students had proper study habits and had positive attitudes towards mathematics; 2) There was a need to develop the computational and problem solving skills of the students; 3) Students who graduated from urban schools were much better in computational skills than those who graduated from rural schools; 4) Students who were found to have good study habits, attitudes, and high school math grades were significantly correlated with computational and

problem solving skills and grades in College Algebra; and 5) Achievement in college algebra could be predicted by study habits, attitude towards mathematics, and high school mathematics grades.

The present study has the same bearing with the aforecited study since both deals with determining variables, which could predict better performance in mathematics. The present study differed from the aforementioned study in terms of year level, content, procedure and combinations of factors that may influence students' achievement in mathematics.

The related studies cited, somehow provided valuable information and clear insights and directions in the proper conduct of the study. Likewise, it aided the researcher in rationalizing the intellective and non-intellective factors identified in the present study, to influence students' achievement in mathematics.

On the other hand, Taguba`s (1992), study focused only on non-intellective factors in relation to academic achievement of freshmen student of De la Salle University-College of Saint Benilde. Based on the findings, the following conclusions were made: 1) That there is correlation between study habits and attitudes,

self-concept and needs; 2) Intelligent Quotient is a good predictor of academic achievement; 3) The researcher also emphasized that sex and academic drive as predictors of academic achievement has to co-exist with IQ in order to be considered as significant predictor.

Taguba`s study, though it used non-intellective factors to academic achievement, it also included IQ and sex. The present study included non-intellective and sex as variables but only as they affect mathematical achievement.

All the above findings and studies have in one way or another greatly influenced the design and the organization of this study. They guided the researcher on the intellective and non-intellective factors affecting the learning and achievement in mathematics, on the process of investigation applied and others worth of consideration in the conduct of this study.

Chapter 3

METHODOLOGY

This chapter presents the methods of research used in the study. It includes research design, instrumentation, and validation of the instruments, sampling technique, data gathering procedure, and statistical treatment of data.

Research Design

This study employed the descriptive method of research using correlational analysis. The problem under consideration focused on finding variables whether they were in close correlation with engineering students' performance in advance mathematics. It did not merely gather data but it is also attempted to classify, generalize, analyze and interpret data for use in classroom practices in the near future. The main instruments used to gather data from the respondents of the study was a questionnaire checklist for their profile, attitude and interest in mathematics and documentary analysis. The frequency counts weighted mean, standard deviation, skewness simple and Kurtosis were

used to describe the profile of the respondents. Moreover, the data were analyzed using Pearson r, t-test for the significance of the coefficient of correlation and simple regression.

Instrumentation

The following instruments were used to obtain data for the study.

The School Records. The students' records served as the instrument for use in this study. It consisted of the final grades of the students in Differential Calculus, College Algebra, Trigonometry and Solid Mensuration, Analytic Geometry and English. Records of grades on the mentioned subjects for the last three years were requested to show the trend of passing and failures of SSPC engineering students specifically on the subjects: specified above.

The Questionnaire. Part I called for Respondents' Profile. This gathered data on their sex, age, course enrolled in, parents' highest educational attainment, parents' monthly income and students' type of high school attended. Part II, elicited data on students' attitude towards mathematics.

Attitude Towards Mathematics. The data for students' attitude towards mathematics as Part II of the questionnaire was obtained from the composite questionnaire which was partly adopted and modified by the researcher from Brown-Holtzman`s "Survey of Study Habits and Attitudes (SSHA), following the sequence of the problems and pursuant to the hypothesis of the study. The SSHA provided the student with a synthetic standardized way of indicating their feelings and practices regarding schoolwork. This was a twenty-item questionnaire equivalent to one hundred points, intended to measure the attitude of the students toward mathematics. For each statement a five point scale was provided for indication of the extent of the phenomenon under study: 5 for strongly agree (SA); 4 for agree (A); 3 for undecided (U); 2 for disagree (D); and 1 for Strongly Disagree (SD).

Validation of the Instruments

The questionnaire-checklist for respondents' profile and attitude towards mathematics was first shown to the research adviser and the committee on oral examination for their approval, then validated among third year

engineering students of SSPC. The instrument was revised based on the comments of the adviser and the committee on oral examination before subjected for validation. This was further revised based on the result of the validation among the students, before distributing the Questionnaire to the intended respondents of the study.

The test-retest method was applied with one-week interval, to obtain the coefficient of correlation. The computed coefficient of correlation was determined between the first test and second test by using the Pearson Product-moment.

Sampling Procedure

The researcher utilized the total enumeration as sampling technique using the second year engineering students enrolled in Differential Calculus at the Samar State Polytechnic College during the first semester of school year 2002-2003. There were five classes in Differential Calculus. Approximately, fifty-nine (59) students were males and twenty-two (22) were females. The researcher used only regular sophomore students. This means that these students had enrolled and had taken Differential Calculus for the first time.

Data Gathering Procedure

The researcher requested permission from the College President to allow him to field and administer the research instruments among the intended respondents. The data was gathered from October 2002 to December 2002, then analysis of gathered data followed. The formal communication explained the nature and objective of the study.

The data pertaining to Entrance Test result was taken from the guidance office. Whereas, ratings in College Algebra, Trigonometry and Solid Mensuration and Analytic Geometry, English and Differential Calculus were taken from the Office of the Registrar. Specifically for math subjects, data on grades for the last three (3) years was requested from the registrar for the purpose of looking into the passing and failure trend in the subjects.

Non-Intellective factors like sex, age attitude towards mathematics, interest in mathematics, and monthly income of parents and type of high school last attended were obtained through Part I of the questionnaire. The respondents were encouraged to honestly answer the

questionnaire to the best of their ability to achieve the objective of the study.

Statistical Treatment of Data

Statistical tools like the frequency count, weighted mean, standard deviation, skewness, kurtosis, Pearson product moment correlation, t-test significance, and linear regression equation were used.

To answer problem number one, the frequency count, weighted mean, and standard deviation skewness and kurtosis were used to describe the profile of the respondents. To interpret the attitude scores and interest in mathematics, the following interval were used:

Score	Interpretation
92-100	Very favorable / Very much interested
84-91	Favorable / Much Interested
76-83	Undecided / Moderate or Fair
68-75	Unfavorable / Little
60-67	Very Unfavorable / very little

To measure the symmetry of a distribution, Skewness was computed through the formula below (Garett, 1973).

$$SK = \frac{3\ (\text{mean-median})}{\text{standard deviation}}$$

Furthermore, the degree of peakedness or flatness of a frequency distribution was also computed through the formula below (Garett, 1973).

$$SK = \frac{\text{Quartile Deviation}}{(\text{Percentile 90} - \text{Percentile 10})}$$

To test the first hypothesis, the Pearson Product Moment formula (Guilford, 1973:88) was used. Correlation Coefficient (Pearson r) is a measure of linear relationship between two sets of variables, X and Y. This is the most commonly used measure of correlation. The formula is shown below:

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

Where:

r_{xy} refers to the correlation coefficient

N refers to the total no. of students under the study

X refers to the students' achievement in math 214

Y refers to the students' rating in other variables

ΣXY refers to the sum of the product x and y

ΣX refers to the sum of x - values

ΣY refers to the sum of y - values

ΣX^2 refers to the sum of squared x - values

ΣY^2 refers to the sum of the square y - values

The obtained r was interpreted using the following scale (Calmorin, 1994:256):

Range	*Interpretation*
0.00 - ± 0.20	Negligible Correlation
± 0.21 - ± 0.40	Low or Slight Correlation
± 0.41 - ± 0.70	Moderate Correlation
± 0.71 - ± 0.91	High Correlation
± 0.91 - ± 0.99	Very High Correlation
± 1.00	Perfect Correlation

To test the significance of the computed coefficients of correlation the fisher's (Walpole, 1982:383) t-test formula was used.

$$t = \frac{r\sqrt{N - 2}}{\sqrt{1 - r^2}}$$

Where:

r - refers to the computed correlation coefficient

N - refers to the total no. of paired variable

In addition, the least squares linear regression equation (Punzalan, 1987:79) was applied through this formula $y = a + bx$, to roughly predict the value of a dependent variables, which is achievement in Differential Calculus, from the independent variables.

Where:

$$b = \frac{\sum(x_i - \bar{X})\ (yi - \bar{y})}{\sum(X_i - \bar{X})^2}$$

$$a = \bar{y} - b\bar{x}$$

Finally, testing of hypotheses was done using $\alpha = 0.05$ as the level of significance.

Chapter 4

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

The data gathered from the respondents of the study, the statistical treatment, analysis, discussion and interpretation of findings are presented in this chapter. The data consist of respondents' profile and relationship between achievement in Differential Calculus to their intellective and non-intellective variables.

Profile of Sophomore Engineering Students

To establish the entry academic performance of college student respondents, a college entrance test was conducted by the guidance office of Samar State Polytechnic College of Catbalogan, Samar. The test results is presented below, as interpreted, analyzed and discussed, to provide the entry academic performance of respondents.

College Entrance Test. An examination of the data from table 1 shows that of the 81 respondents, 37.04 percent had "below average" performance in the College entrance Test. This was followed by 34.57 percent, 19.75 percent and 6.18 percent, who belong to "average", "high

average" and "very high average" performance respectively. It could be noted that the same percentage of students, that is, 1.23 percent belonged to " superior" level performance, and another 1.23 percent to "poor" level performance in the College entrance Test.

The computed mean and standard deviation were 58.67 and 8.87 respectively. The mean of the College entrance test of the respondents appeared to be "average" based on the classification of students in Table 1.

To measure the symmetry of a distribution, skewness was computed. The result showed a distribution that was skewed to the left, which means to be of a negative value, since a normal or symmetrical distribution has zero skewness. Zero skewness or skewness with the range of -1 to +1 is normally distributed. Furthermore, the degree of peakedness or flatness of a frequency distribution was also computed. For normal distribution, kurtosis is equal to 0.263. Its curve is called mesokurtic. If kurtosis is higher than 0.263, the distribution is most likely platykurtic; while the kurtosis is lower than 0.263, the distribution is most likely leptokurtic.

The graph (Figure 2) shows that the respondents' entrance test scores tend to be skewed to the right or positively skewed since the computed value is greater than zero. In positive skewness, some of the high values are not offset by correspondingly low values hence, the mean is greater than the median. A test found to be rather difficult by the examinees may yield such form of distribution. Moreover, the figure shows that it is platykurtic as indicated in the value of kurtosis which is greater than 0.263. Thus, in general, it can be construed that the scores of the students are concentrated on the low values, that is, relatively low and quite heterogeneous.

Table 1

Frequency and Percentage Distribution of Respondents According to College Entrance Test

Test Score	Frequency	Percent	Interpretation
82 & above	1	1.23	Superior
73 - 81	5	6.18	Very High
64 - 72	16	19.75	High Average
55 - 63	28	34.57	Average
46 - 54	30	37.04	Below Average
45 - below	1	1.23	Poor
Total	81		
Mean			
Standard Deviation = 8.87			
Skewness = 8.87			
Kurtosis = 0.30			

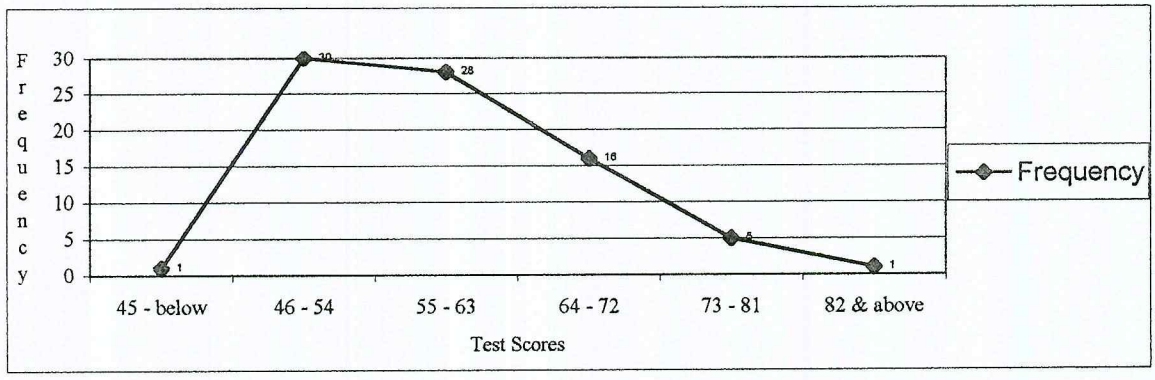

Figure 2. Distribution of Respondents According to College Entrance Test

Achievement in College Algebra. The academic grades were interpreted in accordance with the following descriptions as used in Samar State Polytechnic College:

Grade	Verbal Description
95 & above	Excellent
90 - 94	superior
85 - 89	Very good
80 - 84	Good
75 - 79	Fair or passing
74 & below	Failure

Table 2 shows that 55.56 percent of the students obtained "Passing" grades in the subject, where 25.92 percent had "good" performance, 9.88 percent had "very good" performance, 7.41 percent had "superior"

performance and only 1.23 percent had "excellent" performance.

The distribution has a mean grade of 80.64 and Standard deviation of 5.0. Thus, the average grade, in College Algebra of the respondents could be described as "good". Furthermore, the distribution in Figure 3 also shows that, it is skewed to the right. This means that the bulk of the grades are of low value with a few high grades present. The figure also shows that it is platykurtic in the sense that it is flatter than the normal curve as indicated in the computed value of kurtosis, which is 3.10. A Subject found to be rather difficult by the students may yield such form of distribution.

Table 2

Frequency and Percentage Distribution of Respondents According to Achievement in College Algebra

Grade	Frequency	Percent	Interpretation
95 & above	1	1.23	Excellent
90 - 94	6	7.41	Superior
85 - 89	8	9.88	Very good
80 - 84	21	25.92	Good
75 - 79	45	55.56	Fair or Passing
74 & below	0	0.00	Failure
Total	81	100.00	
Mean = 80.64			
Standard Deviation = 5.0			
Skewness = 0.24			
Kurtosis = 3.10			

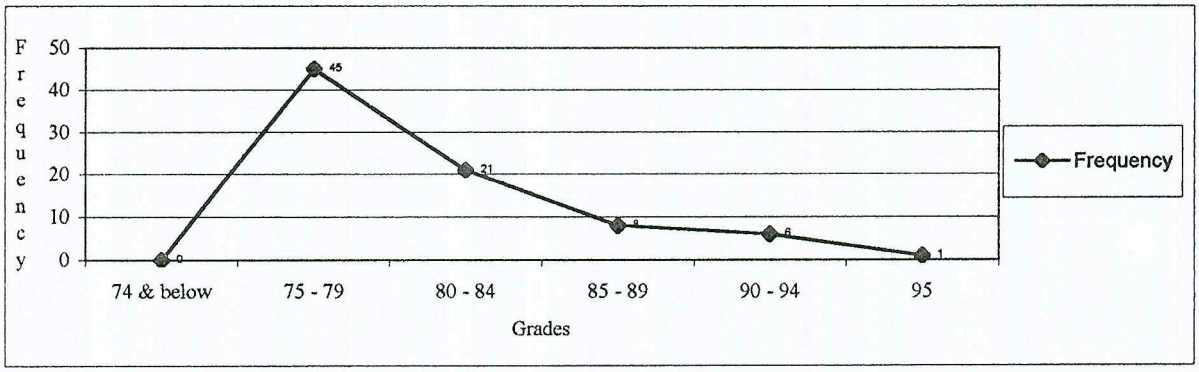

Figure 3. Distribution of Respondents According to Achievement in College Algebra

Achievement in Trigonometry and Solid Mensuration.

Table 3 shows that nobody from the respondents obtained an "excellent" as well as "superior" grade. However, it can be noted that 49.38 percent got "passing" grades in the subject, where 33.32 percent had "good" grades, 16.04 percent had "very good" grades and the remaining 2.46 percent had "failing" grades.

The distribution has a mean of 80.21 with standard deviation of 3.79. Thus, the average grade of the students in Trigonometry and Solid Mensuration could be described as "good". Figure 4 shows that, from the computed value skewness which is equal to 0.28, the distribution is skewed to the right. This means that the bulk of the grades of students are of low value and only few of them received higher grades. The figure also

shows that it is platykurtic as indicated by the value of kurtosis, which is 0.57.

Table 3

Frequency and Percentage Distribution of Respondents According to Achievement in Trigonometry and Solid Mensuration

Grade	Frequency	Percent	Interpretation
95 & above	0	0.00	Excellent
90 - 94	0	0.00	Superior
85 - 89	13	16.04	Very Good
80 - 84	27	33.32	Good
75 - 79	40	49.38	Fair or Passing
74 & below	2	2.46	Failure
Total	81	100.00	
Mean = 80.21			
Standard Deviation = 3.79			
Skewness = 0.28			
Kurtosis = 0.57			

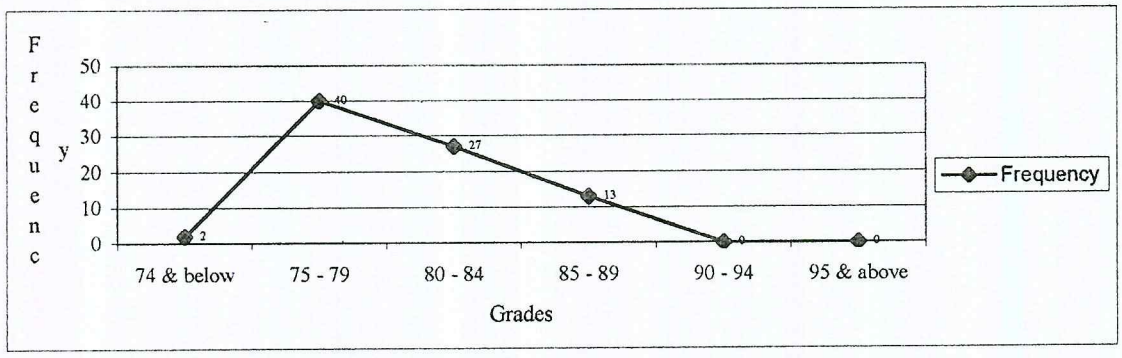

Figure 4. Distribution of Respondents According to Achievement in Trigonometry and Solid Mensuration

Achievement in Analytic Geometry. Data shown in table 4 revealed that out of 81 respondents, 60.50 percent of them got passing grades in Analytic Geometry,

where 23.46 percent were with "good" grades, 11.11 percent had "very good" grades, 3.70 percent had "superior" grades and the remaining 1.23 percent had "failing" grades.

Table 4

Frequency and percent Distribution of Respondents According to Achievement in Analytic Geometry

Grade	Frequency	Percent	Interpretation
95 & above	0	0.00	Excellent
90 - 94	3	3.70	Superior
85 - 89	9	11.11	Very Good
80 - 84	19	73.46	Good
75 - 79	49	60.50	Fair or Passing
74 & below	1	1.23	Failure
Total	81	100.00	
Mean = 79.79			
Standard Deviation = 4.26			
Skewness = 0.29			
Kurtosis = 0.26			

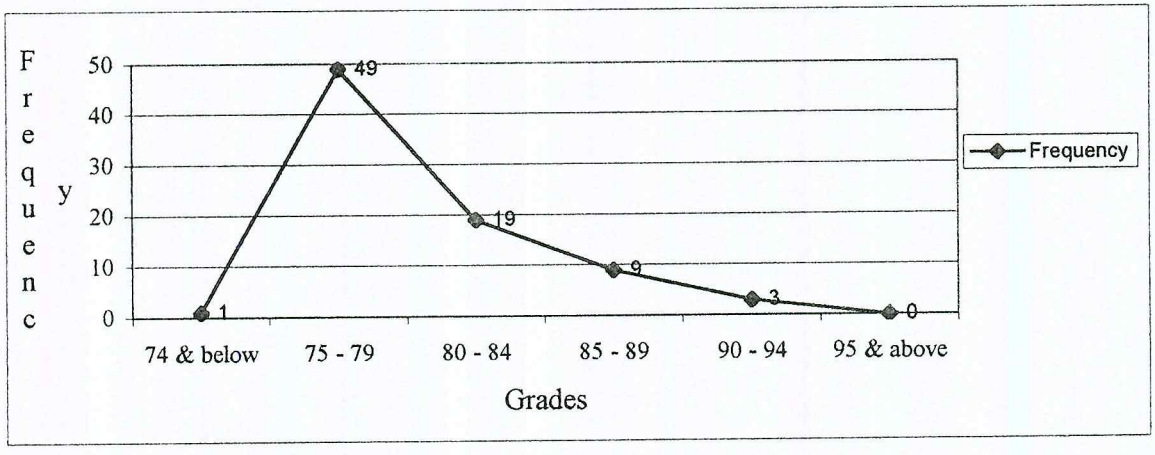

Figure 5. Distribution of Respondents According to Achievement in Analytic Geometry

The distribution had a mean of 79.79 and a standard deviation of 4.26. Thus, the average grade in Analytic Geometry of the respondents could be described as "good". The distribution in Figure 5 also shows that, it is skewed to the right and is leptokurtic as indicated in the computed values of skewness and kurtosis, which were 0.29 and 0.26 respectively.

Achievement in Communication Arts (English 113). Table 5 shows that 38.28 percent of the students obtained "very good" grades in the subject, 33.33 percent had "good" grades, and those with "superior" and "passing" grades had 13.58 percent each. The remaining 1.23 percent had "failing" grades. It could be noted that no one was found to be "excellent" in the subject.

Table 5

Frequency and Percentage Distribution of Respondents According to Achievement in English 113

Grade	Frequency	Percent	Interpretation
95 & above	0	0.00	Excellent
90 - 94	11	13.58	Superior
85 - 89	31	38.28	Very Good
80 - 84	27	33.33	Good
75 - 79	11	13.28	Fair or Passing
74 & below	1	1.23	Failure
Total	81	100.00	
Mean = 84.47			
Standard Deviation = 4.67			
Skewness = 0.06			
Kurtosis = 0.27			

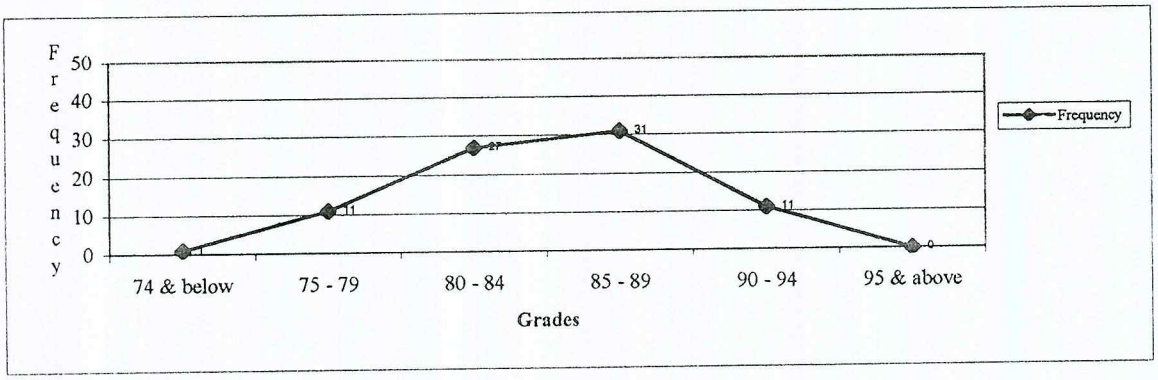

Figure 6. Distribution of Respondents According to Achievement in English 113

The distribution has a mean grade of 84.47 and a standard deviation of 4.67. Thus, the average grade in Communication Arts of the respondents could be described as "good". Furthermore, the distribution in Figure 6 also shows that, it is skewed to the left or negatively skewed. This means that some of the low grades are not offset by correspondingly high grades in the subject. In addition, the bulk of the grades are of high value with a few low grades present. The figure also shows that it is platykurtic as indicated in the computed value of kurtosis, which is 0.27.

Table 6

Frequency and Percentage Distribution of Respondents According To Achievement in English 123

Grade	Frequency	Percent	Interpretation
95 & above	0	0.00	Excellent
90 - 94	10	12.35	Superior
85 - 89	23	28.39	Very Good
80 - 84	35	43.31	Good
75 - 79	10	12.35	Fair or Passing
74 & below	3	3.70	Failure
Total	81	100.00	
Mean = 83.05			
Standard Deviation = 4.88			
Skewness = 0.25			
Kurtosis = 0.25			

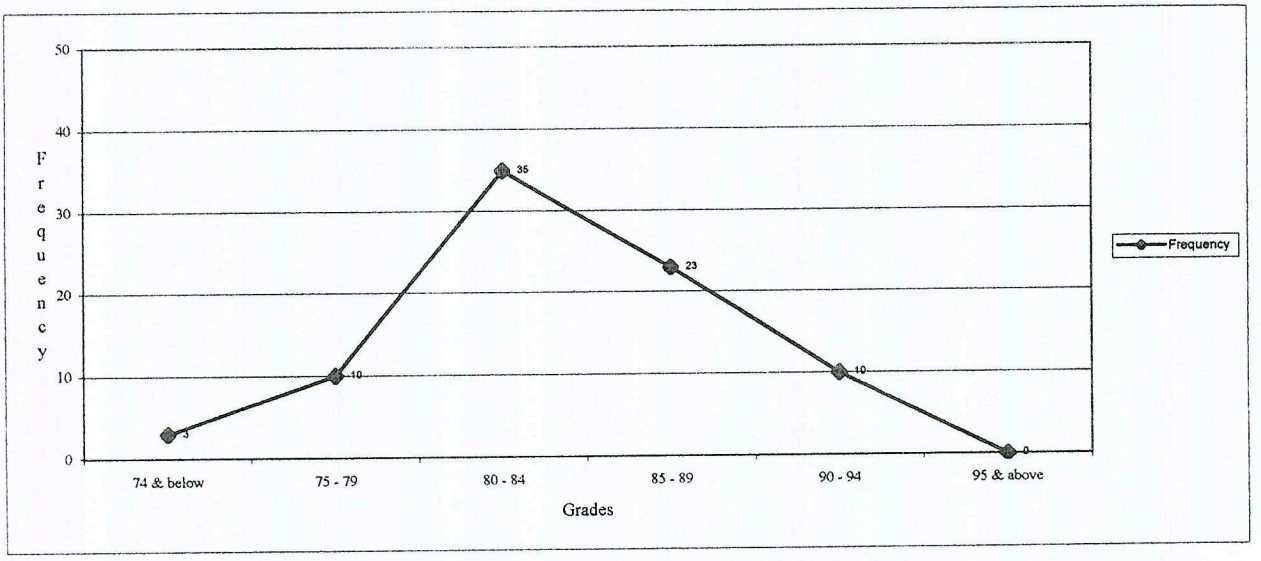

Figure 7. Distribution of Respondents According to Achievement in English 123

Achievement in Advance Communication Arts (English 123). Table 6 shows that no body from the respondents obtained an "excellent" performance in the subject. It can be seen that 43.21 percent obtained "good" grades,

28.39 percent had "very good" grades, while there was the same percentage of 12.35 for those with "superior" and "passing" grades. The remaining 3.70 percent got "failing" grades.

The distribution has a mean grade of 83.05 and a standard deviation of 4.88. The academic performance of the students in Advance Communication Arts could then be described as "good". The distribution in Figure 7 also shows that, it is skewed to the left. This means that the bulk of the grades are of high value with a few low grades present. Moreover, the distribution is leptokurtic in the sense that it is more peaked than the normal curve as indicated in the computed value of kurtosis, which is 0.25.

TABLE 7

Age and Sex Distribution of the Student - Respondents

Age	Sex		Total	Percent
	Male	Female		
17	16	4	20	24.69
18	27	16	43	53.09
19	9	1	10	12.35
20	6	1	7	8.64
21	1	0	1	1.23
Total	59	22	81	100.00
Percent	72.84	27.16	-	100.00
Mean	18.09	18.09	-	18.09
SD	0.84	0.78	-	0.82

Age and Sex. Table 7 shows the distribution of respondents by age and sex. The largest proportion of respondents were 59 males, which constituted 72.84 percent and the remaining 27.16 were females. The data shows that 43 students or 53.09 percent of them were 18 years old, 20 students or 24.69 percent were 17 years old, 10 students or 12.35 percent were 19 years old, 7 students or 8.64 percent were 20 years old and one student or 1.23 percent was 21 year old. It can be seen from the same table that majority of the respondents were aged between 17 to 21. The average age of the male and female respondents were both 18.09 years old with a standard deviation of 0.84 and 0.78 respectively. As a whole, the average age of the respondents was 18.09 years old with a standard deviation equal to 0.82. It is worthwhile to note that the respondents belong more or less to the same age bracket.

TABLE 8

Frequency and Percentage Distribution of Respondents According to Attitude Towards Mathematics

Grade	Frequency	Percent	Interpretation
90 - 100	20	20.99	Very Favorable
80 - 89	26	44.44	Favorable
70 - 79	24	33.33	Undecided
60 - 69	1	1.24	Unfavorable
50 - 59	0	0.00	Very Unfavorable
Total	81	100.00	
Mean = 83.75			
SD = 3.05			
Skewness = -0.06			
Kurtosis = 0.52			

Attitude Towards Mathematics. Table 8 shows that 44.44% of the respondents were within the 80 - 89 class interval showing that 36 students had "favorable" attitudes towards mathematics while 33.33 percent of the respondents had "undecided" attitude towards the subject. However, 20.99 percent of the respondents had "very favorable" attitudes towards mathematics and the remaining 1.24 percent had "unfavorable" attitude towards the subject.

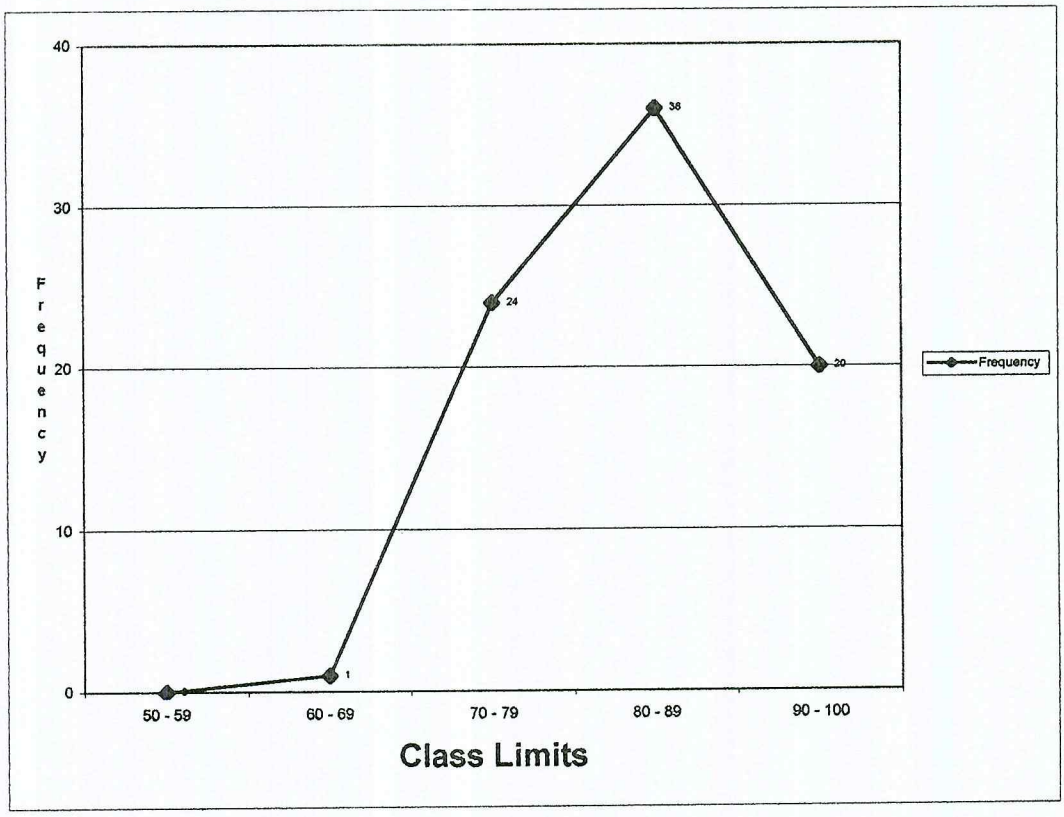

Figure 8. Frequency of Percentage Distribution of Respondents According to Attitude Towards Mathematics

Figure 8 shows that, the distribution is skewed to the left or negatively skewed as indicated in the computed value of -0.06. This means that most scores were located to the right end of the scale. This indicates further that a larger portion of the respondents obtained high scores. Furthermore, a distribution is platykurtic as indicated by the computed value of kurtosis was equal to 0.52. It has a mean of 83.75, with standard deviation of 3.05. This implies that the respondents' attitudes

towards mathematics could be generally described as "favorable".

Table 9

Monthly Income of Parents

Income (₱)	Frequency	Percent
14,001 & Above	11	13.58
12,001 - 14,000	2	2.47
10,001 - 12,000	6	7.41
8,001 - 10,000	14	17.28
6,001 - 8,000	11	13.58
4,001 - 6,000	12	14.81
4,000 & Below	25	30.87
Total	81	100.00
Mean = ₱7,346.18		

Monthly Income of Parents. A closer examination of the data in Table 9 clearly shows that the greater proportion of the students' family income, consisting of 25 respondents (30.87%) had a family income of PhP 4,000 and below. This is followed by the group of the 14 respondents (17.28%), whose family income ranges from PhP 8,000 - Php 10,000. The next income group ranges from PhP 4,000 - PhP 6,000 as registered by 12 respondents (14.81%). The data further indicates that the mean of the family income of the students is PhP 7,346.18. Approximately, 41 percent of the students had a family income above PhP 7,346.18 and 45 percent of the students had a family income below PhP 7,346.18. Whereas, 14

percent of the students had a family income within the range of PhP 7,346.18. The result implies, as based in the poverty threshold set by NEDA in 2002, that family income of the parents was below the poverty threshold.

TABLE 10

Students' Parental Educational Attainment

Educational Attainment	Father	Percent	Mother	Percent
College Graduate	14	17.28	30	37.04
Some Years in College	17	20.99	11	13.58
High School Graduate	8	9.88	6	7.41
Some Years in High School	18	22.22	18	22.22
Elementary Graduate	3	3.70	6	7.41
Some Years in Elementary	21	25.93	10	12.34
Total	81	100.00	81	100.00

Educational Background of Parents. Table 10 shows the comparative data of the educational attainment of students' parents. The largest population of schooled group of parents, registers 25.93 percent of the total number of parents involved, since the fathers of the students spent some years in the elementary grades. The next larger population of schooled group parents' registers 22.22 percent of the involved parents who stayed some years in high school. This is followed by the group of parents who spent some years in college comprising 20.99 percent, while 17.28 percent were college graduates, 9.88 percent were high school

graduates and the remaining 3.70 percent were elementary graduates.

Similarly, 37.04 percent of the mothers were college graduates, 22.22 percent spent some years in high school, 13.58 percent stayed some years in college, 12.34 percent stayed some years in the elementary grades, while there was the same percentage, of 7.41 percent for those who graduated from the elementary and from the high school.

It is evident from the data presented that the students appear to have parents with varied educational attainments. The largest proportion of parents of the students' respondents were college graduates, followed by parents who had some years in elementary and those who spent some years in high school. The profile shows that majority of the students' parents were literate.

TABLE 11

Type of High School Attended

Type of School	Frequency	Percent
Public	63	83.95
Private	13	16.05
Total	81	100.00

Type of High School Attended. Table 11 shows that 68 or 83.95 percent of the respondents came from public secondary schools while 13 or 16.05 percent came from

private secondary schools. It can also be gleaned from the table that the number of respondents who came from public secondary schools was 67.90 percent, which is more than the number of respondents who came from private secondary schools.

TABLE 12

Frequency and Percentage Distribution of Respondents According to Academic Performance in Differential Calculus

Grade	Frequency	Percent
95	0	0.00
90 - 94	1	1.23
85 - 89	14	7.28
80 - 84	24	29.63
75 - 79	25	30.87
70 - 74	17	20.99
Total	81	100
Mean = 79.35		
SD = 5.22		
Skewness = 0.03		
Kurtosis = 1.04		

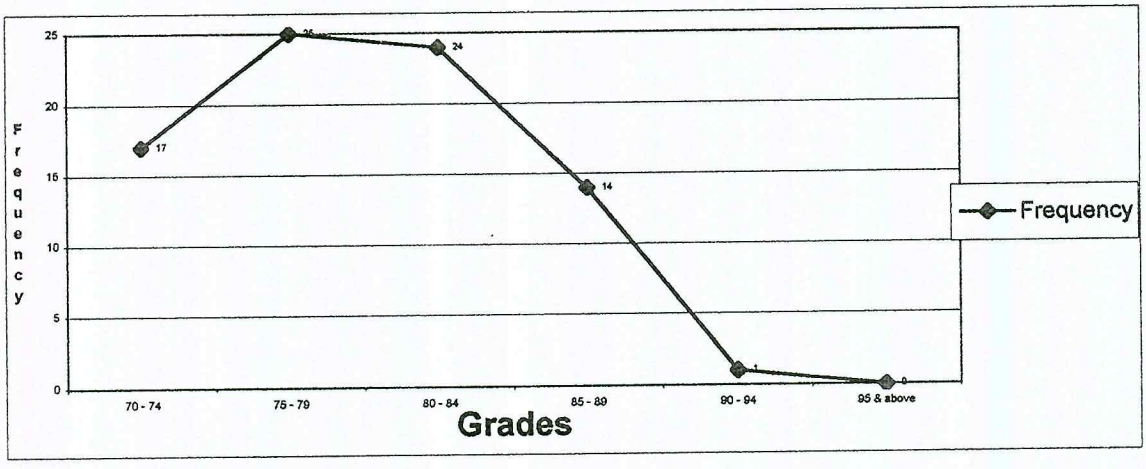

Figure 9. Distribution of Respondents According to Academic Achievements in Differential Calculus

Academic Achievements in Differential Calculus.

Table 12 shows that of the 81 respondents, 20.99 percent of the students obtained "failing" grades in the subject, 30.87 percent had "fair" or "passing" grades, 29.63 percent had "good" grades, 17.28 percent had "very good" grades and the remaining 1.23 percent of the students had "superior" grades in the subject. It could be noted that no one was found to get "excellent" grade.

Figure 9 shows that, the distribution is skewed to the right or positively skewed as indicated in the computed value of 0.03. Most of the schools are located to the left end of the scale. This indicates further, that a larger portion of the respondents obtained passing grades. Furthermore, the distribution is platykurtic as indicated by the computed value of kurtosis, which is equal to 1.04. The percentage equivalent of the mean grade of 79.35 with a standard deviation of 5.22 implies that generally, the students have "fair" or "passing" performance in differential calculus.

Table 13 shows the descriptive data of the sophomore engineering students in terms of intellectual, non-intellective, and dependent variables taken singly, namely: college entrance test, academic achievements in

College Algebra, Trigonometry, and Solid Mensuration, Analytic Geometry, Communication Arts, Advance Communication Arts, Differential Calculus, Sex, Age, Altitude Towards Mathematics, Educational attainment of Parents, Income of Parents, and Type of high school attended.

Among the academic discipline taken by the respondents, their highest achievements was shown to be in Communication Arts, with a computed mean of 84.47. It is followed by Advance Communication Arts, with a mean of 83.05; Analytic Geometry, 79.79 and Differential Calculus, 79.35. The academic performances of the respondents in the intellective variables was considered "good", while their academic performance in Differential Calculus was considered "fair" or "passing". The computed standard deviation in Differential Calculus (5.22), and College Algebra (5.00) revealed that the respondents' academic performance in these subjects were more varied than their academic performance in Communication Arts. This implies that the group of respondents was heterogeneous in terms of their academic performances in College Algebra and Differential Calculus. Moreover, the respondents had the lowest performance in Differential

TABLE 13

Summary of Coefficient and t-value of each of the Factors Affecting Achievement in Differential Calculus

Factors	Mean	SD	SK	K	Verbal Interpretation
A. Intellective					
1. College Entrance Test	58.67	8.87	0.49	0.30	Average
2. Achievement in College Algebra	80.64	5.00	0.24	3.10	Good
3. Achievement in Trigonometry & Menstruation	80.21	3.79	0.28		Good
4. Achievement in Analytic Geometry	79.79	4.26	0.29	0.57	Good
5. Achievement in Communication Arts	84.47	4.67	-0.06	0.26	Good
6. Achievement in Adv. Communication Arts	83.05	4.88	-0.25	0.27	Good
B. Non-Intellective					
1. Sex					
2. Age	18.09	0.82			
3. Altitude towards Mathematics	83.75	3.05	-0.06	0.52	Favorable
4. Educational Background of Parents					
5. Monthly Income of Parents	7,346.18				Below Ave. Income
6. Type of H.S. Attended					
C. Dependent					
1. Achievement in Differential Calculus	79.35	5.22	0.03	1.04	Fair/ Passing

Where:

SD = Standard Deviation

SK = Scariness

K = Kurtusis

Calculus, which was considered "fair" or "passing." It is worthwhile to note that the subject matters or the topics covered in Differential Calculus are a combination of College Algebra, Plane Trigonometry, Analytic Geometry, and English Proficiency Instructions. Failure of the student to perform well in Differential Calculus is attributed to the weak foundation in the preceding mathematics courses.

Correlation between Achievement in Differential Calculus and the Variables taken Singly.

The coefficient of correlation (r) between achievement in Differential Calculus and the selected predictive variables of the study were computed using the Pearson Product-Moment formula to determine if there exists a significant relationship. It was aimed to discover which variable would play a significant role in determining the student ability to perform well in Differential Calculus. Data from table 14, on page 86 shows the computed correlation coefficient and computed values corresponding to the coefficients. It was tested on the well hypothesis that $r = 0$ with a tabular or critical value of +1.986 to -1.986 at 0.05 level of significance with degree of freedom at 79.

College Entrance Test. The computed coefficient of correlation between achievement in Differential Calculus and results of their college entrance test was 0.39. This denotes low or slight relationship between these two variables. However, the computed t-value of 3.77 is generated than the tabular t-value of 1.986 at 0.05 level of significance, which shows that the correlation is significant. The hypothesis, therefore, which states that "there is no significant relationship between achievement in Differential Calculus and results in the college entrance test" is rejected. This finding implies that students with higher College Entrance Test results likewise obtained better achievement in Differential Calculus.

Achievement in College Algebra. The computed r in correlating students' achievement in College Algebra turned out to be 0.52, which denotes a moderate or substantial correlation. The test of significance revealed a computed t-value of 5.44, which is greater than the tabular value of 1.986 at 0.05 level of significance with df equals 79. The relationship was found to be very significant thus, rejecting the hypothesis that there is no significant relationship

between the aforementioned variables. This finding implies that the students who have good achievement in College Algebra could be expected to achieve more in Math 214 than those who did not perform well in College Algebra.

Achievement in Trigonometry and Solid Mensuration. On the relationship between student achievement in Math 214 and achievement in Trigonometry and Solid Mensuration, the computed coefficient of correlation was 0.26. This denotes a low or slight relationship between these two variables. The computed t-value of 2.41 is greater than the critical value of 1.986 at 0.05 level of significance. Therefore, the null hypothesis that there is no significant relationship between the above-mentioned variables is rejected. This implies that the achievement on Trigonometry and Solid Mensuration affect achievement in Differential Calculus (Math 214). This implies further that any learning task is built on some prior learning.

Table 14

Summary of Coefficient and t-value of each of the Factors affecting achievement in Differential Calculus.

Factors	Correlation r	Verbal Interpretation	Value t	Evaluation
College Entrance Test	0.39	Low	3.77	Significant
Achievement in College Algebra	0.52	Moderate	5.44	Significant
Achievement in Trigonometry and Solid Menstruation	0.26	Low	2.41	Significant
Achievement in Analytic Geometry	0.57	Moderate	6.18	Significant
Achievement in Communication Arts	0.37	Low	3.54	Significant
Achievement in Adv. Communication Arts	0.32	Low	3.03	Significant
Sex	-0.01	Negligible	0.09	Not significant
Age	-0.17	Very low	1.54	Not significant
Attitude Towards Mathematics	0.33	Low	3.12	Significant
Educational Budget of Parents	-0.01	Negligible	0.09	Not significant
Monthly Income of Parents	-0.06	Very low	0.53	Not significant
Type of H.S. attended	-0.01	Negligible	0.09	Not significant

Critical t = 1.789 at .05 level with df=79

Achievement in Analytic Geometry. In terms of student achievement in Math 214 and Analytic Geometry, the computed r is 0.57, which denotes a moderate or substantial relationship. Using the Fisher's t to test its significance, the result revealed a computed t-value of 6.18, which is evidently greater than the critical t-value of 1.968 at 0.05 level with df equal to 79. In this case, the hypothesis stating that "there is no significant relationship between the aforecited variables" was rejected. This implies that achievement in Analytic Geometry is related to or it influences students' achievement in Differential Calculus.

The data in Table 14 shows that student achievement in College Algebra, Trigonometry, and Solid Mensuration, and Analytic Geometry affects students' achievements in Differential Calculus. On the above findings, it is significant to note that students learn the mathematical skills through a gradual and progressive approach, where acquisition of new concept depends upon a careful mastery of the previous learned skills.

Achievement in Communication Arts (English 113). The relationship between achievement in Math 214 and achievement in English 113 is given by the correlation

coefficient of 0.37, which is interpreted as "low". Tested at 0.05 level of significance, with a computed t-value of 3.54, the relationship was found to be very significant; thus, rejecting the hypothesis which states that there is no significant correlation between the aforementioned variables. This implies that achievement in English 113 slightly affects the achievement in Math 214. Moreover, students who are proficient in the English language perform better in mathematics than those deficient in the language.

Achievement in Advance Communication Arts(English 123). The computed r is correlating students' achievement in Mathematics 214 with their achievement in English 123 has turned out to be 0.32. This denotes a low or slight correlation. The test of significance reveled a computed t-value of 3.03, which is greater than the critical value of 1.986 at .05 level of significance with df equals 79. The Relationship was found to be significant; thus, rejecting the hypothesis which states that there is no significant relationship between the aforecited variables. This finding implies that achievement in English 123 affects the achievement in Math 214.

A synthesis of the preceding analysis and the interpretations of data gathered indicate that intellective factors namely: (1) College entrance; (2) achievement in College Algebra; (3) achievement in Trigonometry and Solid Mensuration; (4) achievement in Analytic Geometry; (5) achievement in communication arts; (6) achievement in Advance Communication Arts are correlated with students' achievement in Differential Calculus which was assumed by the obtained r's of 0.39, 0.52, 0.26, 0.57, 0.37, and 0.32 respectively to be significant at .05 level of significant with 79 degrees of freedom.

This could be explained by the fact, that all intellective factors reflect possession of skills, and abilities in cognition such as: identification and analysis of problems, comparison and abstraction, mastery of basic concepts and processes and ordered thinking, which among others, all contribute to good performance in Differential Calculus.

Sex. As reveled by Table 13, the correlation coefficient between achievement and Math 214 and their sex was posted at -0.01. This denotes a negligible negative correlation. Correspondingly, fisher's t-value

for testing the significance of this relationship was pegged at 0.09, which was found to be lesser than the critical t-value at 0.05 level of significance and 79 degrees of freedom. Hence, the hypothesis, which states that there is no significant relationship between the achievement in Math 214 and sex variate, was accepted. This denotes that generally, sex is not significantly related to the students' achievement in Math 214 since male performed equally with female.

Age. On the relationship between the respondents' achievement in Math 214 and Age, the computed correlation coefficient was -0.17. This denotes a very low negative relationship between these two variables. The computed t-value of 1.54 is smaller than the critical t-value of 1.986. This connotes the acceptance of the null hypothesis. The interpretation is that Age is not significantly related to achievement in Math 214.

Attitudes towards Mathematics. For this variate, the computed Pearson r and fisher's t-value 0.33 and 3.12 respectively, turned out to be greater than the critical t-value of 1.986, which led to the rejection of the hypothesis. The interpretation is that attitudes towards Mathematics are significantly related to achievement in

Math 214. This means that students' positive attitude towards Mathematics contributes meaningfully to better achievement in mathematics. Furthermore, students with positive attitudes towards mathematics tend to be greater achiever than those with negative attitudes. Positive attitudes generally bring about positive reactions to learning situations and experiences, which contributes to effective learning, and consequently good performance. The significant relationship between the two variables lends further statistical support to the findings of the study conducted by Amporin and Pacolor.

Monthly Income of Parents. For this variate, the correlation coefficient was found to be -0.01, with a fisher' t-value of 0.09, which is lesser than the critical t-value of 1.986 at 0.05 level of significance. Hence, the corresponding hypothesis was accepted. This implies that income of the parents did not turn out as a factor in the respondents' achievement in Math 214.

Educational Background of Parents. The computed correlation coefficient for this variate was -0.01 and the t-value of 0.09. The fisher's t-value was observed to be lesser than the critical t-value of 1.968 at 0.05 level of significance, with the degree of freedom of 79.

Therefore, the null hypothesis, which states that there is no significant relationship between the two variates, was accepted. It can be implied therefore, that educational attainment of parents did not pose as a factor that influence students' achievement in Math 214.

Type of High School attended. The computed r in correlating students' achievement in Math 214 and high school attended turned out to be -0.01, which denotes a negligible correlation. The test of significance revealed a computed t-value of 0.09, which is lower than the critical t-value of 1.968 at 0.05 level of significance. Therefore, the null hypothesis is rejected. The finding implies that whether a student is a graduate of private or public high school, he could excel in Differential Calculus. This also indicates that a type of high school has nothing to do with performance in Differential Calculus or is not dependent on the type of high school attended by the respondents.

Among non-intellective factors, attitudes towards mathematics shows significant correlation with achievement in Math 214 at 0.05 level of significance. However, sex, age, educational background of parents, monthly income of parents, and type of high school

attended were found to be insignificantly related to achievement in Differential Calculus.

Extent to which Selected Variables Predict Individual Achievement in Differential Calculus

Among the variables involved in the study, only the prediction ability of those found to have significant relationship with achievement in Differential Calculus were discussed. The significant relationship between two sets of variables is indicated based on the actual relationship rather than to chance. All the computed value for r in Table 14 are positive, and this imply that the increase in the amount of one of the variables produces a corresponding increase in the amount of the other variable, or vice versa.

Data in Table 15 shows that the predictive ability of selected variables, were found significant in the problem. It shows that, the level of variation of achievement in Differential Calculus was related to college entrance test result, which approximately shows that out of the 15.21 percent of the student respondents who took the entrance test, about 15 percent of them showed achievement in Differential Calculus, that were closely related to their ratings in the entrance test.

The amount of variation in the final grade in Differential Calculus influenced by the achievement in College Algebra was 27.04 percent. From this result, more than one-fourth of the students' achievement in Differential Calculus was related to the achievement in College Algebra. The amount of variation in the final grade in Differential Calculus as influenced by the achievement in Trigonometry and Solid Mensuration was 6.76 percent. The amount of variation of achievement in Differential Calculus that were related to achievement in Analytic Geometry was approximately 17.64 percent. This shows that almost one-fifth of the students' achievement in Differential Calculus was related to their achievement in Analytic Geometry.

The amount of variation in the final grade in Differential Calculus as influenced by the achievement in Communication Arts I and Advance Communication Arts were 10.24 and 6.25 percent respectively. This shows that about 17 percent of the students' achievement in Differential Calculus was related to the academic achievement in Communication Arts.

Among the non-intellective factors considered in the study, only attitude towards mathematics was found to be

significantly correlated with achievement in Differential Calculus. The level of variation in the achievement in Differential Calculus as influenced by attitude towards mathematics was 10.89 percent. This shows that more than one-tenth of the students' achievement in Differential Calculus is related to their attitudinal level towards the subject.

Implications

The findings reveal that significant relationships between achievement in Differential Calculus and College Entrance Test would serve primarily as a predictor of probable future success, and secondarily as basis for counseling and guidance. Moreover, it is important to analyze its value in connection with their academic achievement.

The findings indicate a significant relationship between achievement in Differential Calculus and their grades or achievement in College Algebra, Trigonometry and Solid Mensuration and Analytic Geometry, which implies that this would require instructors to develop the mathematical skills of their students through a gradual and progressive approach, where new concepts to

Table 15

Summary of Person r, Coefficient of Determination and Regression Equation of the Factors Affecting Achievement in Math 214 (y)

Factor	R	R^2	Regression Equation
College Entrance Test (X_1)	0.39	15.21	$y = 16.35 + 0.54X_1$
Achievement in College Algebra (X_2)	0.52	27.04	$y = 44.78 + 0.45X_2$
Achievement in Trigo & Solid Mensuration (X_3)	0.26	6.76	$y = 65.81 + 18X_3$
Achievement in Analytic Geometry (X_4)	0.42	17.64	$y = 45.82 + 0.42X_4$
Achievement in Communication Arts (X_5)	0.32	10.24	$y = 63.70 + 0.25X_5$
Achievement in Adv. Communication Arts (X_6)	0.25	6.25	$y = 63.90 + 0.25X_6$
Attitudes towards Mathematics (X_7)	0.33	10.89	$y = 49.65 + 0.41X_7$

be acquired depend upon a careful mastery of the previous learned skills. Findings suggest that, the instructors should explain to the students the importance of the study of Differential Calculus, to develop among them the confidence in solving problems in Differential Calculus. This is one of the mathematical skills that should be developed among the students. Moreover, instructors would need insight on how to improve teaching-learning

situations through a wise relation of objectives, contents and activities.

A significant relationship between achievement in Differential Calculus with Communication Arts would need instructors to consider that academic achievement is attributed to various factors including comprehension skills. Proficiency in the English Language can be used as a factor for deciding what courses to take, which requires mathematical ability. Furthermore, it could be gleaned that high proficiency in English is a good instrument by which the students can obtain good marks of achievement in such academic courses as science and mathematics. English, it should be noted, is used as the language of instruction in the subjects.

The findings reveal that a significant relationship between achievement in Differential Calculus and students' attitude towards the subject would need instructors to remember that different students have different attitudes towards mathematics. The supports of the instructors have a significant impact on students' learning. Although knowledge may be gained from books, the love for knowledge is transmitted only by way of personal contact. Students learn more effectively when

they have the proper attitude and interest in what they learn and what they achieve hence, if they like and enjoy mathematics, they will learn mathematical skills well. Moreover, instructors should emphasize to the students the importance of the subject matter in order to arouse their interest, as well as, to develop proper attitude towards the subject. Therefore, continuous attention should be directed toward creating, developing, maintaining and reinforcing attitudes of the students.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

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

Summary of Findings

Based on the data gathered, the following results were obtained:

1. On college entrance test: The mean of the result was described as "average", and the final grades of students in College Algebra, Trigonometry and Solid Mensuration, analytic Geometry, Communication Arts were described "good", while their attitude towards mathematics was generally described as "favorable".

2. On sex: The number of males was 45.68 percent, more than the number of females.

3. On age: The average ages of the male and female respondent groups were both 18.09 years old with a standard deviation of 0.84 and 0.78, respectively. The average age of the respondents was 18.09 years old with a standard deviation equal to 0.82.

4. Monthly income of parents: The data indicates that the weighted mean of family income of the students is P7,346.18, which falls under "below average income" bracket, 41 percent of the students have a family income above P7,346.18, while 45 percent of them have a family income below P7,346.18 and another 41 percent have a family income close to the mean of P7,346.18.

5. Education background of parents: The largest proportion of parents of the student-respondents were college graduates (17.28 percent of students' father and 37.04 percent of students' mother); There was 25.93 percent of the fathers and 12.34 percent of mothers who had some years in elementary, and 22.22 percent combined fathers and mothers of the respondents, who had some years in high school.

6. Type of high school attended: The number of students graduated from public schools was 67.90 percent, which was more than the number of students who came from private schools.

7. Academic Achievement in Differential Calculus: The percentage equivalent of the mean grade of 79.35 with a standard deviation of 5.22, implies that generally, the

students have "fair" or "passing" performance in Differential Calculus (Math 214).

8. The study showed a direct low relationship between college entrance test and achievement in Differential Calculus as manifested by a correlation coefficient of 0.39.

9. There is a direct and moderate relationship between achievement in College Algebra (Math 115) and achievement in Differential Calculus (Math 214) as reflected by a correlation coefficient of 0.52.

10. There is a direct and low relationship between Trigonometry and Solid Mensuration (Math 114) and achievement in Differential Calculus (Math 214) as reflected by a correlation coefficient of 0.26.

11. There is a direct and moderate relationship between achievement in Analytic Geometry (Math 124) and achievement in Differential Calculus (Math 214), as reflected by a correlation coefficient of 0.57.

12. There is a direct and low relationship between achievement in Communication Arts (English 113) and achievement in Differential Calculus (Math 214) as reflected by correlation coefficient of 0.37.

13. There is a direct and low relationship between achievement in Advance Communication Arts (English 123) and achievement in Differential Calculus (Math 124) as reflected by a correlation coefficient of 0.32.

14. There is a negative negligible correlation between the achievement in Math 214 and sex with an r equal to -0.01. This implies that sex has no effect in the academic achievement in Math 214.

15. There is a non-significant correlation between achievement in Math 214 and age with an r equal to -0.17. This implies that age has no relation with the academic achievement in Math 214.

16. There is a direct and low relationship between attitude towards mathematics and achievement in Differential Calculus (Math 214) as reflected by a correlation coefficient of 0.33.

17. There is a non-significant correlation between achievements in Math 214 with monthly income of parents with an r equal to -0.06. This implies that monthly income of parents has no effect in the academic achievement in Math 214.

18. There is a negligible correlation between achievement in Math 214 and educational background of

parents with an r equal to -0.01. This implies that educational background of parents has no relations with the academic achievement in Math 214.

19. There is a negligible correlation between achievement in Math 214 and type of high school attended with an r equal to -0.01. This implies that type of high school attended has no relation with the academic achievement in Math 214.

20. The study showed that about 15% of the student achievement in Math 214 is related to college entrance test result of $r^2 = 15.21$.

21. About one-fourth of the students' final grades in the subject could be attributed to achievement in College Algebra since $r^2 = 27.04$.

22. Less than 20% of the students' achievement in Math 214 is related to Trigonometry and Solid Mensuration ratings since $r^2 = 6.76$.

23. Almost 20% of the students' achievement in Differential Calculus was influenced by their achievement in Analytic Geometry since $r^2 = 17.64$.

24. More than 10% of the students' achievement in Differential Calculus (Math 214) was influenced by their achievement in Communication Arts since $r^2 = 10.24$.

25. Less than 10% of the students' achievement in Math 214 is related to achievement in Advance Communication Arts since $r^2 = 6.25$.

26. More than 10% of the students' achievement in Differential Calculus (Math 214) is related to their attitude towards mathematics as revealed by r^2 equal to 10.89.

Conclusions

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

1. There were typical sophomore engineering students enrolled in Differential Calculus (Math 214) at Samar State Polytechnic College, Catbalogan, Samar during the first semester of school year 2002-2003 who were of a majority of males and who graduated from public high school with average college entrance test results, good performance in College Algebra, Trigonometry and Solid Mensuration, Communication Arts and Advance Communication Arts and with "favorable" attitude towards mathematics.
2. Academic achievement in Differential Calculus is moderately affected by factors such as academic

achievements in College Algebra, Trigonometry, Analytic Geometry and Communication Arts.

3. Among the intellective and non-intellective factors, included in this study, the respondents' academic achievement in College Algebra, Trigonometry and Solid Mensuration, Analytic Geometry, Communication Arts and attitudes towards mathematics best explain or predict their academic performance in Math 214.
4. It is concluded that the result of this study implies that the importance of mastering mathematical skills from the simplest to the most complicated is a must for success, complemented by a mastery of reading comprehension skill in the language of instruction used in the classroom.
5. Concluded further, that mathematics instructors need to be well-trained in the teaching learning techniques and approaches focused on mathematics.

Recommendations

From the findings and conclusions made in this study, the researcher recommends the following:

1. The Guidance Office should continue conducting College Entrance Examination to all applicants for freshmen admission. This is a useful tool to assist in the selection and placement of students particularly in the College of Engineering.

2. Student who obtained a grade lower than 3.0 in six to eight units in mathematics course; should be given time to improve their performance. If at the end of such period their performance does not improve, teachers should be encouraged to go into mentoring technique.

3. Mathematical ability of the students should be diagnosed at the start of the semester. Students who are found at the start of classes to have inadequate preparation as revealed by the diagnostic test should be advised to take remedial classes.

4. Other studies about factors influencing students' low achievement in engineering mathematics should be conducted wherein the researcher may not only focus on the intellectual, non-intellectual factors but also on teacher trainings and preparations, and on environmental factors as well.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS

Aquino and Rason. Educational Psychology: A Contemporary Approach. Quezon City: RM Garcia Publishing House, 1985.

Archer, Jhon and B. Lloyd. Sex and Gender. Cambridge: Cambridge University Press, 1985.

Batas, Concepcion G. Carascal, Liza C. Dimaandal, Learma M., Quintana, Violeta V. A Handbook for Subject Matter Enrichment of English, Mathematics and Science for High Schools, Learning Resource Center, College of Arts and Sciences, U.P. Los Banos, Laguna, 1994.

Bowie, Lynn. A Learning Theory Approach to Students' Misconception in Calculus, 1998.

Burke, Karen, "Math Education, Learning Styles, and the Standards: The Winning Tri-MATHLON" Creating an Enhanced Learning Environment Through Individual Convention Center, Roxas Boulevard, Pasay City: 2001.

Conte, S.D. and Boos, Carl de. Elementary Numerical Analysis; An Algorithmic Approach, 3rd Ed. N.Y., MCGraw-Hill Book Company, 1980.

Committee on Calculus, Filipino Educators Inc., Calculus: Differential and Integral, Royal Publishing House Inc., Quezon City, Philippines, 1962.

Che, Analytic Geometry, 1964.

Craig, Tracy. Factors Affecting Students' Perceptions of Difficulty in Calculus Word Problems, 2001.

Dechant, Emerald. Improving the Teaching of Reading, Prentice-Hall of India Private Limited New Delhi, 1969.

De La Fuente, Feleciano, Florentino T. and Uy, Fausto B. Elementary Differential Equations: Ref. Text. Meriam and Webster Dic., Manila Phil., 1989.

Donaldson, Krista. The Engineering Student Survival Guide, MCGraw-Hill, Boston Burr Ridge, IL Dubuque, etc., 1999.

Froe, Otis and Lee, Maurice. How to Become a Successful Student. New York: A Faucett Premier Book, Arco Publishing Company Inc., 1969.

Frankel, W. and Wallen, Norman. How to Design and Evaluate Research in Education. New York: McGraw-Hill Book Co., 1994.

Gines, Adelaida C., Dizon, Priscilla B., Fulgencio, Aurora B., Obias, Peter Howard R., Vendinel, Fortunato G. Jr., Educational Psychology, Rex Book Store, Manila Philippines, 1998.

Good, Carter V. Dictionary of Education. New York: McGraw-Hill Book Company, 1973.

Great Illustrated Dictionary, 1984.

Kern and Bland, Solid Mensuration, 2nd Edition.

Kilpatrick, J. Problem formulating: Where do Good Problems Come From? In A.H. Schoenfeld (Ed.), Cognitive Science and Mathematics Education, Hillside, NJ: Lawrence Erlbaum, 1987.

Leithold, Louis. The Calculus 7. HarperCollins College Publishers, 1996.

Love and Rainville. Differential and Integral Calculus 6th Ed. New York Collier-MacMillan International Editions, 1981.

Polya, G. How to Solve It. Princeton, NJ: Princeton University Press. (Originally Copyrighted in 1945). 1973.

Salamat. Lorina G., Sta. Maria, Antonina C. and Sevilla, Merlyn R. College Algebra: Text/WorkBook Revised Edition. National Book Store, Inc., 1995.

Samar State Polytechnic College Bulletin of Information, 2001-2002.

Schoenfeld, A.H. Mathematical Problem Solving, FL: Academic Press, Orlando: 1985.

Skinner, B.F. Educational Psychology, New York: McGraw-Hill Book Co. Inc., 1961.

Smith, Henry P. and Dechant, Emerald. "Psychology in Teaching Reading" Practice-Hall, Dic. Englewood Cliffs. N.J., 1961.

Vacca, T. Richard. Content Area Reading Little, Brown and Company, Boston Toronto, 1981.

Vance, Elbridge P. Modern College Algebra, 3rd Edition, Addison-Wesley Publishing Company, Reading Massachusette, London, Masterdam, Manila, Singapore, Tokyo, Sydney: 1983.

Webb, John. An analysis of Gender Related Differences in Performance and Attitudes of Participants in the 1997 UCT Mathematics Competition, 1998.

_____. Errors in South African Secondary School Mathematics Textbooks, 1998.

Webster Comprehensive Dictionary, 1999.

Wyle, ray C. and Barrett, Louis C. advanced Engineering Mathematics 5th Ed., McGraw-Hill Book Company, N.Y. 1982.

B. PERIODICALS

Ausubel, David P. (1976). Learning by Discovery. The Bulletin of National Association of Secondary School Principals, Volume 45, p.7.

Bank, Barbara J. et al. "Sex Rates, Classroom Instructions and reading Achievement", "Journal of Psychology Education". Vol. 72 No. 2 April 1980.

Bernstein, Margery R. "Relationship between Interest and Reading Comprehension". Journal of Educational, Dec. 1955.

Kantowski, M.G. Processes involved in Mathematical Problem Solving. Journal for Research in Mathematics Education, 1977.

National Council of Teachers of Mathematics, An agenda for action: Recommendation for school mathematics in the 1980's. reston, VA: The author, 1980.

National Council of Teachers of Mathematics, Curriculum and Evaluation standards for school mathematics. Reston, vA: The Author, 1989.

Newell, A. & Simon, H.A. "Human problem solving". Publication Englewood Cliffs, NJ: Prentice Hall, 1972.

Quinn, and Jadar"Causal Relationship/Between Attitude and Achievement Journal for Elementary Grade Mathematics and Reading". Journal of Education Research, 1987.

Schoenfeld, A.H. "Explorations of Students' Mathematical Beliefs and Behavior". Journal for Research in Mathematics Education, 1989.

Schoenfeld, A.H. and Herrmann, D. "Problem perception and knowledge structure in expert and novice mathematical problem solvers". Journal of Experimental Psychology: Learning Memory and Cognition, 1982.

Shemesh, Michael. "Gender-Related Differences in the Reasoning Skill and Learning Interest of Junior High School Students." Journal of Research in Science Teaching. Vol. 27 No. 1, 1990.

Tyrell, B.Y. "The Adequacy of Meaning as an Explanation for the Superiority of Learning by Independent Discovery." Journal of Educational Psychology, 1976.

Wilson, J.W. "Report of the Georgian Plan Problem-Solving Workshop", Publication, University of Georgia Athens: 1990.

_____. "Generality of Hemistics as an Instructional Variable. University Publication, Stanford University, San Jose, CA.: 1967.

Wilson, P.S. "Research Ideas in the Classroom": High School Publication, New York: McMillan: 1993.

C. UNPUBLISHED MATERIALS

Amporin, Jocelyn. "Predictors of Academic Achievement of First Year High School Students in St. Anthony School." Unpublished Master's Thesis, UST, 1994.

Bejar, Elvie. "Correlates of Achievement in College algebra." A Basis for Instructional Redirection. Unpublished Master's Thesis, SSPC, 2001.

Labine, Carlito. "The Computational and Problem Solving Skills in Mathematics of Special Class Freshmen Students in SNS." Unpublished Master's Thesis, SSPC, 1996.

Lariego, Ben. "Home factors Affecting DBTHS Sophomore Students Attitude Toward and Achievement in Mathematics." Unpublished Master's Thesis, UP, Diliman Q.C., 1990.

Taguba, Judith. "Non-intellective Factors Related to Academic Achievement of Freshmen Students of De La Salle University-College of Saint Benilde", Unpublished Master's Thesis, U.S.T., 1992.

Lupot, Editha. "Intellective and Non-intellective Correlates of Mathematics Entry Skills Among Engineering Freshmen at the University of Bohol." Unpublished Master's Thesis, Divine Word College, Tagbilaran City, 1998.

Pacolor, Eusebio. "Determinants of Achievement in Mathematics of Fourth Year Secondary Students in Samar Island: An Input to a Model Training Design." Unpublished Dissertation, SSPC 1993.

Sarmiento, Agnes Cenen. "Readiness of First Year Engineering Students of the University of the Assumption for College Algebra." Unpublished Master'sThesis, DLSU, Manila, 1994.

A P P E N D I C E S

Appendix A

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

August 27, 1999

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

Sir:

The following research problems/proposals are hereby submitted for appropriate action of this office; preferably for the topic number one:

1. CORRELATES OF STUDENTS' PERFORMANCE IN ENGINEERING MATHEMATICS.

2. FACTORS INFLUENCING LOW ACHIEVEMENTS IN MATHEMATICS OF ENGINEERING STUDENTS.

3. PERFORMANCE IN MATHEMATICS OF SSPC FRESHMEN ENGINEERING STUDENTS COMING FROM GENERAL AND VOCATIONAL SCHOOLS: A COMPARATIVE STUDY.

Early and favorable action on this matter will be highly appreciated.

Very truly yours,

(Sgd.) **ALVIN M. NACARIO**
Researcher

Approved:

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

Appendix B

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

APPLICATION FOR ASSIGNMENT OF ADVISER

NAME: NACARIO, (Surname) ALVIN (First Name) MABESA (Middle Name)

CANDIDATE FOR DEGREE: MASTER OF ARTS IN TEACHING

AREA OF SPECIALIZATION: MATHEMATICS

TITLE OF PROPOSED THESIS/DISSERTATION: CORRELATES OF STUDENTS' PERFORMANCE IN ENGINEERING MATHEMATICS.

(Sgd.) **ENGR. ALVIN M. NACARIO**
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

STUDENTS' PROFILE

Part 1 - Student Information

Name _____ Date _____

Course/Year Level _____ Age _____ Sex _____

School Last Attended (Public/Private) _____

Highest Educational Attainment of Father _____

Highest Educational Attainment of Mother _____

Occupation of Father _____

Occupation of Mother _____

Monthly Income of Parents _____

Part 2 - Students' Attitude Towards Mathematics

Instructions: Read each statement carefully and honestly mark all of the statements whether it describes what you feel about mathematics. Encircle the code letter that corresponds to your answer. Rate yourself on the scale. The corresponding descriptive ratings of which are shown in the scale below:

SA - Strongly Agree
A - Agree
U - Undecided
D - Disagree
SD - Strongly Disagree

ATTITUDE	SCALE				
1. I find mathematics very useful to one's life.	SA	A	U	D	SD
2. I feel I have a good foundation in mathematics.	SA	A	U	D	SD
3. Mathematics makes me feel secure and at the same time, it is stimulating.	SA	A	U	D	SD
4. Mathematics is one of the most useful subjects I know.	SA	A	U	D	SD
5. Mathematics teaches me to be accurate.	SA	A	U	D	SD
6. Mathematics is something I enjoy very much.	SA	A	U	D	SD
7. I am happier in a mathematics class than in any other classes.	SA	A	U	D	SD
8. I enjoy doing mathematical problems when I know how to work with them.	SA	A	U	D	SD
9. Mathematics is a very challenging subject.	SA	A	U	D	SD
10. I would like to spend more time in school working with math.	SA	A	U	D	SD
11. I enjoy doing mathematical exercises and assignments in my own.	SA	A	U	D	SD
12. I am able to think clearly when I am working with mathematics.	SA	A	U	D	SD
13. I feel confident and comfortable in mathematics.	SA	A	U	D	SD
14. I can work on mathematical problems for along time without losing interest.	SA	A	U	D	SD
15. Mathematics is my favorite subject.	SA	A	U	D	SD
16. I am interested in doing my mathematics homework that I sometimes have little time for my other subject.	SA	A	U	D	SD
17.I can listen to my teacher's explanations for a long time, without losing interest.	SA	A	U	D	SD
18. Formulas and concepts attract me very much.	SA	A	U	D	SD
19. I have always been interested in mathematics since I was in the elementary grades.	SA	A	U	D	SD
20. Even in high school, mathematics was my most interesting subject.	SA	A	U	D	SD

Appendix D

The following are the FIRST TIMER Sophomore Engineering Student enrolled in Differential Calculus (Math 214) for the school year 2002-2003.

INTELLECTIVE FACTORS

Respondents	MATH 214	ENTRANCE TEST	MATH 115	MATH 114	MATH 124	ENGLISH 113	ENGLISH 123
1	75	50.99	78	75	75	80	79
2	83	65.53	84	84	80	88	85
3	83	81.00	80	81	81	85	84
4	89	51.00	85	85	79	83	79
5	89	53.62	81	77	87	79	80
6	75	53.37	75	82	75	82	86
7	86	53.00	77	75	75	86	84
8	84	50.64	75	81	75	77	80
9	88	61.48	76	81	92	90	91
10	78	60.50	76	80	86	88	83
11	88	47.30	81	78	79	80	79
12	Failed	48.00	77	76	75	75	Dropped
13	83	53.75	75	76	79	79	82
14	Dropped	59.05	76	81	75	85	84
15	Dropped	53.65	78	84	80	78	77
16	Dropped	51.27	75	83	75	83	84
17	Failed	47.58	76	77	75	78	78
18	92	46.69	78	79	86	79	83
19	81	50.01	78	75	75	77	78
20	87	68.06	79	75	80	87	85
21	76	53.44	76	75	75	87	85
22	88	71.09	92	88	83	85	84
23	89	73.45	94	88	90	92	92
24	80	61.67	80	78	79	83	82
25	81	57.52	76	75	75	87	81
26	81	92.00	75	78	75	81	79
27	88	58.29	78	76	86	80	79
28	83	78.08	86	85	81	92	92
29	71	65.43	83	80	75	88	87
30	87	58.59	81	80	77	81	82
31	75	47.57	79	81	75	80	81
32	77	60.37	77	80	77	85	84
33	Failed	61.23	78	84	77	87	85
34	79	54.79	75	76	75	85	79
35	81	58.88	75	85	80	85	81
36	77	55.37	80	76	75	83	83
37	79	70.43	83	80	78	92	90
38	82	68.20	81	78	83	90	87
39	78	58.71	81	79	79	87	85

40	80	55.70	79	78	75	83	85
41	87	69.79	87	86	81	88	83
42	77	60.41	77	79	76	90	85
43	80	65.29	87	83	81	90	87
44	81	71.28	82	75	77	85	84
45	80	57.70	75	76	76	86	84
46	81	66.43	91	80	80	87	87
47	81	54.02	78	76	80	86	83
48	75	53.92	78	78	86	85	83
49	82	55.79	82	75	85	84	87
50	82	57.58	83	79	83	86	87
51	Dropped	57.36	76	75	75	81	83
52	Failed	54.31	78	76	76	89	80
53	83	56.60	76	81	79	87	84
54	77	58.69	81	82	82	82	85
55	85	66.78	88	89	86	90	90
56	82	77.65	89	89	81	89	91
57	86	75.85	92	89	89	91	91
58	83	68.26	90	87	90	91	92
59	80	60.52	83	79	77	87	85
60	79	58.44	81	78	84	85	82
61	75	67.57	85	83	79	84	89
62	Failed	57.66	79	75	78	81	81
63	Failed	59.30	75	83	75	83	83
64	Failed	65.14	79	79	75	84	86
65	Failed	50.61	75	75	75	78	
66	Failed	47.06	76	77	75	83	82
67	Failed	54.88	77	86	83	83	84
68	75	48.46	76	80	76	79	84
69	Failed	48.93	76	75	75	80	88
70	75	53.14	76	75	75	75	
71	75	52.29	80	85	86	80	82
72	Failed	47.83	76	75	75	75	80
73	79	52.92	80	82	75	85	86
74	Failed	59.70	75	83	76	85	Inc.
75	Failed	49.85	75	76	75	82	85
76	Failed	48.83	75	76	76	80	81
77	75	65.38	81	79	76	85	85
78	85	85.41	95	88	84	89	91
79	78	53.28	83	82	75	87	87
80	83	81.16	93	83	82	93	92
81	77	52.92	81	84	77	85	82

Appendix E

NON-INTELLECTIVE FACTORS

Respondents	Course	Sex	Age	Attitude Towards Mathematics	Highest Educational Attainment		Monthly Income Of Parents	H.S. Attended
					Father	Mother		
1	BSEE	M	18	4.05	CG	CL	10,000	Public
2	BSEE	M	17	4.05	CG	CG	3,000	Public
3	BSEE	M	20	3.80	EL	EL	Below 5,000	Public
4	BSEE	M	18	4.25	CL	CL	3,000+	Public
5	BSEE	M	20	4.15	HSL	HSL	3,000	Public
6	BSEE	M	20	3.40	EL	EL	1,000	Public
7	BSEE	M	18	4.70	HSG	HSG	3,000+	Public
8	BSEE	M	19	4.55	CG	CG	10,000	Public
9	BSEE	F	18	3.85	CG	CL	20,000	Public
10	BSEE	M	17	4.55	CG	CG	30,000	Private
11	BSCE	M	20	4.20		EG	5,000	Public
12	BSCE	M	19	3.65	HSG	HSG	11,000	Public
13	BSCE	M	18	3.35	HSL	HSL	10,000	Public
14	BSCE	M	17	3.55	HSG	CG	7,000	Public
15	BSCE	M	18	4.40	HSL	HSL	8,000	Public
16	BSCE	F	17	4.35	CL	CL	10,000	Public
17	BSCE	M	19	3.25	CL	CG	20,000	Public
18	BSCE	M	18	3.25	EG	EG	10,000	Public
19	BSCE	M	18	3.65	HSL	HSL	Below 2,000	Public
20	BSCE	M	17	4.00	CL	CG	10,000	Public
21	BSCE	M	20	3.70	EL	EL	1,000	Private
22	BSECE	M	18	4.65	CL	CG	5,000	Public
23	BSECE	M	17	4.50	CL	CL	7,000	Public
24	BSECE	M	18	3.55	CL	CL	2,500	Public
25	BSCoE	M	18	3.65	CG	CG	14,000	Public
26	BSCoE	M	18	3.75	HSL	CG	10,000+	Public
27	BSECE	M	18	4.70	HSL	HSL	3,000	Public
28	BSCoE	F	18	3.85	HSG	CG	14,000	Private
29	BSCoE	F	18	3.55	HSG	CG	4,000	Public
30	BSECE	M	18	5.00	EL	CG	8,000	Public
31	BSECE	M	18	3.55	CL	HSL	4,200+	Public
32	BSECE	M	17	4.65	EL	EL	5,000	Public
33	BSCoE	M	17	4.50	HSL	EL	7,000+	Public
34	BSCoE	M	18	4.25	CL	CL	7,000+	Public
35	BSCoE	M	18	4.05	HSL	CG	11,000	Public
36	BSCoE	F	18	3.75	CL	CG	10,000	Public
37	BSCoE	F	18	3.55	CG	CG	10,000+	Public
38	BSECE	F	18	3.90	EL	EL	Below 2,000	Public
39	BSECE	F	17	4.10	CG	CG	15,000	Public
40	BSECE	M	17	3.40	HSL	CL	3,000	Public

41	BSC$_O$E	M	17	4.15	HSL	EG	8,000	Private
42	BSECE	F	17	3.65	HSG	CL	15,000+	Public
43	BSECE	F	17	3.55	CG	CG	15,000	Public
44	BSC$_O$E	M	17	3.90	HSG	HSG	Below 6,000	Private
45	BSC$_O$E	M	18	3.75	CG	CG	17,000+	Public
46	BSECE	F	18	4.50	EL	CG	6,000	Private
47	BSCE	F	18	3.80	EL	HSL	3,000	Public
48	BSCE	M	17	4.00	HSL	EL	1,000+	Public
49	BSCE	M	18	4.40	HSL	EG	8,000+	Public
50	BSCE	M	18	4.45	EL	EL	8,000	Public
51	BSCE	M	18	3.65	CL	HSL	5,000	Public
52	BSCE	M	18	3.75	EL	HSL	7,000	Public
53	BSCE	M	18	4.30	CG	HSL	12,000	Public
54	BSCE	M	18	4.45	CG	CG	25,000	Private
55	BSCE	F	18	3.95	CG	CG	18,000	Public
56	BSCE	M	18	3.95	CG	CG	3,000	Public
57	BSCE	F	18	3.85	EL	HSG	1,000	Public
58	BSCE	M	17	3.75	EL	EL	1,000	Public
59	BSCE	F	18	3.75	HSL	HSL	3,000	Public
60	BSCE	F	18	3.80	HSL	HSL	2,500	Public
61	BSCE	F	18	4.25	EL	CG	1,000	Public
62	BSCE	M	18	3.75	HSL	CL	1,000+	Public
63	BSCE	M	17	4.55	CL	CG	10,000	Public
64	BSCE	M	17	4.30	CL	CG	5,000	Public
65	BSCE	M	19	3.35	EL	EL	2,500	Public
66	BSCE	F	20	4.50	EG	EG	3,000	Private
67	BSCE	F	19	4.35	EL	EL	5,000	Public
68	BSCE	M	18	3.65	EL	HSL	7,750	Public
69	BSEE	M	23	3.75	HSG	HSG	10,000	Public
70	BSCE	M	19	3.92	EG	EG	7,000	Public
71	BSCE	M	17	4.15	CL	CL	15,000	Public
72	BSCE	M	19	3.80	HSG	CG	20,000	Public
73	BSCE	M	19	3.95	HSL	HSL	1,000	Public
74	BSCE	M	19	4.35	CL	CG	10,000	Public
75	BSCE	M	20	3.70	CL	CG	10,000	Public
76	BSCE	F	18	3.35	CL	CG	10,000	Public
77	BSC$_O$E	F	18	4.50	CL	HSL	10,000	Private
78	BSC$_O$E	M	17	4.40	EL	CL	5,000+	Private
79	BSC$_O$E	M	19	4.10	HSL	HSL	10,000	Private
80	BSC$_O$E	F	18	4.55	EG	HSG	6,000	Private
81	BSC$_O$E	M	18	3.95	HSL	HSL	3,000	Public

Appendix F

Mean Scores and Computed r Students' Attitude Towards Mathematics (Validation of the Instrument)

	1st test (X)	2nd test (y)	X^2	Y^2	Xy
1	4.55	4.15	20.70	17.22	18.88
2	3.60	3.85	12.96	14.82	16.86
3	3.50	3.65	12.25	13.32	12.78
4	3.50	4.25	12.25	18.06	14.88
5	4.85	4.45	23.52	19.80	21.58
6	4.30	4.10	18.49	16.81	17.63
7	4.15	4.60	17.22	21.16	19.09
8	4.00	4.25	16.00	18.06	17.00
9	4.40	4.30	19.36	18.49	18.92
10	4.70	4.70	22.09	22.09	22.09
11	4.60	4.55	21.16	20.70	20.93
12	3.90	4.15	15.21	17.22	16.18
13	4.00	4.00	16.00	16.00	16.00
14	4.05	4.00	16.40	16.00	16.20
15	3.80	4.55	16.44	20.70	17.29
16	4.35	4.45	18.92	19.80	19.36
17	3.70	3.45	13.69	11.90	12.76
18	3.80	4.10	14.44	16.81	15.58
19	4.50	3.70	20.25	13.69	16.65
20	3.70	3.50	13.69	12.25	12.95
21	3.40	3.60	11.56	12.96	12.24
22	3.95	4.20	15.60	17.64	16.59
23	3.95	3.95	15.60	15.60	15.60
24	3.55	3.70	12.60	13.69	13.14
25	5.00	5.00	25.00	25.00	25.00
26	3.55	3.65	12.60	13.32	12.96
27	3.60	3.65	12.96	13.32	13.14
	$\sum X=108.95$	$\sum Y=110.50$	$\sum X =444.96$	$\sum Y =456.43$	$\sum XY=449.28$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$r_{xy} = \frac{27\ (449.28) - (108.95)\ (110.5)}{\sqrt{[27\ (449.96) - (108.95)^2]\ [27\ (456.43) - (110.5)^2]}}$$

$$= \frac{91.585}{\sqrt{(143.82)\ (1123.36)}}$$

$$= \frac{91.585}{\sqrt{127.685}}$$

$$= 0.72$$

Appendix G

GRADES FOR THE LAST THREE (3) SCHOOL YEARS MENTIONED ON DECLINING PERCENTAGE OF PASSERS IN THE SUBJECT MATH 214

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

SUMMARY OF ENROLMENT
1st Semester, SY 2002-2003

		MALE	FEMALE	TOTAL
DOCTORAL PROGRAM:				
Ph.D. - Educational Management		10	16	26
MASTERAL PROGRAM:		M	E	I
M.A.Ed. - Administration & Supervision		3	8	11
Educational Management		9	19	28
Master in Public Management (M.P.M.)		22	31	53
M.A. - English		1	4	5
Filipino		0	9	9
Guidance & Counseling		1	9	10
Home Economics		0	9	9
Physical Education		4	11	15
Reading		0	1	1
M.A. Elementary Education (M.A.E.Ed.)		3	12	15
M.A.T. - Chemistry		4	13	17
Mathematics		9	11	20
M.T.E. - Civil Technology		1	0	1
Sub-Total.		57	137	194
BACHELOR OF SCIENCE IN CIVIL ENGINEERING (B.S.C.E.):				
First Year		48	34	82
Second Year		58	28	86
Third Year		41	26	67
Fourth Year		24	15	39
Fifth Year		20	13	33
SUB-TOTAL. . . .		191	116	307
BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (B.S.E.E.):				
First Year		36	1	37
Second Year		22	2	24
Third Year		22	0	22
Fourth Year		16	1	17
Fifth Year		10	1	11
SUB-TOTAL. . . .		106	5	111
B.S. IN ELECTRONICS & COMMUNICATION ENGINEERING (B.S.E.C.E.):				
First Year		17	5	22
Second Year		18	11	29
SUB-TOTAL. . . .		35	16	51
I. **BACHELOR OF SCIENCE IN COMPUTER ENGINEERING (B.S.Co.Eng.):**				
First Year		16	30	46
Second Year		30	29	59
SUB-TOTAL. . . .		46	59	105

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
1st *Semester*, SY 2002 - 2003

BSEE - II
Course/Year & Section

MATH 214	Differential Calculus	5	ALVIN M. NACARIO
Subject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
1		3.0	Passed
		2.5	Passed
5		1.6	Passed
		2.5	Passed
3		2.2	Passed
2		2.2	Passed
		2.0	Passed
8		2.1	Passed
		3.0	Passed
			INC.
7		1.9	Passed
		5.0	Failed
		5.0	Failed
6		3.0	Passed
		2.3	Passed
4		1.6	Passed
		5.0	Failed
10		2.7	Passed
9		1.7	Passed

Note: This form should be submitted at least one (1) week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. ALVIN M. NACARIO
Professor/Instructor

Checked and Found Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice President for Academic Affairs

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
1st *Semester*, SY 2002 - 2003

BSCE - 2A
Course/Year & Section

Math 214	Differential Calculus	4	Ronald L. Orale
Subject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
63	3.3	-	Conditional
64	3.6	-	Conditional
47	2.5	2.4	Passed
49	2.2	2.3	Passed
70	3.3	-	Conditional
76	-	5.0	FAILED
	-	-	Dropped
62	2.9	-	Conditional
66	3.1	-	Conditional
73	2.8	2.6	Passed
69	-	5.0	FAILED
71	3.3	-	Conditional
65	-	5.0	FAILED
61	2.6	-	Conditional
75	-	5.0	FAILED
	3.2	2.8	Passed
55	1.9	2.0	Passed
72	-	5.0	FAILED
74	-	5.0	FAILED
	2.8	2.7	Passed
58	1.9	2.2	Passed
68	3.2	-	Conditional
50	1.9	2.3	Passed
56	2.2	2.3	Passed
60	2.9	2.6	Passed
53	2.1	2.2	Passed
	-	5.0	FAILED
57	1.8	1.9	Passed
51	-	5.0	FAILED
59	2.5	2.5	Passed

Note: This form should be submitted at least one (1) week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. RONALD L. ORALE
Professor/Instructor

Checked and Found Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
1st *Semester*, SY 2002 - 2003

BSCE - 2A
Course/Year & Section

Math 214	Differential Calculus	4	Ronald L. Orale
Subject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
	-	5.0	FAILED
48	3.2	-	Conditional
67	-	5.0	FAILED
52	3.0	-	Conditional
54	3.3	2.8	Passed

Note: This form should be submitted at least one (1) week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. RONALD L. ORALE
Professor/Instructor

Checked and Found Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
FIRST *Semester*, SY 2002 - 2003

BSCE - 2B
Course/Year & Section

ıth 214	DIFFERENTIAL CALCULUS	4	Engr. B. Bermejo
Subject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
	DROPPED		
18	-	1.3	Passed
	-	5.0	FAILED
15	DROPPED		
	DROPPED		
12	-	5.0	FAILED
	-	2.8	Passed
	-	2.8	Passed
	-	1.8	
14	DROPPED		
	-	2.9	Passed
20	-	1.8	Passed
	INCOMPLETE		
	-	1.7	Passed
	-	2.5	Passed
	-	2.6	Passed
	-	1.9	Passed
19	-	2.4	Passed
11	-	1.7	Passed
	DROPPED		
	-	1.6	Passed
	-	1.5	Passed
	DROPPED		
	DROPPED		
	-	5.0	FAILED
13	-	2.2	Passed
	-	2.0	Passed
	DROPPED		
	DROPPED		
	-	1.3	Passed

e: This form should be submitted at least one (1) week
r the Midterm/Final Exam in three (3) copies.

Submitted by:

(SGD.) ENGR. BENJIELITO M. BERMEJO
Professor/Instructor

rified Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

ceived by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice President for Academic Affairs

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
FIRST *Semester*, SY 2002 - 2003

BSCE - 2B
Course/Year & Section

ath 214	DIFFERENTIAL CALCULUS	4	Engr. B. Bermejo
bject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
	-	5.0	FAILED
	-	1.4	Passed
	D R O P P E D		
	-	1.8	Passed
	D R O P P E D		
	-	1.4	Passed
16	D R O P P E D		
17	-	5.0	FAILED
	-	2.0	Passed
	-	5.0	FAILED
	****	****	*******

te: *This form should be submitted at least one (1) week*
er the Midterm/Final Exam in three (3) copies.

Submitted by:

(SGD.) ENGR. BENJIELITO M. BERMEJO
Professor/Instructor

rified Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

ceived by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
FIRST *Semester*, SY 2002 - 2003

ENGINEERING (ECE & CoE)
Course/Year & Section

h 214	DIFFERENTIAL CALCULUS	4	Engr. R. Novilla
ect Code	*Descriptive Title*	*Units*	*Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
78	1.9	2.0	Passed
79	2.8	2.7	Passed
	3.3	INCOMPLETE	
81	2.7	2.8	Passed
80	2.0	2.2	Passed
77	3.2	INCOMPLETE	
	****	****	******

ote: This form should be submitted at least one (1) week fter the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. RENE B. NOVILLA
Professor/Instructor

erified Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

Approved:

Received by:

ERLINDA U. BABALCON

SIMON P. BABALCON, Jr., Ph.D.
Vice President for Academic Affairs

Samar State Polytechnic College
COLLEGE OF ENGINEERING
Catbalogan, Samar

GRADING SHEET
FIRST *Semester*, SY 2002 - 2003

ENGINEERING (ECE & COE)
Course/Year & Section

h 214 | **DIFFERENTIAL CALCULUS** | **4** | **Engr. R. Novilla**
ct Code | *Descriptive Title* | *Units* | *Professor/Instructor*

Respondent	MIDTERM	FINAL	REMARKS
43	2.0	2.5	Passed
25	2.5	2.4	Passed
41	2.1	1.8	Passed
26	2.5	2.4	Passed
46	2.0	2.4	Passed
32	2.9	2.8	Passed
36	2.7	2.8	Passed
39	2.5	2.7	Passed
42	2.7	2.8	Passed
34	2.4	2.6	Passed
44	2.0	2.4	Passed
33	3.1	INCOMPLETE	
21	3.0	2.9	Passed
30	2.0	1.8	Passed
24	2.4	2.5	Passed
	2.4	2.7	Passed
	3.0	2.8	Passed
37	2.6	2.6	Passed
31	3.2	INCOMPLETE	
28	2.0	2.2	Passed
27	2.0	1.7	Passed
45	2.4	2.5	Passed
23	2.0	1.6	Passed
40	2.4	2.5	Passed
35	2.4	2.4	Passed
29	3.1	2.8	Passed
38	2.0	2.3	Passed
22	1.9	1.7	Passed
	****	*****	********

te: This form should be submitted at least one (1) week
r the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. RENE B. NOVILLA
Professor/Instructor

rified Correct:

ENGR. MA. LOURDES P. AMANTE
Dean, College of Engineering

ceived by:

Approved:

ERLINDA U. BABALCON

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

SUMMARY OF ENROLMENT
1st Semester, SY 2001-2002

	MALE	FEMALE		TOTAL
DOCTORAL PROGRAM:				
Ph.D. - Educational Management	18	17		35
MASTERAL PROGRAM:				
M.A.Ed. - Administration & Supervision	14	14	28	
Master in Public Management (M.P.M.)	27	32	59	
M.A. - English	3	4	7	
Filipino	2	11	13	
Guidance & Counseling	1	8	9	
Home Economics	0	14	14	
Language	0	1	1	
Physical Education	6	18	24	
M.A. Elementary Education (M.A.E.Ed.)	1	11	12	
M.A.T. - Chemistry	1	11	12	
Mathematics	10	8	18	
Physics	0	2	2	
M.T.E. - Automotive Technology	1	0	1	
Civil Technology	1	0	1	
Electronics Technology	1	0	1	
Mechanical Technology	1	0	1	
Sub-Total.	69	134		203
BACHELOR OF SCIENCE IN CIVIL ENGINEERING (B.S.C.E.):				
First Year	58	29	87	
Second Year	49	37	86	
Third Year	29	23	52	
Fourth Year	26	12	38	
Fifth Year	32	18	50	
SUB-TOTAL.	194	119		313
BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (B.S.E.E.):				
First Year	43	2	45	
Second Year	23	1	24	
Third Year	20	0	20	
Fourth Year	9	1	10	
Fifth Year	19	1	20	
SUB-TOTAL.	114	5		119
B.S. IN ELECTRONICS & COMMUNICATION ENGINEERING (B.S.E.C.E.):				
First Year	21	14		35
BACHELOR OF SCIENCE IN COMPUTER ENGINEERING (B.S.Co.Eng.):				
First Year	29	40		69
BACHELOR OF SCIENCE IN INDUSTRIAL EDUCATION (B.S.I.E.):				
First Year : Home Economics	0	20	20	
Industrial Arts	6	0	6	
SUB-TOTAL.	6	20		26

SAMAR STATE POLYTECHNIC COLLEGE

GRADING SHEET
FIRST Semester SY 2001 - 2002

ENGINEERING 2-A
Curriculum/Course

Math 214	DIFFERENTIAL CALCULUS	5	Engr. Lister Labuac
Subject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

	MIDTERM	FINAL	REMARKS
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
	-	2.0	Passed
		DROPPED	
	-	2.8	Passed
	-	2.1	Passed
		DROPPED	
	-	2.4	Passed
		DROPPED	
		DROPPED	
		DROPPED	
	-	2.3	Passed
		DROPPED	
	-	2.3	Passed
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
		DROPPED	
	-	1.0	Passed
	-	2.6	Passed
	-	2.8	Passed
		DROPPED	
*****		**********	

Note: This form should be submitted ate least one (1)week after the Mid'term/Final Exam in three (3)copies.

Submitted by:

ENGR. LISTER P. LABUAC
Professor/Instructor

Checked and Found Correct:

ENGR. RODRIGO G. ESTRADA
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

GRADING SHEET
FIRST Semester, SY 2001 - 2002

ENGINEERING 2-B
Curriculum/Course

Math 214 *Subject Code* | **DIFFERENTIAL CALCULUS** *Descriptive Title* | **5** *Units* | **Engr. Lister Labuac** *Professor/Instructor*

	MIDTERM	FINAL	REMARKS
	DROPPED		
	DROPPED		
	-	1.7	Passed
	-	2.0	Passed
	DROPPED		
	DROPPED		
	DROPPED		
	-	2.8	Passed
	-	2.5	Passed
	DROPPED		
	DROPPED		
	DROPPED		
	DROPPED		
	DROPPED		
	DROPPED		
	DROPPED		
	DROPPED		
	-	2.2	Passed
	-	2.4	Passed
	DROPPED		
	DROPPED		
	DROPPED		
	-	2.8	Passed
	-	2.8	Passed
	DROPPED		
	-	2.4	Passed
	DROPPED		
	DROPPED		
	DROPPED		
	DROPPED		

Note: This form should be submitted ate least one (1) week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. LISTER P. LABUAC
Professor/Instructor

Checked and Found Correct:

ENGR. RODRIGO G. ESTRADA
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

GRADING SHEET
FIRST *Semester*, SY 2001 - 2002

ENGINEERING 2-B
Curriculum/Course

Math 214	DIFFERENTIAL CALCULUS	5	Engr. Lister Labuac
Subject Code	*Descriptive Title*	*Units*	*Professor/Instructor*

	MIDTERM	FINAL	REMARKS
		D R O P P E D	
		D R O P P E D	
		D R O P P E D	
	-	2.0	Passed
		**********	

Note: This form should be submitted ate least one (1)week after the Midterm/Final Exam in three (3)copies.

Submitted by:

ENGR. LISTER P. LABUAC
Professor/Instructor

Checked and Found Correct:

ENGR. RODRIGO G. ESTRADA
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

FIRST Semester, SY 2001 - 2002

ENGINEERING 2-C
Curriculum/Course

Math 214 (Subject Code) | DIFFERENTIAL CALCULUS (Descriptive Title) | 5 (Units) | Engr. Lister Labuac (Professor/Instructor)

MIDTERM	FINAL	REMARKS
	DROPPED	
	DROPPED	
-	2.2	Passed
	DROPPED	
-	2.2	Passed
-	3.0	Passed
	DROPPED	
-	3.0	Passed
-	2.6	Passed
-	1.9	Passed
	DROPPED	
	DROPPED	
	DROPPED	
-	2.7	Passed
-	2.8	Passed
	DROPPED	
-	2.7	Passed
	DROPPED	
-	3.0	Passed
-	3.0	Passed
-	2.2	Passed
-	2.4	Passed
	**********	

Note: This form should be submitted ate least one (1) week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. LISTER P. LABUAC
Professor/Instructor

Checked and Found Correct:

ENGR. RODRIGO G. ESTRADA
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.
Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

Catbalogan, samar

GRADING SHEET 2000-2001

1st Semester, SY 19 00 - 19 01

ENGINEERING CE & EE

Curriculum/Course

MATH 214 – II-A | DIFFERENTIAL CALCULUS | 4 | ALVIN M. NACARIO

Subject Code | Descriptive Title | Units | Professor/Instructor

Mid-Term	Finals	Remarks
	2.8	Passed
	2.6	Passed
	5.0	Failed
	2.5	Passed
	5.0	Failed
	2.7	Passed
	2.9	Passed
	2.8	Passed
	5.0	Failed
	2.0	Passed
	2.9	Passed
	2.1	Passed
	5.0	Failed
	5.0	Failed
	2.2	Passed
	3.0	Passed
	5.0	Failed
	5.0	Failed
	2.3	Passed
	2.7	Passed
	5.0	Failed
	5.0	Failed
	2.8	Passed
	5.0	Failed
	2.9	Passed
	3.0	Passed
	INC.	INCOMPLETE
	5.0	Failed
	2.8	Passed
	5.0	Failed

Note: This form should be submitted at least one week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. ALVIN M. NACARIO

Professor/Instructor

Checked and Found Correct:

ENGR. RODRIGO G. ESTRADA

Dean, College of Engineering

Approved:

Received by:

ERLINDA U. BABALCON

Registrar

SIMON P. BABALCON, Jr., Ph.D.

Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

Catbalogan, samar

GRADING SHEET 2000-2001

1st Semester, SY 19 00 - 19 01

ENGINEERING EE & CE

Curriculum/Course

MATH 214 II-A DIFFERENTIAL CALCULUS 4 ALVIN M. NACARIO

Subject Code | Descriptive Title | Units | Professor / Instructor

	Mid-Term	Finals	Remarks
		1.5	Passed
		5.0	Failed
		2.6	Passed
		2.6	Passed
		1.8	Passed
	X X X	X X	X X

Note: This form should be submitted at least one week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. ALVIN M. NACARIO

Professor/Instructor

CHECKED & FOUND CORRECT:

ENGR. RODRIGO G. ESTRADA

Dean, College of Engineering

Received by:

ERLINDA U. BABALCON

Registrar

Approved:

SIMON P. BABALCON Jr. Ph.D.

Vice President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

Catbalogan, samar

GRADING SHEET 2000-2001

1st Semester, SY 19[illegible] - 19[illegible]

ENGINEERING EE & CE

Curriculum/Course

MATH 214 II-B | DIFFERENTIAL CALCULUS | 4 | ALVIN M. NACARIO

Subject Code | Descriptive Title | Units | Professor/Instructor

	Mid-Term	Finals	Remarks
		2.6	Passed
		2.5	Passed
		5.0	Failed
		2.5	Passed
		2.6	Passed
		5.0	Failed
		1.7	Passed
		1.6	Passed
		2.3	Passed
		2.6	Passed
		1.5	Passed
		5.0	Failed
		5.0	Failed
		5.0	Failed
		5.0	Failed
		2.4	Passed
		2.1	Passed
		2.7	Passed
		5.0	Failed
		5.0	Failed
		1.5	Passed
		2.7	Passed
		1.6	Passed
		3.0	Passed
		3.0	Passed

Note: *This form should be submitted at least one week after The Mid-term/Final Exam in three (3) copies*

Submitted by:

ENGR. ALVIN M. NACARIO

Professor/Instructor

CHECKED AND FOUND CORRECT:

ENGR. RODRIGO G. ESTRADA

Dean, College of Engineering

Received by:

ERLINDA U. BABALCON

Registrar

Approved:

SIMON P. BABALCON, Jr. Ph.D.

Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

Catbalogan, samar

GRADING SHEET 2000-2001

1st Semester, SY 19 21A- 19 2811

ENGINEERING EE & CE

Curriculum/Course

MATH 214 11-C | DIFFERENTIAL CALCULUS | 4 | ALVIN M. MACHADO

Subject Code | Descriptive Title | Units | Professor / Instructor

Mid-Term	Finals	Remarks
	3.0	Passed
	5.0	Failed
	5.0	Failed
	5.0	Failed
	5.0	Failed
	2.1	Passed
	3.0	Passed
	5.0	Failed
	2.9	Passed
	5.0	Failed
	5.0	Failed
	3.0	Passed
	5.0	Failed
	3.0	Passed
	5.0	Failed
	5.0	Failed
	5.0	Failed
	5.0	Failed
	3.0	Passed
	5.0	Failed
	2.8	Passed
	2.9	Passed
	3.0	Passed
	5.0	Failed
	2.9	Passed
	5.0	Failed
	2.6	Passed
	2.8	Passed
	5.0	Failed
	5.0	Failed

This form should be submitted at least one week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. ALVIN M. MACHADO

Professor/Instructor

CKED & FOUND CORRECT:

ENGR. RODRIGO G. ESTRADA

Dean, College of Engineering

ed by:

ERLINDA U. BABALCON

Registrar

Approved:

SIMON P. BABALCON, Jr., Ph.D.

Vice President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

Catbalogan, samar

GRADING SHEET 2000-2001

1st Semester, SY 19~~99~~ - 19~~99~~

ENGINEERING EE & CE

Curriculum/Course

MATH 214 II-C | DIFFERENTIAL CALCULUS | 4 | ALVIN M. NACARIO

Subject Code | Descriptive Title | Units | Professor/Instructor

	Mid-Term	Final	Remarks
		3.0	Passed
		2.8	Passed
		DROPPED	Dropped
		2.8	Passed
		DROPPED	Dropped
		5.0	Failed
		DROPPED	Dropped
		DROPPED	Dropped
	X X	X	X X X

Note: This form should be submitted at least one week after the Midterm/Final Exam in three (3) copies.

Submitted by:

ENGR. ALVIN M. NACARIO

Professor/Instructor

CHECKED & FOUND CORRECT:

ENGR. RODRIGO G. ESTRADA

Dean, College of Engineering

Approved:

Received by:

ERLINDA U. BABALCON

Registrar

SIMON P. BABALCON, Jr., Ph.D.

Vice-President for Academic Affairs

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

SUMMARY OF ENROLMENT
1st Semester, SY 1999-2000

		MALE	FEMALE	TOTAL
I.	**BACHELOR OF SCIENCE IN CIVIL ENGINEERING (B.S.C.E.):**			
	First Year	47	35	82
	Second Year	34	24	58 (58)
	Third Year	44	27	71
	Fourth Year	43	18	61
	Fifth Year	14	13	27
	SUB-TOTAL	**182**	**117**	**299**
II.	**BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (B.S.E.E.):**			
	First Year	28	0	28
	Second Year	23	0	(23)
	Third Year	20	0	20
	Fourth Year	11	0	11
	Fifth Year	10	0	10
	SUB-TOTAL	**92**	**0**	**92**
III.	**BACHELOR OF SCIENCE IN INDUSTRIAL EDUCATION (B.S.I.E.):**			
	First Year - Home Economics	0	35	35
	Industrial Arts	7	0	7
	SUB-TOTAL	**7**	**35**	**42**
	Second Year - Home Economics	0	27	27
	Industrial Arts	5	0	5
	SUB-TOTAL	**5**	**27**	**32**
	Third Year - Home Economics	0	26	26
	Industrial Arts	7	0	7
	SUB-TOTAL	**7**	**26**	**33**
	Fourth Year - Home Economics	1	27	28
	Industrial Arts	6	0	6
	SUB-TOTAL	**7**	**27**	**34**
IV.	**BACHELOR OF SECONDARY EDUCATION (B.S.E.):**			
	First Year - Chemistry	6	7	13
	Mathematics	8	22	30
	Physics	5	22	27
	Physical Education	14	41	55
	Tech & Home Economics	1	44	45
	SUB-TOTAL	**34**	**136**	**170**

SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

GRADING SHEET
First Semester, SY 1999 to 2000

ENGINEERING CE
Course

Math 214 (Subject Code) | Differential Calculus (Descriptive Title) | 4 (Units) | Engr. Felisa E. Gomba (Professor)

	Mid-term	Finals	Remarks
	4.0	Inc	
	4.0	Inc	3.0 completed 2/23/2k
	4.0	3.0	
	3.5	3.0	
	3.2	2.7	
	4.0	Inc	3.0 completed 3/28/2k
	4.0	3.0	
	3.2	2.9	
	4.0	Inc	
	4.0	Inc	
	4.0	Inc	
	3.0	2.0	
	4.0	Inc	
	4.0	Inc	
	4.0	Inc	
	2.6	2.0	
	3.5	Inc	2.9 completed Feb/2k
	4.0	Inc	3.0 completed 2/22/2k
	4.0	Inc	
	3.0	2.0	
	4.0	Inc	
	4.0	inc	
	xxxxxxxxx	xxxxxxxxx	xxxxxxxx

Note: *This form should be submitted at least one week after The Mid-term/Final Exam in three (3) copies*

Submitted by:

Engr. Felisa E. Gomba
Professor

CHECKED AND FOUND CORRECT:

ENGR. RODRIGO G. ESTRADA
Dean, College of Engineering

Received by:

ERLINDA U. BABALCON
Registrar

Approved:

SIMON P. BABALCON, Jr. Ph.D.
Vice-President for Academic Affairs

SAMAR STATE POLYTECHNIC COLLEGE

Catbalogan, samar

GRADING SHEET

1ST Semester, SY 1999 - 2000

ELECTRICAL ENGINEERING

Curriculum/Course

MATH 214 | DIFF. CALCULUS | 4 | ENGR. E. FRINCILLO

Subject Code | Descriptive Title | Units | Professor/Instructor

Mid-Term	Finals	Remarks
2.6	2.5	
2.5	2.0	
2.5	2.5	
2.9	3.0	
2.6	2.5	
2.8	2.0	
3.0	3.0	
2.0	1.7	
2.0	2.1	
2.6	2.5	
2.5	2.5	
3.0	3.0	
3.0	2.8	
1.8	1.5	
2.0	2.0	
2.3	2.5	
2.6	2.5	
2.4	2.6	
2.6	2.5	
3.0	3.0	
2.5	2.0	
XXX	XXX	XXX

Note: This form should be submitted at least one week after the Midterm/Final Exam in three (3) copies.

Submitted by:

Professor/Instructor

CHECKED & FOUND CORRECT:

ENGR. RODRIGO G. ESTRADA
Dean, College of Engineering

Approved:

Received by:

ERLINDA U. BABALCON
Registrar

SIMON P. BABALCON, Jr. Ph.D.
Vice President for Academic Affairs

CURRICULUM VITAE

CURRICULUM VITAE

Name	:	**ALVIN M. NACARIO**
Academic Rank	:	Instructor II
Home Address	:	Catbalogan, Samar
Civil Status	:	Married
Birthday	:	July 6, 1971
Wife	:	Ma. Edna Ramos Nacario
Children	:	Mary Diehl Lorraine Alvin Reinzi Alvin Kent Ande

Educational Background

Elementary	:	Catbalogan III Central Elementary School March 1984
Secondary	:	Samar State Polytechnic College March 1988
College	:	Samar State Polytechnic College March 1993 Electrical Engineering
Graduate	:	On Process MAT - Mathematics

Civil Service Eligibility

Registered electrical Engineering Board Examination

Work Experience

Electrical engineering Instructor
August 1995 to date

Chairman, electrical engineering Department
October 1999 to date

Scholarship Grants

SSPC Staff Development
Samar State Polytechnic College
Catbalogan, Samar

Massive Upgrading Program for Teachers-
(Mathematics)
Commission on Higher Education CHED

Seminars Attended

Small-Scale Natural Energy for
Hydroelectric and Geothermal
Power Technology
May 8-10, 2002

The Philippine Association for
Technological Education
(PATE) Inc.
April 26-28, 2001

1st National Consultative Meeting of the
Board of Electrical Engineering with
The IIEE, CHED, and the Academe
July 20-21, 2000

Membership Organization

Philippine Institute of Integrated
Electrical Engineer

Delta Epsilon
Society of Would-be Engineers
SSPC Chapter

LIST OF TABLES

Tables Pages

LIST OF FIGURES