INFORMATION TO USERS

The most advanced technology has been used to photograph and reproduce this manuscript from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

U·M·I

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700 800/521-0600

Order Number 9025433

A study of the impact of enrollment in a computer science class on mathematics scores and attendance in a secondary school

Lei, Tony Tung-tien, Ed.D.

Pepperdine University, 1990

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

A STUDY OF THE IMPACT OF ENROLLMENT IN A COMPUTER SCIENCE CLASS ON MATHEMATICS SCORES AND ATTENDANCE IN A SECONDARY SCHOOL

A Dissertation

Presented to

the Faculty of the Graduate School of Education

and Psychology

Pepperdine University

In partial Fulfillment

of the Requirements for the Degree

Doctor of Education

---

by

Tony Tung-tien Lei

December 1989

This dissertation, written by

Tony Tung-tien Lei

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

Date 1/9/90

Faculty Committee

Chairperson

Arthur L. Adams

John A. Chandler

Dean

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGMENTS

The researcher wishes to acknowledge apprciation to those who provided the support and cooperation which made this study possible.

A special acknowledgment is given to Dr. Roy Adamson, the chairperson of this dissertation committee, whose personal advice, encouragement, and competence sustained the researcher throughout the development and completion of this study.

Special appreciation is given to Dr. John Chandler and Dr. Arthur Adams, without whose support and encouragement this dissertation might not have been completed.

Thanks to Dr. Michael Botsford at Agoura High School who provided the materials and experiences which were very important to this study.

Appreciation is extended to my wife, Judy, and my sons, John and Mike, for their understanding, which enabled me to complete this study.

VITA

Tony Tung-Tien Lei

EDUCATION

1969	M.B.A., Pepperdine University Los Angeles, California
1959	B.A. (Economics) Tunghai University Taiwan

PUBLICATIONS

Management Information Systems, Taipei: Sung Kang C.B. Company, 1987

"Computer Education, Organizational Changes, and Principal's Decision Making," Proceedings of IMC's 1985 Asia-Pacific Regional Information & Micrographic Management Congress, (July 11-13, 1985), pp. 371-440.

Business Management, (Taipei: Great China Publishing Corp., 1984

PROFESSIONAL MEMBERSHIP

Spl. Director, China Information Education Association Taipei

Director, Taipei Marketing Research Association, Taipei

PROFESSIONAL EXPERIENCE

February 1985 to present	Associate Professor, Graduate School of Business Administration, National Chung Hsing University, Taipei
1974-1983	Instructor, Department of Business Administration, National Chengchi University, Taipei
1970-1973	Investigator, CIECD, Taipei Part-time Instructor, National Taiwan University, Taipei
1966-1969	Manager, China Petroleum Corporation, Taipei
1960-1966	Officer, Changhwa Commercial Bank, Taipei
1960-1963	Teacher, Taichung Commercial High School Taichung

HONORS

1970	Fellow, United Nations Asian Institute, Bangkok

ABSTRACT OF THE DISSERTATION

A STUDY OF THE IMPACT OF ENROLLMENT IN A COMPUTER SCIENCE CLASS ON MATHEMATICS SCORES AND ATTENDANCE IN A SECONDARY SCHOOL

BY

TONY TUNG-TIEN LEI

DOCTOR OF EDUCATION IN INSTITUTIONAL MANAGEMENT

THE GRADUATE SCHOOL OF EDUCATION

AND PSYCHOLOGY

PEPPERDINE UNIVERSITY, 1989

ROY ADAMSON, ED.D., CHAIRPERSON

STATEMENT OF THE PROBLEM

There has been a deterioration in attendance and of mathematics test scores among many of the secondary schools in America. Enrollment in a computer science class has recently been focused upon as one of the possible solutions to increasing the attendance and mathematics scores in large urban areas. This study attempted to determine whether those students at a secondary school who had participated in a specific computer science class would show greater mathematics scores at the end of the school year and greater actual attendance in school than those who had not participated.

PROCEDURES

The purpose of this study was to determine whether those students at Agoura High School in the Las Virgenes Unified School District in California who participated in a computer science class during the 1984-85 school year showed greater growth in mathematics scores as measured by standardized test scores than a similar group of students who did not participate, and to determine whether the first group of students showed more actual days of attendance in school than the second group of students.

The population of this project included 347 (eleventh grade) students from the school. The sample consisted of forty-three students enrolled in only one computer science class and another forty-three students not enrolled in a computer science class.

A pretest and posttest with the comprehensive Tests of Basic Skills (CTBS) was used for the purpose of comparing the two groups. Number Cruncher Statistical System (NCSS) was utilized to generate statistics and tables. ANOVA, ANCOVA, and t-tests were used for statistical analysis.

FINDINGS

The data supported the hypothesis that there was a relationship between the enrollment in a computer science class and the posttest mathematics scores using days of attendance and pretest mathematics scores as covariates. The data also supported the premise that there was no relationship between the enrollment in a computer science class and the actual days of attendance. On mathematics posttest scores for the comparing of the two groups, an F-ratio of 8.44 was obtained. The significance level of the F-ratio was .0047. The research hypothesis that the enrolled group would surpass the nonenrolled group on posttest mathematics scores was supported by the above data. This was the critical test result. This study revealed that students enrolled in a computer science class had higher posttest scores in mathematics than those who did not enroll. It revealed also that there was no significant difference in attendance in school between the first group of students and the second group of students.

CHAPTER I

INTRODUCTION

Background of the Problem

As Bchl stated in her book, Information Processing,

> [this book] does present an up-to-date survey of electronic data processing, of computer hardware and software systems in use today, and of current developments that are laying a base for further advancements.[1]

She believes that at the present time every person is a potential user of computers. She also believes that society's information explosion has spawned explosive growth in the requirements for effecient and effective information handling. This fact has, in turn, accelerated the development and application of technologies to automate data-processing functions. Therefore, the use of computer technology in education has become a trend in public schools as well as in business.[2]

Some of the goals facing secondary schools are: (1) the improvement of achievement scores, and (2) the attendance in school by students. History is filled with accounts of eminent men and women, unquestionably gifted, who did not achieve very well during certain periods of their school careers. At least they did not learn what their teachers tried to teach them. Albert Einstein, President Franklin Roosevelt, and

Sir Winston Churchill are examples of men who at times appeared to be unmotivated to learn what their schools offered and made "Cs" on their grade reports.[3] According to Time Magazine, absenteeism is one of the major discipline problems of the late 1970s.[4] In one school the daily absence rate is 17 percent; in another, 25 percent are reported to miss at least one class period a day.[5]

For hundreds of years, the role of education has been a top priority to the people in American society. Therefore, great emphasis has been placed on the total educational process. Education has always been considered the solution to many problems. Hilda Taba stated that:

> Historically the American people have assumed that education has the power to reduce poverty and distress, to prevent child delinquency and crime and to promote the well-being of the individual, the intelligent use of suffrage, and the welfare and stability of the state.[6]

Despite this belief in the educational system, many crises do exist in the classrooms today. Recent research findings in the field of education have found that a large percentage of low-achieving students do attend public schools. Owing to these findings, many old and new methods, programs and techniques are undergoing experimentation.[7]

Mandatory enrollment in computer science classes has recently been focused upon as one of the possible solutions to increasing the attendance of low-achieving students in many large urban centers.[8]

Earle pointed out that "black children get short changed in their search for an education . . . the average ghetto school is a failure factory, and more frequently than not, depresses motivation and destroys morale."[9]

Following a review of the literature, this researcher concluded that many researchers, administrators and microcomputer software manufacturers believe that involving these underachievers in computer science class with hands-on drills, practice, and immediate feedback from Cathode Ray Tube (CRT) may possibly become an alternative to poor attendance and may alter their academic achievement scores.

> Thelen maintains that whenever student tutoring is tried, educators say it works. He enumerates the benefits to participants which were increased in academic skills, more positive attitudes, and improved personal adjustment.[10]

The National Commission on Resources for Youth reported:

> Underachievers, in particular, take to tutoring, whereas the demands of regular school days ovewhelm them to the point of accepting defeat; the intimacy and the feeling of genuine worth that comes from tutoring a child open the ways for real achievement.[11]

If microcomputers are considered to be a tool for learning, as seen by many minority schools with a high percentage of low achievers, then voluntary or mandatory enrollment in a computer science class may be an answer to stem the tide of poor attendance records and low achievement scores in mathematics among many of the senior high schools in our large urban centers.[12]

> Garfield High is a predominantly Latino school in the heart of East Los Angeles. The enthusiasm that computers have triggered among its students is encouraging to educators long troubled by the language problems, poor grades and high drop-out rates often found at Latino schools.[13]

According to the Los Angeles Times:

> Teachers at Garfield and other East Los Angeles schools with computer programs credit computers with reducing pupil absenteeism. . . . Absenteeism rates for those classes is less than 5%, compared to 20% for the school overall and 15% for the district.[14]

Underachievers have become a focus point at the local and national levels of government, as is evidenced by the millions of dollars used on various teaching materials that are purported to raise the level of underachievers. According to the former United States Commissioner of Education Vernon Allen, "the shocking evidence of 11 million crippled readers permeates virtually every aspect of education."[15]

The idea of students learning through working with a computer is a very promising alternative to the traditional system of learning through competition with each other. It also makes the acquisition of knowledge and skills valuable, not in the service of competition for grades, but as a means for personal significant interaction with a machine.[16]

Importance of the Study

The rapid upswing in poor attendance and low achievement scores has occurred within a relatively short period of time. It has evoked awareness and concern across the nation because education is a crucial aspect of the American way of life.

In spite of these shortcomings, the development of programmed instruction has led to the broader utilization of the electronic computer in all spheres of education throughout the world. "At the present time, . . . various types of programmed instruction are used to teach millions of students throughout the world and their ranks are growing every year."[17] With their high-speed calculations, large memory, and ability to process very complex informational transactions, electronic computers seem to be the most effective means for increasing the teacher's productivity and the student's motivation to learn, as well as to increase achievement scores in a variety of learning situations.[18]

As perceived by this researcher, the use of the computer to assist a student in the learning process has become quite popular in recent years. This is most commonly referred to in schools as computer-assisted-instruction (CAI). The computer allows students to proceed according to individual capability and permits constant monitoring of student performance. Enrollment in a computer science class may be the solution to poor attendance records and low achievement scores in mathematics in many of the secondary schools. It is quite certain that in the future the computer will be used widely and extensively in education. There are two reasons for its use: (1) the effectiveness of the computers in education, and (2) the cost of computers in education. The effectiveness follows mainly from interaction and individualization. Computers, particularly microcomputers, are declining rapidly in cost.

In a 1982 National Education Association survey, Norman found that a substantial majority of teachers at the elementary level supported instructional computing when they were convinced that the use of computers with students could improve teaching and learning.[19] Teachers, however, need time to use the equipment and to develop expertise on the hardware. They must be given the opportunity to review and use software and to relate software to their curricular and instructional needs. Kent State University conducts a teacher training program where teachers are trained to successfully utilize computers in classrooms. The context in which computer technology is revealed is introduced and the various potential uses of computers are emphasized. There is an increasing acceptance of the critical necessity for the teacher to become capable of teaching with computers to improve the quality of educaiton.[20]

Agoura High School, a comprehensive high school in the Las Virgenes, California Unified School District, is one school that has supported instructional computing in the belief that the use of computers with students can improve both teaching and learning, especially in the task of improving test scores. It was for this reason that the school was chosen as the site of the present study.

Statement of the Problem

There has been a deterioration of attendance and mathematics test scores among many of the secondary schools in America. Enrollment in a computer science class has recently been focused upon as one of the possible solutions to increasing the attendance and mathematics scores in large urban areas. The issue is relatively new as a research topic. This study will attempt to determine whether those students at a secondary school who had participated in a specific computer science class would show higher mathematics scores and actual attendance in school than those who had not participated.

Statement of the Purpose

The primary purpose of this study will be to examine the possibility of relating both attendance and mathematics posttest scores to enrollment or nonenrollment in a computer science class. Specifically, it was to determine if enrollment in a computer science class would show statistically significant greater mathematics posttest scores and higher students actual attendance in school in one secondary school in the Las Virgenes Unified School District, as opposed to nonenrollment.

Specific research questions concerning the purpose of this study will be as follows:

1. Is there a significant difference in mathematics posttest scores as measured by the Comprehensive Tests of Basic Skills (CTBS) between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School during the 1984-85 school year and those who were not enrolled in any of the three computer science classes offered at the school.

2. Is there a significant difference in actual days of school attendance between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School during the 1984-85 school year and those who have not been enrolled in any of the three computer science classes offered at the school?

Research Hypotheses

The first research hypothesis of this study will be: Eleventh grade students who participate in a specific computer science class will show greater scores at the end of the school year on the mathematics section of the CTBS than will a similar group of students who do not participate, or have never taken a computer science class.

The second research hypothesis of this study will be: Eleventh grade students who participate in a specific computer science class will show greater attendance during the school year than will a similar group of students who do not participate, or have ever taken a computer science class.

Definitions of Terms

BASIC. BASIC (Beginner's All-Purpose Symbolic Instruction Code) refers to a programming language with a small repertoire of commands and a simple syntax, primarily designed for numerical applications.

Cathode Ray Tube. Cathode Ray Tube (CRT) refers to an electronic vacuum tube, such as a television picture tube, that can be used to display graphic images or data.

Computer Assisted Instruction. Computer Assisted Instruction (CAI) refers to the use of the computer to assist a student in the learning process.

High Attendance. This term refers to an individual attending classes more than 80 percent of the school year (144-180 days).

Instructional Computing. Instructional computing refers to any number of computer applications used by teachers directly with students, indirectly as an instructional aid, or as classroom management aids.

Low Attendance. This term refers to an individual attending classes less than 50 percent of the school year (10-90 days).

Lower Achiever. This term refers to any student scoring below his or her assigned grade level on a standardized achievement test.

Programming Language. Programming language is an artificial language established for expressing computer programs.

Software. This term refers to computer programs, procedures, rules, and possibly associated documentation concerned with the operation of a data-processing system.

Word-Processing System. This term refers to a computer system that stores and processes text data. The systems typically include powerful editing and text-formatting capabilities.

Limitations

The study will be limited by certain conditions that were beyond the control of the researcher of this project. The students who enrolled in computer science classes at the eleventh grade level enrolled voluntarily in 1984-85. Since enrollment was voluntary, their motivation for attending and succeeding may have been higher than the group randomly selected. Furthermore, they could have had a predisposition towards mathematical constructs.

A threat to the internal validity of the study would be that some students were exposed to the use of a computer outside the classroom. This might be enhanced by the long interval of time (one and one-half years) between pretest and posttest CTBS.

The sample will be selected from Agoura High School and results cannot be generalized to any other larger population.

Delimitations

The scope of this study will be delimited by the researcher in the following ways: (1) The study will be limited to eleventh grade students in an urban secondary school (see appendix B); and (2) the study will be restricted geographically to a school in the Las Virgenes, California Unified School District.

Organization of the Study

The study consists of five chapters. In chapter 2 pertinent previous research has been reviewed for the purpose of building a frame of reference to make assumptions and draw conclusions.

The design and procedures described in chapter 3 deal with the methods and statistics of this study. The chapter describes the population and sample; the locale of the school: a description of the research instruments; and a statement of the procedure for collecting, analyzing, and treating the data.

The analysis of the data is presented in chapter 4, while the conclusions and recommendations are presented in chapter 5.

REFERENCES CHAPTER 1

[1]Marilyn Bohl, Information Processing (Chicago: Science Research Association., 1980), v.

[2]Ibid.

[3]E. Paul Torrance, "Motivating Children with School Problems," chap in Mental Health and Achievement eds. E. Paul Torrance and Robert D. Strom (New York: John Wiley & Sons, Inc., 1965), 339.

[4]Time Magazine (November 14, 1977), 62-75.

[5]Jean Dresden Grambs and John C. Carr, Modern Methods in Secondary Education (New York: Holt, Rinehart, and Winston, 1979), 419-420.

[6]Hilda Taba, Curriculum Development, Theory and Practice, ed. Willard Spalding (New York: Harcourt, Brace and World, Inc., 1962), 16.

[7]John C. Hill, Curriculum Evaluation for School Improvement (Springfield, IL: Charles C. Thomas Publisher, 1986), 198-200.

[8]Pierre Barrette, Microcomputers in K-12 Education (Rockville, MD: Computer Science Press, Inc., 1981), 1-2.

[9]National Urban League, This Comeback is for Real (New York, undated), 6.

[10]R. A. Earle, "Volunteer Tutors," Journal of Reading 15 (November 1971): 167.

[11]National Commission of Resources for Youth, Youth Tutoring Youth (New York: ERIC Document Reproduction Services, ED 034-246, 1969), 6.

[12]Peter J. Favaro, Educator's Guide to Microcomputers and Learning (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1986), 136-139.

[13]Los Angeles Times, 27 November 1983.

[14]Ibid.

[15]Vernon L. Allen and Robert S. Feldman, Learning Through Tutoring: Low-Achieving Children as Tutors (Wisconsin University: ERIC Document Reproduction Services ED 070-029, September 1972), 7.

[16]Favaro, 136-139.

[17]Bryce F. Zender, trans. and ed., Computers and Education in the Soviet Union (Englewood Cliffs, NJ: Educational Technology Publications, 1975), xxx.

[18]Favaro, 15-23.

[19]Carol Norman, Computer in the classroom: A NEA Survey Report (Washington, DC: National Education Association Research Department, October 1982), 24.

[20]Douglas H. Clement, Microcomputers in Early Education: Rationale and Outline for Teacher Training (Kent, MI: Kent State University, 1982), 1.

CHAPTER II

REVIEW OF LITERATURE

Introduction

A program at the University of Illinois (1959) was committed to the exploration of the educational possibilities and the engineering and economic problems relating to the introduction of the modern high-speed computer as an active element in the instructional process. It introduced a powerful new teaching tool for teaching stragegies in fields as diverse as algebra, anatomy, psychology, pharmacology and life sciences.[1]

The new tool made possible instruction with computers, or student controlled learning, by utilizing teaching strategies which differ completely from the basic tutorial logic of previous school instruction.

Now, as a result, provision can be made for remedial instruction or tutorial assistance during regularly scheduled courses for students with insufficient preparation in computer use. Development of mathematical or other skills at different levels, away from the exposed and many times competitive environment of the classroom, may increase the chance of success in mathematics for a given student.[2]

In this century, society has witnessed a rapid development of science technology. The volume of knowledge has grown so much each year that it is necessary now for each generation to acquire more. Spending more time for instruction is not desired by many people. Consequently, methods for acquiring knowledge in less time is a task of the present educational system. This led to programmed learning in order to overcome one of the basic shortcomings of traditional instruction: limited control during the acquisition of knowledge, skill and habits. As a result, educators have become hopeful about the possibilities of increasing achievement levels for students of varying aptitude levels, socio-economic classification, and attendance patterns.[3]

One study measured the impact of various levels of computer-aided-instruction (CAI) on the academic achievement of disadvantaged students in mathematics. The results showed that there was significant positive impact on students in most cases. The results also showed that it was less expensive than most alternative or compensatory education instruction costs.[4]

Important Studies and Opinions

Some secondary school students apparently possess little desire to learn. Why? What are the mainsprings of human behavior? What can the teacher do to make students want to learn? The following excerpt suggests the seriousness of a problem which confronts every teacher:

> History is filled with accounts of eminent men and women, unquestionably gifted, who did not achieve very well during certain periods of their school careers. At least they did not learn what their teachers tried to teach them. Albert Einstein, President Franklin Roosevelt, President John F. Kennedy, and Sir Winston Churchill are examples of men who at times appeared to be unmotivated to learn what their schools offered and made "Cs." Wernher von Braun, our famous space scientist, failed his high school courses in mathematics and physics. Thomas Edison's teacher thought that Tom was mentally "addled" and his mother withdrew him from school and taught him herself. Edison was motivated to continue to learn throughout his life and contributed numerous interventions even after he was eighty years old. Goertzel and Goertzel (1962) reported that 60 percent of the 400 eminent people in their study had serious school problems. They would have been classified as unmotivated. . . .[5]

Creating, developing, or otherwise activating a desire to learn is not a problem with some students; with others it may be the most difficult aspect of teaching. An individual can be forced to attend class, but he cannot be forced to learn. Yet, teachers must somehow provide an environment which sparks the will to learn.

According to one report, absenteeism is the major discipline problem of the late 1970s.[6] In one school the daily absence rate is 17 percent; in another, one-fourth of the students are reported to miss at least one period of class a day. Absence from class may be due to genuine illness or personal emergency. Why, then, does school after school report such frequent absenteeism? The main reason may well be that there is no real worth in going to class. If a student can learn all that is needed to pass the tests or do the homework without coming to class, why go there and be bored? If class attendance really is not necessary in order to learn material, if it is boring, if the teacher is so unaware of what students are doing that there is no incentive to come, then students will accordingly stay away.[7]

In order to cope with these problems, school administrators have turned their interest to educational computing. During the 1980s there has been a renewed emphasis on quality in mathematics education, and the debate over how to use the computer in mathematics education has increased:

> Another concern of great importance and interest is the continuing debate over "how to use" the computer in the mathematics classroom. There are those who propose a "programming" approach to computer usage in the mathematics classroom.[8]
>
> While there are some strong points to be made for the use of programming to teach problem solving and reasoning skills, too much emphasis on the programming may detract from mathematical learning.[9]

Lamb pointed out that:

> It would seem that any programming to be done in mathematics class should be limited to that necessary to learn and/or teach more and better mathematics. Let's leave computer science to the computer scientists![10]

He further believed that the following goals be considered in the use of computers in mathematics classes.

> On the other hand, many would suggest a heavy reliance on the use of software programs to supplement mathematics programs. While this may be an attractive alternative for teachers with little time for development of teaching materials, caution should be exercised. Many programs are rather poorly written and many others provide only a "skill and drill" approach to mathematics content. One only need to look around for examples of "progrmaming" and/or "software" which exemplify these notions. Hopefully, there is a way to forge a fruitful compromise between these two camps. Our goals must be to teach more mathematics, teach mathematics better, and to teach better mathematics! The computer will be a very useful tool in achieving these goals.[11]

Collis stated that:

> Our goal is that every student should feel more positive about mathematics and be able to do mathematics well enough and quickly enough that he or she can move to the level of enjoying the pleasure of exploring mathematics. We feel the computer applications of geometry and probability have real potential as experiences where such pleasures can occur, and we challenge every mathematics teacher to try some of the ideas.[12]

As perceived by the researcher, literature shows that some schools in the United States believe that by providing computer software and machines to low-achieving students, teachers can help them catch up to the other other students by either using the traditional drill method (which hopefully will increase motivation because of the immediate feedback) or the individualization of instruction as in programmed instruction.

One study reviewed by the researcher had college students as the population of interest.[13] They were deficient in mathematics abilities. They also necessitated more tutorial time from their instructors. The main goal of the study was to determine the effects of using CAI in improving certain deficiencies of the students. The experimental group used the computers. The control group was exposed only to the traditional method of teaching algebra. The results showed that the control group scored higher than the experimental group on the posttest. The instructors believed that in teaching certain aspects of mathematics, the development of the needed software was extremely difficult, and that CAI is not suitable to certain mathematics and pre-engineering subjects.[14]

In the United States, most predominantly minority elementary schools provide fifteen hours per week of exposure to the computer for each student (this is mostly in elementary schools). On the other hand, low socioeconomic, predominantly white schools are significantly less likely to use the computer that much each week.[15]

Schools in the lowest socioeconomic status, predominantly white, have very different patterns of microcomputer use than do predomoinantly minority schools.[16] Predominantly white secondary schools use drill and practice activities much more than predominantly minority secondary schools.[17] Predominantly minority elementary schools report intensive use by below average students much more often than do other groups of elementary schools, whereas low socioeconomic status predominantly white schools, stand out in the frequency with which they report intensive use by above-average students.[18]

Secondary schools said that their students used the computers more than 45 minutes per week. As of January 1983, a majority of United States schools (53 percent) had microcomputers (but the secondary schools were more likely to have one than the elementary schools) and most schools used drill and practice and programming instruction for the main methods of teaching.[19]

Preference for computers is shown from teachers who are in secondary schools. Teachers believe that the computer's patience and flexibility would make them helpful aids, especially for children with learning difficulties. Microcomputers are considered to be a tool for learning, as seen by many minority schools with a high percentage of low achievers. Voluntary or mandatory enrollment in a computer science class may be the answer to stem the tide of poor attendance records and low achievement acores in mathematics among many senior high schools. It is common for schools to report that some teachers have already purchased their own computers as a way of keeping pace with the trends of this informed society and education.[20]

CAI (computer assisted instruction) is now becoming a popular teaching method in secondary schools. Whatever the objectives of a CAI development project, it requires a favorable environment. In order to be successful, it must operate within a variety of constraints and respond to a variety of pressures both at a national and at a local level. At a national level, the pressures would be varied from country to country. Different national education perceptions of roles and relative importance of education compared with other services have influenced both the level and the means of funding computer assisted instruction. The initial stimulus for educational innovation at a national level may rise from within the educational system itself or from outside it. The political response to this stimulus is normally the provision of funding for research or development.[21]

Many times external stimulus has been a political awakening to a nationwide need; perhaps worsening staff to student ratios or a widespread deficiency of some basic skill. The early development of CAI in North America, and later in Europe, was mainly in response to such external pressure. During the past few years, a rapid increase in student numbers was not matched by an increase in the teaching staff and hence there was need for techniques which could enable teachers and trainers to be more cost-effective. CAI was seen to be a suitable educational tool which would extend the power and range of the teachers, enabling them to handle more students without additional effort.

Currently, similar reasons are being used in support of CAI in several developing countries. CAI tends to improve the effectiveness of certain kinds of learning but, with few exceptions, usually at additional cost. Yet, the claim that CAI can save time and money is still advanced as one of the justifications for many educational projects at national, institutional, and departmental levels.[22]

During the past twenty years, society has witnessed the tremendous growth of computer technology. However, relatively little interest has been given by school personnel to provide student access to it.[23]

Recently the degree of interest has changed and so has the kind of interest. For example, language-arts instructors are finding a new classroom tool. They have used the computer in tutorial or drill and practice models. Now the word-processing features and text-editors have made the computer an improved writing tool.[24]

It is this researcher's perception that in the past teachers were not too excited about using punched cards and transporting them to and from an old computer at a nearby campus, and this is understandable. However, when the more appropriate user languages and an extensive library of instructional programs became available, computers did not capture the interest of many instructors. Part of the problem was due to the cost and the inconvenience of time-sharing equipment. Moreover, it was difficult to convince other colleagues that this was an instrument to be controlled, not feared.

At the present time, some teachers are philosophically against computer use because of its difficult-to-use image. Other teachers refuse to get involved, certain that it is another tool that will die away like so many other curriculum innovations. Still others just do not want to bother, content to let the younger people of their staff take the responsibility.[25]

The students are much less afraid of the computers than are their instructors. They have more access and more time to get involved with computers. Programming practices and techniques give the student a chance to control the computer rather than being controlled. It emphasizes the process as much as the product. Few other instances in school could be recalled where a student described an action, then executed it on command. Programming has enabled some public school students to share intellectual products with each other.[26]

CAI may be seen as teaching by two methods of instruction: the traditional method and the self-teaching method. Of course, the dichotomy between these two is not sharp or clear, but it is worth consideirng in terms of actual practice. The traditional method consists primarily of the drill and practice of skill subjects under study.

Glass analyzed findings of a major study evaluating Suppe's Computer Curriculum Corporation (CCC) drill materials as used by more than 2,400 students over a period of several years in the Los Angeles Unified School District. He found that significant benefits were derived from computer drill when used as a supplement to instruction for math computation.[27]

The self teaching method is a tutorial system with the computer providing the stimulation. Students in the CAI tutorial process find themselves in a new give and take situation rather than in the passive lecture-listening situation.[28] Most students seem glad to be able to ask questions of the computer, which they would not otherwise have the opportunity to have answered in any comparable detail. The advantage of CAI is the projected ability of a computer to offer learning experiences to students as their tutor and to allow the students to progress at their own rate of ability.

As of 1983, there was limited administrative support for instructional computing. For the most part, school administrators' primary intent had been to provide teachers with information. School administrators were more likely to provide a computer information service than to actively promote teacher use of computers.[29]

Most teachers consider themselves liaisons between computers and students. They may not become hardware experts or software programmers, but they will know enough to teach students how to use the equipment. Drill programs, tutorials, games and simulations can be written to fit into almost any school curriculum. Nevertheless, teachers must determine the ratios of those different uses, the amount of hands on experience and the possibility of programming.[30]

In school, teachers are under pressure to emphasize skill building and to raise test scores. Drill and practice programs may bring better-skilled students, and show the public a new trend of declining test scores. The educators must use what is on the market or produce it themselves. Games are most available commercially, and drill and practice programs are considered to be the easiest to write. These are some of the reasons why there is a tendency in the public school to use microcomputers as a teaching tool.[31]

Teachers and parents are buying their own microcomputers; but they are buying and producing their own software. They are taking computer courses, subscribing to computer journals and attending seminars to learn.[32]

Analysis of the 1982 National Education Association (NEA) survey data indicated that teachers were concerned about the limited number of attempts by school administrators to provide literature, specialists, released time, study group, and training stipends to promote use of computers in classrooms.[33]

Brownlee, citing Litchman and Leltzzer, states that a primary concern of teachers and CAI researchers is that computer-based learning can be isolating and can have deleterious effects on the interpersonal social skills of students.[34]

Some school districts are supporting teams of teachers and students to produce their own needed software. Normally, a teacher who is knowledgeable about programming and has available software and computer equipment, organizes a team of programmers who are usually high school programming students and teachers with specific needs. The teachers discuss their objectives of a certain program with the programmer. The programmer writes the programming accordingly. During the process, the teachers critique and the programmer revises the program. Each time they may come closer to the type of programs that teachers can use directly in their own classrooms.[35]

It is hard to believe that students may become computer literate without computer teachers. People could understand that developing a computer literate school staff is a major aspect of education for computer literacy. The inclusion of computer literacy units, or courses in the present existing curriculum, tends to skim the long-term issue of staff development. Such a program should be seen as merely a first step but ultimately inadequate, if not part of a long-range growth and development effort.[36]

It is perceived by the author that new educators face yet another question of priorities: Universal computer literacy is a basic goal of the 1980s and deserves an important role in the school curriculum. In order to educate students for computer literacy, schools must develop leadership, curricula and computer-literate teaching staff members, while acquiring the necessary hardware and software facilities.

Use of microcomputing systems is just now in its beginning in public education. Districts will surely experience more and more pressure to purchase them. The schools should be aware that there are many vendors getting into the production of microcomputers. The hardware that people choose today might be replaced in just a few years by an upgraded version or even a different brand which has more capabilities. Only when school people can tell computer manufacturers what they want a system to do, and when the public agrees to pay for it, will public schools have the appropriate hardware they need. Only when people can communicate to software houses and publishers about their specific needs, will they get the desired instructional software.[37]

Summary

With the proliferation of computer technology, particularly CAI, research on its impact on traditional subjects, such as mathematics, has been incomplete. There has been some work on the computer's impact on low achieving students and students with inconsistent attendance patterns. The variables of achievement and absenteeism become particularly difficult to study as those two variables began to interact.

What was very evident from the literature was that computers seemed to be motivational to some students depending on how the computer curriculum is structured. In the case of low achieving students, computers were not critical of student mistakes and allowed repeated attempts for success. There was little study of the effect of computers on groups other than low achievers.

A similar result occurred when considering absenteeism problems. When a computer class was added to the class schedule of students with inconsistent attendance the attendance showed improvement. Some schools have gone so far as to require computer time for all students with the faith that somehow computer use provided at least a partial cure for absenteeism. While it was impossible to apply a cause and effect model to computer use and improved attendance, the area clearly deserved further study.

The final relationship considered was how mathematics achievement scores were affected by computer use without necessarily considering prior academic achievement in all subjects, as well as attendance patterns. Good mathematics students naturally did very well on learning computer skills but might have done well in mathematics even without the technology. There was no definitive answer on how enrollment in a computer class might affect students at all mathematics achievement levels.

Yet another confounding element on the effect which enrolling in a computer science class has on achievement and absenteeism is the nature of the computer class. The class may have been a drill and practice, remediation type design primarily attended by only low achieving students. Or the class may have been a programming class designed to be a supplement to the concurrent enrollment in a mathematics class. Finally, while computers were most often associated with programming and mathematics type skills many laboratories in schools have computers doing English skills such as word processing.

Each selection of literature reviewed provided a piece in the puzzle of the computer's role in education. Computers have had a major impact on the landscape of school course offerings and thus affecting all students to some extent. There remain major gaps in better understanding how computer instruction impacts mathematics achievement and attendance patterns.

REFERENCES CHAPTER 2

[1]Richard C. Dorf, Computer and Man (San Francisco: Boyd and Fraser Press, 1982), 383.

[2]Ibid., 402.

[3]Bryce F. Zender, Computers and Education in the Soviet Union (Englewood Cliffs, NJ: Educational Technology Publications, 1975), xxx.

[4]Stuart Wells, The Effects of Varying Amounts of CAI in Math on Academic Performance of 446 5th and 6th Graders (Princeton, NJ: ERIC Document Reproducton Services, ED 157-899, 1974).

[5]E. Paul Torrance, "Motivating Children with School Problems," in Mental Health and Achievement eds. E. Paul Torrance and Robert D. Strom, (New York: John Wiley & Sons Inc., 1965), 339.

[6]Time Magazine, 110 (November 14, 1977), 62-75.

[7]Jean Dresden Grambs and John C. Carr, Modern Methods in Secondary Education (New York: Holt, Rinehart, and Winston, 1979), 419-420.

[8]National Council of Teachers of Mathematics (1984), Computer in Mathematics Education (Reston, VA: National Council of Teachers of Mathematics, 1984).

[9]Karen L. Jones, and Charles E. Lamb (Summer 1985), "Developing Logical Reasoning Skills Through Programming Activities," Proceedings of the World Conference on Computers in Educaiton, Norfolk, VA.

[10]Charles E. Lamb, "Excellence in Mathematics Education--The Computer's Role," Sixth Annual Microcomputers in Education Conference (Rockville, MD: Computer Science Press, 1986), 246.

[11]Ibid.

[12]Betty Collis, Computers, Curriculum & Whole Class Instruction Issues & Ideas (Victoria: Wadworth Publishing Co., 1988), 296.

[13]Roy Rob, The Use of Computers to Prepare Deficient College Students and Graduate Students for Courses That Build Upon Previously Acquired Information (Troy, NY: ERIC Document Reproduction Services, ED 034-410, 1968).

[14]Ibid.

[15]Henry Jay Becker, "How Schools Use Microcomputers," Classroom Computer Learnings (September, 1983), pp. 41-44.

[16]Ibid.

[17]Ibid.

[18]Ibid.

[19]Ibid.

[20]Gary Ingersoll et al., "Microcomputer in American Public School: A National Survey," Educational Computer (October 1983), 28-31.

[21]Ibid.

[22]Ibid.

[23]Becker, 41-44.

[24]Ingersoll, 433.

[25]Peter J. Favaro, Educator's Guide to Microcomputers and Learning (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1986), 2-3.

[26]Becker, 42-44.

[27]Collins, 224.

[28]Microcomputers in Education Conference, Microcomputers in Education Conference (Rockville, MD: Computer Science Press, 1986), 97-98.

[29]Jacqueline C. Brownlee, A Survey of the Concerns of Elementary Principals and Teachers Regarding the Student Use of Computer in the Education Process and Recommendations for Administrative Use in Staff Development (Ed.D. dissertation, Pepperdine University), 48.

[30]Lamb, 245-246.

[31]Becker, 41-44.

[32]Ingersoll.

[33]Carol Norman, Computer in the Classroom: A NEA Survey Report (Washington, D.C.: National Education Association Research Department, October 1982), 18.

[34]Brownlee, 55

[35]Becker.

[36]Becker.

[37]Favaro, 167-181.

CHAPTER III

RESEARCH METHODOLOGY

Subjects

Eighty-six students (analysis units) were drawn from a population of 347 eleventh grade students enrolled in Agoura High School in the Las Virgenes Unified School District in California during the 1984-85 school year. Forty-three students were enrolled in a computer science class and they were treated as the computer science group. Another forty-three students, selected from the population, were treated as the noncomputer science group, inasmuch as none of them had participated in any of the three computer science classes offered at the school.

The school offered three computer science classes: (1) Computer Programming I (BASIC); (2) Computer Programming II; and (3) Computer Programming III PASCAL/AP. All of the forty-three students in the computer science group participated in only the Computer Programming I (BASIC) class. They did not participate in the other two classes.

The Las Virgenes Unified School District (appendix A) is known throughout the state as a leader in providing exemplary programs for the students they serve. The community is strongly supportive of the schools. The district includes seven elementary schools,[1] two junior high schools, two comprehensive high schools, and a continuation high school. Enrollment in the district for kindergarten through twelfth grade was 8,216 during the 1986-87 school year. Projected enrollment for 1987-88 was expected to be 8,571.

During the school year 1985-86, there were 407 students enrolled in the twelfth grade of Agoura High School who were 11th grade students in the 1984-85 academic year. Two hundred and seven (51 percent) were male, while 200 (49 percent) were female.

Thirty-four percent of the students' parents had advanced degrees, 30 percent were college graduates, 33 percent were high school graduates, while only 3 percent did not have a high school degree.

The school was predominantly Caucasian (88 percent); 5 percent were Asian; and 7 percent were American Indian and Hispanic.

Design

A pretest-posttest (appendix C) with the Comprehensive Tests of Basic Skills (CTBS) was used for the purpose of comparing the two groups to see if there was any change of scores after a period of time.

The research was designed in the following manner:

01 x 02

----

01 02

The observation 01 denoted a pretest, while the observation 02 denoted a posttest. X referred to the computer science class groups. The posttest mathematics score was the dependent variable in relation to student enrollment, or not, in the computer science class.

This research included the utilization of CTBS scores provided by the district and the school.

The independent variables were: (1) MATHPRE (Math pretest); (2) ATTENDCOD (Attendance-coded); (3) ATTENDACT (Attendance-actual days); and (4) ENROLLE (Enrollment in computer science).

The independent variables were treated as follows: (1) ENROLLE was treated as nominal data; (2) ATTENDCOD was treated as ordinal data; and (3) MATHPRE and ATTENDANCT were treated as interval data.

The students' CTBS scores in mathematics (before taking the computer science course) were used as a pretest. CTBS scores in mathematics after taking the computer science course were used as a pretest. The pretest CTBS was taken in May, 1984. The posttest CTBS was taken in December, 1986, over one year after the completion of the Fall, 1985 enrollment.

Null Hypothesis

The following null hypotheses were tested:

H_o1: There is no significant difference in mathematics posttest scores as measured by the Comprehensive Tests of Basic Skills (CTBS) between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High school in the Las Virgenes Unified School District in California during the 1984-85 school year and those who were not enrolled in any of the three computer science classes offered at the school, after adjusting for pretest scores.

H_o2: There is not significant difference in actual days of school attendance between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School in the Las Virgenes Unified School District in California during the 1984-85 school year and those who were not enrolled in any of the three computer science classes offered at the school.

Validity and Reliability

The CTBS has been tested for validity[2]. The specifications for CTBS item development were made to ensure comprehensive coverage of the content and process categories. To ensure content validity[3] of the materials, several methods were applied by the designers to verify their accuracy, currency, and curricular relevance:[4]

1. Current curriculum guides were obtained from state departments of education and from major cities and large school districts throughout the country. The content of recently published textbook series and instructional programs was also examined.

2. To provide a large pool of items for final test selection, two to three times as many items as would be needed were developed. A staff of professional item writers, most of them experienced teachers, researched and wrote items and passages to be tried out. All items and test directions were carefully reviewed for content and editorial accuracy.

3. Items were tried out in schools throughout the country. The teachers who administered the item tryout books were asked to review the content, illustrations, instructions, and time limits and to provide comments. Many improvements in CTBS U and V reflect the comments and suggestions of these teachers.

4. Vocabulary difficulty was controlled by reference to <u>EDL Core Vocabularies in Reading, Mathematics, Science, and Social Studies</u>[5] and <u>The Living Word Vocabulary</u>.[6]

As to the reliability of the CTBS, it was stated by Ahmann that:

> Numerous reliability determinations led to a common conclusion. typical of basic skills tests, a degree of reliability exists for subtest scores as well as for total scores. K-R 20 reliability coefficients were usually in the .55 to .95 region, although a few drifted downward as low as [.25] .75.[7]

Ahmann pointed out that:

> Beyond a doubt, the CTBS is a well developed test which is packaged in a professional manner. It should be attractive to both student and teacher, since is has at least two advantages over currently available tests. In the first place, it has a very high ceiling in that it reaches well into the high school. . . . Moreover, its recent development and use of teacher involvement has anchored it firmly in today's classroom.[8]

As a part of the conclusion to the evaluation of the CTBS, Anthony Nitko stated:

> The user should consider the CTBS, but before deciding to adopt it, the particular uses for which a test is needed should be specified. Then the validity evidence provided for the CTBS should be compared with evidence provided for other tests. For certain uses, the Comprehensive Tests of Basic Skills may prove adequate.[9]

Procedure

On September 17, 1987 the researcher and the chairperson of this dissertation committee met with the principal of Agoura High school, Dr. Michael Botsford. The discussion on how to develop the research techniques for retrieving necessary data ended with a sense of cooperation as the principal offered the needed data to the researcher (appendix L).

On November 4, 1987, the principal provided all the necessary data (appendices D, E, F, G, H, and M). Systematic review of the problems and collection of the raw data were also guided by the principal.

Two samples were selected to represent the population. The first sample consisted of students volunteering for a computer science class. The second sample was systematically selected form a list of all eleventh grade students who had never taken a computer science class. The sampling technique consisted of randomly selecting one of the first six students from a master list of all students who had taken the CTBS. The balance of the sample was every sixth student after the initial student was selected.

There were 347 students in the eleventh grade. Their attendance record was taken in the two semesters of the 1984-85 school year.

The procedures for coding are found in appendix I (Demographic Data Sheet), appendix J (Coding Sheet), and appendix K (Examples of Data File).

NCSS was utilized to generate statistics and tables. Two-way ANOVA,[10] one-way ANCOVA,[11] and t-test were used for statistical analysis.

Data Analysis Procedures

The first null hypothesis stated there is no significant difference in mathematics posttest scores as measured by the Comprehensive Tests of Basic Skills (CTBS) between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School in the Las Virgenes Unified School District in California during the 1984-85 school year and those who were not enrolled in any of the three computer science classes offered at the school, after adjustment for pretest scores.

This null hypothesis was tested by using the analysis of covariance. The single factor was participation in the computer class. The two covariates were pretest mathematics scores and actual days of attendance. The dependent variable was mathematics posttest scores.

The null hypothesis was rejected when the .05 probability level was reached.

A t-test was used to determine whether the difference between the two groups in actual days of attendance was related to the enrollment in the computer science class and nonenrollment in the computer science class.

This null hypothesis stated that there was not statistically significant difference between computer science enrollees and noncomputer science enrollees in actual days of attendance.

The null hypothesis was rejected when the .05 probability level was reached in this case.

The dependent variable in the above analysis was actual days of attendance.

REFERENCES CHAPTER 3

[1]Las Virgenes Unified School District, 1987-88 High School Courses Catalog (Las Virgenes, CA: Las Virgenes Unified School District, 1987), 1.

[2]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Design for Research (Chicago, IL: Rand McNally College Publishing Co., 1963), 5.

[3]Paul E. Spector, Research Design: Series in Quantitative Applications in the Social Sciences (Tampa, FL: Florida Mental Health Institute, 1981), 27.

[4]CTBS, a printout of "Content Organization of CTBS U and V," An Introduction of CTBS, 1988 (Los Angeles, CA: CTBS, 1988), 3-4.

[5]S. E. Taylor, H. Frackenpohl, C. E. White, B. W. Nieroroda, C. L. Browning, and E. P. Birsner, EDL Core Vocabularies in Reading, Mathematics, Science, and Social Studies (New York: EDL/McGraw-Hill, 1979).

[6]Edgar Dale and Joseph O'Rourke, The Living Vocabulary (Chicago, IL: World Book-Childcraft International, Inc., 1976).

[7]Oscar Buros, editor, The Seventh Mental Measurements Yearbook, vol. 1 (NJ: The Gryphon Press, 1972), 9.

[8]Ibid.

[9]Oscar Buros, editor, The Eighth Mental Measurements Yearbook, vol. 1 (NJ: The Gryphon Press, 1978), 13.

[10]J. S. Milton, J. J. Corbet, and P. M. McTeer, Introduction to Statistics (Lexington, MA: D.C. Heath and Company, 1986), 460-484.

[11]Ibid. pp. 391-393.

CHAPTER IV

FINDINGS

Introduction

This chapter reports the findings related to the defined population. The main purpose of this study was to determine if those students at Agoura High School who participated in a computer science class during the 1984-85 school year showed higher mathematics scores as measured by standardized test scores than did a similar group of students who did not participate.

The second purpose of this study was to determine if those students who participated in a computer science class showed higher attendance than a similar gorup of studetns who did not participate.

Research Questions

There were two main research questions:

1. Is there a significant difference in mathematics posttest scores as measured by the Comprehensive Tests of Basic Skills (CTBS) between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School in the Las Virgenes Unified School District during the 1984-85 school year and those who were not

enrolled in any of the three computer science classes offered at the school?

2. Is there a significant difference in actual days of school attendance between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School in the Las Virgenes Unified School District during the 1984-85 school year and those who were not enrolled in any of the three computer science classes offered at the school?

Characteristics of the Sample

Descriptive statistics for these groups are shown in table 1 (see appendices N and O for greater detail).

TABLE 1

DESCRIPTIVE STATISTICS FOR THE WHOLE SAMPLE

Variables	Mean	Median	Standard Deviation
MATHPRE	72.28	73	20.20
MATHPOST	72.87	79	21.70
ATTENACT	170.63	175	13.75

Similarly, all means, medians and standard deviations for each separate group are shown in tables 2 and 3 (see appendix P for greater detail).

TABLE 2

DESCRIPTIVE STATISTICS FOR ENROLLMENT (ENROLL)

Variables	Mean	Median	Standard Deviation
MATHPRE(Enroll)	77.98	78	18.21
MATHPOST(Enroll)	81.91	86	14.16
ATTENACT(Enroll)	173.14	175	7.18

TABLE 3

DESCRIPTIVE STATISTICS FOR NON ENROLLMENT (NON ENROLL)

Variables	Mean	Median	Standard Deviation
MATHPRE(Non-enroll)	66.58	66	14.16
MATHPOST(Non-enroll)	63.62	65	24.22
ATTENACT(Non-enroll)	168.12	173	17.84

Analysis of the Hypotheses

Null Hypothesis One

Null hypothesis one predicted that there would be no statistically significant difference in posttest mathematics scores between the two groups after posttest scores were adjusted for initial differences in pretest mathematics scores and for actual days of attendance.

This hypothesis was tested by using the analysis of covariance. Analysis of covariance was performed on mathematics posttest scores. Actual days of attendance and mathematics pretest scores were used as covariates to equate the groups with respect to those two variables. The results of this test are presented in table 4.

TABLE 4

ANCOVA:MATHPOST by ENROLLMENT AND ATTENDCOD

Source	DF	Sum-Squares	Mean Square	F	Signifance of F
X(MATHPRE)	1	14598.09	14589.09	85.92	0.0000
A(ATTENCOD)	1	583.75	583.75	3.44	0.0674
B(ENROLLME)	1	1433.52	1433.52	8.44	0.0047

TABLE 5

MEANS AFTER ADJUSTMENT OF THE COVARIATE

	TermCount	Mean	Standard Error
	ALL 85	72.81987	
	A: ENROLLME		
Computer	43	77.13885	1.987766
Non-Computer	42	68.50071	2.01129

An F-ratio of 8.44 was obtained. The significance level of the F-ratio was .005, well beyond the alpha level of .05.

Therefore, the null hypothesis that there was no statistically significant difference on mathematics posttest scores between the group which was enrolled in the computer class and the group which was not enrolled was rejected after adjusting for mathematics pretest scores.

The research hypothesis that the enrolled group would surpass the non-enrolled group on posttest mathematics scores was supported by the data. Also, the pretest was a significant covariate.

Hypothesis Two

Hypothesis two predicted that there would be no statistically significant difference between the two groups in actual days of attendance.

This hypothesis was tested by using the t-test. The resutlss of the test are presented in table 6.

TABLE 6

T-TEST BETWEEN ENROLLED AND NON-ENROLL FOR ATTENACT

Variable	Mean	SD	DF	T	Significance of T
Enrolled	173.14	7.177			
			55.87	1.712591	0.0923
Non-enroll	168.12	17.845			

A t value of 1.712591 was discovered. The probability for this t value was 0.0923. This t value did not reach the .05 level. Therefore, null hypothesis two was not rejected even though the enrolled group had better attendance.

The t value indicated that there was no statistically significant difference in the actual days of attendance between the two groups. Although the means are not significantly different, an F test on the variances shows that the non-enrolled group has a significantly higher ($p<.01$) variability.

The research hypothesis that the computer science group would surpass the noncomputer science group on actual days of attendance was not supported by the data.

Summary of Findings

Two null hypotheses were tested in this study. The first hypothesis was rejected while the second hypothesis was not rejected. The findings were as follows:

1. The computer science group surpassed the noncomputer science group in posttest mathematics scores after posttest scores were adjusted for initial differences in pretest mathematics scores and for actual days of attendance.

2. On the actual days of attendance, there was no significant difference between the two groups.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Review of the Study

There were two purposes of this study. The first was to determine whether those students at Agoura High School, who participated in a computer science class during the 1984-85 school year showed higher mathematics scores as measured by a standardized test than a similar group of eleventh grade students who did not participate. The second purpose was to determine whether those students who participated in a computer science class showed higher attendance than did a similar group of students who did not participate.

Research Questions and Hypotheses

The two main research questions were:

1. Is there a signficant difference in mathematics posttest scores as measured by the Comprehensive Tests of Basic Skills (CTBS) between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School in the Las Virgenes Unified School District during the 1984-85 school year and those who have not been enrolled in any of the three computer science classes offered at the school?

2. Is there a significant difference in actual days of school attendance between students who were enrolled in the Computer Programming I (BASIC) class at Agoura High School in the Las Virgenes Unified School District during the 1984-85 school year and those who were not enrolled in any of the three computer science classes offered at at the school?

The first research hypothesis ofthis study was: Eleventh grade students who particpate in a specific computer science class will show greater scores at the end of the school year on the mathematics section of the CTBS than will a similar group of students who do not participate nor have ever taken a computer science class.

The second research hypothesis of this study was: Eleventh grade students who participate in a specific computer science class will show greater attendance during the school year than will a similar group of students who do not participate, or have ever taken a computer science class.

Summary of Results

Results of the first hypothesis showed that the computer science enrollees surpassed the noncomputer science enrollees in posttest mathematics scores after posttest scores were adjusted for initial differences in pretest mathematics scores.

Results of the second hypothesis showed that actual days of attendance of the computer science group were not significantly different from the noncomputer science group.

Conclusions

Microcomputers are considered to be a tool for learning. As this study indicates, voluntary enrollment in a computer science class may also show improved test scores in mathematics in certain secondary schools, as tested by the CTBS instruments. Just as any kind of educational technology may not be a panacea for educational problems, microcomputers, if appropriately used, may be one of the effective learning tools used to support the teaching process. There is, however, no magic formula for assuring the successful use of computers in schools.

The computer class sample in this study was comprised of voluntarily enrolled students. Therefore, it cannot be stated that computer science classes assist in raising mathematics skills, per se. Rather, what this study does indicate is that voluntarily enrolled students in a computer class may exhibit higher scores in mathematics, as measured by the CTBS scores.

Based on this study, the Las Virgenes Unified School District (1) has increased its information system regarding volunteer students in computer classes and their particular math scores; (2) may wish to examine its secondary curricula to expand its elective computer classes with an eye to possibly improving those students' math scores; (3) may utilize this study's findings to enhance its already effective communication system with parents, teachers, students, counselors and administrators; and (4) may wish to study other curricular areas for possible skill improvement.

Recommendations

The following recommendations are based on the findings of this study:

1. It is recommended that further study be undertaken on the same subject with different populations and samples, such as in secondary schools in low-socioeconomic areas.

2. It is recommended that this study be extended to examine the possible relationship between reading scores and attendance or nonattendance in a computer science class.

3. It is recommended that an experimental computer curriculum study be designed examining the differences in attendance of those students who do nto express a voluntary interest in a computer class.

4. It is recommended that this study be replicated using only students in both samples not enrolled in a mathematics class.

APPENDICES

Appendix A

California Academic - Guidance Report

APPENDIX A

California Academic - Guidance Report

CALIFORNIA ACADEMIC - GUIDANCE REPORT

PAGE 1 OF 1 | CURRENT DATE 07-12-82 | STUDENT NUMBER | STUDENT NAME

SCHOOL NAME	CITY	SCHOOL DISTRICT	ENTRY DATE	BIRTHDATE	BIRTHPLACE	HOME PHONE	SEX	GRADE
LINDERO CANYON	AGOURA	LAS VIRGENES	09-08-80	08-01-68	CA		M	07

COUNSELOR | CO. DIST. SCHOOL I.D. 19251037 | PRIOR SCHOOL NAME-CITY, STATE | STUDENT ADDRESS | CITY AGOURA | ZIP 91301

COURSE CODE	COURSE TITLE	MARK	CREDIT	DATE
E11175	ENGLISH 7	D	5.0	6-82
M21175	MATH C	B	5.0	6-82
Q31175	SCIENCE 7	C	5.0	6-82
S15175	SOC SCI 7	D	5.0	6-82
P26275	PE 7	B	5.0	6-82
Y60975	WOODCRAFTS	B	5.0	6-82
XLXX70	LANG PROF	P	.0	6-82
XMXX70	MATH PROF	P	.0	6-82
XRXX70	READ PROF	P	.0	6-82
XWXX70	WRITING PROF	P	.0	6-82
	SEMESTER MPA.		2.17	
E1C165	READING LVL 11	C	5.0	2-81
E1CA65	ENGLISH	C	5.0	2-81
E1C165	READING LVL 11	C	5.0	6-81
E1CA65	ENGLISH	D	5.0	6-81
E11175	ENGLISH 7	D	5.0	2-82
M20265	MATH B-6	B	5.0	2-81
M20265	MATH B-6	C	5.0	6-81
M21175	MATH C	B	5.0	2-82
Q30165	SCIENCE 6	B	5.0	2-81
Q30165	SCIENCE 6	B	5.0	6-81
Q31175	SCIENCE 7	D	5.0	2-82
S10165	SOC SCI 6	C	5.0	2-81
S10165	SOC SCI 6	C	5.0	6-81
S15175	SOC SCI 7	D	5.0	2-82
P26165	PE 6	B	5.0	2-81
P26165	PE 6	C	5.0	6-81
P26275	PE 7	B	5.0	2-82
Y10465	ART 6	B	5.0	N-80
Y10765	FIRST AID 6	C	5.0	2-81
Y10465	STUDY SKILLS 6	C	5.0	4-81
Y10565	CAREER GUIDE	A	5.0	6-81
Y50475	CERM/ST OL	B	5.0	2-82

COURSE CODE	COURSE TITLE	MARK	CREDIT	DATE

CREDITS ATTEMPTED 140.0
MARK PTS. EARNED 315.0

PARENT/GUARDIAN NAME: RICHARD PAUL

CURRENT SUMMARY

STATE COLLEGE M.P.A.		ABSENCE YEAR TO DATE	EXCUSED	
CUM. TOTAL M.P.A.	2.25		UNEXCUSED	
RANK IN CLASS	350		ILLNESS	
NUMBER IN CLASS	417			120.0
CURRENT SEM. CREDIT	30.0	CREDIT DEFICIENCY		
TOTAL CUM. CREDITS	140.0			165.0

CREDITS EARNED AND MARK POINT AVE. BY DEPARTMENT

DEPARTMENT	CREDITS EARNED	MARK PT. AVE.	DEPARTMENT	CREDITS EARNED	MARK PT. AVE.
ENGLISH	30.0	1.50			
MATHEMATICS	20.0	2.75			
SCIENCE	20.0	2.25			
SOC SCIENCE	20.0	1.50			
PHYSICAL ED	20.0	2.75			
NON-DEPART	30.0	2.83			

STANDARDIZED TESTS

ABILITY-DATE		
ACHIEVEMENT		581
READ		60
MATH		63
LANG		57
SOC		00
COMP		00
TECH		00

COLLEGE ENTRANCE EXAMS

SUBJECT	DATE	SCORE

U of CAL A-F REQUIREMENTS

COMPETENCY REQUIREMENTS COMPLETED

TITLE	MARK	DATE	TITLE	MARK	DATE
LANG PROF	P	6-82			
MATH PROF	P	6-82			
READ PROF	P	6-82			
WRITING PROF	P	6-82			

EDUCATIONAL PLANS | CAREER OBJECTIVES

ACTIVITIES - AWARDS - ACCOMPLISHMENTS

GRADUATION OR WITHDRAWAL DATE | SCHOOL OFFICIAL'S SIGNATURE

MARK CODES: A - OUTSTANDING ACHIEVEMENT; B - GOOD ACHIEVEMENT; C - SATISFACTORY ACHIEVEMENT; D - MINIMUM ACHIEVEMENT; F - FAILURE; I - INCOMPLETE; P - PASS; N - NO MARK; W - WITHDRAWAL

Appendix B

Attendance Register

APPENDIX B

Attendance Register

ATTENDANCE REGISTER

AGOURA HIGH — 19782039 — 0 — 07-02-88 — 10 — 19 — 1

[illegible]	[illegible]	Student ID Number	Grade	Sex	1st Week	2nd Week	3rd Week	4th Week	Days Not Enrolled	Unexcused Absence	Excused Absence	Actual Attend	Apportionment Days	Monthly Total Days
	6	B001628268	12	M	M: H							19	19	19
1	5	B001692637	10	M	M: H							19	19	19
8		B001668938	11	F	M: H; F: S	M: S; T: S; F: S					4	15	19	19
		B001660106	09	M	M: H							19	19	19
	4	B001736280	06	M	M: H	T: A; W: A; R: A				3		16	16	19
14		B001576132	12	F	M: H							19	19	19
20		B001576126	12	M	M: H; W: S	T: S	M: S; T: S; R: S				5	14	19	19
1		B001635048	11	M	M: H							19	19	19
4		B001692838	10	F	M: H							19	19	19
6		B001713884	10	F	M: H							19	19	19
7	6	B001737812	11	F	M: H	R: S	R: S				2	17	19	19
7	1	B001713860	12	M	M: H; R: S	T: S					2	17	19	19
5		B001723115	11	F	M: H							19	19	19
8	1	B001622163	10	F	M: H							19	19	19
11		B001628034	10	M	M: H							19	19	19
12	1	B001736326	09	F	M: H							16	19	19
7	1	B001976120	12	M	M: H							19	19	19
4		B001638126	11	F	M: H							19	19	19
7		B001692380	10	F	M: H							19	19	19
8	5	B001644423	10	F	M: H		M: A			1		19	19	19
10		B001775041	10	F	M: H							19	19	19
3	7	B001634972	11	M	M: H							19	19	19
2		B001688945	11	M	M: H							19	19	19
19		B001576114	12	M	M: H	T: S	W: S				2	17	19	19
6		B001644425	10	F	M: H							19	19	19

ATTENDANCE CODES
S-ILLNESS-EXCUSED T-HOME TEACHING
A-UNEXCUSED ABSENCE

E/L CODES
E-ENROLLING FOR FIRST TIME IN THIS SCHOOL
R-RETURNING TO THIS SCHOOL

Appendix C

An Example of Pretest/Posttest

APPENDIX C

An Example of Pretest/Posttest

BESSLER EDUCATIONAL SYSTEMS & TECHNOLOGY,INC   8250 VICKERS ST SH   SAN DIEGO, CA 92111   (619)279-8320

DISTRICT:LAS VIRGENES UNIFIED   TEACHER:ALL GRADE 12   TEST DATE:DEC 1989   PAGE: 3
SCHOOL:AGOURA HS   GRADE:12   TEST NAME:FUNCTIONAL   SI 15

NAME/ID	SCR CAT	NOATR	VOCAB	RCOMP	SPELL	LMECH	LEXPR	MCOMP	CN/AP	REFSK	SCIEN	SOCST	TOTAL READ	TOTAL MATH	TOTAL LANG	TOTA BATT
1639663	RAW	UJ	32	41	26	26	31	24	32	16						
	G.E.		11.5	12.9	12.8	12.9	11.8	10.7	12.4	12.9			12.9	11.9	12.9	12.
	PCT		45	83	84	88	41	39	49	69			61	48	76	6
	Q/S9		/5	/7	/7	/7	/5	/4	/5	/6			3/6	2/5	4/6	3/
	STD		760	829	782	811	736	739	736	801			799	730	774	77
1825542	RAW	UJ	30	39	17	19	40	26	28	16						
	G.E.		12.9	12.9	9.6	10.1	12.9	11.7	10.5	12.9			12.9	11.4	12.9	12.
	PCT		67	69	24	33	80	46	39	69			69	44	55	5
	Q/S9		/6	/6	/4	/4	/7	/5	/4	/6			3/6	3/5	3/5	3/
	STD		794	816	731	733	760	742	729	801			805	736	751	76
1681600	RAW	UJ	39	40	29	29	42	40	43	18						
	G.E.		12.9	12.9	12.8	12.9	12.9	12.9	12.8	12.9			12.9	12.8	12.9	12.
	PCT		71	76	98	98	90	99	89	90			74	98	97	9
	Q/S9		/6	/6	/9	/9	/8	/9	/7	/8			3/6	4/9	4/9	4/
	STD		800	822	861	881	787	823	769	832			811	796	832	81
1634970	RAW	UJ	33	36	21	23	33	30	30	14						
	G.E.		12.1	12.9	12.4	12.9	12.4	12.9	12.8	12.7			12.9	12.8	12.9	12.
	PCT		49	63	49	73	49	65	67	51			56	70	67	6
	Q/S9		/5	/6	/5	/6	/5	/6	/6	/5			3/5	3/6	3/6	3/.
	STD		772	811	750	784	742	790	748	776			792	749	763	76.
1806381	RAW	UJ	34	35	0	10	31	22	24	11	1					
	G.E.		12.0	12.2	4.0	4.3	11.0	9.9	9.5	9.6	2.0		12.9	9.7	8.9	10.
	PCT		52	47	2	18	41	35	28	25	1		52	32	22	3.
	Q/S9		/5	/5	/1	/3	/5	/4	/4	/4	/1		3/5	2/4	1/3	2/.
	STD		776	800	429	694	736	737	721	747	573		788	729	719	74.
BERCHER LES	RAW	UJ	21	26	19	14	26	22	29	11						
	G.E.		8.7	9.3	10.7	10.7	9.9	9.9	10.7	9.6			9.0	10.8	10.4	9.
	PCT		16	22	36	37	26	35	41	25			18	40	34	2
	Q/S9		/3	/3	/4	/4	/4	/4	/5	/4			1/3	2/4	2/4	2/.
	STD		726	776	740	739	722	737	730	747			751	734	731	73

Appendix D

Computer Programming I (BASIC) Description

APPENDIX D

Computer Programming I (BASIC) Description

CALCULUS AP - P - Grade 12 - Year Course, 10 credits
Prerequisite: Math Analysis with a grade of C
Grading: A-F

Description: This is a college level class. Students should expect one hour homework assignments daily. The purpose of this course is to extend the offering in math for seniors who have completed the math curriculum and to offer the opportunity for a student to take an advanced placement class. Topics include limit theory, differentiation and integration, hyperbolic functions, vectors, infinite series, applications to area, volume and arc length, and applications to physics. No exposure to physics is necessary. Students who earn an A or B are expected to take the Advanced Placement Exam.

COMPUTER PROGRAMMING I (BASIC) - Grades 9, 10, 11, 12 - Semester Course, 5 credits
Prerequisite: None
Grading: A-F

Description: An introductory course to basic computer programming designed to familiarize the student with the computer and some of the basics of programming. Course content includes specification of variables, formatting, conditional branching, syntax, editing, mathematical manipulation, loops, subroutines, and graphics. Students will learn about both sequential and random access files. The course language is in BASIC.

COMPUTER PROGRAMMING II - Grades 9, 10, 11, 12 - Semester Course, 5 credits
Prerequisite: Computer Programming I with a C or better or pass screening test
Grading: A-F

Description: In Computer Programming II, the student will do advanced graphics, work with numeric functions, string functions, arrays, sorting, and files. There will be an introduction to LOGO and, finally, a unit of study in PASCAL. Additional topics will include Applewriter and Visicalc, applications in programming.

COMPUTER PROGRAMMING - PASCAL/AP - P - Grades 11, 12 - Year Course, 10 credits
Prerequisite: Algebra II with a C and Computer Programming II or Instructor Approval/ Pass screening test
Grading: A-F

Description: An advanced computer programming course stressing proper program structure and design over syntax details. The student will investigate a diversity of data types, control structure, and program units. Included in these will be declaration units, procedure units, function units, and library units. The students will also become proficient in using the Apple Pascal operating system utilities. They will compile, assemble and link source programs with the inherent system library routines. This course is an excellent introduction for students anticipating majors in computer science.

NOTE: ACCOUNTING II (COMPUTERIZED ACCOUNTING - ROP) (course described in Business Department and under ROP) may be used to meet one year of the General Mathematics requirement for graduation.

Appendix E

Annual Test Report Shows Scores Improving

APPENDIX E

ANNUAL TEST REPORT SHOWS SCORES IMPROVING

16

By Bob Donahue

Each year we prepare a comprehensive test report which contains a review of CTBS scores for both our seniors and our 10th grade class, as well as a review of the 12th grade California Assessment Program (CAP) results, and the data from the College Board tests (SAT/Achievement/Advanced Placement). The 1986-87 report showed scores improving across all tests.

This pattern of improved performance is seen on the CTBS results of the class of 1987, where analysis shows their scores improved over the scores of the class of 1986. The following table, which was included in the summary report presented to the School Board in November, 1987, shows the pattern.

TABLE I

DECEMBER CTBS SCORES - 12TH GRADE 1985-87

Graduation Year	CTBS Form	Total Reading NP	Total Language NP	Total Mathematics NP
1985	S	64	71	62
1986	U	68	77	82
1987	U	72	81	86

A review of the above table reveals that the Las Virgenes School District administered a new form (form "U") of the CTBS in 1986. Since that year, test scores on the test have improved each time the test was given.

While teachers do not teach to the tests, it is thought that part of the reason for test score improvement is the effort by the teachers and the school district to improve high school curricular offerings. Additionally, there has been a statewide emphasis on encouraging students to take a more challenging program during their high school years. This encouragement, as reflected in tougher college entrance requirements at both University of California and California State Universities, has had an impact on the pattern of courses our seniors are reporting having completed by graduation.

The following table shows the pattern of enrollment in important core classes since 1984-85.

17

TABLE II

AGOURA HIGH COURSE ENROLLMENTS 1984-87
(Expressed in % graduates completing the following course sequences)

	1984-5	1985-6	1986-7	Change 1984-7	Average state value 1986-7
3 or more years Math	84.0	78.3	76.8	-7.2	81.6
Advanced Math	68.1	65.5	72.6	+4.5	37.3
3 or more years Science	43.6	42.4	44.1	+0.5	52.5
Advanced Science	--	27.3	60.2	--	49.6
4 or more years Soc. Sci.	55.6	55.2	40.2	-15.4	43.1
3 or more years For. Lang.	23.0	21.0	23.2	+0.2	27.4
1 year Fine Arts	71.9	72.2	77.4	+5.5	75.2
Enrolled a - f	--	50.6	54.8	--	42.9
Grad. completed a - f	--	42.7	42.9	--	27.3

While the above data indicates many of our recent graduates are taking more solids than their predecessors, there is evidence suggesting we need to take a close look at enrollments in Social Studies and Foreign Language. Effective with the graduates of 1989, students will be required to have completed an additional semester course in Economics, which will impact Social Studies course enrollment statistics. With regard to Foreign Language enrollments, we are now looking at our present student selection patterns. Our goal is to encourage successful students in year two of Foreign Language to consider a third year as a way to gain a greater appreciation for the language and the culture of the people they have studied for two years.

In addition to CTBS results and analysis of course enrollment patterns, the 1986-87 test report presented to the School Board indicated that the graduates of 1987 had improved College Board scores over the graduates of 1986. In the verbal area on the SAT, the mean score of last year's graduates was 462, compared to a verbal score of 460 for the class of 1986. The same group reported a mean mathematics score of 526, compared to a math score of 511 in 1986.

The national average verbal score last year was 430, and the math average was 476, both scores well below the performance level of our seniors. While the Scholastic Aptitude Test is not an achievement test, it is a measure by which we can compare our student population with national populations of College Board seniors. Records of testing over the years show our seniors are indeed competitive with seniors graduating throughout the United States.

Appendix F

Survey of Basic Skills: Grade 12

APPENDIX F

California Assessment Program

Survey of Basic Skills: Grade 12

1986 — 1987

Subgroup Report

County LOS ANGELES COUNTY
District LAS VIRGENES UNIFIED
School AGOURA HIGH
CDS 19-64683-1930080

Table A

Classification	School Students No	School Students %	School Read	School Writ	School Spel	School Math	District Students No	District Students %	District Read	District Writ	District Spel	District Math	State Students No	State Students %	State Read	State Writ	State Spel	State Math
Total	407		69.3	71.4	73.5	76.9	699		70.0	71.6	74.2	77.5	219585		63.6	64.1	70.6	[illegible]
Sex																		
Male	207	51	69.4	69.4	70.3	78.8	372	53	70.8	70.1	71.6	79.5		49	63.6	61.1	68.6	[illegible]
Female	200	49	69.2	73.3	76.8	75.0	327	47	69.2	73.3	77.1	75.2		51	63.6	65.2	72.6	[illegible]
Parent Education																		
Advanced degree	140	34	74.7	73.9	77.5	81.9	255	36	75.2	73.5	76.8	81.9		17	70.6	71.7	74.8	[illegible]
College graduate	140	34	66.8	72.0	73.6	74.6	235	34	67.7	72.6	74.3	76.6		24	66.7	67.4	72.6	[illegible]
Some college	84	21	71.4	69.3	69.3	75.6	132	19	70.4	70.0	72.2	75.8		25	65.1	65.5	71.2	[illegible]
High school graduate	33	8	56.4	64.6	67.4	69.1	49	7	58.4	65.4	68.4	67.0		20	59.4	59.5	68.1	[illegible]
Not high school graduate	5	1					8	1						11	51.0	53.8	64.0	[illegible]
Ethnic Background																		
American Indian or Alaskan Native	7	2					8	1						2	58.9	58.1	66.0	[illegible]
Asian	22	5	73.4	74.2	72.7	86.4	32	5	71.7	71.0	71.9	82.4		9	60.0	62.9	72.0	[illegible]
Pacific Islander	0	0					1	0						1	58.4	59.2	70.7	[illegible]
Filipino	2	0					4	1						3	61.8	63.4	77.6	[illegible]
Hispanic	7	2					14	2	73.5	71.9	75.0	75.3		20	56.5	56.9	[illegible]	[illegible]
Black - not of Hispanic Origin	4	1					12	2	79.6	63.0	66.7	68.9		8	56.5	56.6	67.0	[illegible]
White - not of Hispanic Origin	358	88	69.2	71.8	74.0	70.7	612	88	69.9	72.2	74.4	77.7		56	68.2	68.5	72.4	[illegible]
No response	7	2					16	2	62.7	62.7	68.8	75.6		2	55.2	56.1	64.1	[illegible]
English Proficiency																		
English only	395	97	69.5	71.3	73.4	76.8	684	95	70.3	71.7	74.3	77.3		83	65.4	65.8	71.4	[illegible]
Fluent English	9	2	66.9	77.6	86.1	84.8	22	3	71.7	78.6	80.7	86.8		11	58.8	60.2	[illegible]	[illegible]
Limited English	3	1					13	2	53.9	50.8	55.8	69.2		5	44.5	46.8	60.4	[illegible]

Survey of Basic Skills: Grade 12

California Assessment Program

1986 — 1987

Subgroup Report (continued)

County	LOS ANGELES COUNTY
District	LAS VIRGENES UNIFIED
School	AGOURA HIGH
CDS	19-64683-1930080

Table 8

Classification	Parent Education	School Students No.	School Read	School Writ	School Spel	School Math	District Students No	District Read	District Writ	District Spel	District Math	State Students %	State Read	State Writ	State Spel	State Math
Ethnicity																
American Indian or Alaskan Native	Adv Deg	2	--	--	--	--	2	--	--	--	--	12	63 4	61 3	68 1	66 6
	Coll Grad	1	--	--	--	--	2	--	--	--	--	20	61 3	60 5	68 7	[illegible]
	Some Coll	4	--	--	--	--	4	--	--	--	--	29	61 5	60 9	67 8	[illegible]
	H.S. Grad	0	--	--	--	--	0	--	--	--	--	28	56 1	54 8	63 8	[illegible]
	Not H.S. Grad	0	--	--	--	--	0	--	--	--	--	10	50 2	52 4	59 6	55 2
Asian	Adv Deg	14	82 3	80 9	78 8	94 8	18	80 9	82 2	80 0	92 9	17	70 0	73 4	78 1	[illegible]
	Coll Grad	8	--	--	--	--	13	60 5	58 4	63 5	69 2	26	63 7	66 5	71 6	[illegible]
	Some Coll	0	--	--	--	--	0	--	--	--	--	17	61 8	64 0	72 9	[illegible]
	H.S. Grad	0	--	--	--	--	1	--	--	--	--	19	55 9	58 8	70 0	[illegible]
	Not H.S. Grad	0	--	--	--	--	0	--	--	--	--	19	49 7	52 5	66 1	[illegible]
Pacific Islander	Adv Deg	0	--	--	--	--	1	--	--	--	--	14	60 9	60 6	70 8	66 6
	Coll Grad	0	--	--	--	--	0	--	--	--	--	20	60 4	62 5	72 0	70 0
	Some Coll	0	--	--	--	--	0	--	--	--	--	26	62 8	61 2	73 1	[illegible]
	H.S. Grad	0	--	--	--	--	0	--	--	--	--	27	54 3	54 8	69 9	67 4
	Not H.S. Grad	0	--	--	--	--	0	--	--	--	--	10	53 3	54 3	64 5	60 4
Filipino	Adv Deg	1	--	--	--	--	3	--	--	--	--	16	64 7	67 6	79 6	[illegible]
	Coll Grad	1	--	--	--	--	1	--	--	--	--	42	64 2	65 4	79 3	[illegible]
	Some Coll	0	--	--	--	--	0	--	--	--	--	21	62 3	61 6	77 4	[illegible]
	H.S. Grad	0	--	--	--	--	0	--	--	--	--	14	55 7	58 2	73 3	[illegible]
	Not H.S. Grad	0	--	--	--	--	0	--	--	--	--	6	52 0	52 1	73 7	[illegible]
Hispanic	Adv Deg	2	--	--	--	--	3	--	--	--	--	5	63 8	64 7	70 3	[illegible]
	Coll Grad	3	--	--	--	--	4	--	--	--	--	6	61 4	61 8	69 5	66 8
	Some Coll	1	--	--	--	--	3	--	--	--	--	18	61 6	61 9	69 1	[illegible]
	H.S. Grad	0	--	--	--	--	1	--	--	--	--	25	56 4	56 7	66 5	[illegible]
	Not H.S. Grad	1	--	--	--	--	1	--	--	--	--	43	52 8	51 2	64 1	[illegible]
Black -- not of Hispanic origin	Adv Deg	1	--	--	--	--	5	--	--	--	--	12	61 6	62 6	68 5	[illegible]
	Coll Grad	2	--	--	--	--	4	--	--	--	--	23	58 1	57 7	[illegible]	[illegible]
	Some Coll	0	--	--	--	--	0	--	--	--	--	34	57 7	57 8	66 0	[illegible]
	H.S. Grad	0	--	--	--	--	1	--	--	--	--	22	52 2	52 4	65 1	[illegible]
	Not H.S. Grad	0	--	--	--	--	0	--	--	--	--	5	50 2	49 8	62 8	[illegible]
White -- not of Hispanic origin	Adv Deg	119	73 8	73 6	77 9	80 8	222	74 5	73 8	76 6	81 4	22	72 6	73 4	[illegible]	[illegible]
	Coll Grad	122	67 3	72 5	74 8	75 0	204	68 0	73 4	75 4	77 6	28	69 4	69 8	[illegible]	[illegible]
	Some Coll	79	71 5	69 9	69 0	75 7	122	70 2	70 5	72 1	75 5	28	67 8	68 1	[illegible]	[illegible]
	H.S. Grad	31	58 3	65.9	69 4	71.8	43	59.5	67.6	70 3	68 1	17	63 8	61 1	69 4	[illegible]
	Not H.S. Grad	4	--	--	--	--	7	--	--	--	--	3	59 0	59 4	67 2	[illegible]

California Assessment Program

Survey of Basic Skills: Grade 12

1986 — 1987

Subgroup Report (continued)

County: LOS ANGELES COUNTY
District: LAS VIRGENES UNIFIED
School: AGOURA HIGH
CDS: 19-64683-1930090

Table C

SCHOOL

Classification	Students %	Sex: Boy %	Sex: Girl %	Parent Education: Adv Deg %	Coll Grad %	Some Coll %	HS Grad %	Not HS Grad %
Courses Completed								
English								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	0	0
One year	0	0	0	0	0	0	0	0
One and one-half years	0	0	0	0	0	0	0	0
Two years	0	0	0	0	0	0	0	0
Two and one-half years	0	1	0	1	0	0	0	0
Three years	0	1	0	0	1	0	0	0
Three and one-half years	3	2	3	3	2	4	0	0
Four years	94	95	93	93	94	92	97	100
Four and one-half years	1	1	2	1	2	3	0	0
Five or more years	2	2	2	2	2	1	3	0
No response	0	0	0	0	0	0	0	0
Mathematics								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	0	0
One year	0	0	0	0	0	0	0	0
One and one-half years	0	0	0	0	0	0	0	0
Two years	23	22	25	8	27	33	39	40
Two and one-half years	3	4	3	2	3	4	3	20
Three years	29	23	35	30	27	29	32	20
Three and one-half years	2	2	3	2	2	4	0	0
Four years	35	39	31	44	37	28	18	20
Four and one-half years	1	1	1	2	0	0	0	0
Five or more years	7	10	4	12	4	3	10	0
No response	0	0	0	0	0	0	0	0
Science								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	0	0
One year	1	1	1	1	1	0	3	0
One and one-half years	1	1	1	1	2	0	0	0
Two years	54	42	65	42	54	83	88	60
Two and one-half years	3	4	3	2	3	4	6	0
Three years	22	28	15	21	28	18	10	40
Three and one-half years	2	3	2	4	1	3	0	0
Four years	15	16	13	27	10	10	8	0
Four and one-half years	0	1	0	1	0	0	0	0
Five or more years	1	1	0	2	0	0	0	0
No response	1	2	1	1	0	3	8	0

DISTRICT

Classification	Students %	Sex: Boy %	Sex: Girl %	Parent Education: Adv Deg %	Coll Grad %	Some Coll %	HS Grad %	Not HS Grad %
Courses Completed								
English								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	2	0
One year	0	0	0	0	0	0	0	0
One and one-half years	0	0	0	0	0	0	0	0
Two years	0	0	0	0	0	0	0	0
Two and one-half years	1	1	0	0	0	0	2	13
Three years	0	1	0	0	1	0	0	0
Three and one-half years	2	1	3	2	2	2	0	0
Four years	94	94	93	95	93	95	94	88
Four and one-half years	1	1	2	1	1	2	0	0
Five or more years	1	1	1	1	1	1	2	0
No response	0	0	0	0	0	0	0	0
Mathematics								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	0	13
One year	0	0	0	0	0	0	0	0
One and one-half years	0	0	0	0	0	0	0	0
Two years	18	16	21	8	20	26	36	38
Two and one-half years	3	3	3	2	3	3	2	13
Three years	31	28	38	32	32	30	34	25
Three and one-half years	3	3	3	2	2	7	4	0
Four years	38	44	32	45	38	32	15	13
Four and one-half years	0	1	0	1	0	0	0	0
Five or more years	8	7	4	8	3	2	8	0
No response	0	0	0	0	0	0	0	0
Science								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	0	0
One year	1	1	1	0	0	1	4	0
One and one-half years	1	1	1	1	1	0	0	0
Two years	47	38	57	35	49	69	64	75
Two and one-half years	3	4	3	2	4	3	6	0
Three years	25	20	21	26	31	18	17	25
Three and one-half years	2	2	1	2	0	3	0	0
Four years	18	20	15	28	13	13	4	0
Four and one-half years	1	1	0	2	0	0	0	0
Five or more years	1	2	0	2	1	1	0	0
No response	1	1	1	1	0	2	4	0

STATE

Classification	Students %	Sex: Boy %	Sex: Girl %	Parent Education: Adv Deg %	Coll Grad %	Some Coll %	HS Grad %	Not HS Grad %
Courses Completed								
English								
None	0	0	0	0	0	0	0	[illegible]
One-half year	0	0	0	0	0	0	0	[illegible]
One year	0	0	0	0	0	0	0	[illegible]
One and one-half years	0	0	0	0	0	0	0	[illegible]
Two years	1	1	1	0	0	1	1	[illegible]
Two and one-half years	1	1	0	0	0	0	1	[illegible]
Three years	8	8	7	3	5	8	12	[illegible]
Three and one-half years	5	5	4	3	4	5	6	[illegible]
Four years	78	74	78	78	78	76	72	[illegible]
Four and one-half years	5	5	5	7	6	4	4	[illegible]
Five or more years	5	5	6	8	6	5	4	[illegible]
No response	1	1	0	0	0	0	1	[illegible]
Mathematics								
None	0	0	0	0	0	0	0	[illegible]
One-half year	0	0	0	0	0	0	0	[illegible]
One year	0	0	0	0	0	0	0	[illegible]
One and one-half years	0	1	0	0	0	0	1	[illegible]
Two years	17	17	18	10	14	19	24	[illegible]
Two and one-half years	8	6	8	4	5	7	7	[illegible]
Three years	30	29	32	28	30	31	30	[illegible]
Three and one-half years	7	8	7	6	7	7	7	[illegible]
Four years	33	38	31	43	37	31	27	21
Four and one-half years	2	2	1	2	2	1	1	1
Five or more years	4	4	3	5	4	3	3	[illegible]
No response	1	1	1	1	1	1	1	1
Science								
None	0	0	0	0	0	0	0	0
One-half year	0	0	0	0	0	0	0	0
One year	2	2	2	1	1	1	1	4
One and one-half years	1	1	1	1	1	1	1	2
Two years	43	40	48	33	40	46	50	48
Two and one-half years	6	6	6	5	6	6	6	6
Three years	27	28	27	32	30	27	24	21
Three and one-half years	3	4	3	4	4	3	3	1
Four years	12	14	11	19	14	11	9	8
Four and one-half years	1	1	1	1	1	1	0	0
Five or more years	2	2	1	3	2	1	1	1
No response	2	2	1	1	1	1	2	1

Appendix G

Part Catalog of Las Virgenes Unified School District

APPENDIX G

Part Catalog of Las Virgenes Unified School District

LAS VIRGENES UNIFIED SCHOOL DISTRICT
30961 WEST AGOURA ROAD - SUITE 100
WESTLAKE VILLAGE, CALIFORNIA 91361
(818) 889-4004

The Las Virgenes Unified School District is known throughout the state as a leader in providing exemplary programs for the students we serve. The community is strongly supportive of the schools. The district includes seven elementary schools, two junior high schools, two comprehensive high schools, and a continuation high school. Enrollment in the district is 8,216, K-12. Projected enrollment for 1987-8 is expected to be 8,571.

The courses of instruction, here described, are offered to students registered at either of the two comprehensive high schools, Agoura High School, or Calabasas High School. Cross registration petition are available from either high school office and must be approved by both principals before the student will be allowed to register at both schools.

Students are not admitted to any course unless they have fulfilled all the prerequisites for that course, as stated in this catalog.

Special attention is called to the introductory pages of this catalog, particularly the list of graduation requirements which lead to the student earning a diploma. Questions concerning specific course requirements should be directed to the counseling department of the respective high schools: Agoura Counseling Department, phone (818) 889-1262; Calabasas Counseling Department, phone (818) 888-0012.

ABOUT THIS CATALOG: Course descriptions are reviewed each year by Department Chairpersons, the Assistant Principals of both high schools, and the Director of Instruction. New course descriptions, as well as any changes in existing courses, are included as is the approved school calendar for 1987-8. Please keep this catalog for future reference.

ACKNOWLEDGMENTS: Review and Updating of Text: Bob Donahue, Agoura High School
Word Processing and Layout: Julie Gross, Agoura High School

AGOURA HIGH SCHOOL
28545 WEST DRIVER AVENUE
AGOURA HILLS, CA 91301

DR. MICHAEL BOTSFORD, Principal
ROBERT DONAHUE, Assistant Principal
JOHN ALBREZZI, Vice Principal,
JEANETTE MORGAN, Vice Principal
LES VAN DYKE, Vice Principal

THE COMMUNITY

Situated in the western end of the San Fernando Valley in Los Angeles County. Suburban residential, high income community. Parents are mainly employed in professional, executive, business, art and entertainment fields.

SCHOOL OPENED - Fall of 1965

FIRST GRADUATING CLASS - 1967

THE SCHOOL

Public - Grades 9 through 12
Accredited - The Western Association of Schools and Colleges

THE STUDENT BODY

Projected Enrollment -
1987 - 1988 1850

LENGTH OF SCHOOL YEAR - 181 days
First Day of School - Sept. 10, 1987

THE CURRICULUM

Credits required for graduation			220
English	40	Health	05
Math	20	Dr Ed/Guidance	05
Science	20	For Lang/Fine Art/ Practical Art (2 of the 3)	20
Soc Stud	30*		
Phys Ed	20	Electives	60

*Beginning with the Class of 1988-89, all students will be required, by State law, to complete one semester of economics. This class may be taken for either Social Studies or Business Education credit.

All students must pass minimum proficiency tests in (1) reading comprehension, (2) math computation, (3) language skills, and (4) writing sample as well as the specific graduation requirements to earn an Agoura High School diploma.

SPECIAL PROGRAMS

Educationally Handicapped, Honors, Advanced Placement, Gifted and Talented Education, Communication Skills Lab, Work Experience, and ROP. Advanced sections grouped homogeneously in math, English, and science and social studies.

GRADING SYSTEM

A-Superior	N-No Mark/No Credit
B-Above Average	I-Incomplete
C-Average	P-Passed
D-Below Average	Cr-Credit
F-Failure	WF-Withdraw Failing

RANKING

Includes only academic subjects (English, Foreign Language, Math, Science and Social Studies), grades 9-12, including Summer School courses, failed and repeated subjects. Four point scale used: A - 4, B - 3, C - 2, D - 1, and F - 0. Final rank at end of 8th semester. A five-point scale is used for designated 11th & 12th grade Honors and AP classes.

ADVANCED PLACEMENT RESULTS

		1984	1985	1986
AP Grade of	5	5	11	18
	4	27	29	26
	3	38	23	18
	2	20	10	50
	1	2	2	1
Total		92	75	68

SAT RESULTS

1986	Verbal	Math
Agoura	460	511
State	423	481
Nation	431	475
1985		
Agoura	467	502
State	424	480
Nation	431	475

Appendix H

A Nomination for Agoura High School

APPENDIX H

AHS NOMINATED FOR CALIFORNIA DISTINGUISHED SCHOOL AWARD - AGAIN!

2

* * * * * * * * * * * * * * * * *

SACRAMENTO--Superintendent of Public Instruction Bill Honig announced the nominees for the 1987-88 Distinguished Secondary School Awards today. The 120 high schools from throughout the state are being notified that they may apply for the prestigious award.

"I am delighted to recognize these nominees as excellent examples of how quality education is being achieved in California schools," stated Honig. "These schools can take great pride in their accomplishments. They were selected out of a pool of over 800 senior high schools in the state."

The Distinguished School Awards program is part of a more comprehensive California School Recognition Program (CSRP) which Honig launched in 1986. In the first year of the program high schools and middle schools were given the honors. Last June elementary schools were chosen to receive the awards. This year 60 middle schools and 60 high schools will be selected as California Distinguished Schools. The middle schools application process will be announced in November. The 120 nominated middle schools originate from the 1,500 schools statewide.

"It is important to acknowledge the efforts and achievements of our most successful school programs," said Honig. "We hope that by recognizing these schools, we will motivate them to continue their push for excellence, and encourage other schools to strive for higher quality education."

Schools were nominated by having the highest performance or greatest improvement on a variety of quality indicators such as test scores, more students taking more academic courses, and dropout rates.

Comparison groups are used so that only schools with similar socio-economic student populations compete with one another. As a result, schools in the same school district may not necessarily be competing against each other when they are nominated for the state award.

The schools wishing to apply must submit an application which provides detailed information about their curriculum, instructional practices, staff development, and school activities.

A selection committee of state and local educators will review the nominated schools' applications and recommend semi-finalists for a site visitation during January - March, 1988. The 60 high and 60 middle schools selected as California Distinguished Schools will be announced in late April.

Dr. Michael L. Botsford, Principal of Agoura High School, has been notified by the State Department of Education that Agoura is one of the high schools nominated for the California Distinguished Schools program. "We are pleased that our faculty and educational program are being recognized," said Dr. Botsford. "We are proud of our students and the product we produce."

* *

TEACHING THE TOOLS, CAPTURING THE TALENT

Appendix I

Demographic Data Sheet

APPENDIX I

Demographic Data Sheet

Student Number: _____

Grade Level: _____

SEX: _____MALE _____FEMALE

Appendix J

Coding Sheet

APPENDIX J

Coding Sheet

COLUMN	QUESTION	WIDTH	CODING
4-6	Respondent Student Number	3	
8-9	MATHPRE	2	actual score
11-12	MATHPOST	2	actual score
14	ATTENCOD	1	1-Lo 2-Med 3-Hi
16-18	ATTENACT	3	actual days
20	ENROLLME	1	1-computer science class 2-non-computer science

Appendix K

An Example of Data File

APPENDIX K

An Example of Data File

```
01 101 72 86 2 177 1
02 102 31 53 2 176 1
```

Appendix L

Michael Botsford's Letter

APPENDIX L

Michael Botsford's Letter

AGOURA HIGH SCHOOL
28545 Driver Avenue, Agoura Hills, California 91301
Telephone (818) 889-1262

COPY

Las Virgenes Unified School District

March 21, 1988

TO: Tony Lei

FROM: Mike Botsford, Ed.D.

SUBJ: Dissertation Materials

First of all, I apologize for the delay. I hope your timeline allows you to work around my long response time.

At our most recent meeting, you and Dr. Adamson indicated a desire to make a change in the focus of your study. Your experimental group now is those 11th grade students who took the Basic Computer Course in 1984-85. You then need pre and post CTBS data to see if any growth in math scores occurred due to the computer course. You requested the following:

1.	May 1984 - 10th Grade CTBS Scores	Enclosed
2.	Class rosters for all 1984-85 Basic Computer Classes	Enclosed
3.	December 1985 - 12th Grade CTBS Scores	Enclosed
4.	Exit Cal Guides (transcripts) for the Graduating Class of 1986	Available in Counseling Office at AHS
5.	Student Attendance Data for 10th Grade, 1984	Available in Attendance Office at AHS
6.	Student Attendance Data for 12th Grade, 1986	You already have

When your study is completed, I must have all school records returned. In some cases, the material loaned to you is our only copy. If you need to work directly from our files (see items 4 and 5), please call me and we can set up dates. We can work it to your convenience as long as it is between 7:00 a.m. and 3:00 p.m. Please let me know if you need access to our on-campus files.

Memorandum to Tony Lei
Page 2
March 21, 1988

Again, sorry about the delay. Good luck in your study.

Mike

Michael L. Botsford, Ed.D.
Principal

jg

xc: Dr. Adamson, Adviser
Dr. Marley, Superintendent

P.S. In response to Dr. Adamson's invitation, I will plan on sitting in on your doctoral interview at 2:30 p.m. on April 11, 1988 (at Pepperdine).

Appendix M

A Sample of Computer BASIC Class Record

APPENDIX M

A Sample of Computer BASIC Class Record

COMP BASIC SEC 1 155 REZINAS 290 1975201 10-04-

STUDENT NAME 823755

Student ID	Grade			Teacher
8001638565	12	1		ACTON
8001576137	12	2		ACTON
8001736370	09	3		ACTON
8001658934	11	4		ACTON
8001652149	12	5		ACTON
8001576091	12	1		ACTON
8001634998	11	2		ACTON
8001818278	12	3		ACTON
8001576108	12	4		FEINMAN
8001608644	12	5		FEINMAN
8001810829	12	1		FEINMAN
8001644487	11	2		FEINMAN
8001538929	09	3		FEINMAN
8001635521	11	4	243	FEINMAN
8001773975	12	5		FEINMAN
8001652340	11	1		FEINMAN
8001833324	12	2		FEINMAN
8001679198	09	3		FEINMAN
8001869928	11	4	226	FEINMAN
8001736249	09	5		FEINMAN
8001576581	12	1		FEINMAN
8001737479	12	2		FEINMAN
8001635226	11	3		FEINMAN
8001654532	11	4		FEINMAN
8001879205	12	5		FEINMAN
8001844519	11	1		FEINMAN
8001715779	11	2		JOHNSON
8001576741	12	3		JOHNSON
8001871722	11	4		JOHNSON
8001715726	12	5		JOHNSON

Appendix N

Variables Labels and Data File

APPENDIX N

Variables Labels and Data File

```
------------------------------------NCSS Editor-----------------------------------
Date/Time        05-24-1988   14:25:57
Data Base Name   BILEIDATA
Description      Data base created at 12:43:37 on 05-24-1988

No. Variable     Rows Vlab        Label
  1 MATHPRE       86              Math pre-test
  2 MATHPOST      85              Math post-test
  3 ATTENCOD      86 attend       Attendance coded
  4 ATTENACT      86              Attendance-actual number of days
  5 ENROLLML      86              Enrollment in computer science
  6 C6             0
  7 C7             0
  8 C8             0
  9 C9             0
 10 C10            0
 11 C11            0
 12 C12            0
 13 C13            0
 14 C14            0
 15 C15            0
```

Tonv Lei Database

		MATHPRE	MATHPOST	ATTENCOD	ATTENACT	ENROLLME
1	101	72	86	2	177	1
2	102	31	53	2	176	1
3	103	78	86	2	175	1
4	104	92	72	2	172	1
5	105	67	55	1	164	1
6	106	99	99	2	175	1
7	107	86	90	2	175	1
8	108	48	93	3	179	1
9	109	11	87	2	174	1
10	110	73	70	3	179	1
11	111	69	53	2	172	1
12	112	98	90	3	180	1
13	113	67	72	2	175	1
14	114	86	97	2	170	1
15	115	98	77	3	180	1
16	116	95	94	2	177	1
17	117	65	70	2	176	1
18	118	75	83	2	176	1
19	119	96	92	2	172	1
20	120	99	99	3	179	1
21	121	99	94	2	176	1
22	122	72	66	2	177	1
23	123	51	55	2	174	1
24	124	80	78	2	170	1
25	125	82	66	1	165	1
26	126	73	89	2	169	1
27	127	73	76	3	179	1
28	128	70	98	2	173	1
29	129	94	97	1	168	1
30	130	70	97	2	172	1
31	131	78	87	3	178	1
32	132	80	83	2	177	1
33	133	55	68	1	137	1
34	134	82	82	3	179	1
35	135	95	97	2	173	1
36	136	97	92	1	167	1
37	137	95	93	3	179	1
38	138	73	83	2	174	1
39	139	67	62	2	175	1
40	140	91	66	1	165	1
41	141	82	97	1	164	1
42	142	67	76	2	174	1
43	143	70	62	2	177	1

Tony Lei Database

		MATHFRE	MATHPOST	ATTENCOD	ATTENACT	ENROLLME
44	201	84	98	2	176	2
45	202	46	44	3	179	2
46	203	31	53	2	176	2
47	204	38	37	3	179	2
48	205	91	79	3	179	2
49	206	94	86	1	164	2
50	207	53	68	3	178	2
51	208	49	40	1	168	2
52	209	82	83	1	159	2
53	210	26	12	1	166	2
54	211	51	42	2	170	2
55	212	69	62	3	178	2
56	213	57	64	1	152	2
57	214	72	38	3	178	2
58	215	98	97	3	180	2
59	216	57	25	2	172	2
60	217	55	46	2	176	2
61	218	44	44	1	159	2
62	219	28	12	1	147	2
63	220	60	66	3	180	2
64	221	66	82	2	173	2
65	222	99	99	2	176	2
66	223	78	64	2	177	2
67	224	55	59	2	176	2
68	225	42	35	1	155	2
69	226	53	38	1	145	2
70	227	72	68	1	156	2
71	228	94	0	0	71	2
72	229	65	79	2	173	2
73	230	52	37	1	162	2
74	231	97	92	3	180	2
75	232	73	87	3	178	2
76	233	99	97	3	180	2
77	234	78	86	2	176	2
78	235	96	87	3	179	2
79	236	77	86	2	169	2
80	237	55	68	1	168	2
81	238	70	62	1	161	2
82	239	87	92	2	175	2
83	240	57	44	1	165	2
84	241	63	82	2	173	2
85	242	86	83	2	177	2
86	243	54	49	1	168	2

Appendix O

Descriptive Statistics of the Whole Sample

APPENDIX O

Descriptive Statistics of the Whole Sample

```
------------------------------Descriptive Statistics------------------------------
Date/Time          05-24-1988   14:46:26
Data Base Name     B:LEIDATA
Description        Data base created at 12:47:37 on 05-24-1988

                              Detail Report

Variable: MATHPRE

Mean - Average           72.27907      No. observations          86
Lower 95% c.i.limit      67.98771      No. missing values        0
Upper 95% c.i.limit      76.57043      Sum of frequencies        86
Adj sum of squares       34053.3       Sum of observations       6216

Standard deviation       20.01567      Std.error of mean         2.158345
Variance                 400.6271      T-value testing mean=0    33.48819
Coef. of variation       .2769221      T-test prob level         0.0000
Skewness                -.6709014      Kurtosis                  .1116655

100-%tile (Maximum)      99            90-%tile                  98
 75-%tile                87            10-%tile                  45
 50-%tile (Median)       73            Range                     88
 25-%tile                57            75th-25th %tile           30
  0-%tile (Minimum)      11
11----------------------------Line Plot / Box Plot----------------------------99
1             1 1  2     1  1 1 1  121214 3 1     21424 44 2 5 2 41132   21 62145
                                   ----------[XXXXXXXXXXXXamXXXXXXXXXXX]----------

                         Distribution & Histogram

Variable: MATHPRE
Bin    Lower       Upper      Count Prcnt Total Frcnt  Histogram
 1    11.00E+00   40.33E+00      6   7.0      6   7.0 :**
 2    40.33E+00   69.67E+00     27  31.4     33  38.4 :*********
 3    69.67E+00   99.00E+00     53  61.6     86 100.0 :******************
```

```
--------------------------Descriptive Statistics---------------------------
Date/Time         05-24-1988  14:53:04
Data Base Name  B:LEIDATA
Description     Data base created at 12:43:37 on 05-24-1988

                              Detail Report

Variable: MATHPOST

Mean - Average          72.87059        No. observations            86
Lower 95% c.i.limit     68.18925        No. missing values          1
Upper 95% c.i.limit     77.55193        Sum of frequencies          85
Adj sum of squares      39567.58        Sum of observations         6194

Standard deviation      21.70352        Std.error of mean           2.354077
Variance                471.0426        T-value testing mean=0      30.95506
Coef. of variation      .2978364        T-test prob level           0.0000
Skewness               -.8346523        Kurtosis                    -1.844256E-02

100-%tile (Maximum)     99              90-%tile                    97
 75-%tile               90              10-%tile                    40
 50-%tile (Median)      79              Range                       87
 25-%tile               62              75th-25th %tile             28
  0-%tile (Minimum)     12
12---------------------------Line Plot / Box Plot----------------------------99
2           1         122 1 1 31  1   3 2  1  4 23 4 2 2  2 12  35 64.12 422 823
                          -------------------[XXXXXXXXXaXXXXmXXXXXXXXX]------

                         Distribution & Histogram

Variable: MATHPOST
Bin   Lower       Upper     Count Prcnt Total Prcnt  Histogram
 1   11.00E+00   40.67E+00     9  10.6     9  10.6  :***
 2   40.67E+00   70.33E+00    27  31.8    36  42.4  :*********
 3   70.33E+00   10.00E+01    49  57.6    85 100.0  :****************
```

```
----------------------------Descriptive Statistics----------------------------
Date/Time       05-24-1988  15:03:19
Data Base Name B:LEIDATA
Description     Data base created at 12:43:37 on 05-24-1988

                              Detail Report

Variable: ATTENACT

Mean - Average          170.6279       No. observations         86
Lower 95% c.i.limit     167.679        No. missing values       0
Upper 95% c.i.limit     173.5768       Sum of frequencies       86
Adj sum of squares      16080.09       Sum of observations      14674

Standard deviation      13.75418       Std.error of mean        1.483152
Variance                189.1776       T-value testing mean=0   115.0441
Coef. of variation      8.060923E-02   T-test prob level        0.0000
Skewness                -4.905679      Kurtosis                 32.50796

100-%tile (Maximum)     180            90-%tile                 179
 75-%tile               177            10-%tile                 159
 50-%tile (Median)      175            Range                    109
 25-%tile               168            75th-25th %tile          9
  0-%tile (Minimum)     71
71--------------------------Line Plot / Box Plot---------------------------180
1                                          1     11    1  11  211  6152355AA7F6
                                                                ------[XaXXmX]-
```

```
------------------------------Descriptive Statistics------------------------------
Date/Time        05-24-1988  15:03:19
Data Base Name   B:LEIDATA
Description      Data base created at 12:43:37 on 05-24-1988

                              Detail Report

Variable: ATTENACT

Mean - Average           170.6279         No. observations          86
Lower 95% c.i.limit      167.679          No. missing values        0
Upper 95% c.i.limit      173.5768         Sum of frequencies        86
Adj sum of squares       16080.09         Sum of observations       14674

Standard deviation       13.75418         Std.error of mean         1.483152
Variance                 189.1776         T-value testing mean=0    115.0441
Coef. of variation       8.060923E-02     T-test prob level         0.0000
Skewness                 -4.905679        Kurtosis                  32.50796

100-%tile (Maximum)      180              90-%tile                  179
 75-%tile                177              10-%tile                  159
 50-%tile (Median)       175              Range                     109
 25-%tile                168              75th-25th %tile           9
  0-%tile (Minimum)      71
71---------------------------Line Plot / Box Plot---------------------------180
1                                                1      11    1 11 211 61523355AA7F6
                                                                   -------[XaXXmX]-
```

Appendix P

Descriptive Statistics of Separate Samples

APPENDIX P

Descriptive Statistics of Separate Samples

```
------------------------------Descriptive Statistics------------------------------
Date/Time        05-25-1989  15:36:06
Data Base Name  B:leidata
Description     Data base created at 12:47:37 on 05-24-1988

                              Detail Report

Variable: MATHPRE                        Break: ENROLLME = Enrolled

Mean - Average          77.97675        No. observations          43
Lower 95% c.i.limit     72.37263        No. missing values        0
Upper 95% c.i.limit     83.58086        Sum of frequencies        43
Adj sum of squares      13926.98        Sum of observations       3353

Standard deviation      18.20974        Std.error of mean         2.77696
Variance                331.5947        T-value testing mean=0    28.0799
Coef. of variation      .2335279        T-test prob level         0.0000
Skewness                -1.474827       Kurtosis                  3.670542

100-%tile (Maximum)     99              90-%tile                  98
 75-%tile               95              10-%tile                  65
 50-%tile (Median)      78              Range                     88
 25-%tile               70              75th-25th %tile           25
  0-%tile (Minimum)     11
11---------------------------Line Plot / Box Plot------------------------------99
1                  1               1   1        1 413 23 2 2 2 3  2     11 41133
                                                ----[XXXXXXmXXXXXXXXXXXXXX]---

                              Box Plots

Break: ENROLLME = Enrolled
                        11                                                    99

MATHPRE                  :                          ---[XXXXmXXXXXXXXXX]-- :
```

```
---Descriptive Statistics----------------------------------
Date/Time           05-25-1988   15:37:51
Data Base Name  B:leidata
Description        Data base created at 12:43:37 on 05-24-1988

                              Detail Report

Variable: MATHPOST                          Break: ENROLLME = Enrolled

Mean - Average           81.90698        No. observations         43
Lower 95% c.i.limit      77.55064        No. missing values       0
Upper 95% c.i.limit      86.26332        Sum of frequencies       43
Adj sum of squares       8415.628        Sum of observations      3522

Standard deviation       14.15528        Std.error of mean        2.158661
Variance                 200.3721        T-value testing mean=0   37.94342
Coef. of variation       .1728215        T-test prob level        0.0000
Skewness                 -.656614        Kurtosis                 -.7346225

100-%tile (Maximum)      99              90-%tile                 97
 75-%tile                94              10-%tile                 62
 50-%tile (Median)       86              Range                    46
 25-%tile                70              75th-25th %tile          24
  0-%tile (Minimum)      53
53-------------------------Line Plot / Box Plot-------------------------99
2  2          2      2  1   2  2      2  1    1 3    3 2  1 2  2 2 2   61 2
             -------------[XXXXXXXXXXXXXXXXXXaXXXXXXmXXXXXXXXXXXXX]-----

                              Box Plots

Break: ENROLLME = Enrolled
                        53                                              99

MATHPOST              :          ----------[XXXXXXXXXXXXXXaXXXXmXXXXXXXXX]----  :
```

```
---------------- --------Descriptive statistics ---------------------------
Date/Time        05-25-1988  15:46:54
Data Base Name B:leidata
Description     Data base created at 12:43:37 on 05-24-1988

                              Detail Report

Variable: ATTENACT                    Break: ENROLLME = Enrolled

Mean - Average          173.1395     No. observations          43
Lower 95% c.i.limit     170.9309     No. missing values        0
Upper 95% c.i.limit     175.3482     Sum of frequencies        43
Adj sum of squares      2163.163     Sum of observations       7445

Standard deviation      7.17662      Std.error of mean         1.094424
Variance                51.50388     T-value testing mean=0    158.2015
Coef. of variation      4.144992E-02 T-test prob level         0.0000
Skewness               -3.237885     Kurtosis                  14.83906

100-%tile (Maximum)     180          90-%tile                  179
 75-%tile               177          10-%tile                  165
 50-%tile (Median)      175          Range                     43
 25-%tile               172          75th-25th %tile           5
  0-%tile (Minimum)     137
137--------------------------Line Plot / Box Plot---------------------------180
1                                              2 2  1 1 1 2  4 2 4 5 4 51 6 2
                                                 ------------[XXaXXmXXX]---

                                Box Plots

Break: ENROLLME = Enrolled
                      137                                                180

ATTENACT              :                                ----------[XaXmXX]--- :
```

```
----------------------------Descriptive Statistics----------------------------
Date/Time          05-25-1988  15:36:22
Data Base Name  B:leidata
Description       Data base created at 12:43:37 on 05-24-1988

                                   Detail Report

Variable: MATHPRE                          Break: ENROLLME = Non-enroll

Mean    Average          66.5814        No. observations          43
Lower 95% c.i.limit      60.32918       No. missing values        0
Upper 95% c.i.limit      72.83361       Sum of frequencies        43
Adj sum of squares       17334.46       Sum of observations       2863

Standard deviation       20.31564       Std.error of mean         3.098107
Variance                 412.7254       T-value testing mean=0    21.491
Coef. of variation       .3051249       T-test prob level         0.0000
Skewness              -9.463894E-02     Kurtosis                 -.879754

100-%tile (Maximum)      99             90-%tile                  94
 75-%tile                84             10-%tile                  42
 50-%tile (Median)       66             Range                     73
 25-%tile                53             75th-25th %tile           31
   0-%tile (Minimum)     26
26-------------------------------Line Plot / Box Plot-------------------------99
1  1   1       1    1  1  1    1  11213  3   1      11   11  21    1  2    111  12    1    2  1  1
                  --------------[XXXXXXXXXXXXXmXXXXXXXXXXXXXXXXXX]--------
--------------------------------------------------------------------------------
                                    Box Plots

Break: ENROLLME = Non-enroll
                      26                                                        99

MATHPRE               !                ----------[XXXXXXXXXmaXXXXXXXXXXXX]----------       !
```

```
-------------------------------Descriptive Statistics-------------------------------
Date/Time          05-25-1988   15:38:06
Data Base Name     B:leidata
Description        Data base created at 12:43:37 on 05-24-1988

                              Detail Report

Variable: MATHPOST                          Break: ENROLLME = Non-enroll

Mean - Average            63.61905        No. observations             43
Lower 95% c.i.limit       56.07249        No. missing values           1
Upper 95% c.i.limit       71.1656         Sum of frequencies           42
Adj sum of squares        24045.9         Sum of observations          2672

Standard deviation        24.21746        Std.error of mean            3.736836
Variance                  586.4855        T-value testing mean=0       17.02485
Coef. of variation        .3806637        T-test prob level            0.0000
Skewness                 -.3327486        Kurtosis                    -.8677563

100-%tile (Maximum)       99              90-%tile                     92
 75-%tile                 86              10-%tile                     36
 50-%tile (Median)        65              Range                        87
 25-%tile                 44              75th-25th %tile              42
  0-%tile (Minimum)       12
12----------------------------Line Plot / Box Plot-----------------------------99
2          1        122 1 1 31  1   1    1  2 21 3        2  22 32    2   211
                 -------[XXXXXXXXXXXXXXXXaXmXXXXXXXXXXXXXXXXX]------

                              Box Plots

Break: ENROLLME = Non-enroll
                          12                                                   99

MATHPOST                  :            -----[XXXXXXXXXXXXamXXXXXXXXXXXX]----
```

------------------------------Descriptive Statistics------------------------------

Date/Time   05-25-1988   15:47:10
Data Base Name   B:leidata
Description   Data base created at 12:43:37 on 05-24-1988

Detail Report

Variable: ATTENACT   Break: ENROLLME = Non-enroll

Mean - Average	168.1163	No. observations	43
Lower 95% c.i.limit	162.6245	No. missing values	0
Upper 95% c.i.limit	173.6081	Sum of frequencies	43
Adj sum of squares	13374.42	Sum of observations	7229
Standard deviation	17.84485	Std.error of mean	2.721314
Variance	318.4385	T-value testing mean=0	61.77762
Coef. of variation	.1061459	T-test prob level	0.0000
Skewness	-4.075106	Kurtosis	21.09537
100-%tile (Maximum)	180	90-%tile	179
75-%tile	178	10-%tile	155
50-%tile (Median)	173	Range	109
25-%tile	164	75th-25th %tile	14
0-%tile (Minimum)	71		

71----------------------------Line Plot / Box Plot----------------------------18
1   11   1 11 211 21311131628
                                                          --------[XaXXXmXXX]

Box Plots

Break: ENROLLME = Non-enroll
71   18

ATTENACT   :   -----[XaXmXX]

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Barretta, Pierce. Microcomputers in K-12 Education. Rockvile, MD: Computer Services Press, Inc., 1981.

Berk, R. A. Educational Evaluation Methodology: The State of the Art. Baltimore, MD: The Johns Hopkins University Press, 1981.

Best, John W. Research in Education. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1986.

Bohl, M. Information Processing. Chicago: Science Research Associates, 1980.

Bork, A. Learning with Computers. Billerica, MA: Digital Press, 1981.

________. Interaction in Learning. National Educational Computing Conference 2 (1982).

Campbell, Donald T. and Stanley, Julian C. Experimental and Quasi-Experimental Design for Research. Chicago: Rand McNally College Publishing Co., 1963.

Carin, Arthur A., and Sund, B. Robert. Developing Questioning Techniques. Columbus: Charles W. Merrill Publishing, 1971.

Cohen, D. and S. Cohen. The Kid's Guide to Home Computers. New York: Pocket Books, 1983.

Coleman, J. et al. Equality of Educational Opportunity. Washington, D.C.: United States Government Printing Office, 1966.

Collis, Betty. Computers, Curriculum & Whole Class Instruction Issues & Ideas. Victoria: Wadworth Publishing Co., 1988.

Deal, T.E. and S.C. Nutt. Promoting, Guiding and Surviving Change in Small School Districts. Cambridge, MA: Abt Associates, 1973.

Dorf, R.C. Computer and Man. San Francisco: Boyd and Fraser Publishing Co., 1982.

Dunkin, M.J. and B.J. Biddle. The Study of Teaching. New York: Holt, Rinehart & Winston, 1974.

Favaro, Peter J. Educator's Guide to Microcomputers and Learning. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1986.

Grambs, Jean Dresden and John C. Carr. Modern Methods in Secondary Education. New York: Holt, Rinehart, and Winston, 1979.

Guba, E.G. and Y.S. Lincoln. Effective Evaluation. San Francisco, CA: Jossey-Bass Inc., 1981.

Harrison, Grant. Training Theology to Tutor. University of California, Los Angeles: ERIC Document Reproduction Service, ED 014-900, 1969.

Hill, John C. Curriculum Evaluation for School Improvement. Springfield, IL: Charles C. Thomas, Publisher, 1986.

Issac, S. and W. Michael. Handbook in Research and Evaluation. Third Edition, San Diego, CA: robert Knapp, 1972.

Johnson, M. Clemens. A Review of Research Methods in Education. Chicago: Rand McNally College Publishing Co., 1977.

Krug, E.A. The Shaping of the American High School. New York: Harper & Row, 1964.

Lamb, Charles E. "Excellence in Mathematics Education--The Computer's Role." Sixth Annual Microcomputers in Education Conference. Rockville, MD: Computer Science Press, 1966.

Lotie, D. C. School Teacher: A Sociological Study. Chicago: University of Chicago Press, 1975.

Martin, Roy. Writing and Defending a Thesis or Dissertation. Springfield: Charles C. Thomas Publisher, 1980.

McCall, C. H. Sampling and Statistics Handbook for Research. Ames, IA: Iowa State University Press, 1982.

Meredith, J. C. The CAI Author/Instructor. NJ: Educational Technology Publications, 1976.

Milton, J.S., J.J. Corbet and P.M. McTeer. Introduction to Statistics. Lexington, MA: D.C. Heath and Company, 1986.

National Council of Teachers of Mathematics. Computer in Mathematics Education. Reston, VA: National Council of Teachers of Mathematics, 1984.

National Urban League. _This Comeback is for Real_. New York: Eric Document Reproduction Service, ED 034-246.

Rob, Roy. _The Use of Computers to Prepare Deficient College Students and Graduate Students for Courses that Build Upon Previously Acquired Information_. Troy, NY: Eric Document Reproduction Service, ED 034-410, 1968.

"Schools Climb Aboard Computer Bandwagon." _Los Angeles Times_, 27 November 1983, Sec. 4, p. 23.

Siezel, Suniy. _Nonparametric Statistics for the Behavioral Science_. New York: McGraw-Hill Book Co., 1956.

Spector, Paul E. _Research Designs: Series in Quantitative Applications in the Social Sciences_. Tampa, FL: Florida Mental Health Institute, 1981.

Taba, Hilda. _Curriculum Development and Practice_. Willard Spaulding (ed.) New York: Harcourt, Brace and World, Inc., 1962.

Torrance, E. Paul. "Motivating Children With School Problems." In E. Paul Torrance and Robert D. Strom, eds., _Mental Health and Achievement_. New York: John Wiley & Sons, Inc., 1965.

Turabian, Kate L. _A Manual for Writers of Term Papers, Theses, and Dissertations_. Chilcago: The University of Chicago Press, 1982.

Zender, Bryce F. (Editor/Translator). _Computers and Education in the Soviet Union_. Englewood Cliffs, NJ: Educational Technological Publications, 1975.

Wells, Stuart. _Effects of Varying Amounts of CAI in Math on Academic Performance of 446 5th and 6th Graders_. Princeton, NJ: ERIC Document Reproduction Service. ED 157 899, 1974.

Wolins, Leroy. _Research Mistakesin the Social and Behavioral Sciences_. Ames, Iowa: Iowa State University Press, 1982.

Articles

Allen, Vernon L. and S. Robert. "Low Achieving Children as Totors." _Learning Through Tutoring_. Wisconsin: Wisconsin University ERIC Document Reproduction Service, 1972, p. 7.

Becker, Henry J. "How Schools Use Micro-computers." Classroom Computer Learnings. September 1983, 41-45.

Bork, A. "Computers and the Future: Education." Computers and Education 8 no. 1 (1984): 1-4.

Earle, R. A. "Volunteer Tutors." Journal of Reading 15 (November 1971): 167.

Interviews

Agoura High School, September 17, 1987, Agoura Hills, California.

The Principal's Office, November 4, 1987, Agoura High School, Agoura Hills, California.

Botsford, Michael L. February 4 and May 6, 1988, Agoura High School, Agoura Hills, California.