May 1992

The Use of Computers to Enhance the Administrative Function in Tennessee Schools

Jerry W. Cole
East Tennessee State University

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The use of computers to enhance the administrative function in Tennessee schools

Cole, Jerry William, Ed.D.
East Tennessee State University, 1992
THE USE OF COMPUTERS TO ENHANCE THE
ADMINISTRATIVE FUNCTION IN TENNESSEE SCHOOLS

A dissertation
Presented to the Faculty of the Department of
Educational Leadership and Policy Analysis
East Tennessee State University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
Jerry William Cole
May 1992
APPROVAL

This is to certify that the Graduate Committee of

JERRY WILLIAM COLE

met on the

____ 19th ______ day of ______ March ______, 1992

The committee read and examined his dissertation, supervised his defense of it in an oral examination, and decided to recommend that his study be submitted to the Graduate Council and the Associate Vice-President for Research and Dean of the Graduate School, in partial fulfillment of the requirements for the degree of Doctor of Education in Educational Administration.

Chairman, Advanced Graduate Committee

[Signature]

Associate Vice-President for Research and Graduate Studies

[Signature]
ABSTRACT

A STUDY OF THE USE OF COMPUTERS TO ENHANCE
THE ADMINISTRATIVE FUNCTION IN TENNESSEE SCHOOLS

by

Jerry William Cole

The purpose of this study was to compare the levels of computer use by school principals in administering their schools. Comparisons were made of the different techniques being employed by school principals as they manage the vast amounts of data that are present in today's educational process. A comprehensive collection of computer applications was identified and school principals were surveyed regarding their use of these applications.

A random sample was selected from a population of 1,800 school principals in the state of Tennessee. School principals from 430 public schools and 70 private/parochial schools in Tennessee were surveyed for responses relative to their practices regarding the use of computers in the management of their school. Surveys were mailed in early January, 1992, to those principals who were identified in the sample selection. Surveys were received over a period of several weeks. A return of 71% was obtained.

Findings include the determination that schools have computers specifically for the purpose of completing administrative tasks. Principals and office staffs are using administrative computers to improve their management of school data. The primary areas identified as being performed by school principals were attendance, management of student data, wordprocessing, grade reporting, and transportation. Principals indicated that the major avenues for computer training is through seminars and workshops.

The major conclusions included the need for additional computer training in principal preparation curricula, exposure to innovative uses of computers to enhance the administrative function.
PROJECT TITLE: Dissertation: The Use of Computers to Enhance the Administrative Function in Tennessee Schools

PRINCIPAL INVESTIGATOR: Jerry Cole

The Institutional Review Board has reviewed the above-titled project on December 20, 1991 with respect to the rights and safety of human subjects, including matters of informed consent and protection of subject confidentiality, and finds the project acceptable to the Board.

Anthony J. DeLucia
Chairman, IRB
DEDICATION

To
My Wife, Penny Cole
and Our Children
Benjamin, Rebecca, and Bethany
For their support and encouragement.
ACKNOWLEDGMENTS

Sincere appreciation is extended to Dr. Charles Burkett, committee chairperson, for his encouragement, motivation, guidance, and expertise. His willingness to provide feedback and assistance in a timely manner helped me in meeting crucial deadlines.

Special gratitude is due Dr. Russell West for his patience, endurance, and expert assistance in the analysis of the data gathered for this study. Other members of my committee who provided encouragement, suggestions, and advice were Dr. Howard Bowers, Dr. Robert McElrath, and Dr. Cecil Blankenship.

Thanks are in order for all the members of Cohort I who encouraged one another and provided much support as we proceeded together through the completion of this goal. Their wonderful personalities, warm encouragement, and thoughtful consideration for the difficulties associated with completion of a degree while working in responsible positions were certainly a strong motivating factor.

Appreciation is extended to all members of Cohort III for their participation in the pilot study that preceded this study and to Mrs. Peggy Willocks for her help in reading, proofing, and correcting this effort.
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CHAPTER I

Introduction

Today's school administrator is truly functioning in an age of information and accountability. This Information Age is providing for school administrators vast amounts of information relative to students, teachers, teaching techniques, trends in test analysis, and many other valuable pieces of information that are useful in making decisions relative to school programs and curricula. Effective decision making often hinges upon the administrator's being knowledgeable of the variables involved in the decision.

In today's world (and even more in tomorrow's) timely, accurate, and appropriate information is a prime commodity. The communication and processing of information, whether in business, science, education, or government, has become one of the world's major endeavors.\(^1\)

Reductions in educational funding and increasing accountability demands are heightening the need to study school data. The management, retrieval, and evaluation of such data should result in improved decision making and projections.

The pace of change in the information age is much more rapid than it was during the preceding ones. Schools must respond more quickly, which means that school administrators must move with a sense of urgency to computerize the schools in order to keep pace with technology and the demands of society.\(^2\)

---

\(^1\) A.I. Forsythe et al., *Computer Science* (New York: John Wiley & Sons, Inc., 1975), iii.

The growing amount of data and documentation that schools are required to maintain is placing an overwhelming burden on school administrators. The enormity of the task of recordkeeping is evidenced in the necessity of recording daily events, operational data, and other accountability details.

Technology has created limitless opportunities for learning -- both in terms of the amount of information and knowledge that exists and the assessability of that information and knowledge.3

Current educational/tax reform is emphasizing the need for improved accountability along with reducing expenditure of funds in areas of administration. This reduction of administrative costs could decrease the number of administrators functioning in the school arena. Simultaneously, administrators are being held more accountable for the function of their schools and the planning, management, and envisionment necessary to operate an effective school organization.

Effective principals have the capacity and energy to closely monitor all aspects of the school program--teaching, learning, and the environment. Strong instructional leaders have the ability to analyze and manage resources in a way that allows the entire school community to realize its potential.4

School principals are finding that many of the current reform movements are outlining procedures focusing upon more efficiency and accountability. This focus highlights the need for constant evaluation of the methods being used and the identification and implementation of strategies that improve the efficiency of administrative procedures. This

3 William J. Cook, Jr., Strategic Planning (Montgomery: Cambridge Management Group, Inc., 1990), 64.

need for improved efficiency highlights the possibilities that are provided by the effective use of computers.

Communication within the knowledge work force is becoming critical as a result of the computer revolution in information. Throughout the ages the problem has always been how to get "communication" out of "information." The more we automate information-handling, the more we will have to create opportunities for effective communication.5

There has been a strong movement toward the use of computers in education for some time, and certainly there should be a presence of computers in the majority of schools because of this emphasis. "Even with the extraordinary potential of technology as a school reform tool, technology experts concede that formidable barriers stand in the path of reform. One of those barriers is a lack of vision about technology among administrators."6

Tennessee has seen the movement toward the use of the computer for management of student achievement in the areas of Basic Skills First, the provision of computers for student use through the Computer Skills Next program, the recording of student attendance, and the linking of schools across the state through interactive programs. These are but a few of the attempts that have been suggested statewide urging the use of computers in our schools by students, teachers, and administrators.

The ability to be creative in the development of techniques that will enhance the administrator's ability to manage data is becoming a skill that will provide many efficient methods for the management of school data,


and communication. "Principals should become involved with computers, if for no other reason than to be able to provide leadership in computer use." Creative software packages now provide the user with the flexibility to design and create a computer environment that will address specific needs in the school operation. These needs can be identified, and software packages that allow for customization can be used to monitor many of the time consuming requirements of the school administrator. Areas such as evaluation, budgeting, curriculum analysis, student achievement, discipline records, special education IEP's, and attendance recording are areas for which the school administrator is responsible. The creative administrator can establish methods for maintaining an accurate computer record of these areas while developing a data base that can be used to analyze trends, identify problem areas, and provide information that can be used to plan for the future.

The greatest impact of the computer lies in its limitations, which will force us increasingly to make decisions, and above all, force middle managers to change from operators into executives and decision-makers.\footnote{Drucker, 164.}

Such events and developments have presented school administrators with an avenue allowing them methods to better manage the request for improved accountability in the face of increasing data and recommendations for a reduction of administrative staff. The focus of this study is to determine if such avenues are in fact being explored by school administrators, and if more efficient methods are being employed to

analyze and manage school data and communication.

Eventually the computer—potentially by far the most useful management tool—should make executives aware of their insulation and free them for more time on the outside... The computer only makes visible a condition that existed before it. Executives of necessity live and work within an organization. Unless they make conscious efforts to perceive the outside, the inside may blind them to the true reality.⁹

**Statement of the Problem**

Technology exists, or will soon be available, in today's society that provides school principals with the opportunity to better manage school data and communication. This technology will allow school principals to store, access, and analyze school data in a manner that provides a detailed record of the school operation. From these data, school principals will be able to observe trend analyses, historical information, and additional data. When used effectively, these data will provide the administrator with the necessary information to make better decisions.

Are school principals using these capabilities in a manner that will help them to more effectively operate their schools? Are they interested in the development of the necessary skills to employ these capabilities in the operation of their schools? Are school principals aware of the current levels of sophistication in technology and how these capabilities might be used to more effectively operate schools?

**Purpose of the Study**

The purpose of this study was to investigate the level at which school administrators currently use computer technology to manage, store, and access school data and communication. The appropriate management of

⁹ Drucker, 17 - 18.
selected data could lead to techniques that would help develop an historical review of school procedures, identify current trends, and forecast future needs. The electronic management of these data should enhance the management of time as well as provide the ability to access and evaluate specific data. Data for this study was collected through the completion of a Computer Use Questionnaire.

Research Questions

The following research questions were posed in this study.

**Question I:**

Is computer equipment available in Tennessee Schools for administrative purposes?

**Question II:**

What specific types of computer equipment and peripheral devices are available for administrative purposes?

**Question III:**

When available, are administrative computers being used in a manner that is appropriate to the administrative function?

**Question IV:**

For what specific tasks are computers being used by administrators?

**Question V:**

Are School Administrators identifying and applying computer solutions to help improve the administrative function?

**Question VI:**

How much time does the principal and staff spend with the computer doing administrative tasks?
Question VII:
Are school administrators at the elementary level using computers more or less than administrators at the secondary level?

Question VIII:
How are school principals and associated administrators receiving their training in computer use for administrative purposes?

Hypotheses
The following research hypotheses in null format were tested:

H$_{01}$.
There will be no significant relationship between the availability of computers in the schools and their use for administrative functions.

H$_{02}$.
There will be no significant relationship between the size of the school and the use of computers for administrative purposes.

H$_{03}$.
There will be no significant difference between rural, urban, and suburban school administrators in terms of their use of computers for administrative purposes.

H$_{04}$.
There will be no significant relationship between the use of computers for administrative purposes and the per pupil expenditure of the school system.
H₀⁵.
There will be no significant difference between the use of computers at the elementary level and the secondary level in terms of their use for administrative functions.

H₀⁶.
There will be no significant difference between the use of computers for administrative purposes in public, private, and parochial schools.

H₀⁷.
There will be no significant difference in the amount of time principals use computers in terms of various time periods that have passed since the principals last attended school.

H₀⁸.
There will be no significant difference in the amount of time principals use computers in terms of selected levels of education.

H₀⁹.
There will be no significant difference in the amount of time principals use computers in terms of selected categories of experience.

H₀¹⁰.
There will be no significant difference in the amount of time principals use computers in terms of the amount of computer education in three categories.

Significance of the Problem

Change is certainly a primary ingredient in today’s education. Many significant proposals are being recommended as the public seeks to hold
educators accountable for improvements in the educational process. "In fact, it may be that education itself is being totally redefined. Technology has created limitless opportunities for learning—both in terms of the amount of information and knowledge that exists and accessibility of that information and knowledge."¹⁰ Many of today's leaders and futurists are endorsing the qualities of computerization. The leadership at IBM states that in the future, technology in the nation's schools will be one of the keys to educational quality. "It can help lower dropout rates, enhance student achievement, and most importantly, raise self-esteem, as well as inspire educators to provide more time for teaching."¹¹ Funding and accountability are fast becoming two of education's primary concerns. This study will investigate the degree to which school efficiency and effectiveness might be improved through the use of the computer to assist in the management of school data, and communication.

As the knowledge explosion continues in this age of information, it becomes more and more important that school principals attain the skills necessary to access those items of information that are important to the effective operation of schools. These items of information and the trends that they determine, are helpful in making the appropriate decisions relative to future directions. In the interest of being timely, these trends and demographic data will be of great assistance as principals attempt to make quality decisions. During the past decade, modern computers have revolutionized the amount of information available to an organization.

¹⁰ Cook, p. 64.

“Many decisions that were once made at upper levels can be made closer to the immediate situation.”

A careful analysis of student data will often provide insight into those areas in need of improvement. Analysis of areas such as achievement, testing methods, attendance, student potential, and curriculum analysis will provide the administrator with information that can be used to improve future practices. A good example of such a possibility would be the tracking of student achievement through the various domains of an achievement test. Such tracking, if done over a period of years will provide information that identifies those areas most often the lowest in student achievement. A careful examination of the curriculum and/or teaching strategies in these areas could help to identify weaknesses that allow for lower levels of achievement.

The principal has been identified by many educators and past studies as the most important individual in the school environment. It is through one's leadership that many of those intangible concepts such as school climate, human relations, student achievement and school effectiveness are developed. The Select Committee on Equal Educational Opportunity of the United States in a 1973 report described the role of the school principal as:

... The one who set the tone for the school, the climate for teachers, and the degree of concern for students' futures. The report stated that, the principal’s performance largely determined the attitudes of students and parents, and provided the main link between school and community.


Limitations and Delimitations

The limitations of the study included those associated with population, instrument for measurement, design, and time of the study. The study was confined to the population of school principals in the State of Tennessee and to the results obtained from one instrument and to one sampling of the population. Generalizations to other areas can be made only to the extent that they are similar to the geographic region chosen for this study.

The study was limited to a random sample of five hundred principals taken from a population of 1,800 principals in Tennessee school systems. The inventory instrument used in the study was the sole source for obtaining data from principals in Tennessee.

The study was limited to the time of the research, conducted during the 1991-1992 school year. The results, therefore, were valid only for the time they were given and may have limited applicability for the future. While projections of subjectively interpreted results are common to all social science research, the importance of understanding groups of people specifically and within institutions has led researchers to continue this kind of investigation.

The study was limited to those principals listed in 1990-1991 Directory of Public Schools, Approved Nonpublic Special State Schools, and the State Department of Education, State of Tennessee.

The validity of the test instrument for use with educators may be in question since no evidence exists to its use, beyond development, with education.
Assumptions of The Study

It was assumed that the majority of Tennessee schools have and use computers for instruction and administrative functions. Through this use, educators have become familiar with and understand the possibilities that the computer provides.

Definition of Terms

Following is a list of terms used in this investigation. Subsequent use of the terms relate to the definitions that follow:

Algorithm

"An algorithm is a list of instructions for carrying out some process step by step."14

"An algorithm is a prescribed set of well-defined, unambiguous rules or processes for the solution of a problem in a finite number of steps. Algorithms are commonly used as integral parts of computer programs. Thus the study of computers and the study of algorithms are closely related subjects."15

Access

"Access is generally, the obtaining of data."16

Barcode

"A barcode is a label containing lines, or bars, which provide

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16 Spencer, p. 2.
information unique to that item."\textsuperscript{17}

**EDP**

"Electronic Data Processing."\textsuperscript{18}

**CPU - Central Processing Unit**

"The Central Processing Unit is a major component of a computer system with the circuitry to control the interpretation and execution of instructions."\textsuperscript{19}

**Chip**

"A chip is a small component that contains a large amount of electronic circuitry. A thin silicon wafer on which electronic components are deposited in the form of integrated circuits. Chips are the building blocks of a computer and perform various functions, such as doing arithmetic, serving as the computer's memory, or controlling other chips."\textsuperscript{20}

**Cohort III**

School leaders comprised of principals, assistant principals, and central office certified staff are the participants in a program of graduate studies at East Tennessee State University. This group has been identified as Cohort III.

\textsuperscript{17} Celia Watson and Bill Morgan, "The Principal As Manager" Electronic Learning: Special Supplement, (September, 1989), p. 31.


\textsuperscript{19} Spencer, p. 40.

\textsuperscript{20} Spencer, p. 43.
Database

"Most generally, a database is any clearly identified collection of data, such as a telephone book or the card catalog at the library. In theory, a database should contain all its information in one central store or file, each record in the file containing roughly the same type of information—such as name, address, city, state, zip code, area code, and telephone number. Each of these categories is called a field, while a record consists of a set of fields pertaining to one person or item. The database file is made up of a number of related records. Some people differentiate between a data base (two words), meaning an underlying collection of data in the real world, and a database (single word) as a coherent collection of data entered into a computer system. As applied to data in the computer, it particularly means data organized so that various programs can access and update the information."21

Word Processor

"A word processor is a computer program that provides for manipulation of text. (Can be used for writing documents; inserting or changing words, paragraphs, or pages; and printing documents.)22"

Spreadsheet

"A spreadsheet is any one of a number of programs that arrange data and formulas in a matrix of cells. (Has wide range of business uses, including What if considerations. VisiCalc is the best-known of the

---

21 Spencer, p. 74.

22 Spencer, p. 312.
commercial spreadsheets. Also called plansheet and worksheet.\(^{23}\)

**School Data**

School data are data generated through the daily operation of schools. Some examples are the financial accounting process, classroom assignments, attendance, and regular written communication.

**Communication**

"Communication is (1) the flow of information from one point (the source) to another (the receiver), (2) the act of transmitting or making known. (3) Process by which information is exchanged between individuals through the use of a commonly accepted set of symbols."\(^{24}\)

**Modem**

"A modem is a device that translates digital pulses from a computer into analog signals for telephone transmission, and analog signals from the telephone into digital pulses the computer can understand. Modems provide communication capabilities between computer equipment over common telephone facilities."\(^{25}\)

**Interface**

"An interface is a point of meeting between a computer and an external entity, whether an operator, a peripheral device, or a communications medium. An interface may be physical, involving a connector, or logical, involving software."\(^{26}\)

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\(^{23}\) Spencer, p. 274.

\(^{24}\) Spencer, p. 50

\(^{25}\) Spencer, p. 192.

\(^{26}\) Spencer, p. 153.
**Student Data**

Student data is defined as various items of information that are maintained relative to student attendance, achievement, health, and necessary demographics.

**Principal**

A principal is the administrative head and professional leader of a school division or unit; a highly specialized, full-time administrative officer in large public school systems, but usually carries a teaching load in the smaller ones, in public education, usually subordinate to a superintendent of schools.  

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**Microcomputer**

"(1) A microcomputer is the smallest and least expensive class of computers. They are fully operational computers that use microprocessors as their CPU. Used in the home as personal computers; also widely used in schools and businesses. (2) Any small, low-cost computer that performs input, processing, storage, and output operations following a set of instructions."  

**Minicomputer**

"A minicomputer is a digital computer distinguished from a microcomputer by higher performance, more powerful instruction sets, a higher price, and a wider selection of available programming languages and operating systems. Distinguished from a mainframe by smaller size, lower cost, and less data-handling capacity. Minicomputer systems are

---


"Spencer, p. 188."
divided into four operational classes, mini-, midi-, maxi-, and superminicomputers.\(^2\)

**Perception**

A perception is a direct or intuitive cognition, a capacity for comprehension, insight.\(^3\)

**Organization of the study**

The study was organized into five chapters.

Chapter 1, *Introduction*, includes the introduction, the statement of the problem, the purpose of the study, the research questions, the research hypotheses, the significance of the problem, the limitations, the definition of terms, and an organization of the study.

Chapter 2, *Review of Relevant Literature*, provides the theoretical and research background for the present study by reviewing the relevant literature related to the administrative use of computers.

Chapter 3, *Methodology*, describes the methodology and procedures used in the study to obtain research data. This section includes the description of the study, sample selection, instrumentation, population parameters, reliability and validity procedures, data collection procedures, and data analysis.

Chapter 4, *Presentation and Analysis of Data*, contains the presentation, analysis, interpretation and discussion of the findings.

Chapter 5, *Summary, Conclusions, and Recommendations*.

\(^2\)Spencer, p. 191.

\(^3\) (Webster, 1969, p. 626).
summarizes the findings, presents the general conclusion of the study, and provides those recommendations that seem appropriate.
CHAPTER 2
REVIEW OF LITERATURE

Introduction

With the introduction of computers into the field of education in the early 1950s, school systems embarked upon a new technology. "Commencing in the 1950s, many schools began using computers to do administrative data processing."\(^{31}\) This advanced technological addition to our society brought about many concerns and fears among educational professionals. It was difficult for one to envision the practical applications the computer could provide the educational community and comprehend the power that it could bring to the workforce.

The first computers were large mainframe devices that often were operated by specialists. These machines were complicated and difficult to operate, generating many fears and concerns within those not having an opportunity to become acquainted with the device. As the development of computers continued, the microcomputer was developed and many people were able to have hands-on experience, as well as the opportunity to explore and envision the possibilities that the computer provided.

As computers became more common among the workforce of America, the concerns moved toward methods of access and specific problems associated with the types of computer -- mainframe, minicomputer, or microcomputer. Underlying much of the discussion, however, was a concern that the potential of computers in education was

not being fully realized. The largest part of the literature was intended to
give educational practitioners, particularly administrators, better
knowledge of how to take advantage of computer technology.

**Brief Historical Development of Computers**

Tracing the historical development of computers from earliest efforts
to the microcomputer as we know it today was included in much of the
literature.

"In the past thirty years, computers have moved from the margins of
our existence into the center of our lives. Few technologies have come so far
so fast." Computers have evolved naturally through the centuries moving
from the early methods of using ones fingers or stones to early counting
devices such as the abacus. In today's world the computer uses electronic
impulses to solve complicated problems.

As a result of technological innovations during the last thirty years,
the costs of computing have come down from more than $1.25 for
100,000 multiplications in 1952 to much less than a penny today. It
has become feasible to use computers today for applications that
would have been uneconomical only a few years ago.

"Like the telephone, television, the automobile, and the airplane, the
computer has transformed our world." The development of the vacuum
tube and subsequent development of the transistor, provided the necessary
components for computer technology to move rapidly through our society.

Early counting methods involved simply counting objects, or using

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*Spencer, Donald D., *An Introduction To Computers* (Columbus:

"Spencer, 57.

"Spencer, 57.
ones fingers for smaller problems. One of the earliest counting devices was
the abacus. It was used by merchants and trades people. Additional
counting devices were developed by such famous people as Blaise Pascal,
Gottfried Wilhelm Leibnitz, and J.H. Muller. One of the most important
eyearly developments was originated by Charles Babbage. "Babbage, a man
before his time, attempted to develop the largest difference engine anyone
might ever want which was accurate to 20 digits and produced printed
output."35

All the early counting machines were mechanical devices. They
used gears, levers, and pulleys as a method of operation. They were often
unreliable and were quite large. With the advent of the electronic age,
came the development of many innovative counting devices. In the
beginning of this age the machines were electromechanical. Electricity
was used to control mechanical relays. "The first relay computer was
called the 'complex calculator' and is believed to have been the first
computer to employ binary components."36 Several machines of this type
were developed in the early 1900s, and precipitated the development of
much more innovative equipment.

The period of time from 1942 to 1958 was a time when the first
generation of electronic computers was developed. "Vacuum tubes, flipped
on and off like switches, and could count thousands of times faster than
moving mechanical parts."37 Several larger computers were developed

35Spencer, 61.
36Spencer, 67.
37Spencer, 68.
during this period by such companies as UNIVAC and IBM.

This was a period of great technological advancement. Many new electronic creations were developed during this period. "The transistor was invented by Bell Laboratories in 1947."\textsuperscript{38} This development of the transistor allowed conversion from vacuum tubes, with their problems of size, heat, cost, slow speed, and fragility, to smaller, faster, movable, durable, and less expensive semiconductor systems.

The period from 1959 to 1963 was the period of second-generation electronic computers. The development of the transistor brought many new possibilities but, "it's often a long road from invention to application."\textsuperscript{39} Transistors were small and could be packaged tightly. They produced much less heat and responded more quickly.

In 1959, more sophisticated computers arrived—ones that used transistors for arithmetic, magnetic cores for memory, and magnetic disks or tapes for storage. Now the computer could multiply two 10-digit numbers in $1/100,000$ of a second.\textsuperscript{40}

The third-generation computer era was from 1964 to the early 1970. It was characterized by much development and miniaturization of circuitry. During this time the ability to etch electronic circuits eliminated the need for complicated wiring that required more space. It was during this time that one of the more important advancements in computer development occurred. "The most important advance in computer

\textsuperscript{38}Spencer, 74.

\textsuperscript{39}Spencer, 74.

\textsuperscript{40}Spencer, 74.
technology in the mid-1960s was the integrated circuit." Integrated circuits (chips) are single units containing many components. These chips are made of thin layers of silicon or germanium and are so tiny that thousands could occupy the same space as a pencil eraser. The use of these chips allowed for a reduction in the size of etched circuits and less wiring. Integrated circuits were very reliable, easy to replace, and inexpensive to manufacture.

The fourth-generation of electronic computers was from the early 1970s to present. "In the early 1970s the IBM Corporation began delivering its System/370 computers." These were larger, mainframe computers and were designed primarily for business, industry and government applications.

In the late 1970s and early 1980s microminiature circuits were used by a variety of manufacturers to produce microprocessors, microcomputers, memory chips and other computer circuitry. By 1981, hundreds of thousands of microcomputers were being used to accomplish work in a wide variety of areas.

Altair, the first personal computer, was announced to the public in 1975, in an article in Popular Electronics magazine. The Altair, named after a planet in a Star Trek episode, was a homemade computer of very limited capability. It kept hobbyists at work and gave a focus to the developing community of technologists who were exploring electronics.

The introduction of the PET, by Commodore Computers in 1977, expanded the use of computers beyond engineers and hobbyists. The PET,

"Spencer, 74.

"Spencer, 79.

"Spencer, 79.
with its typewriter-style keyboard, facilitated computer data entry. Unlike the Altair kit, the PET was already assembled in modules and had only to be plugged together to be put into use. Maintenance also was simple and uncomplicated.

Other manufacturers were not far behind. Within days of the announcement of the PET, Radio Shack announced its first microcomputer, the TRS-80 Model 1. The Apple II computer came on the consumer market in 1977 and quickly moved out in front in sales due to its ease of adaptability, disk drive storage, and eye appeal.

Possibilities that will be presented by future generation computers leave much to the imagination. Technology is advancing so rapidly in today's world that it is difficult to envision the possibilities of tomorrow. Miniaturization continues to provide many possibilities and the future will surely include many electronic marvels.

**General Studies**

After the defense industry, education is the largest national industry. It should be noted that the defense industry is already making extensive use of computers. The rapid advancing of computer development was due in part to the needs of the defense industry. The management and operation of today's schools have become increasingly difficult. Confronted with the task of operating schools within the boundaries set by regulating agencies and goals for improvement, administrators should be turning to computer technology. Application of computer technology by schools could help with much of their work. "Like business and science, schools need to acquire knowledge, to manage information, and to organize programs. Yet, it is noted that schools are lagging behind business and science in
appropriating the new technology.\textsuperscript{44}

Gerard cites the benefits of computer technology in that computers allowed access to information that was not previously available. "A great benefit is the speed with which computers can process information to solve problems."\textsuperscript{45}

An efficient computer information system should reduce time expended on clerical or paperwork tasks. When used properly, it would produce accurate information, ensure generation of reports, and facilitate the decision making process. The savings of time realized through the use of computers would provide the administrator additional opportunities to be more accessible to students and staff. This reapplication of time saved would provide the school principal the opportunity to increase the overall level of productivity. It has been hypothesized that the efficient use of a single microcomputer by a principal, could save up to 25 eight-hour days, in a single school year.

Bruer, in his 1984 article, 'Microcomputers and Management Information Systems: An Emerging Partnership' not only commends the ability of computers to process information, he states that computer technology is becoming a necessity in the administrative process. Business and institutional administrators are seen as using microcomputers "as a


basic tool of the trade."\textsuperscript{46}

Gustafson perceives a potential of great magnitude. Acknowledging the impressive influence computers have already had on society, the impact of microcomputers on schools may be revolutionary. "The power of the technology is just beginning to surface."\textsuperscript{47}

Pogrow in an NASSP Bulletin Special acknowledges the push into computer technology as being simply one of need. The many functions of a school are more complex than the functions of a business of the same size. "Most schools store a variety of information in many different files. Despite these records, the information needed to solve any one problem is almost never in one place."\textsuperscript{48} With reducing financial and personnel resources to command, school administrators must turn to computers to get their jobs done. "Paperwork is the most mismanaged resource in education."\textsuperscript{49}

Mojkowski has very definite views as to the importance of using the microcomputer in the administrative environment of today's schools. "The decisions principals make now about using technology are critical to their


\textsuperscript{49} Pogrow, p. 45.
growth as leaders and managers and to the improvement of our schools.\textsuperscript{50} Mojkowski continues by saying that simple automation is not enough. It is his feeling that renovation and innovation are important concepts as administrators implement the use of computers in their respective environments.

Pogrow in another reading stated that "Computers can't make poor managers better, but they can make good school executives more efficient."\textsuperscript{51} Computers have the potential to reduce your school or school system's paperwork by as little as 50 percent or as much as 90 percent—but only with careful assessment of your needs and informed review of the administrative software now available.\textsuperscript{62}

Administrators must work together to develop technological systems that include the entire school system. It is important that individuals work within the framework of the entire system when developing computerized management practices. "As we head into the 1990's, we must keep pace with accelerated technological advancements to remain competitive."\textsuperscript{53}

Administrators in their zeal to remain competitive and develop innovative methods that help them to manage their environments must be careful to


\textsuperscript{52} Pogrow, p. 26.

broaden their perspective. “An essential but often overlooked element of developing an effective organization is assuming a system perspective.”

The National School Boards Association in cooperation with Josten’s Learning Corporation, produced a report prescribing certain policies and planning strategies to be used in implementing educational technology programs. In this report it is stated that; “In the long run, technology can result in productivity gains by expediting record-keeping, reporting, and other classroom and office management functions.” While productivity increases can be realized, it is important to point out the need for proper training and staff development. Technological advances are not without their demands for the proper training and use.

Vigilante, in a paper entitled “Computer Systems for Urban School Administrators: A Guide for Decision Making,” affirms that “Computerized information systems can enable the school administrator to achieve many management objectives more effectively and efficiently than formerly possible and to achieve other objectives never before possible.” He provided an array of methods that might be used in making decisions about the process of implementing a computer system. The areas he considered included administrative applications, research applications, computer-assisted instruction, computer-managed instruction, and

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1Honeycutt and Richards, p. 42.


computer literacy.

Connors and Valesky in their Phi Delta Kappan Fastback stated that "One of the most important benefits of computerizing school administrative functions is that decisions can be based on more complete and more recent data, helping administrators make more informed and timely decisions in a variety of areas." It was their contention that the microcomputer can be used to accomplish school administrative tasks more easily, in less time, and for less money.

A recent survey of superintendents conducted by the AASA across the United States and Canada has revealed that "many U.S. and Canadian school districts have made strong efforts in educational computing and are planning to make even more." This survey was sent to 1200 school superintendents across the U.S. and Canada. It was their sentiment that much has been done but that there is much to be done. They cited costs as the greatest obstacle in their efforts to integrate computers into the school environment.

Many of today's educational reform movements are being chided for "taking a horse-and-buggy system and repainting the buggy, paying the driver more, keeping the passengers in it longer and foolishly expecting it to go faster and better." Prophet, the superintendent of the Portland,

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"Dick Ricketts, "Superintendents Say: Much Done, Much To Do," The School Administrator (Special Issue, 1990), p. 10.

"Matthew W. Prophet Jr., "The Best Laid Plan Does Work," The School Administrator (Special Issue, 1990), p. 34."
Oregon schools, suggests that these movements should focus on the implementation of modern data and information-systems to enhance the probability of school improvement. The Portland, Oregon school administration indicates that they are moving away from the past methods. "We believe we're putting a powerful engine in the educational buggy, turning the driver loose, and riding off swiftly toward meeting the goal of helping every student become everything he or she can and wants to be."60

According to Dede, "futurists use the term 'improvement' to mean doing the same things more efficiently, which then produces moderate gains in productivity."61 While this method will provide modest gains in methods and improvements in the education process, this does not seem to be the solution for restructuring the educational environment. "In a generation, the emerging technology intensive paradigm for education will completely reshape today's classrooms and school."62

**Common uses for Microcomputer**

**In Schools**

Administrators in the educational arena are rapidly adapting to the advantages offered by microcomputers. The vast number of opportunities for more efficient organization of daily office tasks and record keeping requirements are being implemented in school administration throughout the country. In the early 1970s instructional applications of computers, such as computer-assisted instruction, computer-managed instruction,

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60 Prophet, p. 34.

61 Christopher Dede, "What Will The Future Hold For Schools and Technology?" *The School Administrator* (Special Issue, 1990), p. 39.

62 Dede, p. 39.
and computer-assisted testing were being implemented in the schools. Today, "educational administrators are learning how to thrive and survive with microcomputers." Tremendous improvements have been made in microcomputer design and storage capacity. Microcomputers have not developed to the point that they could replace mainframe computers but certainly have the capacity to supplement and automate tasks never before thought feasible. "Computers have become smaller, smarter, faster, less expensive, and easier to use than any product of the industrial revolution."

Crawford in his article written for "The Practitioner," a quarterly publication of the Research Department of the National Association of Secondary School Principals, identified four situations that would generally justify the use of a computer:

When Do You Use A Computer?

"Four situations would generally justify the use of any computer:
- When massive amounts of data are processed through well-defined operations
- When data processing is highly repetitive
- When processing speed is important
- When the task can be performed by a computer, and manual performance is not practical."  


"Crawford, p. 1.

"Crawford, p. 1."
Crawford in the same article identified 16 administrative functions in education that have one or more data processing tasks a microcomputer can perform:

1. "Athletics
2. Attendance accounting
3. Budgeting
4. Financial accounting
5. Food service
6. Grade analysis & reporting
7. Guidance
8. Information from databanks
9. Instructional management
10. Inventory and property records
11. Media center
12. Planning
13. Scheduling
14. Staff/Personnel records
15. Student records
16. Student transportation"

Crawford, in his study conducted in the Florida schools, determined that 53% of the computer usage fell into the areas of student records, scheduling, attendance accounting, and grade analysis and reporting. It is possible for these areas to share much of the same information. "Software producers, therefore, have developed comprehensive packages that address all four functions."

Student Records

An implemented student information system allows the creation of an integrated database on students that can be updated and maintained in an orderly, effective, and efficient manner. This information can be stored, analyzed and retrieved in a variety of reports and formats. "A student records system will store and retrieve basic information about each

"Crawford, p. 2.

"Crawford, p. 2."
These items of data are usually stored in areas called 'fields.' These fields include such items as first, middle and last names, sex, ethnic group, age and birthdate, student identification number, parents' or guardians' names, address, and phone number, homeroom, locker number, and more. "A well designed system permits the user to define additional items of data (fields) unique to each school's setting."

The maintaining of student records is rapidly becoming an enormous task for the local school administrator. Many requirements are forcing the maintenance of new records regarding individual student progress, attendance, and achievement. "The increasing complexity of state records requirements has added to the recordkeeping burden. Fortunately, computers have vastly simplify the whole process."

Many software packages available today provide methods by which identifiers may be attached to student records. These identifiers allow the administrator to extract the records of specific grouping of students as identified by the administration, coaches, music teachers, or other school personnel. "The CIMS III feature, TAGS lets the administrator track certain user-defined groups of students." CIMS III is a comprehensive software package produced by The National Computer Systems for the maintenance of school data. "The TAG system is flexible. Students can be

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"Crawford, p. 2.

"Crawford, p. 3.


given any number of TAGs and tracked in any number of ways.\textsuperscript{72}

\textbf{Scheduling.}

"Scheduling software performs tasks ranging from student locator to master schedule generator."\textsuperscript{73} Efficient scheduling software packages permit the school to make multiple attempts at developing master schedules. This allows administrators to review multiple arrangements and select the most appropriate one with the fewest conflicts. The development of a comprehensive master schedule has a dynamic effect upon the total school program.

Crawford suggests that scheduling software for microcomputers can:

1. "Generate a master schedule from student requests and produce a conflict matrix"
2. Test student requests against various combinations of course offerings while producing conflict matrices
3. Balance section assignments for number, sex, and ethnic group
4. Provide for prerequisites, corequisites, and priority assignments for required courses
5. Block schedule courses for specified groups of students
6. Schedule four quarters of up to 32 course selections for 10-day periods with continuity for semester and year courses
7. Show alternate sections and permit reassignment for any period

\textsuperscript{72}Buoni, p. 7.

\textsuperscript{73}Crawford, p. 3.
8. Print individual student schedules, alphabetized class rosters, and staff assignments
9. Determine room use for all periods
10. Report unassigned periods for students, staff, and rooms.\textsuperscript{74}

Software packages for scheduling are becoming very complex as they attempt to offer the administrator a greater variety of options in determining scheduling possibilities. This complexity carries with it great demands upon the capabilities of the microcomputer. Future packages should have the capability to handle variable length periods, that will test almost any relationship involving scheduling data.

\textbf{Attendance Accounting.}

"Attendance accounting software collects and organizes absence and tardy information as well as twenty-day or monthly, six-weeks or nine-weeks semester, and yearly records."\textsuperscript{75} Student attendance is a matter of concern to school administrators and teachers. For many school systems, attendance is the vehicle through which the system receives their funding. The monitoring of attendance is an area that can be handled very efficiently by microcomputers. Crawford identified the following attributes which quality attendance packages should include:

1. "Capability of using optical mark scanners or card readers for speed and accuracy of data entry
2. Capacity to record up to 16 categories of absences
3. Weekly, daily, and periodic reports of absentees, attendance exceptions, and attendance profiles

\textsuperscript{74}Crawford, p. 3 - 4.

\textsuperscript{75}Crawford, p. 4.
4. Lists of absentee parents' names with phone numbers in school-specified categories

5. Form letters addressed to parents after a specified number of absences of certain types

6. Automatic dialing of home phone numbers during school as well as evening hours with recorded messages to parents and with a provision for parental responses

7. Transfer of attendance data to grade reports.  

Grade Analysis and Reporting

Grade reporting was one of the first computer applications to be implemented in the school administrative environment. Managing grade reports by computer offers several advantages. It reduces personnel time and costs, improves the accuracy of the reported information, speeds up the preparation and reporting procedure, and provides a variety of supplementary reports that can be used by counselors and administrators to evaluate the curriculum and student progress.

"Grade analysis and reporting software produces student grade reports as well as final transcripts, grade point averages, and class rankings." Quality packages in this area would include selection of honor roll students, printing of failure and incomplete lists, determination of athletic eligibility, and analysis of grade distributions for individual teachers, subjects, department, grade levels, or any other variable selected.

"Specialized software is the choice for production of student grade reports, grade point averages, class ranks, transcripts, and analyses of

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*Crawford, p. 4.

*Crawford, p. 5.
It was reported by Crawford that more than 70% of the software recommended by principals for grade analysis and reporting is specific to this function.

Creative administrators will continue to find many uses for the microcomputer in their workplace as they enhance the operation of today’s schools. These four uses, which have been discussed, represent but a few of those listed by Crawford in his study that was conducted in the Florida schools.

**Current Trends**

Stanley Pogrow in his article, “Administrative Uses of Computers: What Is the Ideal System? What Are the Trends?” written for the NASSP Bulletin in December, 1985 listed eight new trends affecting computer use in schools. Pogrow listed these trends as:

1. "A rapid increase in the number of companies producing administrative software for schools and the rapid growth in the quality of available programs, for both minis and micros.
2. Purchasing software from vendors instead of developing it in-house.
3. A move away from consortia and service bureaus and toward purchasing and operating one's own computer--especially for student management applications.
4. School systems are moving away from the central computers toward distributive processing--a process where computer and computer processing are spread throughout the district.
5. The computerization of more administrative applications. The

*Crawford, p. 6.*
most commonly computerized student management applications have been attendance, grade reporting, and scheduling. The newest ones are: library management, IEP management for special education, and robot callers.

6. The use of new devices to make existing applications more efficient. Time saving equipment such as scanners and bar code readers to replace keying and punch cards.

7. More direct involvement by principals and staff in working directly with computers--both in terms of helping to select them, formatting reports, and entering requests for information.

8. More powerful systems--both at the local school and district office--and greater communication within and between sites.  

The implications for this is that “the availability of more effective computer systems means that we are reaching a point where paperwork can be vastly simplified.”

Using Raw Data to Provide Useful Information

“Data is the raw material. Information is what you get when you make that data easily available and build with it.” Administrators will be able to use the collection of student data to determine the possible answers to many questions. The number of course requests can be used to

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"Pogrow, p. 47-52.

"Pogrow, p. 52.

determine the number of classes needed in each subject area when developing a master schedule. Lack of student success might be tracked through student history to inadequate preparation. When administrators have the ability to extract the necessary data regarding their school and its population, they will be able to plan more efficiently.

**Wordprocessor**

The most often used computer tool is the *Wordprocessor*. In today's office environment, wordprocessing is the rule rather than the exception. All correspondence, form letters, long documents, and contracts are developed and constructed through the use of a wordprocessor.

**Spreadsheets**

Spreadsheets can be used to track budget data. Through the collection of data and development of histories, trend analyses can be developed in various budget areas to provide information regarding expenditure/fiscal demands. An examples might be the tracking of monthly expenditures for electricity use by various schools. The collection of these data over a period of years will enable the fiscal agent to project the monthly expenditures for each school. This historical accounting can then be used to project future electrical budgets. Another view of this information might reveal schools having abnormally high demands and lead to steps to correct inefficiencies. Similar information can be maintained and tracked within many of the business activities of a school system. Many reform movements are being implemented across our country and are now requiring more accountability of local school districts. State governments are asking that local system forward reports and information regarding the local school systems to the State Departments of
Education. Much of the required information, if kept efficiently, can be generated from the proper records.

Databases

Databases can be used to maintain records of almost any nature. Currently available databases are very flexible and can be designed and adapted to perform almost any imaginable task. Shalvoy and Morgan reported in their writings of office automation about a school systems use of a database management program to maintain and prepare information for an annual safety hazard survey. In this survey, the Pinellas County School System tracked safety problems such as crumbling sidewalks or busy intersections without crossing guards. This enabled the system to take steps to correct these possible problems prior to their becoming a greater issue.

There are many benefits to implementing an office automation system in each school. It is often hard for administrators to realize the benefits because the first phase of turning data into information is often time consuming and without much return. The first year is usually spent moving student data out of file folders and onto the computer. The second and third years this burden will be lessened, but it is important to update school data continuously.

The real benefit becomes more apparent when data have been entered into the computer and can be analyzed to discover trends, needs, and

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2 Shalvoy and Morgan, p. 16.

3 Shalvoy and Morgan, p. 16.
Once the system and the data are in place, administrators can begin to look for historical information and develop "what-if" situations. These scenarios are very valuable in tracking student discipline records, attendance, and other factors contributing to student drop-outs.

The main goal is to deliver a better educational system. When looking at a student's entire record, a counselor can do a better job of designing a course structure. In the same way, if a principal has all the information, he or she can deal more effectively with parents who come in to discuss their child. Information can reaffirm that what one is doing is correct. It is important that principals become aware of this opportunity and make all the necessary arrangements to improve their school's performance.

Shalvoy and Morgan suggested that there are four good reasons that school systems should implement an office automation system:

1. "An integrated computer system can solve problems in dealing with state mandates in producing and filing reports and test results.

2. A centralized printing system can alleviate the paper burden, and at the same time, customize reports at the school level.

3. A networked automated system closes the communication gap among a group of separate and different schools, and eases the transfer of important information from person to person.

4. A network creates the opportunity for electronic mail, and

"Shalvoy and Morgan, p. 17.

"Shalvoy and Morgan, p. 17.
document retrieval and sharing. It also promotes the co-development of projects within and between school districts.\textsuperscript{68}

**The Principal As Manager**

The advent of site based management has brought about new thinking in methods of managing school budgets, ordering school supplies, maintaining an inventory of supplies and teaching materials, library circulation, and school purchasing. With the aid of the computer and local area networks, school administrators can now maintain a constant assessment of what is available, what is needed, and the funds that have been allocated to their respective schools for purchasing. Administrators working with teachers can now make decisions regarding expenditure of funds allocated to their schools and which supplies will most benefit the students. Teaching strategies to be employed can also be reviewed. Using this method turns teachers into decision makers.\textsuperscript{67}

School systems are finding it practical to streamline and automate their process of acquiring and purchasing supplies. For most school systems, the purchasing is performed at the beginning of the year and the supplies are stored and distributed during the year. Using this method, most teachers do not have any knowledge of what is available to them during the year. Often there is waste and inefficient expenditure of school funds. Through the use of the computer and efficient management software, school systems are now distributing funds to local schools for the

\textsuperscript{67} Shalvoy and Morgan, p. 16.

\textsuperscript{67} Celia Watson and Bill Morgan, "The Principal As Manager" *Electronic Learning: Special Supplement*, (September, 1989), p. 28.
purpose of purchasing the needed supplies. Teachers, meeting with administrators, can determine what funds are available at any time during the year and make decisions concerning their needs and possible expenditures of available funds. Centralized computer networks have made it possible for local schools to look at the available bids for materials, make their selections, and input the necessary purchase request from the computer terminal. This request is based upon the availability of funds and is printed in the office of the purchasing agent. Upon securing approval for the expenditure, the purchasing agent assures the necessary steps to order the material. This method helps to eliminate waste, lower the need for large storage areas, and provide the individual teacher with input into the purchasing system. “A building level approach to purchasing enables the teachers and administrators to tailor their purchasing more efficiently to fit specific needs of the students in their building.” This method provides the principal with a certain amount of flexibility in the management of funds allocated to his or her school. Decisions can be made to reallocate funds between budget codes. If there is a higher priority for certain materials, funds might be diverted from other budget codes to satisfy this need. This method provides the principal and teacher with up-to-date information relative to each budget code. This information, along with an inventory of supplies, will be valuable to the principal as he seeks to manage his school funds efficiently.

This method of tracking through networked, centralized computer systems also provides opportunities to track available resources from central media centers. In most school systems, the volume of learning

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"Watson and Morgan, p. 28."
resources is so overwhelming that there is little wonder that teachers often do not know what is available or how to use it. Methods of searching for resources are available today through centralized computers. This is of great benefit to teachers in enhancing their teaching methods. A unique computer catalog program called Bibliofile, a CD-ROM program published by Library Corporation, Washington, D.C., can streamline the time needed to locate and select teaching materials. This program permits school systems to link teaching materials to particular curriculum objectives. Each curriculum objective for each grade is assigned a number. All teaching resources that could contribute to the mastery of this objective are linked to this unique number. Teachers simply select the number for the objective, and the computer will supply a listing of all materials associated with the teaching of this objective.

These same techniques can be used to inventory textbooks and library books. With the use of barcodes, each book can be identified and cataloged into the computer network. The quickest and most efficient way to track supplies; particularly those which are to be returned like videotapes, library books, and textbooks; is to use barcoding.

Teachers check the textbooks out from the central supply. At this time the textbooks are assigned to a particular teacher by using the barcode. This ensures that every teacher is responsible for his or her own textbooks.

"Watson and Morgan, p. 30.
"Watson and Morgan, p. 30.
"Watson and Morgan, p. 30.
"Watson and Morgan, p. 31.
The teacher then assigns each textbook to an individual student who signs for the book. This technique provides the school system with the opportunity to track all books of a particular type. With this system it is easy to maintain an inventory and to determine exactly how many of each book the system owns and their exact location.

Data entry is the most difficult, but once the information is in the computer, the system can use the data in many beneficial ways. The age and condition of each book can be maintained. This will provide the purchasing department the necessary information needed to project cost associated with the purchase of new or replacement books. A study of the data can provide the system with trend analyses of needs for the future and provide sufficient time to prepare the necessary budget items. Trends in book losses and insufficient levels of responsibility on the part of particular individuals can also be identified.

By using the computer to assist in functions such as purchasing and inventory, systems will be able to keep costs in these areas down. This will provide individual systems with the ability to focus funds more efficiently toward the achievement of their educational goals. "Computers help us put our money right where it's needed."

The improvement in efficiency relative to supplying teaching materials and funding for the improvement of teaching helps to create a positive climate between management and staff. This, along with the collaborative effort and team decision making, helps to provide a feeling of ownership within each staff member resulting in higher morale and job satisfaction. In situations such as these, learning is maximized.

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*Celia and Morgan, p. 33.*
Financial Management

Improving efficiency in the management of finances offers much promise in the area of providing additional funds for instruction. There has been a tendency for school administrators to view automation as a cost rather than an investment.\(^4\) The development of more efficient methods of budgeting, managing of budgets, insurance costs, payroll, personnel benefits, food service, transportation, maintenance, and utilities will provide a savings that will more than pay for the necessary computer hardware/software to accomplish the task.\(^5\)

Budgeting

The development of today's school budget is rapidly evolving into a science. Reading and understanding school budgets of the past have presented many problems for the typical school administrator. With today's advanced computer software, budgets can be assembled with much less effort and in a manner that provides school administrators an improved understanding of the process. Today, school administrators can go to the computer, call up individual budget categories and see the current status of each individual code. Also present is the ability to try "what-if situations." This is a great mechanism to allow school administrators to apply creative methods to explore the possibilities and select the one that provides the most efficient method of financing school programs. By assembling a history of each account, school administrators can build a trend and provide


information that will allow them to project future scenarios that are likely to develop. "We know exactly what our finances are now, and can project what our budgets might be a year or five years from now. There's no more guessing."  

**Payroll**

By linking personnel records to the payroll data, administrators will be able to determine the monthly payroll in a more timely fashion. As teachers are off for illnesses and other reasons, systems must replace those teachers with other teachers, often having different levels of degree and/or experience than the teacher who was replaced. This causes variations in the monthly payroll and over a length of time, can affect the overall budget code. By using a system such as this, budget directors and school administrators will be able to monitor their payroll more accurately and in a more timely fashion. It will be possible to see a more realistic picture of what is being spent each month. Administrators will be able to develop trends that might be occurring at a particular school or even at a specific grade level.  

**Insurance**

Many systems provide a variety of insurance plans for their employees. This variety of plans also has a variety of costs. By linking the personnel information to the software that monitors the insurance, computers can maintain an up-to-date accounting of insurance costs and

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"McCarthy and Shalvoy, p. 39.

"McCarthy and Shalvoy, p. 39.

"McCarthy and Shalvoy, p. 39."
benefits. As employees adjust their individual plan, the computer will adjust the cost to the system and the individual. This will provide the opportunity to maintain an up-to-date status report of insurance costs along with providing monthly information that can be used to develop trend analyses. The information gained from these analyses can be used to project needs for future insurance budgeting. Perhaps the most dramatic benefit realized through the computerization of administrative tasks is cost savings. Some school systems have reported saving $500,000 per year through computerization.99

Summary

A comprehensive review of the literature provides a brief introduction into the development of the computer and its evolution into the powerful tool that is available today. Individual sections of the review provide insight into the birth of the computer, the development of the transistor, and its affect upon the development of the powerful computer tools available today.

Brief summaries of studies pertinent to this effort are included and provide insight into how the computer is being used in schools today. Many interesting possibilities are presented and offer today's administrator a multitude of opportunities for improvement of the administrative process. The focus on accountability will require a closer management of school data and its use to enhance the administrative process and decision making. The imaginative administrator will be able to develop and implement many strategies that will improve the operation of his or her organization.

99 McCarthy and Shalvey, p. 35.
The methodology of the study is included in this chapter. It encompasses the following procedures: research design, instrument development, pilot study, reliability and validity, identification of participants in the study, assessments for the instrument, data analysis techniques, statistical techniques and analysis, and a summary.

The techniques of descriptive research were used throughout the collection of data in order to answer questions or test hypotheses relative to the current use of computers by school principals and other office personnel. The purpose of this study was to determine the level at which school administrators are currently employing electronic technology to enhance the operation of their schools. A survey instrument was used to collect the necessary data to ascertain this level. Additionally, an attempt was made to ascertain some of the innovative methods being employed by school principals, as they found new ways to apply current computer processes. The data collected were used to develop recommendations in the area of administrative uses of the computer and test the hypotheses stated.

No effort was employed to manipulate the variables or influence the findings through intervention or suggestion. Principals completed a survey instrument designed to measure the current application of computer technology in Tennessee schools. This instrument focuses primarily upon the methods involving computers employed by principals in completing the administrative tasks of school operation.
It would seem that in this day of modern technological advances, especially in the area of computerization, that innovative and creative administrators have explored a number of methods to help them to operate their schools more efficiently. Through the collection and analysis of data, the study determined the degree to which principals in Tennessee are implementing computer techniques to enhance their administrative skills and develop innovative techniques that provide leadership in decision making. These skills, when implemented, should provide more efficient use of time and a higher quality of management.

A search for a suitable instrument did not yield a tool that would provide the necessary items to ensure the collection of appropriate data. Several instruments were located and evaluated but were not found to be appropriate for this study. It was necessary to construct and pilot a survey instrument designed to collect the appropriate data. A copy of this instrument is included in Appendix B.

Criteria for Instrument Development

The following section describes plans for the initial development of a pilot instrument. Included are criteria that were used in conducting the pilot study and the administration of the pilot instrument.

Through the review of literature, those areas determined to be important to the enhancement of efficiency in administrative tasks were identified. Areas that were initially identified are: wordprocessing, budget development, financial management, inventory, food services, transportation, geographic information, attendance, curriculum planning, and media services.

Using these general areas of interest, questions were constructed
that when completed, provided the necessary information to complete the study. Questions were developed to gather information for use in identifying those areas principals felt were important to the administration of their individual schools. Additionally, these questions sought to determine the amount of time used by the principal in administering his/her school through the use of computers. Subject matter experts were used when possible to help check the content validity of the questions selected for gathering data. Those items appearing to be out of character were either restated or removed. Area experts were encouraged to suggest additional items that might provide pertinent information.

The following criteria were developed to serve as a guide in the development of items for the survey instrument and the administration of that instrument.

1. Areas of special value were identified through the review of literature, and test items were constructed to address these areas.

2. Efforts was made to construct an instrument that addressed those areas identified in the review of literature.

3. A sufficient number of items were included to allow sufficient collection of data to evaluate the research questions and hypotheses.

4. Items were written in clear, distinct language to eliminate as much as possible any ambiguities and/or misunderstandings.

5. The instrument was designed to allow simple marking procedures. The intent was to provide an instrument that would provide optimum reliability without creating a
cumbersome number of response options.

6. Subjects used in the pilot study were different from those randomly selected for use in the actual study.

Once the questions were determined and approved by the subject area consultants, the instrument was administered in written form, on a one-to-one basis to local administrators currently participating in the Cohort III program. Feedback and suggestions from these individuals were used to improve the wording and organization of the test items and final refinement of the test instrument.

Pilot Instrument for Principals

A fifty item pilot questionnaire was developed for measuring the current level of computer use in the administrative function of school operation (Appendix B). The pilot instrument contained ten demographic items and forty items for measuring the current uses of computers. The response procedure was varied with questions requiring the respondent to fill in the blank, select true or false, or mark an appropriate range. The demographic section provided opportunities for principals to complete statements in a manner that most appropriately fit their specific situation. A section was provided that allowed the respondent to choose between a yes or no response to identifying those areas currently being used in his/her school. The remainder of the instrument employed a Likert-type scale that provided a range of possibilities, allowing the respondent to identify the situation that most appropriately described his/her particular work environment. This area measured the level at which principals currently use computers in their administrative tasks.
**Pilot Test**

After the necessary revisions were completed, the pilot test was administered to twenty-five principals who had chosen to participate in the Cohort III program. The purposes for administering the pilot study are as follows:

1. To determine that the wording of each item was clear and understandable;

2. To provide an opportunity to evaluate the instrument for ease of use, readability, and clarity;

3. To obtain pilot data for the purpose of testing the instrument for internal consistency and reliability;

4. To identify those items that were unsatisfactory prior to administration to the target sample; and

5. To obtain sample data for use in determining the effectiveness of the instrument.

**Pilot Instrument Validity**

In the development of a research instrument, investigation was conducted into the instrument's validity. Validity is present in several forms and each for a different purpose. For the purposes of this study, the investigation of the instrument were confined to content validity and face validity.

Borg and Gall defined content validity as "the degree to which the sample of test items represents the content that the test is designed to measure."[^100] This statement highlights the need to carefully define the

content area. Once the content areas had been defined, the assessment of the test items began.

In making such an assessment relative to a test instrument, it is often wise to enlist the services of subject area specialists. These specialist evaluated the individual items relative to their ability to measure or test the problem statement and/or the content area. Through this analysis, these experts were able to make recommendations regarding the item's worthiness and ability to contribute to the appropriate gathering of data.

Validation processes for this study consisted of the following procedures:

1. The pilot instrument was administered to twenty-five principals. These principals were those who chose to become a part of the Cohort III program.

2. An evaluation of the instrument's performance was conducted through personal visits with members of the pilot group. Opportunities were provided for pilot group members to make suggestions regarding the pilot instrument.

3. Comments obtained through the personal interviews were compiled and analyzed. This information was used to improve the pilot instruments performance as well as to refine, modify, and/or clarify the instrument.

4. The "Statistics Package for Social Sciences" along with "Statview II" was used to prepare a frequency chart of responses. This chart was analyzed to identify items that provided little variance. These items were reconstructed or eliminated.
5. The number of items was reassessed to determine which combination of items provided the most appropriate instrument.

6. Once the instrument had been analyzed, refined, and restructured; it was reviewed a second time by subject area specialists for final approval.

**Pilot Instrument Reliability**

Reliability is a necessary component for validity. While a test that is valid measures what is intended to be measured, a test is reliable if it measures the proposed content consistently. This consistency also relates to the individual items on the scale and their ability to measure consistently and over time the area being measured. When alternate forms of an instrument are not available or possible to construct, the same instrument may be administered twice to the same group with a lapse of time between administrations. Results obtained from the two administrations were then compared in order to determine the consistency of measurement.

The questionnaire that was used in soliciting data for this study did not request information dealing with attitudes or perceptions. For this reason, it was decided that reliability would be tested through a test-retest process. The test instrument was administered to the pilot sample on December 11, 1991, and the results were analyzed and compiled. A second administration of the test was conducted with the pilot sample on January 15, 1992. Again the results were compiled and analyzed. The responses from the first administration were then compared with those gained in the second administration.
According to DeVellis:

Temporal stability is another two-score method of computing reliability. It involves the temporal stability of a measure, or how constant scores remain from one occasion to another. Test-retest reliability is the method typically used to assess this.\(^{101}\)

The following statistical procedures were performed on the pilot data in an effort to assess the reliability of the pilot instrument:

1. A test-retest approach was used to provide some indication of the reliability of the instrument and the individual questions from one administration to another.

2. The "Statistical Package for Social Sciences" and the "Statview II" package were used to assess the relationships existing between the individual item responses on the first administration of the test as compared to the same item responses on the second administration.

3. An analysis of the individual test items was conducted to determine their ability to obtain similar results. The instrument was found to be reliable in the measurement of the data. Only slight differences were found to exist in the analysis of the data obtained from the pre-test and post-test.

4. Personal visits with members of the pilot group were conducted to obtain suggestions as to how the questions might be adjusted to achieve greater clarity. Those recommendations received were used to rephrase questions that revealed a need for greater clarity. Questions that provided a selection of alternatives were reviewed to ensure that the alternatives

Identifying Participants In the Study

The Tennessee Education Directory 1990-1991 was used to identify the total population of school principals in the state of Tennessee. One thousand and eight-hundred principals were identified. From that number, 248 principals were from private/parochial schools and 1,552 were from public schools. For the purposes of this study it was determined that a sampling of principals at each level of the educational spectrum would be appropriate. It was the intent of this study to sample principals from elementary schools, middle schools, high schools, and private/parochial schools. A ratio was established to ensure a fair representation of public and private/parochial schools. Thirteen percent of the principals in Tennessee are employed by private/parochial schools. In selecting the sample, 13% were selected from the private/parochial category.

Randomization was used to distribute the sample throughout the entire range of school descriptions.

In order to assure participation from the different levels of the principalship, it was determined that a random sampling technique would be employed. This provided a cross section of principals from each of the different position descriptions and ensured the representativeness of the sample. Good representativeness provided the opportunity to generalize to the entire population. No attempt was made to stratify in the direction of small/large schools, rural/urban, city/county, or appointed superintendents/elected superintendents.
To determine an appropriate sample size, the following formula was used:

\[ n = \frac{Npq}{(N - 1)D + pq} \]

where \( q = 1 - p \) and \( D = \frac{B^2}{4} \)

Since surveying the entire population of 1800 principals was not feasible, the above formula was used to determine an appropriate sample size. "In a practical situation we do not know \( p \). An approximate sample size can be found by replacing \( p \) with an estimated value."\(^{102}\) In using this formula, \( p \) was set at .5 and a bound error of estimation was set at \( B = .05 \).

In completing the calculations, it was determined that a sample size of 327 was appropriate for the specifications adopted. Realizing that there was the possibility of less than a complete return of the questionnaires, it was decided to select five hundred participants.

Returning to the initial investigation of the population, it was reported that 13% would be selected from the private/parochial school systems and 87% from public schools. Using this ratio, it was determined that seventy questionnaires would be sent to principals of randomly selected private/parochial schools and 430 questionnaires would be sent to principals in randomly selected public schools. The randomization process was used to ensure an appropriate distribution of those selected from among the different levels of schools. (i.e. elementary, middle, secondary)

The following subroutine in Applesoft Basic was used with an Apple IIe computer to prepare two lists of random numbers. One list included

\(^{102}\) Richard L. Scheaffer, William Mendenhall and Lyman Ott,  
1,000 random numbers between one and 1,552; while the second list included 1,000 random numbers between one and 248. Random number lists occasionally repeat numbers several times. For this reason, 1,000 numbers were requested to ensure that each number was represented at least one time.

10  REM *** RANDOM NUMBERS 1 TO 248 ***
20  PR#1
30  I = 1
40  A = 1
50  B = 248
60  V1 = INT(RND(1) * (B - A + 1)) + A
70  PRINT INT(V1),
80  I = I + 1
90  IF I <= 1000 THEN GOTO 60
100 PR#0

Two lists of 1,000 random numbers were prepared by the computer and subroutine, but only the first 70/430 different numbers were used to identify the sample. The 70/430 different random numbers represented the 13% private or parochial schools and 87% public schools.

The sample for this study was drawn from a general population of 1,800 principals in the state of Tennessee. The desired number for the study was approximately five hundred. This provided the opportunity to conduct a random sampling of principals from the total population and ensured proportional representation in each of four areas: elementary, middle-school, high school, and private schools.
Data Collection Procedures

The Inventory along with a cover letter and a self-addressed stamped envelope requesting a reply by January 31, 1992, were mailed to the principals of those schools that were randomly selected. Return envelopes contained an identification number on the mailing label. This provided the researcher an opportunity to monitor the return and follow-up with those members of the sample who did not respond. A careful accounting of each returned survey was maintained to provide for an analysis of those returning their survey and the variety of school types represented. The mailing date and the return date of each survey were recorded to provide an opportunity to analyze the amount of time that lapsed between mailing and receipt.

A follow-up procedure was used to contact those respondents not returning their instruments by the requested deadline. This procedure included the mailing of a second instrument along with a second letter encouraging the sample members to participate in the study. The follow-up procedure was effective in recovering responses from schools not responding to the first mailing.

Figure 1 provides a graphic illustration of the Sample and the dispersion between public, private, and parochial schools. Public schools represented 87% of the total sample or 430 principals. Private and parochial schools were represented by seventy principals or 13%. The number of returned surveys is represented by the second column in each division. The public school principals returned at a 71% rate and are represented by 304 respondents. Private schools returned thirty-one of
SAMPLE DATA SHOWING THE NUMBER IN EACH CATEGORY AND THE NUMBER RETURNED

<table>
<thead>
<tr>
<th>SCHOOL TYPES</th>
<th>SAMPLE</th>
<th>RETURNED</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC</td>
<td>430</td>
<td>304</td>
</tr>
<tr>
<td>PRIVATE</td>
<td>45</td>
<td>31</td>
</tr>
<tr>
<td>PAROCHIAL</td>
<td>25</td>
<td>18</td>
</tr>
</tbody>
</table>

forty-five for 69% and parochial schools returned eighteen of twenty-five for 72%. The overall percentage of returns was seventy-one.

Upon receipt of the returned inventories, the data received were compiled and analyzed. The "Statistics Package for Social Sciences" and "StatView II" were used to analyze the data. The results of this analysis can be found in Chapter 4.

**Statistical Tests and Analysis**

Data from this study were analyzed initially using descriptive statistical procedures. Specifically, summary measures including mean,
median, mode, range, and percentage were used, where applicable. Many of these finding are reported along with other statistical information in the tables found in Chapter 4.

The Spearman coefficient of correlation was used to determine measures of correlation for $H_0^1$, $H_0^2$, and $H_0^4$. It was important to determine the degree to which the data met required assumptions associated with the Spearman's rho. Those assumptions include randomness of the sample, variables measured along an interval scale, a degree of linearity between the two variables, data that are approximately normally distributed, and data that are homoscedastic.

The Chi-Square test for Goodness of Fit was used for testing $H_0^3$, $H_0^5$, $H_0^6$, $H_0^7$, $H_0^8$, $H_0^9$, and $H_0^{10}$ at the .05 level of significance. It was important to determine the degree to which the data met the required assumptions associated with the Chi-Square test. Those assumptions include randomness of the sample and nominal level data. "SPSS" was used along with "StatView II" to compute the differences between the means/proportions. These statistical packages were used to compute the mean, standard deviation, $t$ value, rho corrected for ties, Chi-Square, and degrees of freedom.

The results of the analyses of the collected data and the application of these results to the hypotheses are presented in Chapter 4. The demographic data collected along with the other data are also included in Chapter 4.
Research Questions

Research Question I:
Is computer equipment available in Tennessee Schools for administrative purposes?

Research Question II:
What specific types of computer equipment and peripheral devices are available for administrative purposes?

Research Question III:
When available, are administrative computers being used in a manner that is appropriate to the administrative function?

Research Question IV:
For what specific tasks are computers being used by administrators?

Research Question V:
Are School Administrators identifying and applying computer solutions to help improve the administrative function?

Research Question VI:
How much time does the principal and staff spend with the computer doing administrative tasks?

Research Question VII:
Are school administrators at the elementary level using computers more or less than administrators at the secondary level?

Research Question VIII:
How are school principals and associated administrators receiving their training in computer use?
The hypotheses were tested in the null form as indicated below:

$H_0^1$. There will be no significant relationship between the availability of computers in the schools and their use for administrative functions.

$H_0^2$. There will be no significant relationship between the size of the school and the use of computers for administrative purposes.

$H_0^3$. There will be no significant difference between rural/urban school administrators in terms of their use of computers for administrative purposes.

$H_0^4$. There will be no significant relationship between the use of computers for administrative purposes and the per pupil expenditure of the school system.

$H_0^5$. There will be no significant difference between the use of computers at the elementary level and the secondary level in terms of their use for administrative functions.

$H_0^6$. There will be no significant difference between the use of computers for administrative purposes in private schools and public schools.

$H_0^7$. There will be no significant difference in the amount of time principals use computers in terms of various time periods that have passed since the principals last attended school.

$H_0^8$. There will be no significant difference in the amount of time principals use computers in terms of selected levels of education.

$H_0^9$. There will be no significant difference in the amount of time principals use computers in terms of selected categories of
experience.

H₀⁰⁰. There will be no significant difference in the amount of time principals use computers in terms of the amount of computer education in three categories.

**Summary**

This chapter describes the methods used for identification of the population, selection of the sample, construction and piloting the instrument, soliciting the final data, statistical tests and analyses, and hypotheses. The instrument (Computer Use Questionnaire) was used to provide the participants with a vehicle for expressing their current level of implementation relative to computerization of management tasks such as, managing school data, attendance, budget development, financial management, discipline, food service, geographic information, inventory, transportation, curriculum planning, and media services.

A return that was adequate, representative, and provided sufficient data to allow generalization to the total population was received. Principals from public, private, and parochial schools, contributed to a 71% return rate. This return was proportionally divided among the different types of schools as well as the different patterns of organization. The "Statistical Package for Social Science" (SPSS) and "Statview II" were used to analyze the data and prepare the findings. The results of this analysis can be found in Chapter 4.
CHAPTER 4
ANALYSIS OF DATA

This chapter presents the study's findings. The data describe computer presence and use by a selected sample of principals in the State of Tennessee. In addition, the investigation measures the use of computers by other school administrative personnel in specific areas and the avenue through which principals received their computer training.

Data for this study were compiled from the results of a survey sent to a random sample of principals in Tennessee School Systems. Data were compiled through responses given by principals to a set of forty-eight questions on the survey. Principals indicated their choices by selecting the appropriate range identifying the total number of computers in their school, the number of computers set aside for administrative purposes, avenues by which they have received their computer training, and specific uses for which they were using their computers. Additional questions solicited "yes" or "no" responses to identify specific uses that were being implemented in individual schools.

Schools in Tennessee were categorized as public, private, and parochial. A study of the total number of schools revealed that 87% of the schools were operated by the state and local governments and were classified as public. The remaining 13% were either private or parochial schools. To ensure that this ratio was maintained, 87% of the sample was selected randomly from the Tennessee Public School Systems, and 13% were randomly selected from the private and parochial schools in Tennessee.
Population and Sample Characteristics

The sample surveyed was randomly selected from a population of all schools in the State of Tennessee. The total population included 1,800 principals; 1,552 of those principals were employed by public schools, while 248 were employed by private/parochial schools. A random sampling technique provided a sample that was representative of public, private, and parochial schools. The total number of public schools represented in the sample included sixty-eight high schools, twenty junior high schools, forty-six middle schools, 270 elementary schools, four primary schools, three intermediate schools, one alternative school, and twenty K-12 schools. The private/parochial schools were represented by four high schools, eighteen elementary schools, one center, and forty-seven schools with a grade distribution of K-12.

Sample Response

The sample was defined by a random selection of five hundred participants from the population of 1800 principals in the State of Tennessee. Surveys were mailed to the five hundred selected principals on January 6, 1992. The mailing included a copy of the survey, an introductory letter, and a self-addressed, stamped envelope. Figure 2 shows the number of public school participants by school type and the number of returned surveys.

Three-hundred and fifty-three surveys were returned. This represents a return of 71% of the mailed surveys. During the first week after the initial mailing, sixty-six surveys were received. Small numbers were received the first two days from local respondents, and thirty-seven were received on the last day of the first week. The number received during
the first week was 18.7% of the total number received.

The second week was the best week of the collection. During this week, 155 surveys or 43.9% of the total were received. The dispersion of these 155 surveys was fairly even with a high of fifty-seven received on the ninth day after the original mailing. This was the highest number received in any one day. Figure 3 shows the number of private and parochial schools by school type and the number of returned surveys.
The third week saw a depreciation in the number of surveys being received. The highest number of returns was on the first day of the week with ten surveys being received. The total for the third week reached twenty-eight surveys. This number represented 7.9% of the total surveys received. At this point, it was decided that a follow-up letter would be sent. On Tuesday, January 22, 1992, a follow-up letter, along with a second copy of the survey and a self-addressed, stamped envelope was sent to the 250 respondents who had not returned their initial mailing.

Eighty-two surveys, or 22.2%, were received during the fourth week with a high of forty surveys being received on the ninth day after the second mailing. Immediately after the high day of the week, the returns again
dwindled to four or five surveys per day. Not all of the surveys received during this week were a result of the second mailing.

A fifth week was used to collect the remaining surveys that were returned. During this week a total of twenty-two surveys were received. This number represented 6.2% of the total number of surveys returned. Several days passed with no additional returns, and the collection was terminated on February 8, 1992.

**Sample Descriptives**

The sample contained representatives of the various educational levels. Table 1 indicates that the Masters Plus category reflected the highest percentage, with 47.98% of sample. The combined percentages of the three middle levels of education represented 84.97% of the total sample. A point noted was the presence of school principals, mostly in the private and parochial sector, with a bachelor's degree.

Table 2 reflects the mean number of years experience for the total sample by gender. The mean number of years experience for the entire sample was 11.78 years. Male respondents had a mean number of years experience of 13.87 years and the female respondents 6.94 years.

The largest percentage of participants in the sample was from rural schools. Rural schools were represented by 174 principals or 49.43% of the total sample. Suburban schools had the next highest number at ninety-nine, representing 28.13%, and finally the urban schools with seventy-nine participants accounted for 22.44%. Table 3 presents a graphic illustration of the percentage of schools and a breakdown of their specific groups.
TABLE 1
LEVELS OF EDUCATION FOR THE SAMPLE

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>THOSE REPORTING</th>
<th>PERCENT OF SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS</td>
<td>15</td>
<td>4.34%</td>
</tr>
<tr>
<td>MA</td>
<td>88</td>
<td>25.43%</td>
</tr>
<tr>
<td>MA PLUS</td>
<td>166</td>
<td>47.98%</td>
</tr>
<tr>
<td>EDS</td>
<td>40</td>
<td>11.56%</td>
</tr>
<tr>
<td>EDD/PHD</td>
<td>37</td>
<td>10.69%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>346</td>
<td>100%</td>
</tr>
</tbody>
</table>

TABLE 2
SAMPLE EXPERIENCE AS GROUP AND BY GENDER

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>COUNT</th>
<th>MEAN EXPERIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>241</td>
<td>13.87 YRS</td>
</tr>
<tr>
<td>FEMALE</td>
<td>104</td>
<td>6.94 YRS</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>345</td>
<td>11.78 YRS</td>
</tr>
</tbody>
</table>
TABLE 3
SAMPLE BY SCHOOL
SETTING

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>COUNT</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL</td>
<td>174</td>
<td>49.43%</td>
</tr>
<tr>
<td>URBAN</td>
<td>79</td>
<td>22.44%</td>
</tr>
<tr>
<td>SUBURBAN</td>
<td>99</td>
<td>28.13%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>352</td>
<td>100%</td>
</tr>
</tbody>
</table>

The total population of principals in Tennessee is 1,800. Of this number 1,648 (87%) were public schools, and 252 (13%) were private or parochial. Using these numbers, a ratio was determined to select the sample. The random sample was initially determined by selecting 87% of the sample from the public school sector and 13% from the private or parochial environment. Within this context, the respondents were represented by 304 public schools or 86.36%, the private schools had thirty-one returns that represented 8.81%; and the parochial schools were represented by eighteen schools and 4.83%. Table 4 presents a graphic illustration of these computations. It was noted that the public schools represented almost exactly the 87%, which was intended, and the private and parochial schools together represented almost exactly the 13%, as was planned.
TABLE 4
SAMPLE BY SCHOOL CLASSIFICATION

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>COUNT</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC</td>
<td>304</td>
<td>86.36%</td>
</tr>
<tr>
<td>PRIVATE</td>
<td>31</td>
<td>8.81%</td>
</tr>
<tr>
<td>PAROCHIAL</td>
<td>18</td>
<td>4.83%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>353</td>
<td>100%</td>
</tr>
</tbody>
</table>

Within the operation of the schools, there were different personnel who were responsible for tasks relative to the administration of the school. School principals indicated that many of the administrative tasks relative to computer use were delegated to other office personnel. The demographic data revealed that 183 school secretaries representing 52.74% of the sample were the primary operators of computers that were being used for administrative purposes. Principals represented the second largest number of operators with 112 principals being listed as the primary operator of administrative computers. This number represented 32.28% of the sample. Other users of computers identified as a part of the administrative effort are shown in Table 5.
TABLE 5
ADMINISTRATIVE COMPUTER
USERS

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>COUNT</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRINCIPAL</td>
<td>112</td>
<td>32.28%</td>
</tr>
<tr>
<td>SECRETARY</td>
<td>183</td>
<td>52.74%</td>
</tr>
<tr>
<td>CLERK</td>
<td>27</td>
<td>7.78%</td>
</tr>
<tr>
<td>SPECIALIST</td>
<td>7</td>
<td>2.02%</td>
</tr>
<tr>
<td>ASST PRINCIPAL</td>
<td>18</td>
<td>5.19%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>347</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the analysis of the data, an effort was made to identify those schools that were secondary and those schools that were elementary. The relatively large number of schools that were K-12 were included in the secondary school classification. Table 6 reveals that 247, or 70.17% of the sample, were elementary schools. The remainder of 105, or 29.83%, were secondary. The variety of classifications present in the sample made it difficult to classify schools by elementary or secondary. There was much overlap in the middle grades. Schools K-8 or K-6 were included in the elementary classification. Middle schools, typically grades 6-8, were included in the secondary classification.
TABLE 6
SAMPLE BY ELEMENTARY AND SECONDARY SCHOOLS

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>COUNT</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEMENTARY</td>
<td>247</td>
<td>70.17%</td>
</tr>
<tr>
<td>SECONDARY</td>
<td>105</td>
<td>29.83%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>352</td>
<td>100%</td>
</tr>
</tbody>
</table>

Data Analysis

Research Questions

Research Question I:

Is computer equipment available in Tennessee Schools for administrative purposes?

The Comprehensive Education Reform Act of 1984 (CERA) contained a component entitled “Computer Skills Next.” A part of this component was the establishment of computer labs in Tennessee Schools. Through the growth and implementation of this reform movement, state bid prices for computers became available to Tennessee schools. These lower prices allowed many schools to purchase Apple IIe computers through the state bid avenue to equip their classrooms and labs. Data received through the Computer Use Survey reflected the presence of these computers purchased for labs and classrooms as a result of the state’s arrangement with Apple Computer Company to provide computer equipment at a special state price.

Another focus of the CERA legislation was the emphasis on improved attendance accounting. This emphasis brought about the
development of software for use with Apple and other computers for the purpose of maintaining attendance records. Card readers were used to read attendance records into the computers and provided a method of expediting the process.

These legislative actions brought about the presence of equipment that here-to-fore had not been present in all Tennessee schools. In putting the equipment to use, many principals began to discover the possibilities brought about by these technological devices. Equipment such as computers, printers, card readers, and scanners began to appear in most all of Tennessee's schools.

An analysis of the data indicated that 83.48% of all schools reporting have more than thirteen computers for student use. There were no schools that reported having zero computers. Responding to the survey question regarding administrative computer equipment, 77.71% of the principals reported having one to three computers specifically for administrative purposes. An analysis of the type computer used for administrative purposes indicated that 77.30% were microcomputers and 11.37% were mainframe configurations. Responding to the question regarding online services, 78.95% indicated that they were not taking advantage of this service. This indicated that modems are not yet in widespread use. Networking computers within a school system to provide communication from school-to-school was not in use at a high level with 86.96% of the respondents returning a negative response to this question.
Research Question II:

What specific types of computer equipment and peripheral devices are available for administrative purposes?

The Comprehensive Education Reform Act of 1984 (CERA) provided Tennessee schools with microcomputers and printers for the "Computer Skills Next" component. The "Basic Skills First" component also provided schools with a microcomputer, printer, and management system for monitoring student achievement in the area of basic skills. The focus on accuracy in the recording of attendance figures provided the schools with microcomputers, printers, and a card reading device for maintaining student attendance.

The majority of respondents reported using microcomputers for administrative functions. Two-hundred and sixty-five, or 77.26% of the sample, were using microcomputers to perform administrative tasks. Mainframe computers were reported by thirty-nine respondents. This represents 11.37% of the sample. Other configurations reported were laptop computers in four schools and minicomputers in seven with twenty-eight schools reporting the use of other computer systems. Other systems identified were Unisys, Digital, and Honeywell mini- and main-frame installations.

Online or phone modem capabilities were reported by seventy-two schools, representing 21.05%. Phone dialers for sending telephone messages to parents and students in their homes were reported to be used in nine schools, or 2.57%. When responding to the question regarding networking, forty-five schools, or 13.04%, reported that their individual schools were networked with other schools in their system.
Research Question III:

When available, are administrative computers being used in a manner that is appropriate to the administrative function?

Those applications reported most frequently represent the areas emphasized by the State of Tennessee or the normal functions one might expect to see in an office environment. Wordprocessing, maintenance of attendance records, management of Basic Skills mastery, and teaching "Computer Skills Next." These data are reflected in Table 7 on page 82. Most of the areas identified in Chapter 2 as innovative and worthy of consideration were not reported at a high level.

There remains a vast arena of administrative functions that might be appropriately managed by microcomputer and other peripheral devices. Very few schools reported the use of microcomputers for the development of trends and analyses, that could provide information beneficial for budget preparation and development. These analyses of historical patterns might provide valuable guidance in planning for future directions of the school and school system.

Research Question IV:

For what specific tasks are computers being used by administrators?

Responses submitted by the responding principals indicated that the management of attendance was the leading administrative function for which computers were being used in Tennessee schools. This was not surprising in that the state placed great emphasis on this area of recordkeeping in the CERA legislation of 1984. Two-hundred and eighty-five, or 81.43%, of the sample, reported that they were using computers to track attendance. The Minimum Foundation Program, that has been used
to finance education in Tennessee for several years, places much emphasis upon average daily attendance. This accounts for the emphasis on the use of computers for the purpose of managing attendance records.

Wordprocessing was the second highest identified function with 262, or 74.86% of the sample indicating that they were using computers for this purpose. Wordprocessing software makes it possible for small administrative centers such as a school office to produce professional, letter-perfect correspondence. Table 7 indicates other areas where computers were frequently reported as being used in schools and the degree to which each of these functions was performed by the individuals responding to this study.

Four major administrative functions lend themselves to efficient management by computer. Student records, scheduling, attendance accounting, and grade reporting are administrative tasks that must be performed by each school. All of these functions were reported with some regularity by the respondents. Following attendance and word processing, student record management was listed third as a function currently being performed through computerization. One-hundred and sixty-five principals reported the management of student records by computer. This represented 47.14% of the sample. Grade reporting and scheduling were reported frequently but did not appear with the same frequency as those areas previously mentioned.
### TABLE 7

**ADMINISTRATIVE FUNCTIONS AND FREQUENCY OF APPLICATION**

<table>
<thead>
<tr>
<th>AREA OF USE</th>
<th>THOSE REPORTING</th>
<th>PERCENT OF SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTENDANCE</td>
<td>285</td>
<td>81.43%</td>
</tr>
<tr>
<td>WORD PROCESSING</td>
<td>262</td>
<td>74.86%</td>
</tr>
<tr>
<td>STUDENT RECORDS</td>
<td>165</td>
<td>47.14%</td>
</tr>
<tr>
<td>TRANSPORTATION</td>
<td>151</td>
<td>43.27%</td>
</tr>
<tr>
<td>LIBRARY MANAGEMENT</td>
<td>136</td>
<td>38.86%</td>
</tr>
<tr>
<td>GRADE REPORTING</td>
<td>135</td>
<td>38.57%</td>
</tr>
<tr>
<td>FINANCIAL</td>
<td>135</td>
<td>38.51%</td>
</tr>
<tr>
<td>BUDGETING</td>
<td>133</td>
<td>38.00%</td>
</tr>
<tr>
<td>DESKTOP PUBLISHING</td>
<td>130</td>
<td>37.25%</td>
</tr>
<tr>
<td>SCHEDULING</td>
<td>122</td>
<td>34.00%</td>
</tr>
<tr>
<td>INVENTORY</td>
<td>107</td>
<td>30.66%</td>
</tr>
<tr>
<td>DISCIPLINE</td>
<td>100</td>
<td>28.57%</td>
</tr>
</tbody>
</table>
TABLE 7 (CONTINUED)

ADMINISTRATIVE FUNCTIONS AND FREQUENCY OF APPLICATION

<table>
<thead>
<tr>
<th>AREA OF USE</th>
<th>THOSE REPORTING</th>
<th>PERCENT OF SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOGRAPHIC INFORMATION</td>
<td>97</td>
<td>27.71%</td>
</tr>
<tr>
<td>EVALUATION OF STUDENT DATA</td>
<td>80</td>
<td>22.86%</td>
</tr>
<tr>
<td>FOOD SERVICE</td>
<td>78</td>
<td>22.35%</td>
</tr>
<tr>
<td>SPECIAL EDUCATION</td>
<td>70</td>
<td>20.00%</td>
</tr>
<tr>
<td>PURCHASING</td>
<td>64</td>
<td>18.29%</td>
</tr>
<tr>
<td>CAI</td>
<td>48</td>
<td>13.71%</td>
</tr>
<tr>
<td>STAFF EVALUATIONS</td>
<td>25</td>
<td>7.14%</td>
</tr>
<tr>
<td>MAINTENANCE</td>
<td>21</td>
<td>6.02%</td>
</tr>
<tr>
<td>TREND ANALYSIS</td>
<td>14</td>
<td>4.00%</td>
</tr>
<tr>
<td>PHONE DIALERS</td>
<td>9</td>
<td>2.57%</td>
</tr>
</tbody>
</table>

Research Question V:

Are school administrators identifying and applying computer solutions to help improve the administrative function?

The typical respondent identified those administrative functions that are normal for school office performance. Items mentioned were word processing, attendance, student record management, and, to some extent,
financial management. Also identified were those areas that were emphasized in recent CERA legislation and funded by the state. Chapter 2 identified several school administrative functions that, when managed by computer, can provide a significant savings of time for administrators. Included in this listing were such areas as food service, budgeting, development of trends for analysis, special education, staff evaluation records, inventory, and geographic information. As shown in Table 7, page 82, the incidence of these computer applications was very low.

Some systems reported that their central office provided local schools with computer services. Information was transferred to the central office where reports, records, and computer operations were performed at that location and returned to the individual schools. These systems often were those reporting mainframe installations.

Research Question VI:

How much time does the principal and staff spend using the computer to perform administrative tasks?

Respondents reported a variety of individuals who are responsible for the operation of computers in the completion of administrative tasks. Principals, secretaries, office clerks, computer specialists, and assistant principals were identified as individuals who share in the use of administrative computers. Table 8 reports the percentage of use by each of these identified individuals. The data indicated that the primary user of the computers for administrative purposes was the secretary who used the computers 52.74% of the time to perform administrative tasks. Table 9 reports the number of hours per week and percentage of the total time administrative computers were used for the completion of administrative
tasks by principals. In assessing computer use by principals, 68.84% of the respondents reported using the computer three hours or less per week.

TABLE 8
USE OF COMPUTERS FOR ADMINISTRATIVE PURPOSES BY IDENTIFIED INDIVIDUALS

<table>
<thead>
<tr>
<th>GROUPING</th>
<th>COUNT</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRINCIPAL</td>
<td>112</td>
<td>32.28%</td>
</tr>
<tr>
<td>SECRETARY</td>
<td>183</td>
<td>52.74%</td>
</tr>
<tr>
<td>CLERK</td>
<td>27</td>
<td>7.78%</td>
</tr>
<tr>
<td>SPECIALIST</td>
<td>7</td>
<td>2.02%</td>
</tr>
<tr>
<td>ASST PRINCIPAL</td>
<td>18</td>
<td>5.19%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>347</td>
<td>100%</td>
</tr>
</tbody>
</table>

Research Question VII:
Are school administrators at the elementary level using computers more or less than administrators at the secondary level?

A high percentage of schools reported the use of computers by the principal and other office personnel. The majority, 68.84%, of principals who reported using administrative computers used the equipment three hours or less per week. Computer use by other office personnel exceeded the use by principals. Office personnel under the supervision of the
principal used administrative computers 46.03% of the time. Personnel who assist in the office, used administrative computers eight hours or more weekly in performing administrative tasks. This group represented the highest level of the computer operation for the purpose of completing administrative tasks.

In examining the data from elementary schools, 73.18% of principals reported using administrative computers three hours or less weekly. It was further reported by 48.60% of principals that other administrative personnel use administrative computers seven hours or less weekly in performing administrative tasks. In reporting the hours of use at the secondary level, 58.25% of the principals indicated that they use administrative computers less than three hours weekly. The highest use of
computers among the elementary and secondary schools was performed by the supplementary office help at the secondary level.

**TABLE 10**

**USE OF COMPUTERS FOR ADMINISTRATIVE PURPOSES BY OTHER OFFICE PERSONNEL**

<table>
<thead>
<tr>
<th>HOUR USED WEEK</th>
<th>THOSE REPORTING</th>
<th>PERCENT OF SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>37</td>
<td>10.51%</td>
</tr>
<tr>
<td>1 - 3 HOURS</td>
<td>80</td>
<td>22.73%</td>
</tr>
<tr>
<td>4 - 7 HOURS</td>
<td>73</td>
<td>20.74%</td>
</tr>
<tr>
<td>8 - 11 HOURS</td>
<td>53</td>
<td>15.06%</td>
</tr>
<tr>
<td>12 + HOURS</td>
<td>109</td>
<td>30.97%</td>
</tr>
<tr>
<td><strong>SUMMARY</strong></td>
<td><strong>352</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

It was reported that 69.53% of the supplementary administrative personnel use the micro-computer for administrative purposes eight hours or more weekly, with 54.29% exceeding twelve hour per week. This would indicate that the secondary administrators and their staffs are making the greatest use of micro-computers in completing administrative tasks. Table 10 reflects the level of computer use by other office personnel as reported by the respondents.
Research Question VIII:

How are school principals and associated administrators receiving their training in computer use?

Three variables were defined by the responses received through the completion of the Computer Use Survey. Respondents were asked to identify the number of college courses in computer literacy they have attended, the number of seminars or workshops they have attended, and the number of vocational or adult evening classes in which they have participated.

Data received from the survey indicated that the primary avenue by which principals and associated administrators receive their computer training is the seminar/workshop process. Nearly 30% of the respondents indicated that they have attended four or more seminars relative to computer training and literacy. Of all the possibilities, this was the highest percentage. Seventy-two principals reported having taken one or more seminars and/or workshops related to computer skills.

Thirty-four percent of the respondents indicated that their computer training was a result of attending college courses. This method of developing skills ranked second to the seminar/workshop process. Thirty-four principals indicated participation in college or university classes to improve their computer knowledge and skills.

The lowest percentage derived was found in the responses to vocational and adult evening class instruction. Only 7% of the respondents indicated that they have participated in this category of skill development. Seven principals indicated having attended vocational/adult evening classes for the purpose of improving their computer skills.
**Hypotheses**

Ten hypotheses were developed and tested. These hypotheses were established to investigate the use of computers for administrative purposes by principals and their administrative subordinates. The Spearman correlation coefficient and the Chi-Square statistical procedures were used to test these hypotheses. Some hypotheses were tested against data representing both the individual principals' use of computers and the use of computers by assistant principals, secretaries, clerks, and computer specialists.

Hypothesis $H_0^1$ stated that there would be no significant relationship between the availability of administrative computers in schools and their use for administrative purposes. The data were collected in two categories for this hypothesis. Data were collected defining the use of administrative computers by the principal, and computer use by other administrative personnel. The hypothesis was tested against both groups.

Findings relative to the use of administrative computers by the principal indicated that there was a positive correlation between the presence of administrative computers and their use by principals. Table 11 reflects the results of a statistical analysis of the data relative to this hypothesis. A Spearman's rho of .21313 indicated a positive correlation between the availability of administrative computers and their use by the principal. The correlation was statistically significant. The positive correlation along with the high level of significance provided the necessary information to reject the null hypothesis.
When testing this hypothesis against the data collected for use of administrative computers by other administrative personnel under the supervision of the principal, a Spearman's rho of .43540 was derived. This represented a positive correlation between the presence of computers for administrative purposes and their use by other administrative personnel. This relationship was also statistically significant. The positive correlation along with the high level of significance provided the necessary information to reject the null hypothesis. These data support the argument that the presence of computers was related to a high level of use for administrative purposes.
Hypothesis \( H_0^2 \) was established to investigate the relationship between the size of the individual school and the use of administrative computers for administrative purposes. This hypothesis was tested against both the computer use by the individual principal and use by administrative personnel under the supervision of the principal. Table 11 contains the results of the statistical analysis.

The Spearman coefficient of .03331 represents a positive but weak correlation between school size and the use of administrative computers by the school principal. The correlation was not statistically significant. These findings indicated a failure to reject the null hypothesis.

Testing the hypothesis against the data representing the use of administrative computer use by administrative personnel other than the principal provided a slightly different perspective. A Spearman coefficient of .19322 was obtained. This was statistically significant. These findings indicated that a positive correlation did exist between the size of the school and computer use by other administrative personnel. This positive correlation was weak but significant. With respect to these findings the null hypothesis was rejected.

Hypothesis \( H_0^3 \) states there will be no significant difference between rural, urban, and suburban schools relative to the amount of computer use for administrative purposes. This hypothesis was tested using the Chi-Square test for Independence. Table 12 contains the relevant data obtained through the application of the Chi-Square statistic.
Table 12

RELATIONSHIP BETWEEN RURAL, URBAN AND SUBURBAN SETTINGS AND THE EXTENT OF COMPUTER USAGE FOR ADMINISTRATIVE PURPOSES

<table>
<thead>
<tr>
<th>HOURS PER WEEK</th>
<th>RURAL</th>
<th>URBAN</th>
<th>SUBURBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>21</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>12.07%</td>
<td>15.19%</td>
<td>4.08%</td>
</tr>
<tr>
<td>1-3</td>
<td>43</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>24.71%</td>
<td>25.32%</td>
<td>16.33%</td>
</tr>
<tr>
<td>4-7</td>
<td>43</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>24.71%</td>
<td>15.19%</td>
<td>18.37%</td>
</tr>
<tr>
<td>8-11</td>
<td>28</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>16.09%</td>
<td>11.39%</td>
<td>16.33%</td>
</tr>
<tr>
<td>12+</td>
<td>39</td>
<td>26</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>22.41%</td>
<td>32.91%</td>
<td>44.90%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>174</td>
<td>79</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

χ² = 22.21, df = 8, p < .05.

Results of the Chi-Square test indicated that 61.23% of the suburban schools used computers for administrative purposes eight or more hours per week. Similarly, 44.30% of the urban schools used computers for administrative purposes eight or more hours per week. Rural schools used their computers for administrative purposes eight or more hours per week at the 38.50% level.

A Chi-Square of 22.21 was derived with a significance of p = .0046 when testing the data provided by the sample. When compared to the critical value of 15.507 for eight degrees of freedom at the .05 level of significance, it was found that the computed Chi-Square exceeded that.
value. The results of this test indicated that principals and their staffs, who work in suburban and urban schools used computers for administrative purposes to a greater extent than those principals and staffs in rural schools. The null hypothesis was rejected.

Hypothesis $H_0^4$ stated there would be no significant relationship between the per pupil expenditure of the individual school and the use of administrative computers for administrative purposes. The variable that represented the per pupil expenditure contained five categories. These categories involved expenditures of $2,500, $3,000, $3,500, $4,000, and $4,500 per pupil. Individual school principals indicated the category that represented their particular school relative to the amount of money expended by their system for the education of individual students. The Spearman correlation coefficient was used to test this hypothesis. Results can be found in Table 11 located on page 88.

The Spearman correlation coefficient of .04946 represented a positive but weak correlation between per pupil expenditure and the use of administrative computers by school principals. The significance level of $p = .40383$ was not significant. These findings indicated there was not a significant relationship between the per pupil expenditure and computer use by the principal. Failure to reject the null hypothesis was appropriate.

Testing the hypothesis against the data representing the use of administrative computers by administrative personnel other than the principal provided a similar result. A Spearman coefficient of .11224 was obtained. This correlation was not statistically significant. Failure to reject the null hypothesis was appropriate.

Hypothesis $H_0^5$ stated there will be no significant difference in the
use of computers for administrative purposes in the elementary and secondary schools. To test this hypothesis, the Chi-Square statistic for Independence was used.

When looking at the data shown in Table 13, it was noted that the percentage of computer use by secondary schools was higher than that in elementary schools. Secondary schools using computers for administrative purposes 8 or more hours per week was reported at 69.31%. This was contrasted with 36.18% use at the elementary level for the same weekly rate. At the lower end of the spectrum, 19.05% of the secondary schools reported using their computers three hours or less per week. Elementary schools used their computers three hours or less at a rate of 39.03%. Not only did the secondary schools use their computers more at the upper end of the scale, the elementary schools had a larger percentage reporting very little use for administrative purposes.

A Chi-Square of 44.879 was computed at a significance level of \( p = .0001 \) when testing the data. The derived Chi-Square indicated that the difference was statistically significant. The null hypothesis was rejected.

Hypothesis \( H_0 \) stated there will be no significant difference between public, private, and parochial schools and the extent to which their computers were used for administrative purposes. The Chi-Square statistic was used to test the data provided by the respondents. Three-hundred and four public school principals responded, along with thirty-one private school principals and seventeen parochial school principals.
TABLE 13

RELATIONSHIP BETWEEN ELEMENTARY AND SECONDARY SCHOOLS AND THE EXTENT OF COMPUTER USAGE FOR ADMINISTRATIVE PURPOSES

<table>
<thead>
<tr>
<th>HOURS PER WEEK</th>
<th>ELEMENTARY</th>
<th>SECONDARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>14.23%</td>
<td>1.91%</td>
</tr>
<tr>
<td>1 - 3</td>
<td>61</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>24.80%</td>
<td>17.14%</td>
</tr>
<tr>
<td>4 - 7</td>
<td>61</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>24.80%</td>
<td>11.43%</td>
</tr>
<tr>
<td>8 - 11</td>
<td>37</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>15.04%</td>
<td>15.24%</td>
</tr>
<tr>
<td>12+</td>
<td>52</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>21.14%</td>
<td>54.29%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>246</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

\( \chi^2 = 44.88, \text{df} = 4, p < .05. \)

As shown in Table 14, there was a statistically significant relationship between school type and use of computers for administrative purposes. Sixty percent of the private school respondents used computers eight or more hours per week. This was in contrast to 41.18% of the parochial schools and 45.07% of the public school respondents.

At the opposite end of the spectrum, private school principals reported use of their computers for administrative purposes three hours or less per week, or 26.67% of the time. At this level of use, the public schools achieved 33.55% and the parochial schools 35.30%.
TABLE 14
RELATIONSHIP BETWEEN PUBLIC, PRIVATE AND PAROCHIAL
SCHOOLS AND THE EXTENT OF COMPUTER USAGE
FOR ADMINISTRATIVE PURPOSES

<table>
<thead>
<tr>
<th>HOURS PER WEEK</th>
<th>PUBLIC</th>
<th>PRIVATE</th>
<th>PAROCHIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>25</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>9.21%</td>
<td>16.67%</td>
<td>23.53%</td>
</tr>
<tr>
<td>1-3</td>
<td>74</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>24.34%</td>
<td>10%</td>
<td>11.77%</td>
</tr>
<tr>
<td>4-7</td>
<td>65</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>21.38%</td>
<td>13.33%</td>
<td>29.53%</td>
</tr>
<tr>
<td>8-11</td>
<td>47</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15.46%</td>
<td>6.67%</td>
<td>23.53%</td>
</tr>
<tr>
<td>12+</td>
<td>90</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>29.61%</td>
<td>53.33%</td>
<td>17.65%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>304</td>
<td>30</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 16.85, df = 8, p < .05. \]

A Chi-Square of 16.85 was derived with a significance level of 
p = .0317. This was compared to a critical value of 15.507 for eight degrees of 
freedom and a significance level of .05. The derived Chi-Square was greater 
than the critical value, resulting in the rejection of the null hypothesis.

Hypothesis H_0 7 stated that there will be no significant difference in 
the use of computers for administrative purposes and various time periods 
that have elapsed since the principal last attended school. The data 
received from the respondents relative to the number of years since last 
attending school were interval data. These data were categorized by using 
the recode function in the statistics package. In Table 15, the column
entitled "Recent" includes those principals with zero to nine years since last attending school. The column entitled "Medium" includes those principals with ten to nineteen years since last attending school. The final column, "Long", includes those principals with twenty to thirty years since last attending school.

### TABLE 15
RELATIONSHIP BETWEEN AMOUNT OF TIME SINCE LAST ATTENDING SCHOOL AND COMPUTER USAGE FOR ADMINISTRATIVE PURPOSES

<table>
<thead>
<tr>
<th>HOURS PER WEEK</th>
<th>RECENT</th>
<th>MEDIUM</th>
<th>LONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>25</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10.55%</td>
<td>9.41%</td>
<td>18.75%</td>
</tr>
<tr>
<td>1-3</td>
<td>55</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>23.21%</td>
<td>22.35%</td>
<td>12.50%</td>
</tr>
<tr>
<td>4-7</td>
<td>54</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>22.79%</td>
<td>17.65%</td>
<td>18.75%</td>
</tr>
<tr>
<td>8-11</td>
<td>35</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>14.77%</td>
<td>16.47%</td>
<td>18.75%</td>
</tr>
<tr>
<td>12+</td>
<td>68</td>
<td>29</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>28.69%</td>
<td>34.12%</td>
<td>31.25%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>237</td>
<td>85</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

$\chi^2 = 3.56, df = 8, p > .05$

An analysis of the column percentages did not reveal any clear pattern that would indicate a significant difference. A Chi-Square of 3.56 was derived when the data were tested with the Chi-Square statistic. The significance level was high at $p = .8945$. These figures, when compared to
the critical value of 15.507 with eight degrees of freedom and a significance level of .05, indicate that there was not a significant difference between the number of years since the principal last attended school and the use of computers for administrative purposes. Failure to reject the null hypothesis was appropriate.

The null hypothesis $H_0^8$ states there will be no significant difference in the amount of time principals use computers for administrative purposes in terms of selected levels of education.

The Chi-Square test indicated there was a significant difference between the use of computers for administrative purposes and levels of education. Greater than 54% of those respondents with an EdD or PhD degree used the computer for administrative purposes at the highest number of hours per week. Forty-three percent of of those responding with a EdD or PhD degree used the computer for administrative purposes more than twelve hours per week. Results of this statistic can be seen in Table 16.

The Chi-Square of 38.18 exceeded the critical value of 26.29 at the .05 level of significance. A significance level of $p = .0014$ was derived when calculating the Chi-Square with sixteen degrees of freedom. The null hypothesis was rejected.

Hypothesis $H_0^9$ stated there will be no significant difference in the amount of time principals use computers for administrative purposes in terms of selected categories of experience. The data collected from the respondents relative to years of experience were interval level data.
TABLE 16

RELATIONSHIP BETWEEN PRINCIPAL'S CURRENT LEVEL OF EDUCATION AND COMPUTER USAGE FOR ADMINISTRATIVE PURPOSES

<table>
<thead>
<tr>
<th>HRS PER WEEK</th>
<th>BS/BA</th>
<th>MS/MA</th>
<th>MA+</th>
<th>EdS</th>
<th>EdD/PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>7</td>
<td>8</td>
<td>19</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>9.09%</td>
<td>11.46%</td>
<td>7.50%</td>
<td>0%</td>
</tr>
<tr>
<td>1 - 3</td>
<td>2</td>
<td>19</td>
<td>40</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>14.29%</td>
<td>21.59%</td>
<td>24.10%</td>
<td>27.50%</td>
<td>16.22%</td>
</tr>
<tr>
<td>4 - 7</td>
<td>3</td>
<td>23</td>
<td>29</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>21.43%</td>
<td>26.14%</td>
<td>17.47%</td>
<td>15%</td>
<td>29.73%</td>
</tr>
<tr>
<td>8 - 11</td>
<td>2</td>
<td>13</td>
<td>26</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>14.29%</td>
<td>14.77%</td>
<td>15.66%</td>
<td>20%</td>
<td>10.81%</td>
</tr>
<tr>
<td>12+</td>
<td>0</td>
<td>25</td>
<td>52</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td>28.41%</td>
<td>31.33%</td>
<td>30%</td>
<td>43.34%</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>14</td>
<td>88</td>
<td>166</td>
<td>40</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 38.18, \text{df} = 16, p < .05 \]

These data were recoded into categories represented by the columns entitled “Little”, “Average”, “Aveplus”, and “Much.” The results of this recoding can be seen in Table 17. The column entitled “Little” represents those principals with zero to nine years of experience. The column labeled “Average” represents those principals with ten to nineteen years of experience, and the column labeled “Aveplus” represents those principals with twenty to twenty-nine years of experience. The final column, which was entitled “Much”, represents those principals whose experience exceeds thirty years.
An analysis of the data presented in Table 17 indicates that there were no areas noticeably greater than the remainder of the areas. Those principals included in the “Little” experience category used computers for administrative purposes eight hours or more per week, or 43.40% of the time. Principals in the “Average” category used computers eight hours or more per week, or 52.94% of the time. The principals in the “Aveplus” category used computers eight hours or more per week, or 30.91% of the time. Only nine principals fell in to the “Much” experience category, and they used computers for administrative purposes more than eight hours per week 77.77% of the time.
A Chi-Square of 17.22 was derived with a significance level of $p = .1416$. This was compared to a critical value of 21.026 for 12 degrees of freedom and .05 level of significance. The computed Chi-Square did not exceed the critical value nor did the significance level meet the specified level. Failure to reject the null hypothesis was appropriate.

Hypothesis $H_0$ stated that there will be no significant difference in the amount of time principals use computers for administrative purposes in terms of the amount of computer education in three categories. Training was measured in three areas: college courses attended, seminars/workshops, and vocational/adult education courses. The majority of respondents reported having attended seminars/workshops to improve their computer knowledge and expertise. This variable was used to test this hypothesis.

In reviewing Table 18, the column labeled "One", "Two", "Three", "Four", and "Five" represent the number of computer seminars attended. When comparing the observed frequency table with the expected values table, there were no areas not reasonably close to what was expected. An analysis of the percentages derived did not indicate any area that exceeded what was expected.

The application of the Chi-Square statistic derived a Chi-Square of 21.26 with a significance level of $p = .1685$. This score was compared to a critical value of 26.296 for sixteen degrees of freedom and a significance level of .05. The computed Chi-Square did not exceed the critical value of 26.296, nor did the significance level match that of the required .05 level. These results indicated that failure to reject the null hypothesis was appropriate.
### TABLE 18

**RELATIONSHIP BETWEEN RECENT COMPUTER TRAINING AND THE EXTENT OF COMPUTER USAGE FOR ADMINISTRATIVE PURPOSES (SEMINARS, CLASSES, ETC.)**

<table>
<thead>
<tr>
<th>HRS PER WEEK</th>
<th>ONE</th>
<th>TWO</th>
<th>THREE</th>
<th>FOUR</th>
<th>FIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>7</td>
<td>9.59%</td>
<td>2</td>
<td>2.78%</td>
<td>15</td>
</tr>
<tr>
<td>1-3</td>
<td>18</td>
<td>24.66%</td>
<td>21</td>
<td>29.17%</td>
<td>23</td>
</tr>
<tr>
<td>4-7</td>
<td>14</td>
<td>19.18%</td>
<td>15</td>
<td>20.83%</td>
<td>20</td>
</tr>
<tr>
<td>8-11</td>
<td>10</td>
<td>13.70%</td>
<td>13</td>
<td>18.06%</td>
<td>11</td>
</tr>
<tr>
<td>12+</td>
<td>24</td>
<td>32.88%</td>
<td>21</td>
<td>29.17%</td>
<td>25</td>
</tr>
<tr>
<td><strong>SUMMARY</strong></td>
<td>73</td>
<td>100%</td>
<td>72</td>
<td>100%</td>
<td>94</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 21.26, \text{df} = 16, \text{p} > .05 \]

**Summary**

This chapter has displayed and described the data collected in this study. Data were presented describing the sample, the different configurations of schools represented by the principals, and the return rate of the respondents. The data presented described characteristics of the use of computers for administrative purposes in the sample selected. Additional descriptions of specific uses used by the sample were included, along with a report of findings relative to training and education of principals in the area of computers. A summary of the findings of this study, along with conclusions, implications, and recommendations for
further study were included in Chapter 5.
CHAPTER 5
SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Overview

The purpose of this chapter is to summarize the study, provide conclusions, offer implications, and suggest recommendations for further research. The first section of this chapter presents the problem statement that provided direction for the study. The second section of this chapter presents the summary of the purpose and procedure of the study. The third section summarizes the major findings of the study. The fourth section offers the conclusion. The fifth section suggests implications. The final section provides recommendations for further research and entertains avenues through which principals might gain additional understanding of innovative uses for computers in the operation of their schools.

Statement of the Problem

Technology exists, or will soon be available, in today's society that provides school principals with the opportunity to better manage school data and communication. This technology will allow school principals to store, access, and analyze school data in a manner that provides a detailed record of the school operation. From these data, school principals will be able to observe trend analyses, historical information, and additional data. When used effectively, these data will provide the administrator with the necessary information to make better decisions.
Are school principals using these capabilities in a manner that will help them to more effectively operate their schools? Are they interested in the development of the necessary skills to employ these capabilities in the operation of their schools? Are school principals aware of the current levels of sophistication in technology and how these capabilities might be used to more effectively operate schools?

**Purpose and Procedures**

The purpose of this study was to investigate the presence and use of computers for administrative purposes in the schools of Tennessee. The Comprehensive Education Reform Act of 1984 (CERA) provided computer equipment for Tennessee schools to assist them in performing designated administrative functions. These functions dealt primarily with the management of student mastery of basic skills, as outlined by the state, and the maintenance of accurate attendance records for the purpose of funding.

Many schools were using computers prior to the implementation of CERA; however, this action by the state provided all schools with a minimum number of computers. Several years have passed since this movement was implemented, and this study sought to determine to what extent principals have continued to implement computer techniques in an effort to improve the efficiency of school operations.

The approach was to investigate the presence of computers for both student and administrative use within a selected random sample of principals in the State of Tennessee. This sample provided data relative to the following areas:

1. The number of computers present in each school represented in the sample. Computers were divided into those
computers present in the school and computers specifically
designated for administrative purposes.

2. Administrative personnel who use computers for the
   completion of administrative tasks.

3. The hours per week administrative computers were used by
   these different administrators.

4. Specific administrative tasks that were being performed by
   those individuals who use the administrative computers.

5. Computer configurations and specific types of systems being
   used by Tennessee schools.

6. Typical methods by which school principals are receiving their
   training in the operation of computers.

The results of this study provided additional information regarding
the current trends in computer use by school administrators in the State of
Tennessee. The results will also add to the growing body of knowledge
relative to innovative methods of using computers to administer schools in
a more efficient and effective manner. They will contribute additional
information to professional educators who are involved in the improvement
of their administrative abilities. More specifically, data or obtained through
this study, in addition to providing a more stable base for research than is
presently available, will:

1. Help school principals at all levels develop methods
   that will improve their ability to manage administrative
   tasks through innovative computer techniques.

2. Provide self-starters with a means to assess their personal
   level of computer use and identify strengths and weaknesses in
their personal computer expertise.

3. Provide school administrators with some guidance for use in the development of inservice activities that will further educate school principals in some of the possibilities available through computers.

4. Provide institutions with the necessary data to evaluate the need for additional computer literacy courses for administrator preparation.

Relevant literature related to the trends in computer use for administrative purposes were reviewed to provide a supportive foundation for the study. This is a field in the process of blooming and literature findings were somewhat scarce and often limited to periodicals. This provided a more up-to-date foundation regarding the present trends and future possibilities.

A single instrument was used to collect data for this research. This instrument was developed for this purpose in conjunction with area personnel well versed in the use of computers and possible applications in which computers could be used appropriately. The instrument contained 48 questions and returned data that were interval, ordinal, and nominal. The instrument was pilot tested with the Cohort III group of Doctoral students at East Tennessee State University in December, 1991, and January, 1992. This group represented a sample of area principals from a variety of school configurations.

In addition to the data collected for the purpose of researching the use of computers, the instrument used for this study contained demographic sections that provided the opportunity to subdivide the data
into categories defined by the demographic data. This opened the opportunity to compare different school configurations, school settings, varying levels of educational accomplishment by school principals, and public, private, and parochial schools.

The sample for this study was drawn from the total population of principals in the State of Tennessee. The calculated sample size for this study was 327 with the final size for the sample being set at five hundred. In order to ensure a random sample, a list of random numbers was generated through the use of a random number generator and a microcomputer. This list of random numbers was then used to identify principals from the 1990 - 1991 Directory of Public Schools, Approved Nonpublic Schools, developed by the State Department of Education, State of Tennessee. A ratio was established to ensure the appropriate distribution of public and private/parochial schools. This ratio was established at 87% public schools and 13% private/parochial schools.

Five weeks were allowed for the return of completed questionnaires. After the completion of five weeks, a follow-up mailing was performed in an effort to improve the percentage of returns. The return rate was greater than 71% of those selected in the sample.

**Major Study Findings**

Major findings of this study are discussed in the following sections: The first section presents findings relative to eight research questions developed prior to the study. The second section provides the findings used to reject or fail to reject ten research hypotheses.
**Major research question findings**

**Research Question I:**

Is computer equipment available in Tennessee Schools for administrative purposes?

Computers are present in Tennessee schools for administrative purposes and student use. School principals reporting the availability of computers for administrative purposes indicated that 77.71% of the time schools had one to three computers for administrative purposes. Related peripheral equipment was also reported as being present by the sample.

**Research Question II:**

What specific types of computer equipment and peripheral devices are available for administrative purposes?

The majority of principals reported using microcomputers for their administrative functions. This specific type of computer was reported by 265 respondents or 77.26%. Additionally, mainframe computers are available in many school systems. Mainframe computers were reported by thirty-nine participants or 11.37% of the sample. These mainframe computer systems appeared to be system wide installations with terminals in the individual schools. Peripheral devices such as printers, scanners, card readers, and modems were reported as being available in many of the schools.

**Research Question III:**

When available, are administrative computers being used in a manner that is appropriate to the administrative function?

A variety of uses were defined by the sample. Those areas that have been emphasized by the state in the Comprehensive Education Reform Act
of 1984 were most prominent. These areas included the monitoring of student attendance, management of Basic Skills First mastery, and teaching Computer Skills Next.

Those functions that are normally performed in small office environments were also reported. Those areas included wordprocessing, maintenance of financial records, transportation, grade reporting, and desktop publishing.

**Research Question IV:**

For what specific tasks are computers being used by administrators?

Four major administrative functions lend themselves to efficient management by computer. These areas are the maintenance of student records, scheduling, attendance accounting, and grade reporting. All of these areas were reported by respondents as being performed in their school through computerization. Attendance accounting was the leading area as reported by the sample. This area was reported by 81.43% of the respondents as being performed through the use of administrative computers.

**Research Question V:**

Are School Administrators identifying and applying computer solutions to help improve the administrative function?

The typical respondent identified those administrative functions that are normally performed in office environments as being performed in their school offices. Many of these have been identified in Research Questions I - V. Many of those areas that were identified in Chapter 2 as innovative administrative tasks for computerization were listed infrequently. Areas
such as Trend Analyses, Budget Development, Discipline Records, School Maintenance, and Staff Evaluations were mentioned infrequently.

**Research Question VI:**

How much time does the principal and staff spend with the computer doing administrative tasks?

Respondents reported a variety of office personnel who perform administrative tasks using the computer. Principals, secretaries, clerks, computer specialists, and assistant principals were listed as participating in computer use. Secretaries were chosen 52.74% of the time as the individual using the computer to perform administrative tasks. The larger portion of principals reported the use of computers at the one to three hours per week range. The use of computers by other office personnel was reported at a much higher level with 30.97% of the sample reporting use in the greater than twelve hours per week range.

**Research Question VII:**

Are school administrators at the elementary level using computers more or less than administrators at the secondary level?

In analyzing the data, it appears that administrators at the secondary level and their office staffs are making a greater use of their computers for completion of administrative tasks. The percentages computed reflected a greater use by secondary office staffs. This was especially true for the supplementary office personnel who reported using the computer greater than eight hours per week in 69.53% of the respondents.
Research Question VIII:

How are school principals and associated administrators receiving their training in computer use for administrative purposes?

Three possibilities were presented as avenues for computer training. These areas were: college/university courses, seminars/workshops, and vocational/adult education classes. The primary method of training as reported by the respondents was seminars and workshops. Nearly 30% of the respondents reported having attended four or more seminars/workshops related to computer literacy.

Major research hypotheses findings

Hypothesis 1:

There will be no significant relationship between the availability of computers in the schools and their use for administrative functions.

There was a significant positive relationship between the presence of administrative computers and their use by principals and supplementary office staffs. As mentioned earlier, this hypothesis was tested for significance for both principals and supplementary office personnel. It was found that both areas tested have a significant positive relationship between the presence of administrative computers and their use for administrative purposes. The strength of the relationship was stronger between the computer presence and other administrative personnel under the supervision of the principal. The null hypothesis was rejected.

Hypothesis 2:

There will be no significant relationship between the size of the
school and the use of computers for administrative purposes. This hypothesis was also tested for significance between the size of the school and both the principal's and other personnel's use of administrative computers. There was not a significant relationship between the size of the individual school and the use of administrative computers by the principal. There was a positive weak relationship, but it was not significant at the .05 level. There was a significant relationship between the size of the individual school and the use of administrative computers by other office personnel. This relationship was positive and weak but significant at the .00028 level. With reference to the principal, the data supported a failure to reject the null hypothesis. In assessing the relationship between other office personnel and computer use, the null hypothesis was rejected.

**Hypothesis 3:**

There will be no significant difference between rural, urban and suburban school administrators in terms of their use of computers for administrative purposes.

There was a significant difference between the use of computers for administrative purposes in the rural, urban, and suburban schools. The Chi-Square statistic was used to compare the data between the rural, urban, and suburban schools. Results of this test indicate that administrators in suburban and urban schools use their computer for administrative purposes a higher percentage of the time. The null hypothesis was rejected.

**Hypothesis 4:**

There will be no significant relationship between the use of
computers for administrative purposes and the per pupil expenditure of the school system.

There was no significant relationship between the use of computers for administrative purposes and the per pupil expenditure of the school system. The Spearman's rho of .04946 represented a positive but weak relationship. However, this relationship was not significant at the .05 level. The null hypothesis was rejected.

**Hypothesis 5:**

There will be no significant difference between the use of computers at the elementary level and the secondary level in terms of their use for administrative functions.

There was a significant difference in the use of computers for administrative purposes in elementary and secondary schools. The Chi-Square statistic was used to test this hypothesis, and it was found that secondary administrators and their office staffs use administrative computers more often than do their elementary counterparts. The null hypothesis was rejected.

**Hypothesis 6:**

There will be no significant difference between the use of computers for administrative purposes in public, private, and parochial schools.

There was a significant difference between public, private, and parochial schools with respect to their use of administrative computers. The results of the Chi-Square statistic indicated that both the public and private schools make use of their administrative computers more often than do the parochial schools. The null hypothesis was rejected.
Hypothesis 7:
There will be no significant difference in the amount of time principals use computers for administrative purposes in terms of various periods that have passed since the principals last attended school.

There was no significant difference between the use of computers for administrative purposes and the amount of time that has elapsed since the principal last attended school. Results of the Chi-Square statistic neither exceeded the critical value nor met the required significance level. These results supported a failure to reject the null hypothesis.

Hypothesis 8:
There will be no significant difference in the amount of time principals use computers for administrative purposes in terms of selected levels of education.

There was a significant difference between the use of computers for administrative purposes and the principal's level of education. The Chi-Square statistic indicated that principals with higher levels of education use computers a greater percentage of the time. The null hypothesis was rejected.

Hypothesis 9:
There will be no significant difference in the amount of time principals use computers for administrative purposes in terms of selected categories of experience.

There was no significant difference between the number of years experience as a principal and the level of computer use. The Chi-Square statistic indicated that the achieved Chi-Square neither exceeded the
critical value nor was significant at the prescribed level. A failure to reject the null hypothesis was appropriate.

**Hypothesis 10:**

There will be no significant difference in the amount of time principals use computers for administrative purposes in terms of the amount of computer education in three categories.

There was no significant difference between the amount of computer education and the level of computer use. The Chi-Square statistic computations did not exceed the critical value needed for rejection. The computed significance level did not exceed the .05 level, that was prescribed for rejection. A failure to reject the null hypothesis was appropriate.

**Conclusions**

The following conclusions drawn from the study are limited to the sample investigated:

1. Tennessee schools are equipped with computers for use in the completion of administrative tasks and school management. Some schools were using computers prior to the implementation of the Comprehensive Education Reform Act of 1984 (CERA). However, this reform movement supplied most all schools in Tennessee with microcomputers and some peripherals.

2. The primary type of computer being used in Tennessee schools is the microcomputer. A few systems appear to be migrating to larger mainframe installations that network the individual system schools into a single environment.

3. Online services are not an area the majority of Tennessee schools have discovered. This service would permit communication via
phone modem to other computer systems and data banks.

4. Computers present in Tennessee schools for student use are equally divided between classroom installations and computer laboratories.

5. The majority of individual school principals are actively using administrative computers to assist in the efficient operation of their school. To a greater extent, the principal is delegating administrative computer tasks to other office personnel.

6. Administrative tasks being performed in Tennessee schools through the use of computers are those tasks that have been emphasized in the CERA legislation. Other tasks being performed are those tasks that are normally performed by computers in office environments.

7. A wide variety of innovative computer applications are available but remain to be tapped by school principals for use in the efficient operation of their schools.

8. The primary avenue by which principals receive their computer training is through attendance at workshops and seminars.

9. A small segment of Tennessee principals are unfamiliar with computer terminology and operating procedures. Responses to questions included on the questionnaire indicated that there was a lack of knowledge on the part of some respondents. This was especially noticeable in the responses relative to main-frame computers as opposed to microcomputers.

Implications

If one of the goals of education is to develop effective and efficiently managed educational institutions providing students with opportunities to develop skills appropriate to their abilities, then school principals are going
to be called upon to plan and make wise decisions regarding the present and future operation of their schools. Wise decisions are best made when the decision maker is in possession of sufficient information to weigh the different alternatives and choose the most productive direction.

Today's world is becoming exceedingly complex, with many regulations, prescriptions, and requirements under which public institutions must operate. The ability to store, retrieve, and analyze vast amount of communication, data, and student records would provide the school principal with the opportunity to develop a historical scenario of past successes and failures and find ways to improve future directions. The modern computer would provide the principal and his/her staff with the vehicle for storing and accessing the necessary data to improve decision making skills and planning for future operation.

With principals indicating they are gaining, to a large extent, their computer expertise from seminars and workshops, it would appear that administrative preparation programs might consider the inclusion of additional computer preparation classes in their course requirements. Many colleges and universities are developing quality computer laboratories that might be used to provide additional coursework for those students preparing themselves to be future administrators.

Practical examples of computer use should be presented at state meetings and administrative gatherings to provide administrators an opportunity to view first hand the advantages presented by computerization. State administrative workshops required of principals should contain practical demonstrations and training sessions relative to the advantages of computerized office tasks. Simulations that allow administrators to provide
information relative to their own individual situation and observe the results would be beneficial in presenting principals with actual examples of benefits gained through computerization.

Software designed to meet the specific state requirements relative to reporting and analysis would be beneficial. Investments at the state level into software development that would provide methods that could be used in the meeting of state requirements for reporting should be undertaken.

**Recommendations**

The following recommendations are presented for consideration:

1. Tennessee school principals should continue to equip their schools with computers both for student use and administrative operation of the school.

2. School systems should investigate the advantages of installing mainframe configurations and networking system schools to a central computer.

3. School principals should continue to investigate uses for the computer that will provide a savings in time and resources. These uses should exceed the typical use for wordprocessing, attendance monitoring, and financial management.

4. State education agencies should develop and present progressive workshops that provide quality examples of computer implementation in the areas of school administration.

5. Communication by local schools with On-Line services should be investigated. This would provide the administrator, teachers and students with the opportunity to communicate with large databases containing valuable, up-to-date information.
6. Higher education institutions providing curricula for preparation of school principals should consider the addition of computer courses that will prepare principals more completely in the area of computer use.

7. Principals are delegating administrative computer tasks to their staffs. Appropriate training should be provided for these staff members to prepare them for these responsibilities.

8. The development of software that would meet the state requirements for reporting and recordkeeping should be undertaken. This is an area that should be pursued at the state level and provided for school systems to assist them in development of the appropriate data for state accounting.

Recommendations for Further Research

The following are suggested recommendations for additional research:

1. Additional research with different samples should be conducted to determine the degree to which principals implement new computer applications to enhance their management of school data.

2. Further research is needed to identify the avenues available to principals relative to computer training.

3. Longitudinal research is recommended to identify needs and practices that will provide school principals with the needed skills to plan for future operation of their institutions.

4. Investigation and evaluation of software programs to perform administrative functions in a manner that would match the guidelines determined by the State of Tennessee are needed.
Longitudinal research is needed to study the desirability of a state network through a mainframe configuration. This would provide the opportunity to maintain records in a similar fashion and provide a uniform method of data collection and reporting techniques.

Longitudinal research should be undertaken to study the change in computer technology and how it could best be used by schools for administrative purposes.

Further research is recommended in the development of computer simulations to be used to train and present positive examples of computer techniques that enhance the administration of schools.

Further research is recommended in the area of formal as opposed to informal training as it relates to computer education.
BIBLIOGRAPHY

BOOKS


**PERIODICALS**


APPENDICES
Dear Principal,

Enclosed you will find a questionnaire which is being used to conduct a state-wide study of computer use by school principals. Would you please take a few moments of your time to complete this questionnaire?

There are six parts to this survey. In PART I you are asked to provide demographic information about your school and yourself. In PART II you are asked to provide information about your school and its specific organization. PART III requests information about the computers which are present in your school. PART IV provides an opportunity for you to document how the computers in your school are used and the amount of time they are used for administrative purposes. PART V investigates the areas for which computers are used in your school and the final section, PART VI, asks that you indicate the amount of computer training you have received.

Four-hundred-thirty public school principals and 70 private school principals from across the state are completing this survey to provide information relative to the current administrative practices being used by school principals. A self addressed, stamped envelope has been provided for the purpose of returning the completed survey.

We would request that you complete and return your survey in the self addressed, stamped envelope by January 31, 1992. You will note that a small number has been placed in the corner of the return address. This is for the purpose of identifying which schools have responded and provide the researcher an opportunity to follow-up with those who fail to respond. Thank you very much for taking your valuable time to participate in this research project.

Sincerely,

Jerry Cole
Assistant Superintendent
Johnson City Schools
APPENDIX B
SURVEY INSTRUMENT
A Study of Computer Use

by School Principals
COMPUTER USE SURVEY

PART I: DEMOGRAPHIC INFORMATION

1. Please provide your current age

2. Years experience as a principal:

3. Number of years in your present position:

4. Number of years since last attending school:

5. Your gender is: Male Female

6. Current degree:
   - BS
   - MA
   - MA+
   - EdS
   - EdD

7. What is the estimated annual per-pupil expenditure in your school district?
   - $2,500
   - $3,000
   - $3,500
   - $4,000
   - $4,500

PART II: SCHOOL ORGANIZATION

9. The enrollment in your school is:

10. The number of full time teachers at your school is:

11. The grade range of your school is: (example: K-5, K-12)

12. Number of in-school administrators in your school is:

13. Number of full-time employed office staff in your school is:

14. The school in which you work is:
   - Rural
   - Urban
   - Suburban

15. The school in which you work is:
   - Public
   - Private
   - Parochial
### PART III. SCHOOL COMPUTERS AND ACTIVITIES

16. Total number of computers in your school: (Include labs)
   - 0
   - 1-3
   - 4-7
   - 8-12
   - 13+

17. Number of computers used in your school for administrative purposes:
   - 0
   - 1-3
   - 4-7
   - 8-12
   - 13+

18. Type computer used for administrative purpose:
   - Laptop
   - Micro (PC)
   - Mini
   - Mainframe
   - Other

19. Brand of computer used primarily for administrative purposes: (Select one)
   - IBM
   - IBM-compatible
   - Apple
   - Macintosh
   - IIGS

20. Does your school utilize any on-line service?
   - Yes
   - No

21. Are schools in your system networked? (School-to-School)
   - Yes
   - No

22. Your computers are housed primarily in:
   - Labs
   - Classrooms

### PART IV. COMPUTER USE

23. Computers used for administrative purposes are PRIMARILY operated by:
   - Principal
   - Secretary
   - Office Computer
   - Asst Principal
   - Clerk/Other Specialist

24. How many hours per week do you personally use a computer AT SCHOOL for administrative purposes?
   - 0
   - 1-3
   - 4-7
   - 8-11
   - 12+

25. How many hours per week do you personally use a computer AT HOME for school administrative purposes?
   - 0
   - 1-3
   - 4-7
   - 8-11
   - 12+

26. How many hours per week do other employees use the computer in performing administrative tasks?
   - 0
   - 1-3
   - 4-7
   - 8-11
   - 12+
### PART V. SPECIFIC USES OF COMPUTERS FOR ADMINISTRATIVE PURPOSES

Instructions: Please check all the functions listed below which are currently being used in your school to assist in the administration of your organization.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  Word Processing</td>
<td></td>
<td>12. Library Management</td>
<td></td>
</tr>
<tr>
<td>2.  Budgeting</td>
<td></td>
<td>13. Discipline Records</td>
<td></td>
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<tr>
<td>3.  Attendance</td>
<td></td>
<td>14. Inventory</td>
<td></td>
</tr>
<tr>
<td>4.  Scheduling</td>
<td></td>
<td>15. Student Records</td>
<td></td>
</tr>
<tr>
<td>5.  Transportation</td>
<td></td>
<td>16. Robot Dialers</td>
<td></td>
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<tr>
<td>6.  Food Service</td>
<td></td>
<td>17. School Maintenance</td>
<td></td>
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<tr>
<td>7.  Grade Reporting and Analysis</td>
<td></td>
<td>18. School Purchasing</td>
<td></td>
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<tr>
<td>8.  Desktop Publishing</td>
<td></td>
<td>19. Evaluation of Student Data</td>
<td></td>
</tr>
<tr>
<td>9.  Special Education IEP Management</td>
<td></td>
<td>20. Staff Evaluation Records</td>
<td></td>
</tr>
<tr>
<td>11. Geographic Information</td>
<td></td>
<td>22. Instructional Management -CAI</td>
<td></td>
</tr>
</tbody>
</table>

### PART VI: COMPUTER TRAINING

23. Number of College/University level computer courses you have taken:
   0 1 2 3 4+
   □ □ □ □ □

24. Number of computer Seminars/Workshops you have attended:
   0 1 2 3 4+
   □ □ □ □ □

25. Number of computer classes you have taken at Vocational/Training Schools:
   0 1 2 3 4+
   □ □ □ □ □
APPENDIX C
FOLLOW-UP LETTER
January 24, 1992

Dear Principal,

Recently I sent to you a survey concerning the use of computers in your school for administrative purposes. The responses have been very rewarding. Having been a principal for many years, I have been extremely proud of the principals and the manner in which they have returned the surveys.

We allowed a deadline of January 31, 1992 for the return of the survey and feel that everyone will do their very best to meet that timeline. A vast majority of the surveys have been returned and as the deadline approaches, we would like to encourage each school that was randomly selected, to participate.

The survey instrument for your school has not been received at this time. I have enclosed an additional copy of the survey instrument along with a stamped envelope just in case the initial instrument has been misplaced. It would be greatly appreciated if you would take a short amount of time to complete the survey so that the results will be as complete as possible.

As you are probably able to determine, this study is for the purpose of completing a Doctorate in Educational Administration and the results will be used solely for that purpose.

Thank you for taking your valuable time to assist in making this study a success.

Sincerely,

Jerry Cole
2804 Sumpter Drive
Johnson City, TN 37604
VITA
VITA

JERRY WILLIAM COLE

Personal Data:  
Date of Birth:   December 7, 1937  
Place of Birth: Elizabethton, Tennessee  
Marital Status: Married

Education:  
Public Schools, Elizabethton, Tennessee  
East Tennessee State College, Johnson City, Tennessee;  
Music Education, B.S., 1960  
East Tennessee State University, Johnson City,  
Tennessee; Supervision and Administration, M.A.,  
1972  
East Tennessee State University, Johnson City,  
Tennessee; Supervision and Administration, Ed.S.,  
1985

Professional Experience:  
Teacher, Washington County School System; Jonesboro,  
Tennessee, 1960 - 1962  
Band Director, Hawkins County School System;  
Rogersville, Tennessee, 1962 - 1965  
Band Director, Elizabethton City School; Elizabethton,  
Tennessee, 1965 - 1967  
Band Director, Johnson City School System; Johnson  
City, Tennessee, 1967 - 1981  
Elementary Principal, Johnson City School System;  
Johnson City, Tennessee, 1981 - 1989  
Assistant Superintendent, Johnson City School System;  
Johnson City, Tennessee, 1989 - 1992